49th Annual Conference of ISBTI

TRANSCON 2024

Educate, Excel, Elevate, Empower

Event by:

ISBTI
(GUJARAT CHAPTER)

21st - 23rd November, 2024

Mahatma Mandir Convention and Exhibition Centre, Gandhinagar

SOUVENIR

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WELCOME LETTER

Greetings and Welcome to TRANSCON 2024,

Dear Friends and Esteemed Colleagues,

We are thrilled to extend a warm welcome to all of you in Ahmedabad, India, a city recognized as India's 1st World Heritage City. We invite you to be a part of the prestigious 49th Annual National Conference of the Indian Society of Blood Transfusion and Immunohaematology (ISBTI), known as TRANSCON 2024, scheduled to take place from November 21st to 23rd 2024, in the vibrant state of Gujarat.

This significant annual gathering is being hosted by the ISBTI Gujarat State Chapter and serves as an ideal platform to showcase the latest research, advancements, and innovations within our esteemed fraternity. The conference's hallmark will undoubtedly be the presence of distinguished international and national experts who will enrich our scientific sessions by sharing insights into the most recent developments and accomplishments in the field of Transfusion Medicine.

We firmly believe that this event will provide us all with a valuable opportunity to exchange our studies, perspectives, and research findings in Transfusion Medicine with fellow professionals, while benefiting from the knowledge shared by our carefully selected lineup of esteemed speakers, chosen by our experienced scientific committee.

The Organizing Committee is diligently working to curate an educational and scientific program that promises to be an academic extravaganza. Rest assured that TRANSCON 2024 in Ahmedabad will be an enlightening, intellectually stimulating, and clinically significant conference. It will serve as a vital platform for comprehensive discussions on all aspects of the transfusion chain, from fundamental principles to the latest advancements in the field. We are committed to delivering a dynamic scientific program that explores the challenges and opportunities in Transfusion Medicine, facilitating meaningful information exchange with leading experts.

We cordially invite you to savor the academic content and the warm hospitality during this conference, ensuring that you leave with cherished memories that will last a lifetime.

Warm regards,

DR. NIDHI BHATNAGAR
ORGANIZING CHAIRPERSON,
TRANSCON 2024

DR. RIPAL SHAH
ORGANIZING SECRETARY,
TRANSCON 2024

Bhupendra Patel

Chief Minister, Gujarat State

Dt. 09-11-2024

Message

We ought to understand and value the importance to GIVE back something to the society where in we are living. But, if you would rise up and look around, you would find many people having urgent need of blood amid they met an accident or having operated in the hospitals. In present scenario, along with blood, organ donation is considered as the most sacred activity across the world. Blood Transfusion is indeed a lifesaving activity. It gives me immense pleasure to learn that the zeal and enthusiasm of professionals and volunteers are working in this field. **Honourable Prime Minister Shree Narendra Modi** lauded the blood donors and blood donation drive conducted by the social services organizations and asserted in one of his addresses that "I commend all the blood donors. Their act of kindness leads to countless lives being saved. It also reaffirms India's ethos of service and compassion."

I am much pleased to learn that **Indian Society of Blood Transfusion and Immunohematology (ISBTI) Gujarat Chapter** is organizing its prestigious **49th National Conference – TRANSCON 2024** during **21st-23rd November, 2023** at **Gandhinagar**. As the state with a rich initiative towards health initiatives, this exercise further cements our promise for safe blood services. I would like to appreciate the endeavours by ISBTI in improving transfusion practices and embracing to voluntary blood donation. I hope, the conference will be an excellent platform for knowledge sharing and cooperation for the benefit of patients and healthcare supporters. I wish **TRANSCON 24** all success and expect to push forward transfusion medicine in India and wish all the attendees for their bright future ahead.

(Bhupendra Patel)

To,
Dr. Nidhi Bhatnagar, *Organizing Chairperson,*
TRANSCON 2024
Prathama Blood Centre, B/h. Jivraj Mehta Hospital,
Nr. Lavanya Society, Dr. C. V. Raman Marg,
Vasna, Ahmedabad-380007.
Email: isbtigjc@gmail.com, info@transcon2024in
Mo: 8928763008, 8238074955

Apro/ ug /2024/11/09/rs

सत्यमेव जयते

Letter No. 244/2024
Dt. 22.10.2024

Dr. Nidhi Bhatnagar,

As the 49th National Conference, TRANSCON 2024 ISBTI, organized by The Indian Society of Blood Transfusion and Immunohematology (ISBTI) Gujarat Chapter approaches, I would like to extend my warmest wishes to all participants and organizers involved.

This conference serves as a vital platform for sharing knowledge, discussing advancements and addressing challenges in the field of blood transfusion and immunohematology. Your efforts to bring together experts, practitioners and stakeholders will undoubtedly contribute to enhancing the quality and safety of blood services in our country.

I commend the ISBTI Gujarat Chapter for its dedication to improving health outcomes and fostering collaboration among professionals in this critical field. May this conference inspire innovative solutions and strengthen our collective commitment to the health and well-being of our communities.

Wishing you a successful and enriching conference.

Warm regards,

RUSHIKESH PATEL
Minister,
Health & Family Welfare and Medical Education, Higher and Technical Education,
Law, Justice, Legislative & Parliamentary Affairs,
Government of Gujarat

MULUBHAI BERA

No.: T./C.A./F & E/C.C./ 348 /2024
Minister,
Tourism, Cultural Activities,
Forest and Environment,
Climate Change,
Government of Gujarat
Swarnim Sankul-1, 2nd Floor,
Sachivalaya, Gandhinagar-382010
Phone No. : 079-232-50116
Fax No. : 079-232-50120

Date : 15 OCT 2024

Message

I am extremely happy to congratulate the Indian Society of Blood Transfusion and Immunohematology (ISBTI) and the Gujarat Chapter for putting together the 49th Annual Conference, TRANSCON 2024 to be held on 21st to 23rd November, 2024. This platform is crucial for advancing transfusion medicine, sharing new research, and promoting voluntary blood donation across the nation. I am confident that the knowledge exchanged during this conference will contribute significantly to improving healthcare outcomes. I extend my best wishes for the success of this remarkable event.

(Mulubhai Bera)

To,
Dr. Nidhi Bhatnagar,
Chair Person, ISBTI, Gujarat Chapter,
Prathma Blood Centre,
B/h Jivraj Mehta Hospital,
Near Iavanay Society, Vasna,
Ahmedabad.

प्रो.(डॉ.) अतुल गोयल
Prof. (Dr.) Atul Goel
MD (Med.)
स्वास्थ्य सेवा महानिदेशक
DIRECTOR GENERAL OF HEALTH SERVICES

सत्यमेव जयते

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
स्वास्थ्य सेवा महानिदेशालय
Government of India
Ministry of Health & Family Welfare
Directorate General of Health Services

Message

On behalf of the DGHS, I extend warm felicitations to ISBTI on this 49th Annual National Conference, Transcon 24. The International Society for Blood Transfusion and Immunohematology is an important platform for idea exchange, partnership building, and improvement of methods in blood transfusion and immunohematology. We appreciate your steadfast commitment to improving quality of care and enhancing patient safety. As we commemorate this achievement, we look forward to the new ideas and talks that will come from this meeting. Enjoy a productive conference!

I extend my warm-hearted congratulations to the Indian Society of Blood Transfusion and Immunohematology (ISBTI) on its 49th Annual National Conference, Transcon 24, launched by the Directorate General of Health Services (DGHS) on behalf of the nation. This pivotal event enables experts in the field to share information, discuss ideas, and form partnerships to enhance the practices of blood transfusion all over India.

We really appreciate the continued efforts of ISBTI members towards blood safety and quality delivery of healthcare. Your effort in advancing research, education, and best methods is worthy of praise and essential to saving lives.

At the confluence of so many events celebrating progress and shaping the future, we wish to keep on collaborating to strengthen our health care system. We wish you a productive conference attended by meaningful talk and a productive outcome.

(Atul Goel)

14th October 2024.
New Delhi.

Room No. 446-A, Nirman Bhawan, New Delhi-110011
Tel. No.: 011-23061063, 23061438, Fax No.: 011-23061924, email:dghs@nic.in

Dr. Krishan Kumar
डॉ. कृष्ण कुमार
Sr. CMO (SAG)
वरिष्ठ मुख्य चिकित्सा अधिकारी

सत्यमेव जयते

भारत सरकार
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
स्वास्थ्य सेवा महानिदेशालय
Government of India
Ministry of Health & Family Welfare
Directorate General of Health Services

I am honored to extend my warmest greetings to the esteemed participants of the 49th Annual Conference of ISBTI, Transcon 24. The theme, "Elevate, Excel, Empower, Educate," aptly reflects our collective mission to advance the field of transfusion medicine. By fostering excellence in blood services and empowering professionals through education, we can meet the evolving challenges in this vital sector.

The Gujarat Chapter of ISBTI has done a commendable job in organizing this event, and I am confident that the discussions and collaborations during this conference will elevate our shared vision for a safer, self-sufficient blood supply system in India. I wish all the delegates a productive and enlightening experience.

Warm regards,

(Dr Krishan Kumar)

Room No. 342-B, A-Wing, 3rd Floor, Nirman Bhawan, New Delhi-110011
Telephone No.: 011-23062625, Email ID: karishan.kumar31@rmlh.nic.in

डॉ. मेघा प्रविण खोब्रागडे
Dr. Megha Pravin Khobragade
सहायक महानिदेशक
Assistant Director General

सत्यमेव जयते

स्वास्थ्य सेवा महानिदेशालय
(स्वास्थ्य एवं परिवार कल्याण मंत्रालय)
भारत सरकार
निर्माण भवन, नई दिल्ली-110 108
Directorate General of Health Services
(Ministry of Health & Family Welfare)
Government of India
Nirman Bhawan, New Delhi-110 108
Tel.: 011-2306 3247
Email: drmegha1603@gmail.com
mp.khobragade@gov.in

दिनांक/Dated. 7th November 2024

I am delighted to extend my heartfelt congratulations to the ISBTI Gujarat Chapter for organizing the 49th Annual Conference, Transcon 24. The theme, "Elevate, Excel, Empower, Educate," beautifully captures the foundational pillars we must strengthen to advance blood transfusion services across the country. Like the four sturdy legs of a table, these principles provide unwavering support, fostering a system that can bear the weight of both progress and responsibility.

This theme underscores the vital importance of continuous learning, innovation, and the empowerment of professionals whose work safeguards the availability and safety of blood for those in need. Conferences such as this one are essential stepping stones, providing invaluable opportunities for networking, knowledge sharing, and collaboration. They enable us to collectively address the ever-evolving challenges within this critical field, just as each stone in a bridge helps span the distance to a safer, more reliable future.

I commend the dedication of the organizers and participants for their commitment to elevating the standards of transfusion medicine. May the discussions and insights from this event serve as a beacon, guiding our collective efforts to ensure a safer, more efficient blood supply system.

Warm regards,

(Dr. Megha Pravin Khobargade)

Dhananjay Dwivedi, I.A.S.
Principal Secretary

No. PS|HFWD|PA-25-2024
Health & Family Welfare Department
Government of Gujarat
7/7, Sardar Bhavan, Sachivalaya,
Gandhinagar-382010.
Date : November 7, 2024

MESSAGE

On behalf of the Government of Gujarat, it gives me immense pleasure to extend a warm welcome to all the distinguished participants, experts, and delegates attending the 49th Annual Conference of the Indian Society of Blood Transfusion and Immuno-Hematology – TRANSCON 2024. We are honoured to host this prestigious event at Mahatma Mandir, a place that will remind and reinforce Mahatma Gandhi's motto - "वैष्णव जन तो तैने कहिए, जे पीर पराई राखे ले".

Blood transfusion science plays a vital role in saving lives across the world, from women battling postpartum haemorrhage (PPH) to accident victims with severe trauma. Each year, countless lives are saved by the timely and precise administration of blood products. However, we must acknowledge that despite these remarkable advancements, challenges remain – particularly in ensuring timely access to blood, the right balance between whole blood and components, and addressing the gaps in infrastructure and supply.

Best practices from across the globe, including standardized protocols for managing PPH and trauma-induced haemorrhages, have proven to be life-saving. Adopting such measures and emphasizing the importance of safe, evidence-based transfusion practices can significantly improve outcomes in our healthcare systems.

This conference provides a valuable platform to exchange knowledge, improve practices, and collaborate on innovative solutions to these pressing challenges. I hope that the discussions here will further strengthen our commitment to enhancing transfusion medicine and saving more lives, ensuring a healthier future for all.

Wishing you all a fruitful conference!

[DHANANJAY DWIVEDI]
Principal Secretary, [H&FWD]

Dr. Nidhi Bhatnagar
Organising Chairperson,
49th Annual Conference of ISBTI
TRANSCON 2024

• Phone : (079) 232 51403, 232 51401 • Fax : (079) 232 54653 • E-mail : sechfwd@gujarat.gov.in

सत्यमेव जयते
Harshad R. Patel, IAS
Commissioner and Secretary

No: COH/MSG/2024
Commissioner of Health, Medical Services, Medical Education & Research
Government of Gujarat
Block No. 5/1st Floor, Dr. Jivraj Mehta Bhavan,
Sachivalaya, Gandhinagar-382010
Phone : +91 79 23253271
Email : cohealth@gujarat.gov.in
Date : 7 NOV 2024

MESSAGE

Dear Delegates and Participants,

I extend my warmest greetings to you all at the 49th Annual National Conference of ISBTI - Transcon 2024. This year's theme, "Educate, Excel, Elevate, Empower," is both timely and crucial.

Recent years have seen remarkable progress in transfusion medicine, from improved testing to efficient blood component separation. However, challenges persist, particularly in ensuring safe blood supply in remote areas.

I commend ISBTI for its tireless efforts in promoting research, education, and best practices. As we gather, I urge you to use this platform for knowledge exchange and collaboration. Let us work together to address challenges and strive for excellence in Transfusion services.

I wish you a productive conference and look forward to the insights that emerge from your discussions. Your commitment to this vital aspect of healthcare is truly commendable.

Best Regards,

Harshad R. Patel, IAS
Secretary (PH & FW) &
Commissioner (Health) Gandhinagar

Health & Family Welfare Department, Block No. 7/8th Floor, Sardar Bhavan, Sachivalaya,
Gandhinagar-382010 **Phone** : +91 79 23251416 **Email** : secph-hfwd@gujarat.gov.in

Government of Gujarat
Remya Mohan IAS
Mission Director

National Health Mission - Gujarat
First floor. N.H.M Bhavan,
Civil Hospital Campus,
Gandhinagar-382012 (Gujarat)
Tel: (O) : 079-232 23906/53299
Email Id: md-nhm@gujarat.gov.in

It gives me immense pleasure to congratulate ISBTI Gujarat Chapter for organizing the 49th Annual Conference, Transcon 24. I am sure that this conference will be a great platform to discuss and deliberate new ideas and processes to empower professionals who play a key role in ensuring the safety and availability of blood.

The blood centres of Gujarat will also benefit from this as there will be a lot of learning and knowledge sharing. It will enable the participants to address the evolving challenges in this critical field.

I wish success to the organizers and hope that the discussions and outcomes from this event further strengthen our collective efforts in ensuring a safer and more efficient blood supply system.

Best regards,

Remya Mohan IAS
Mission Director
National Health Mission
Gujarat

Additional Director
Medical Education and Research

Additional Director,
Medical Education and Research,
Commissioner, Health, Medical Services and
Medical Education (ME)
2nd Floor, Library Department,
GMERS Medical College, Sector-12,
Gandhinagar.
Email :adddirme@gujarat.gov.in

No./DMER/Message/IHBTI Conf / 20203 /2024/Sankalan
Date : 07/11/2024
14

Message

It is a matter of privilege to know that Indian Society of Blood Transfusion and Immunohaematology (ISBTI) is organizing National level Annual Conference of ISBTI (TRANSCON 2024) in Ahmedabad from 21st to 23rd November, 2024. I extend a warm welcome to all delegates to Vibrant Gujarat. I appreciate the opportunity to exchange knowledge, share insights, and collaborate with experts and colleagues dedicated to improving transfusion practices and patient outcomes.

The significance of this conference cannot be overstated, particularly in light of the rapid advancements in immunohaematology and transfusion medicine. With the ongoing challenges posed by emerging infectious diseases, patient safety concerns, and the need for innovative therapies, it is crucial that professionals in these field come together to discuss these pressing issues.

Gujarat has been one of the pioneers in the field of Blood Transfusion Services. I am sure the conference will enable participants to gain knowledge and fruitful insights into the subject.

I wish all the delegates an interactive and enlightening experience.

Additional director
Medical Education and Research
Gandhinagar

To,
The Organizing Secretary,
TRANSCON 2024

Since 1973
ISBTI
INDIAN SOCIETY OF BLOOD TRANSFUSION & IMMUNOHAEMATOLOGY
National Organization on Blood Transfusion Medicine, Blood Banking & Donor Motivation
#92, 1st Floor, Sector 15, Hisar (Hry.) 125001 INDIA
01662-245343, +917015415343
President
Dr. Yudhbir Singh, IAS
www.isbti.org
info@isbti.org
Secretary General
Dr. Sangeeta Pathak

Date 06.11.2024

It gives me immense pleasure to Greet and Welcome everyone to Transcon-2024 – The Annual Conference of "Indian Society of Blood Transfusion & Immunohaematology" (ISBTI) which happens to be the most important event of every year for everyone – blood donors, motivators, camp organizers, blood transfusion specialists, technicians, clinicians and the paramedical staff associated with blood transfusion services.

49th Annual Conference of ISBTI being held in Ahmedabad is aimed at enhancing the Safe Blood Transfusion Services, Voluntary Blood Donation Awareness Programs and Yogic Way of Life to achieve 100% voluntary blood donation in India.

The theme of the conference this year is:

EDUCATE

EXCEL

ELEVATE

EMPOWER

The theme itself is self speaking.

In the conference, an attempt would be made to explore innovative ideas to make people aware of blood, blood donation and need for voluntary blood donation. There would be exchange of knowledge, views, experiences, and success stories related to voluntary blood donation by dedicated and experienced individuals. The blood transfusion specialists would share their latest knowhow about blood transfusion service.

I congratulate all the members of the Organizing Committee for their commitment and dedication to make the conference memorable and successful. The team is striving hard and doing its best to make sure that every aspect of conference achieves excellence.

The annual conference will provide great opportunity to all the delegates, participants, and other stake holders to interact with each other. It is going to be a great learning experience for life.

I would like to offer my best wishes for grand success of the conference.

(Dr. Yudhbir Singh)

Dr. Sangeeta Pathak
Secretary General-ISBTI
Director & Head -Transfusion Services
Maxhealthcare-Delhi

MESSAGE

It gives me immense pleasure to extend a cordial welcome to all the participants of the 49th Annual conference of Indian Society of Blood Transfusion & Immunohematology at the vibrant & historic city Ahmedabad, which is also a first world heritage city of India, from 21st -23rd November 2024.

The theme for this year is ''Educate, Excel, Elevate, empower'', which says it all.

The Conference will have representatives from Government, Private Sector, Corporate Sector & NGO's & shall provide a unique platform for in-depth discussion & deliberation on various dimensions of the subject including the Scientific, clinical & research aspects. Deliberation on topics related to advances in Transfusion practice will enrich the knowledge base among the participants & upscale the existing knowledge in the field of blood transfusion.

Five Pre conference workshops have been arranged, which would add huge value to all the participants.

ISBTI Awards have been announced for recognition of excellence, encouragement & motivation of members who have tirelessly worked in the field of Transfusion Medicine.

''ISBTI got talent'' have been incorporated in Transcon-2024, which provides a great platform for the members to showcase their talent.

I hope that the delegates will find the scientific sessions & the rich experience of the learned speakers useful for improving their capacity & enable betterment of blood transfusion services as a whole.

I would like to express my sincere gratitude to the organizing committee for their meticulous work & seamless coordination in making this event a success.

I whole heartedly wish a grand success for conference & wish them the very best.

Looking forward to see you in large numbers.

Dr Sangeeta Pathak

CIVIL HOSPITAL Amdavad

DEPARTMENT OF IMMUNOHAEMATOLOGY & BLOOD TRANSFUSION

Blood Centre, B-2, Civil Hospital, B. J. Medical College, Ahmedabad.
E-mail: ihbt_bjmc08@yahoo.com; Tel. No.: 079-22682840, 079-22683721
Licence No.: GB/791

Dear Friends,

It is a great honour to welcome you to Gujarat for the **TRANSCON 2024, the 49th National conference of ISBTI.** The Organising Team is thrilled to host a dedicated group of professionals who are shaping the future of medicine.

As Transfusion specialists, we play a crucial role, though often behind-the-scenes, in patient care. Our work is integral to, treatment plans, and public health strategies, and it is through collaboration and innovation that we continue to make meaningful strides in our field. This conference is an opportunity to engage in knowledge-sharing, challenge ourselves with new ideas, and be inspired by the cutting-edge research taking place globally.

Over the next few days, we will explore a wide range of topics, from the recent advances to the future directions of transfusion. I encourage you to engage fully in the discussions, exchange ideas, and make the most of the connections that will undoubtedly be forged throughout this event.

Let us seize this opportunity to learn, grow, and collaborate in the pursuit of knowledge and innovation.

I look forward to an inspiring and interactive three days with all of you.

Sincerely,

Nidhi Bhatnagar

Dr. Nidhi Bhatnagar
Professor & Head
Dept. of Immunohaematology & Blood Transfusion
B.J. Medical College & Civil Hospital, Ahmedabad

Appreciations and awards

PRATHAMA BLOOD CENTRE
ADVANCED TRANSFUSION MEDICINE RESEARCH FOUNDATION

Dear Friends,

I am delighted to welcome you to **Transcon 2024, 49th annual national conference of Indian Society of Blood transfusion & Immunohematology**. This year's theme, **"Educate, Excel, Elevate, Empower"** embodies our collective mission to advance knowledge, inspire excellence, and elevate the standards of blood transfusion practices across the country.

We are excited to host this momentous event, where experts from all over the nation will come together to share insights, foster collaboration, and explore the latest advancements in the field of transfusion medicine. Transcon 2024 is not just an academic gathering, but a celebration of our shared commitment to saving lives and improving patient outcomes.

As we embark on this journey of learning and professional growth, I encourage each of you to engage, interact, and leave with new perspectives and valuable connections that will inspire you to make a positive impact in your practice.

Let us all work together to "Educate", strive to "Excel", and continuously "Elevate" the field of blood transfusion, ensuring a healthier future for all.

I look forward to your active participation and wish you an enriching and inspiring conference experience.

Besides academics, we have put in efforts to make to enjoy delicacy of Gujarat. Me and my team will ensure that all faculties, delegates, exhibitors and all guest will have a memorable and pleasurable experience. My heartfelt gratitude to all the exhibitors who have supported us.

Warm regards,

Ripal

Dr. Ripal Shah
Organising Secretary
Transcon 2024

Dr. C.V. Raman Marg, Vasna, Ahmedabad-380 007, Gujarat, India.
T : +91-79-26600101, 66213333 E : info@prathama.org I W : www.prathama.org
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SCIENTIFIC PROGRAM - DAY 1

TRANSCON 2024 - 21st November 2024	
Hall Name	Hall 1
Time	
08:00 - 9:00	REGISTRATION
09:00 - 10:35	**Session 1: Donor & Donation Challenges** **Chairpersons: Dr Yudhbir Singh, Dr Y Italia**
09:00 - 09:20	Topic: Donor motivation - challenges & opportunities Speaker: Dr Apoorva Ghosh
09:25 - 09:45	Topic: Donor retention first time to regular: challenges and remedies Speaker: Dr Atul Kulkarni
09:50 - 10:10	Topic: Donor Deferral - Science behind it Speaker: Dr Sajith Vilambil
10:15 - 10:35	Topic: Socio-cultural dynamics in blood donation Speaker: Dr Amita R
10:35 - 10:50	NETWORKING BREAK & EXHIBITION VISIT
10:50 - 12:10	**Session 4: Blood Donor Management** **Chairpersons: Dr Megha Khobragade, M Satish Kumar**
10:50 - 11:10	Topic: Managing blood donation in disaster Speaker: Dr Deepti Sachan
11:10 - 11:30	Topic: Adverse donor event - minimizing techniques Speaker: Dr Suchet Sachdeva
11:30 - 11:50	Topic: Innovations in Donor Care Speaker: Dr Abhinav Verma
11:50 - 12:10	Topic: Experience in donor notification and counselling Speaker: Dr Gopal Patidar
12:15 - 13:00	**ORATION** **Chairperson: Dr V P Gupta, Dr Sangeeta Pathak** **Speaker: Dr Bharat Singh (Delhi)** **Topic: Three decades of Challenges and Achievements in Transfusion**
13:00 - 13:10	**Launch of NABH standard for blood centres, 4th edition**
13:10 - 14:00	LUNCH
14:00 - 15:20	**Session 7: Apheresis** **Chairpersons: Dr Paresh Vyasa, Dr Rajesh Sawant**
14:00 - 14:20	Topic: Granulocyte harvest: What is new? Speaker: Dr Anil Khetarpal
14:20 - 14:40	Topic: Therapeutic Cytapheresis: New challenges in the therapy of patients Speaker: Dr Vijay Kumawat
14:40 - 15:00	Topic: Managing Inventory of Platelet Apheresis components Speaker: Dr Ritam Chakrabarty
15:00 - 15:20	Topic: Therapeutic apheresis in neurological disorders Speaker: Dr Archana Solanki
15:20 - 15:30	NETWORKING BREAK & EXHIBITION VISIT
15:30 - 16:15	**Panel Discussion 1: Innovative Ideas for 100% Voluntary Blood Donation** Moderator: Dr Rajesh Sawant Panelist: Dr Joy Memmon, Dr Latha Jagannathan, Dr Suchet Sachdeva, Dr Vishvas Amin, Dr Atul Kulkarni, Dr Purnima Rao
16:15 - 17:00	**Panel Discussion 2: Experience Sharing** Chairperson: Dr Kusum Thakur, Dr T R Raina Moderator: Dr Mehar Prit Singh Panelist: Dr Shalini Bahadur, Dr Sajith Vilambil, Dr Gulshan Paul Saluja, Dr Bankim Das, Dr MD Sadiq Khan, Mr Himanshu Bhatt, Mr Amar Singh, Ms Bimla Kaswan, Mr Manvir Sangwan
17:00 - 18:00	INAUGURATION
19:00 onwards	"ISBTI GOT TALENT" DINNER AT HOTEL LEELA

TRANSCON 2024 - 21st November 2024	
Hall Name	Hall 2
Time	
08:00 - 9:00	REGISTRATION
09:00 - 10:35	**Session 2: PBM** **Chairpersons: Dr Sanjay Prakash, Dr Manisha Srivastava**
09:00 - 09:20	Topic: Roadmap to achieve PBM Speaker: Dr Rashmi Sood
09:25 - 09:45	Topic: Role of audit improving clinical transfusion practices Speaker: Dr Rajendra Chaudhary
09:50 - 10:10	Topic: PBM Practices in Neonates Speaker: Dr Anil Kumar Gupta
10:15 - 10:35	Topic: PBM Guidelines for Indian perspective Speaker: Dr Ajay Gandhi
10:35 - 10:50	NETWORKING BREAK & EXHIBITION VISIT
10:50 - 12:10	**Session 5: PBM** **Chairpersons: Dr Kusum Thakur, Dr Sangeeta Pahuja**
10:50 - 11:10	Topic: Transfusion in Combat setting Speaker: Dr Amit Biswas
11:10 - 11:30	Topic: Patient Blood Management and Transfusion Strategies in Perioperative Settings Speaker: Dr Arun R
11:30 - 11:50	Topic: Platelet components: When and What to transfuse? Speaker: Dr Anisha Navkudkar
11:50 - 12:10	Topic: Role of BTS in Management of DIC Speaker: Dr Velu Nair
12:15 - 13:00	**ORATION (Hall 1)** **Chairperson: Dr V P Gupta, Dr Sangeeta Pathak** **Speaker: Dr Bharat Singh (Delhi)** **Topic: Three decades of Challenges and Achievements in Transfusion**
13:00 - 13:10	**Launch of NABH standard for blood centres, 4th edition**
13:10 - 14:00	LUNCH
14:00 - 15:20	**Session 8: Sharing experience in Clinical Transfusion Practices** **Chairpersons: Dr Amit Sharma, Dr Hansa Goswami, Dr Chetan Trivedi**
14:00 - 14:20	Topic: Blood component therapy in solid Organ transplant cases Speaker: Dr Meenu Bajpai
14:20 - 14:40	Topic: How I manage blood component in acute severe PPH? Speaker: Dr Sangeeta Pahuja
14:40 - 15:00	Topic:Specialised blood components in neonatal and Pediatric patients Speaker: Dr Satyam Arora
15:00 - 15:20	Topic: How I manage blood component in alloimmunized multi transfused patients? Speaker: Dr Amit Agrawal
15:20 - 15:30	NETWORKING BREAK & EXHIBITION VISIT
15:30 - 16:15	**Oral Paper:** **Chairpersons: Dr Tanvi Yardi, Dr Maya Devi** 15:30 - 15:38 - Dr P S Gowtham 15:39 - 15:47 - Dr Sanket Kamleshbhai Patel 15:48 - 15:56 - Dr Iti Garg 15:57 - 16:04 - Dr Deerej P 16:05 - 16:12 - Dr Abhra Barman 16:13 - 16:20 - Dr Rajvi Vora
16:15 - 17:00	TRANSFLIX
17:00 - 18:00	INAUGURATION (Hall 1)
19:00 onwards	"ISBTI GOT TALENT" DINNER AT HOTEL LEELA

TRANSCON 2024 - 21st November 2024	
Hall Name	Hall 3
Time	
08:00 - 09:00	**QUIZ - PRELIMINARY ROUND** **Quiz Coordinator: Dr Bhargav Prajapati** **Quiz Master: Dr Lakhvinder Singh, Dr Nippun Prinja**
09:00 - 10:35	**Session 3: Component** **Chairpersons: Dr Prashant Agrawal, Dr Jitendra Vachhani**
09:00 - 09:20	Topic: Donor factors affecting quality of blood components Speaker: Dr Mamta Shah
09:25 - 09:45	Topic: What's new in blood components? Speaker: Dr Karan Kumar
09:50 - 10:10	Topic: Leucodepletion Speaker: Dr Brinda Kakkar
10:15 - 10:35	Topic: Preparation and Storage of Platelet Concentrate - - an update Speaker: Dr Priti Desai
10:35 - 10:50	NETWORKING BREAK & EXHIBITION VISIT
10:50 - 12:10	**Session 6: QCI Session** **Chairper: Dr Gajendra Gupta, Dr Atul Mohan Kochhar**
10:50 - 11:10	Topic: NABH Standards Speaker: Ms Varsha Srivastava
11:10 - 11:30	Topic: Mentoring Blood Centre Equipment Speaker: Dr Yogini Patel
11:30 - 11:50	Topic: Tips to perform Internal Audit Speaker: Dr Nidhi Mehta
11:50 - 12:10	Topic: Quality concerns in Red Cell Serology Lab Speaker: Dr Bankim Das
12:15 - 13:00	**ORATION (Hall 1)** **Chairperson: Dr V P Gupta, Dr Sangeeta Pathak** **Speaker: Dr Bharat Singh (Delhi)** **Topic: Three decades of Challenges and Achievements in Transfusion**
13:00 - 13:10	**Launch of NABH standard for blood centres, 4th edition**
13:10 - 14:00	LUNCH
14:00 - 15:20	**Session 9: Regulatory and Policy Issues** **Chairpersons: Dr R N Makroo, Dr Joy Memmon**
14:00 - 14:20	Topic: Implementation of evidence based guidelines in Blood Transfusion Services Speaker: Dr Krishan Kumar
14:20 - 14:40	Topic: ONDLS Speaker: Dr Ravi Kant Sharma
14:40 - 15:00	Topic: E-records : Need of Hour Speaker: Dr Pragnesh Shah
15:00 - 15:20	Topic: Blood Transfusion Services in India Speaker: Dr Megha Khobargade
15:20 - 15:30	NETWORKING BREAK & EXHIBITION VISIT
15:30 - 16:15	**Oral Paper:** **Chairpersons: Dr Rajesh Kumar, Dr Bipin Patel** 15:30 - 15:37 - Dr Aditi Goel 15:38 - 15:45 - Dr Rashmi Kumari 15:46 - 15:53 - Dr Shubhi yadav 15:54 - 16:01 - Dr Priyanka Roy 16:02 - 16:09 - Dr Anusha Thangaraju 16:10 - 16:17 - Dr Tejal Ahuja
16:15 - 17:00	**Oral Paper:** **Chairpersons: Dr Amit Agrawal, Dr Bankim Das** 16:17 - 16:24 - Dr Mihir Balu Ghugetkar 16:25 - 16:32 - Dr Vaidehi Prasanth 16:33 - 16:40 - Dr Palak Mehta 16:41 - 16:48 - Dr Aparna Krishna 16:49 - 16:56 - Dr Amruta Indulkar 16:57 - 17:04 - Dr Shivangi Vaghela
17:00 - 18:00	INAUGURATION (Hall 1)
19:00 onwards	"ISBTI GOT TALENT" DINNER AT HOTEL LEELA

SCIENTIFIC PROGRAM- DAY 2

TRANSCON 2024 - 22nd November 2024	
Hall Name	**Hall 1**
Time	
09:00 - 10:35	**Session 10: Immunohematology** **Chairpersons: Dr Sanmukh Joshi, Dr Sreelatha**
09:00 - 09:20	Topic: Antibody/ies against High frequency antigen Speaker: Dr Poonam Srivastava
09:25 - 09:45	Topic: Multiple antibodies - Interesting case reports Speaker: Dr Hem Chand Pandey
09:50 - 10:10	Topic: Significance of Rh-Kell typing in donor populations Speaker: Dr Lakhvinder Singh
10:15 - 10:35	Topic: Transfusion support and pre-transfusion testing in AIHA Speaker: Dr Dheeraj Khetan
10:35 - 10:50	**NETWORKING BREAK & EXHIBITION VISIT**
10:50 - 11:50	**Session 13: Immunohematology** **Chairpersons: Dr Meenu Bajpai, Dr Poonam Srivastava**
10:50 - 11:10	Topic: How to resolve DAT postive cases? Speaker: Dr Manoj Kahar
11:10 - 11:30	Topic: Role of antibody titer in ABOi solid organ Transplantation Speaker: Dr Dipti Sachan
11:30 - 11:50	Topic: Significance of Platelet Cross Match Speaker: Dr Divjot Singh Lamba
11:50 - 12:20	**Plenary 1:** **Chairpersons: Dr Narendra Vasavada, Dr R N Makroo** **Topic: Transfusion Medicine and Global Health** **Speaker: Dr Evan Bloch**
12:20 - 12:50	**Plenary 2:** **Topic: Role of Transfusion Medicine Specialist in HPC Transplant** **Speaker: Dr Aseem Kumar Tiwari**
12:50 - 14:00	**LUNCH**
14:00 - 15:20	**Session 16: Managing Tricky Situations** **Chairpersons: Dr Subhash, Dr Pratul Sinha**
14:00 - 14:20	Topic: Component separation: 6 hours v/s 24 hours Speaker: Dr Anju Verma
14:20 - 14:40	Topic: Breaking RhD Barrier in Red Cell Transfusions - When, where & by whom? Speaker: Dr Abhishek Gowda
14:40 - 15:00	Topic: NAT reactive seronegative blood donor -referral and deferral Speaker: Dr Sangeeta Pathak
15:00 - 15:20	Topic: Donor Selection in emergency and rare group: Where to accept and when to defer Speaker: Dr Farzana Kothari
15:20 - 15:30	**NETWORKING BREAK & EXHIBITION VISIT**
15:30 - 16:15	**Moderator:** Dr Sitalakshmi Subramanian **Debate: NAT Or No NAT** Dr Sangeeta Pathak (For), Dr Rahul Kathiria (Against)
16:15 - 17:00	**Moderator:** Dr Suchet Sachdev **Debate: Iron supplement or not** Dr Nirali Patel (For), Dr Ganesh Mohan (Against)
17:00 - 18:00	**Annual General Body Meeting**
19:00 onwards	**GALA DINNER**

TRANSCON 2024 - 22nd November 2024	
Hall Name	**Hall 2**
Time	
09:00 - 10:35	**Session 11: Rare/Newer programs in TM** **Chairpersons: Dr Sangeeta Pahuja, Dr Sitalaxmi**
09:00 - 09:20	Topic: Cryopreserved blood components: Development and Future directions Speaker: Dr Priti Elhence
09:25 - 09:45	Topic: Characteristics of Apheresis products for CAR T cell therapy Speaker: Dr Priti Desai
09:50 - 10:10	Topic: Development of indigenous CAR T cell Therapy in India Speaker: Dr Alok Shetty
10:15 - 10:35	Topic: Rare donor registry Program Speaker: Dr Swati Kulkarni
10:35 - 10:50	**NETWORKING BREAK & EXHIBITION VISIT**
10:50 - 11:50	**Session 14: Cellular Therapies** **Chairpersons: Dr Ripal Shah, Dr Priti Desai**
10:50 - 11:10	Topic: Pathogen Inactivation Speaker: Dr. Tulika Chandra
11:10 - 11:30	Topic: Safety aspects of donors in allogenic hematopoietic stem cell donation Speaker: Dr Paresh Vyasa
11:30 - 11:50	Topic: Quality Assurance in HPCT products Speaker: Dr Shashank Ojha
11:50 - 12:20	**Plenary 1: (in HALL 1)** **Chairpersons: Dr Narendra Vasavada, Dr R N Makroo** **Topic: Transfusion Medicine and Global Health** **Speaker: Dr Evan Bloch**
12:20 - 12:50	**Plenary 2: (in HALL 1)** **Topic: Role of Transfusion Medicine Specialist in HPC Transplant** **Speaker: Dr Aseem Kumar Tiwari**
12:50 - 14:00	**LUNCH**
14:00 - 15:20	**Session 17: Case Based Discussion** **Chairpersons: Dr. Dolly Daniel, Dr R N Makroo**
14:00 - 14:20	Topic: The Use of Fresh Frozen Plasma (FFP) and Cryoprecipitate in Clinical Practice Speaker: Dr Sitalakshmi Subramanian
14:20 - 14:40	Topic: Blood component therapy in Hematological malignancies Speaker: Dr Ankit Jitani
14:40 - 15:00	Topic: Advances in pulmonary complications of Transfusion Speaker: Dr Rahul Kathiria
15:00 - 15:20	Topic: Laboratory monitoring of extended half-life factors in hemophilia Speaker: Dr Rajesh Phatale
15:20 - 15:30	**NETWORKING BREAK & EXHIBITION VISIT**
15:30 - 16:15	**Panel Discussion 3- New Modalities of Plasma Exchange** **Moderator:** Dr Hem Chand Pandey **Panelist:** Dr Rashmi Sood, Dr Amardeep Pathak, Dr Abhishek Gowda
16:15 - 17:00	**Panel Discussion 4: Effective donor screening in ensuring safety of blood components** **Moderator:** Dr Nidhi Mehta **Panelist:** Dr S.B.Rajadhyaksha, Dr Smita Joshi, Dr Sangeeta Agrawal, Dr Hitish Narang
17:00 - 18:00	**Annual General Body Meeting (Hall 1)**
19:00 onwards	**GALA DINNER**

TRANSCON 2024 - 22nd November 2024	
Hall Name	**Hall 3**
Time	
09:00 - 10:35	**Session 12: Development of TM Specialities: Hurdles & Opportunities** **Chairpersons: Dr Ashish Jain, Dr B Abhishek**
09:00 - 09:20	Topic: Managerial skills for Blood Centre Speaker: Dr. Ripal Shah
09:25 - 09:45	Topic: How to develop Transfusion Medicine dependent educational model for Under graduate medical studies Speaker: Dr Prasun Bhattacharya
09:50 - 10:10	Topic: What more to be done in D & C Act? Speaker: Dr. Jayashree Sharma
10:15 - 10:35	Topic: Role of Informed Consent and Patient Information Chart in perspective of TM Speaker: Dr R P Singh
10:35 - 10:50	**NETWORKING BREAK & EXHIBITION VISIT**
10:50 - 11:50	**Session 15: Quality Assurance** **Chairpersons: Dr Sangeeta Agrawal, Dr Pragnesh Shah**
10:50 - 11:10	Topic: National Standards for quality - What do we expect? Speaker: Dr Monica Gupta
11:10 - 11:30	Topic: The paradox of performance measurements: A double - edged sword Speaker: Dr Irfana Nikhat
11:30 - 11:50	Topic: Risk Assessment as measures to reduce errors before they happen Speaker: Dr Gajendra Gupta
11:50 - 12:20	**Plenary 1: (in HALL 1)** **Chairpersons: Dr Narendra Vasavada, Dr R N Makroo** **Topic: Transfusion Medicine and Global Health** **Speaker: Dr Evan Bloch**
12:20 - 12:50	**Plenary 2: (in HALL 1)** **Topic: Role of Transfusion Medicine Specialist in HPC Transplant** **Speaker: Dr Aseem Kumar Tiwari**
12:50 - 14:00	**LUNCH**
14:00 - 15:20	**Session 18: Hemovigilance** **Chairpersons: Dr Rajesh Kumar Sharma, Dr Vineeta Srivastava**
14:00 - 14:20	Topic: Haemovigilance : Time to address appropriate blood usage Speaker: Dr Nidhi Bhatnagar
14:20 - 14:40	Topic: International haemovigilance: what have we learned and what do we need to do next? Speaker: Akanksha Bisht
14:40 - 15:00	Topic: Regulatory Frameworks and Hemovigilance Knowledge - Is the existing knowledge sufficient Speaker: Dr Aseem Kumar Tiwari
15:00 - 15:20	Topic: Donor vigilance in ensuring blood donor safety: Difference in reporting strategies by different Blood Centres Speaker: Dr Varoon Capoor
15:20 - 15:30	**NETWORKING BREAK & EXHIBITION VISIT**
15:30 - 16:15	**Oral Paper:** **Chairpersons: Dr Abhinav Verma, Dr Divjot Singh Lamba** 15:30 - 15:37 - Dr Monika Verma 15:38 - 15:45 - Dr Deepthi Krishna G 15:46 - 15:53 - Dr Disha Sadashiv Parchure 15:54 - 16:01 - Dr Rut Hasmukhbhai Naik 16:02 - 16:09 - Dr Amita Radhakrishnan Nair 16:10 - 16:17 - Ms. Anju Radhakrishna Kurup
16:15 - 17:00	**Quiz (Second Round)** **Quiz Coordinator: Dr Bhargav Prajapati** **Quiz Master: Dr Lakhvinder Singh, Dr Nippun Prinja**
17:00 - 18:00	**Annual General Body Meeting (Hall 1)**
19:00 onwards	**GALA DINNER**

TRANSCON 2024 - 23rd November 2024	
Hall Name	**Hall 1**
Time	
09:00 - 10:35	**Session 19: Global Practices** **Chairpersons: Dr Mamta Shah, Dr Satyam Arora**
09:00 - 09:20	Topic: Registry of Stem Cell donors- How helpful to patients ? Speaker: Dr Vimarsh Raina
09:25 - 09:45	Topic:Lab grown blood - where are we standing today? Speaker: Dr Kshitija Mittal
09:50 - 10:10	Topic: Global practices in blood donation Speaker: Dr Divjot Singh Lamba
10:15 - 10:35	Topic: Role of Pooled Platelet Concentrate (PPC) versus SDP Speaker: Dr Bhargav Prajapati
10:35 - 10:50	**NETWORKING BREAK & EXHIBITION VISIT**
10:50 - 12:30	**Session 22: TTI** **Chairpersons: Dr Farzana Kothari, Dr Sajith**
10:50 - 11:10	Topic: Methods of Screeening - which one to choose? Speaker: Dr Sonu Bhatnagar
11:10 - 11:30	Topic: Occult Hepatitis B infection: Are we doing enough? Speaker: Dr Manish Bhatnagar
11:30 - 11:50	Topic: Implementing LJ charts & west guard rules in TTI Lab: What should we know? Speaker: Dr Narinder Naidu
11:50 - 12:10	Topic: Challenges of syphilis infection testing Speaker: Dr Paramjit Kaur
12:10 - 12:30	Topic: Utilising NAT to identify Occult Hepatitis B in donated blood Speaker: Dr Rajesh Sawant
12:30 - 12:50	Topic: Centralisation model of NAT Speaker: Dr Ruby Khan
13:00 - 14:00	**LUNCH**
14:00 - 15:20	**Session 25: Recent advances** **Chairpersons: Dr Sangita Pahuja, Dr Rahul Kathiria**
14:00 - 14:20	Topic: Shades of RED, RBC Genotyping: Why? How? Speaker: Dr Stephan Jacobs
14:20 - 14:40	Topic: Molecular applications - Next gen sequencing in Transfusion Medicine Speaker: Dr John Gnanaraj
14:40 - 15:00	Topic: Role of Transfusion Specialist in regenerative medicine Speaker: Dr Atul Sonker
15:00 - 15:20	Topic: Denditric cell Immunotherapy in advanced malignancies - Case studies Speaker: Dr Vikesh Shah
15:20 - 16:00	**VALEDICTORY FUNCTION**

TRANSCON 2024 - 23rd November 2024	
Hall Name	**Hall 2**
Time	
09:00 - 10:35	**Session 20:Transplant & transplant Immunology** **Chairpersons: Dr Arun R, Dr Shashank Ojha**
09:00 - 09:20	Topic: Setting up a HLA lab: Basic requirements Speaker: Dr Dolly Daniel
09:25 - 09:45	Topic: Evaluation of antibodies against HLA Speaker: Dr Sandip Shah
09:50 - 10:10	Topic: Quality & Accreditation in HLA Lab Speaker: Dr Rajesh Sawant
10:15 - 10:35	Topic: Role of minor blood group antigens in case of solid Organ Transplant Speaker: Dr R M Jaiswal
10:35 - 10:50	**NETWORKING BREAK & EXHIBITION VISIT**
10:50 - 12:10	**Session 23: Hemoglobinopathies & Coagulopathies** **Chairpersons: Dr M D Gajjar, Dr Dilip Dave**
10:50 - 11:10	Topic: Thalassemia Major - Transfusion & Transplantation Speaker: Dr Deepa Trivedi
11:10 - 11:30	Topic: Diagnostic Algorithm of anemia Speaker: Dr Rima Kusumgar
11:30 - 11:50	Topic: Newer biologics in management of Hemophilia Speaker: Dr Bharat Singh (Lucknow)
11:50 - 12:10	Topic: Establishing a coagulation working lab in TM Speaker: Dr Ganesh Mohan
12:10 - 13:00	**Oral Paper:** **Chairpersons: Dr Ankita Shah, Dr Sangita Shah** 12:10 - 12:17 - Dr Ujjwal Dimri 12:18 - 12:25 - Dr Sonal Sonu 12:26 - 12:33 - Dr Surangama Singh 12:34 - 12:41 - Dr Himani Aneja 12:42 - 12:49 - Ms Krupali Vaidya 12:50 - 12:57 - Dr Rizwan Javed
13:00 - 14:00	**LUNCH**
14:00 - 15:20	**Session 26: Beyond Transfusion Medicine** **Chairpersons: Dr Milind Dighe, Dr Priti Elhence**
14:00 - 14:20	Topic: Effect of climate Change in BTS Speaker: Dr Hitesh Pagare
14:20 - 14:40	Topic: Empowering Transfusion Medicine through digital media integration Speaker: Dr Ruchi Punamia
14:40 - 15:00	Topic:Blood Banking Information Sysytems - Future Expectation Speaker: Dr Soumya Das
15:00 - 15:20	Topic: Role of AI / virtual reality in TM Speaker: Dr Anand Deshpande
15:20 - 16:00	**VALEDICTORY FUNCTION**

TRANSCON 2024 - 23rd November 2024	
Hall Name	**Hall 3**
Time	
09:00 - 10:35	**Session 21: Ethical & Legal Implications** **Chairpersons: Dr Bharat Singh (Delhi), Dr Nidhi Bhatnagar**
09:00 - 09:20	Topic: Seroreaction donors/haplo identical donors in non-malignant situation : Ethical and legal consideration Speaker: Dr Rasika Setia
09:25 - 09:45	Topic: How safe is safe blood? Speaker: Dr R N Makroo
09:50 - 10:10	Topic: Is best matched blood a safe path in multi-transfused patients? Speaker: Dr Sadhna Mangwana
10:15 - 10:35	Topic: Night Transfusion - Ethical concerns (monitoring) Speaker: Dr Meena Siddhu
10:35 - 10:50	**NETWORKING BREAK & EXHIBITION VISIT**
10:50 - 11:50	**Session 24: Teaching & Training** **Chairpersons: Dr Divjot Singh Lamba, Dr Amrish Pandya**
10:50 - 11:10	Topic: Basics of Scientific writing Speaker: Dr Ravneet Kaur
11:10 - 11:30	Topic: Big data analysis in TM Speaker: Dr Joy Memmon
11:30 - 11:50	Topic: Process improvement through continuous training & its evaluation Speaker: Dr Gita Negi
11:50 - 13:00	**Oral Paper:** **Chairpersons: Dr Sumit Bhardva, Dr Jignesh Jambukiya** 11:50 - 11:57 - Dr Sanmukh Joshi 11:58 - 12:05 - Dr Divya 12:06 - 12:13 - Dr Sheetal Chandak 12:14 - 12:21 - Dr Naveen Reddy. A 12:22 - 12:29 - Dr Gayathiri Kaduveti Chellaiya 12:30 - 12:37- Dr Swati Srivastava 12:38 - 12:45 - Dr Yadhu P Mukundan 12:46 - 12:53 - Dr Ganesh Mohan 12:54 - 13:01 - Dr Suhasini Sil
13:00 - 14:00	**LUNCH**
14:00 - 14:45	**Oral Paper:** **Chairpersons: Dr Sadhana Saraiya, Dr Rasika Setia** 14:00 - 14:07 - Dr Casimirvy Lamin 14:08 - 14:15 - Dr Franzine Marie Syiemlieh 14:16 - 14:23 - Dr Ruchi Singla 14:24 - 14:31 - Dr Mansi Sharma 14:32 - 14:39 - Dr Daljit Kaur 14:40 - 14:47 - Dr Meethu Muraleedharan
14:45 - 15:20	**Quiz (Final Round)** **Quiz Coordinator: Dr Bhargav Prajapati** **Quiz Master: Dr Lakhvinder Singh, Dr Nippun Prinja**
15:20 - 16:00	**VALEDICTORY FUNCTION**

Tribute to the visionary in Transfusion Medicine and Beloved Mentor

Dr Meena D started her academic career way back in 1989 where she joined as Lecturer in Transfusion Medicine at Government Medical College, Trivandrum. She mastered the new arena with passion and love for the subject. The same was transformed later into a vision for Transfusion Medicine with the commencement of a postgraduate course in Transfusion Medicine in 2008. A passionate and dedicated teacher who would go the extra mile to ensure the students are academically at par with the standards. A mother figure for her dear students, madam would go to any extent for her students be it their academic, personal or career needs.

A bold woman of principles, she was always a role model for her juniors.Heading the departments at Government Medical College, Alleppey and Trivandrum was the phase in her career where she envisioned state of the art blood centres with automation. She was the principal investigator for a WHO baseline assessment of blood centres of Kerala State. The findings of which paved the way for a new era for Transfusion Medicine in the state.

She was appointed as State Nodal officer for Transfusion Medicine services for Kerala State. Under her able leadership, she brought forward remarkable changes in the quality of kits and reagents used, technical support for all blood centres of the state through district nodal officers, State hemotherapy cell to monitor the blood usage at hospitals etc. Her brain child was State Transfusion policy, to guide the doctors on good transfusion practices which were first of its kind in the country. She established a state of the art nodal centre for Transfusion Medicine services of the state with coagulation, molecular, advanced immunohematology labs for advanced testing in Government sector.

She was promoted as Principal and Joint Director in Medical Education where her leadership qualities were acknowledged in a wider realm as she got NMC approval for Government Medical College Idukki for Undergraduate admissions and milestone achievements in medical education for Kerala State. She retired on 30 th April 2024 from service with an excellent track record.

On a personal note, she was a compassionate human being who would do the smallest possible good to a person under her scope. A perfect family woman and a wonderful human being. She left for heavenly abode on 3rd of August 2024 at the age of 62 years. She is survived by husband Dr. Syam K Ramesh and two daughters Dr. Priyanka, Dr. Praveena , son in laws, Dr. Vishnu & Dr. Balu and grand kids Abhiram and Advay. Her loss is irreplaceable but her legacy will live forever through her students whom she had inspired..

Breaking RhD Barrier in Red Cell Transfusions - When, where, and by whom?

Dr Abhishekh B
Additional Professor and Head
Department of Transfusion Medicine JIPMER, Puducherry

The RhD barrier refers to the incompatibility between RhD-positive and RhD-negative blood types. Generally, it refers to the transfusion of RhD-positive blood to RhD-negative recipients as the reverse is usually compatible and the transfusion is uneventful.

Transfusion of RhD-positive blood components to an RhD-negative patient can result in the formation of anti-D. The risk is greatest when RhD-positive red cell components are transfused. Formation of anti-D following transfusion of RhD-positive platelets is also recognised. Sensitisation following transfusion of RhD-positive frozen plasma components is unlikely, as the small amounts of red cell stroma present are less immunogenic than intact red cells.

The formation of anti-D following transfusion of RhD-positive blood components might result in a number of consequences:

1. An absolute requirement for RhD negative support for future transfusions
2. Hemolytic transfusion reactions when RhD-positive red cell components are transfused
3. Hemolytic disease of the newborn

The clinical intervention of this type aims to ensure that the likely clinical benefit of a procedure exceeds the risks associated with the intervention. Evidence indicates that as little as 0.03ml of red cells can lead to alloimmunisation to RhD.

The chances of RhD alloimmunization in various categories have been shown below in Fig 1. The description of various categories and the attributable reason for various categories are summarised in Table 1.

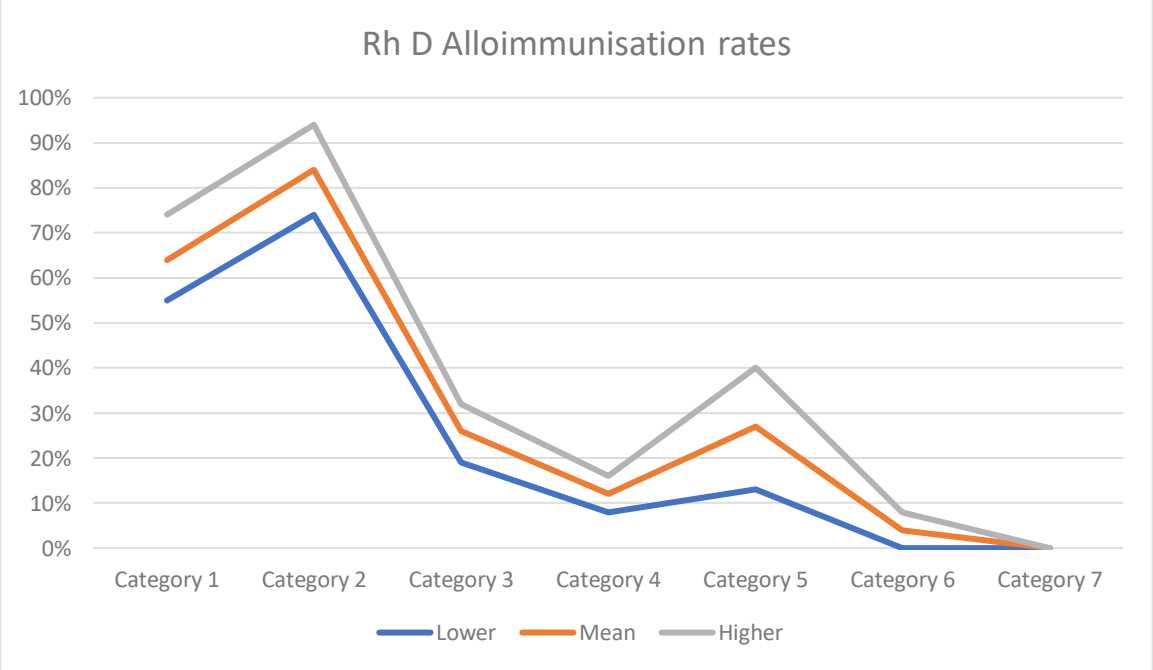

Figure 1. Frequency of alloimmunisation rates in various types of recipients

Table 1. Description of various recipient caharacteristics and attributable reasons

Category	Patient population	Attributable reasons
I	Small-volume transfusion in RhD-negative healthy volunteers	• Different transfusion volumes of RhD-positive RBCs • RHD genotype of donor RBCs • Interval of restimulation

II	Whole units of RBC transfusion in RhD-negative healthy volunteers	Probably an anamnestic response
III	RhD-negative patients with mixed diseases	• Immunocompetent, younger patients in the group • Heterogeneity of the group
IV	RhD-negative oncology patients	• Lymphocyte impairment in hematologic diseases • Reduced IgG and IgM levels due to immunosuppressive chemotherapy
V	RhD-negative trauma patients	• Immunomodulatory effect of trauma • Stress-related immune suppression
VI	RhD-negative immunocompromised patients with solid-organ and hematopoietic stem cell transplantation	Immunosuppressive protocols for transplantation and certain hematologic malignancies prevent primary immune responses to the RhD antigen.
VII	RhD-negative AIDS patients	A decrease in CD4+ T helper lymphocytes could not effectively assist B cell activation to produce anti-D

The requirement to give RhD-negative red cells to RhD-negative recipients must be balanced with the need to conserve this scarce resource. There are guidelines from Blood transfusion services from various countries while breaking this barrier and switching to RhD positive blood. The one that is appropriately detailed from Newzealand Blood Services is summarised below.

1. For PRBCs

Patient category	Indication	Criteria	Authorisation/Decision
Females <55 years old	Clinical emergency with significant blood loss	Life-threatening emergency only when insufficient Rh(D) Neg red cells are available	Transfusion Medicine/hematologist
Females >55 years old	Emergency and elective transfusion	When insufficient RhD Neg red cells are available	Transfusion Medicine/hematologist
Males	Clinical emergency with significant blood loss	Make an early switch to RhD Pos red cells to conserve RhD Neg red cell stock.	Registered Medical Laboratory Scientist with regular TMS review
	Elective surgery	Only if supplies of RhD Neg red cells are low	

2. For platelet concentrates

(i) Patients with conditions other than hematological malignancies

Patient category	Indication	Criteria	Authorisation/Decision
Females <55 years old (including female children) *On-going and future pregnancies are possible.*	Trauma or surgery needing short-term support	Use Rh(D) Pos platelets only if absolutely no RhD Neg platelets are available. *Anti-D Ig should be given if RhD Pos platelets are used.*	Transfusion Medicine/hematologist

Young male children (In pediatric wards)	Short term support	Use Rh(D) Pos platelets only if absolutely no RhD Neg platelets are available.	Registered Medical Laboratory Scientist with regular TMS review
Other patients			

(ii) Patients with hematological malignancies and other patients requiring long-term platelet support

Patient category	Indication	Criteria	Authorisation/Decision
Females <55 years old (including female children) *On-going and future pregnancies are possible.*	Ongoing support	Use Rh(D) Pos platelets only if absolutely no RhD Neg platelets are available.	Transfusion Medicine/hematologist
Female children		Use Rh(D) Pos platelets only if absolutely no RhD Neg platelets are available. ***Anti-D Ig should be given.***	
Male children		Use Rh(D) Pos platelets only if absolutely no RhD Neg platelets are available.	Registered Medical Laboratory Scientist with regular TMS review
Other patients			

3. Fresh Frozen Plasma/Cryoprecipitate

FFP and cryoprecipitate of any RhD type may be given regardless of the recipient's RhD status. No anti-D immunoglobulin needs to be given if RhD-negative recipients receive RhD-positive FFP or cryoprecipitate.

The Scottish National Blood Transfusion Service has a recommendation of a 50-year cutoff for females and RhD-negative patients with immune anti-D to provide only RhD negative blood.

TRANSFUSION IN COMBAT SETTING

Dr A K Biswas

Transfusion practices have paramount historical significance in military medicine and battlefield care. An understanding of transfusion history during recent wars have helped inform some current practices and must not be forgotten, especially as we define the future of battlefield transfusion as it pertains to the importance and implementation of whole blood.

Transfusion of blood products is an essential component of the treatment of major trauma victims. Verification of the patient's identity and providing safe blood components both to identified and unidentified injured in mass casualty events require established standard operating procedures. Early identification of patients with trauma-induced coagulopathy may be life-saving, since these patients tend to have higher mortality rates and, therefore, early supply of blood components are helpful for correction of coagulopathy and early damage control resuscitation.

As rule of thumb, a higher injury severity score, acidosis, hypothermia, and low blood pressure on admission are predictive factors for trauma-induced coagulopathy. These patients are also candidates for massive transfusion. For patients defined as in need of massive transfusion due to low blood pressure, high pulse rate, or high injury severity score, implementation of massive transfusion protocol is beneficial. Frequent monitoring of CBC, prothrombin time, thromboplastin time, fibrinogen level, and the use of thromboelastogram may be helpful to adjust therapy with PRBC, FFP, cryoprecipitate, rFVIIa, and antifibrinolytic agents.

The implementation of damage control resuscitation (DCR) during the recent wars in Iraq and Afghanistan has changed the face of modern transfusion practices in both military and civilian trauma. The value of whole blood has been recognized clinically and is considered the best fluid for hemorrhagic shock; however, despite being readily available during walking blood banks, widespread adoption and standardized availability remain a challenge.

It should be emphasized that, while exposure to fresh frozen plasma is life-saving during a massive transfusion or coagulopathy scenario, it could be hazardous and leads to higher rates of multi-organ failure or transfusion-related acute lung injury. Therefore, for patients who do not suffer from major bleeding or coagulopathy, the conservative use of this product should be recommended.

For massively bleeding patients, PRBC <14 days old should be used when available. In cases when supply of blood or blood components is short, fresh whole blood may be considered, remembering that this product has not been checked with state-of-the-art tests for transmissible diseases, is not FDA approved, and may be justified only for immediate life-saving scenarios.

To conclude, transfusion support is an essential element of modern emergency healthcare. Blood services together with hospital transfusion teams are required to prepare for, and respond to, mass casualty events as part of wider healthcare emergency planning. Preparedness is a constant collaborative process that actively identifies and manages potential risks, to prevent such events becoming a 'disaster'. The aim of transfusion support during incidents is to provide sufficient and timely supply of blood components and diagnostic services, whilst maintaining support to other patients not involved in the event. Transfusion is an essential capability and saves lives on the battlefield. Whole blood, followed by component therapy using the proper ratios, is the best fluid for hemorrhagic shock.

International haemovigilance: what have we learned and what do we need to do next

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Abstract

Successful haemovigilance systems necessitate a comprehensive approach that integrates policy support, active participation, quality data collection, targeted training, expert oversight, and robust communication to enhance safety and improve blood transfusion practices. A diverse range of stakeholders—including patient and donor organizations, hospitals, blood centers, ministries of health, and international bodies like the WHO and IHN play critical roles in this collaborative effort. These entities work together to identify and report adverse events, manage donor health, ensure regulatory compliance, and share data to promote safety. Despite notable achievements, such as the UK's SHOT scheme, which has significantly improved transfusion safety by addressing issues like clerical errors and respiratory complications, challenges remain. Many countries still lack established haemovigilance systems, particularly in regions like Asia and Africa, facing hurdles such as insufficient resources, funding, and uniform reporting standards.

India has established a robust Haemovigilance programme at the national level for over a decade, demonstrating significant progress since its inception on December 10, 2012. This initiative has led to the development of comprehensive guidelines and policies, as well as thorough data analysis aimed at enhancing blood transfusion services across the country. Notably, the programme has resulted in publications in esteemed journals and newsletters, along with organizing Continuing Medical Education (CME) & workshops to raise awareness and promote the reporting of adverse reactions.

The Haemovigilance Programme of India (HvPI) not only focuses on improving practices domestically but also extends its support to neighboring countries like Bhutan and Bangladesh in establishing their own haemovigilance systems. Additionally, HvPI collaborates actively with the World Health Organization and other countries in the Southeast Asia Region (SEAR) to strengthen haemovigilance efforts. As a member of the International Haemovigilance Network (IHN), India continues to play a crucial role in advancing global standards for blood safety.

Additionally, the impact of haemovigilance is often difficult to quantify, as increased reporting may reflect heightened awareness rather than actual risk. Nevertheless, the data generated is invaluable for informing policy, enhancing training, and improving clinical practices. The Haemovigilance Program of India (HvPI) conducted a survey from January to April 2022, featuring 27 questions to evaluate the program's strengths and weaknesses. Significant improvements were noted in both recipient and donor care. For recipients, 79.6% reported enhanced documentation of transfusion reactions, while 54% appreciated increased support from Hospital Transfusion Committees. Notably, 30.5% observed a reduction in near-miss errors, and 20.1% noted fewer ABO incompatible transfusions. Donor-focused enhancements included a more stringent medical questionnaire, with 68% indicating its implementation, and 56.4% reported initiatives like multimedia visuals and bedside counseling to reduce donor anxiety. Additionally, 65.2% adopted strategies such as encouraging pre-donation hydration and muscle tension techniques, and 68.4% provided special care for donors with adverse reaction histories. Early intervention was highlighted by 55.6% as critical for identifying and managing initial reactions to prevent complications.

To effectively launch a haemovigilance system, stakeholders should engage early, consider starting with pilot programs, explore various reporting methods, and leverage existing networks for support and collaboration. By prioritizing these elements, health authorities can enhance blood safety and patient outcomes, ultimately fostering a culture of continuous improvement in transfusion practices.

Blood component therapy in alloimmunized multi transfused patients

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Blood Transfusion is considered as akin to a temporary mini-transplant ABO & Rh D cross matched blood is a norm. Extended Rh & K matched blood advised preferably for all patients as recipient is exposed to numerous foreign unmatched red cell antigens.

Alloimmunization is a process of developing different antibody, against antigens other than self-e.g. Rh D negative individual may form allo anti-D but by RhD positive. Incompatible antigen introduced in an immune-competent host and evokes an immune response

- Clinically relevant issue
- Result in complications in medical management of patients.

Risk patients for alloimmunization:

- Sickle cell disease
- Sickle-beta thalassaemia compound heterozygotes
- Beta thalassaemia major
- Myelodysplastic syndromes
- Aplastic anaemia
- Chronic renal failure / dialysis patients
- Bone marrow and PBSC transplant patients
- Anaemias of chronic disease
- Daratumumab therapy (anti-CD38)

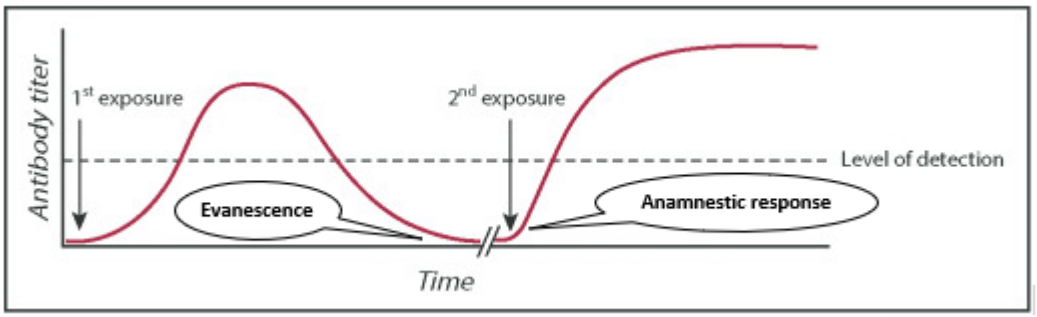
Implementation of Alloimmunization

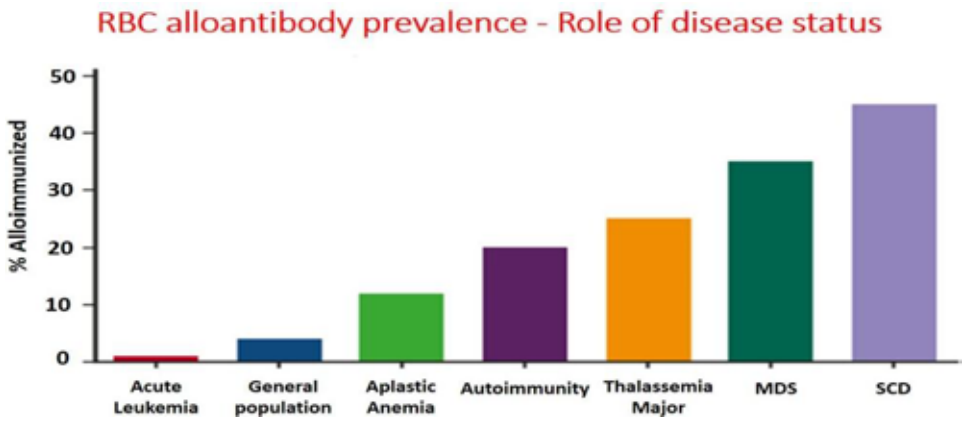
- Hemolytic transfusion reaction (delayed common)
- DHTRs
- Hemolytic disease of fetus and newborn
- Complicate hematopoietic stem cell and solid organ transplantation
- Transfusion delays as new alloantibodies are in the process of being identified
- Difficulties in locating compatible blood for highly alloimmunized individuals
- Leading cause of transfusion-related mortality and morbidity

Pre-requisites for alloimmunization

- Exposure to a non-self RBC antigen and
- Have an HLA binding motif capable of presenting a portion of the non-self antigen

RBC AlloAb induction, evanescence & anamnestic response





Management of alloimmunized individuals-PRBC management

- Timely identification of alloantibodies using antibody screen
- Only packed red cell,Whole blood not advised
- Provision of antigen negative blood
- Identification of individuals at risk of developing additional antibodies
- Limited antigen matched / extended antigen matched blood
- Limiting blood transfusions to necessary

Prevention strategies

- Limit exposure to foreign antigens
    - Judicious transfusion using established guidelines
- Reduce donor and recipient antigen disparities
    - Using phenotypically matched RBCs
    - Limited phenotype match vs extended phenotype match
    - Rh and K matched RBCs for SCD and thalassemia
- RhIg immunoprophylaxis in pregnancy
- Leucoreduction

Providing Antigen Negative Blood

- Limited number of donors for Thalassemia & Sickle cell anemia patients
- Developing Registry of voluntary donors who are fully phenotyped
- Rh (C c E e)
- Duffy, Kidd, MNSs & Lewis

Phenotyped Matched Blood

- Prevent or minimize red cell alloimmunization
- All the patients to be typed for following
- Rh (C c E e)
- Duffy, Kidd, MNSs & Lewis
- Corresponding Phenotyped blood

Antibody detection

- Risk of Allo & Auto-immunization
- Regular check of unexpected red cell antibodies by AB Screen
- If Pt develops antibody, Antigen negative blood has to be arranged

Exploring The Cultural and Symbolic Meanings of Blood

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Blood is a substance "thick with magical significance, mystical claims, pharmacological prodigies, alchemistical dreams," writes Piero Camporesi in The Juice of Life.

Blood is obviously an objective, biological substance; at the technical level, scientists share a set of common understandings about its physical attributes. But blood is more than a biological substance; it is also a cultural entity with complex social meanings that vary in different cultures and change over time.

Metaphors of blood have diverse and sometimes contradictory connotations. Blood is seen as a source of life and energy, but it is also a symbol of violence and danger. It is a metaphor for social solidarity and the connection between the individual and society, but it has also represented the biological distinctions between peoples and is linked to the politics of race and social class. Blood is a social fluid that calls for altruistic relationships, but blood plasma is an economic product that can be competitively bought and sold. Purity of blood is a clinical concept associated with physical health, but it is also a racist construct used to define ethnicity and to justify exclusion and discrimination. In its social meanings, blood can stand at once for purity and contamination, vitality and death, community and corruption, altruism and greed. With its multiple connotations and complex associations, blood is a malleable and powerful construct; the idea of tainted blood both reflects and effects social relationships, public trust, and the way people relate to authority and community.

Beliefs about blood find expression in the economics and politics of blood product distribution and regulation, the behaviour of health care institutions in their efforts to assure a safe blood supply, the claims and expectations of HIV-infected individuals, and the public's perception of the nature, causes, and dangers of devastating disease.

Blood metaphors, collected from historical and contemporary sources, frequently cluster around four repeated and related themes:

1. Blood is defined as an essentialist substance, the essence of personhood, the basic life force.
2. Blood—and the exchange or donation of blood —is an important symbol of community and social solidarity.
3. Metaphors of blood are a means to represent the prevalence of danger and risk.
4. The concept of pure blood include references to social relationships and moral as well as physical contamination.

I would be exploring more on this topic in my talk.

Relevance:

The variation in these interpretations demonstrate how the relationship between race and biology continues to be nebulous and yet simultaneously leveraged to determine who qualifies as a suitable biological citizen and whose rights bio-civic acts should prioritize as a blood donor and and as a recipient of blood transfusion.

PBM Practices in Neonates

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Introduction:

A neonate is unique in itself and not just a miniature child. Neonates commonly experienced anemia and thrombocytopenia during their stay in neonatal intensive care units (NICUs). Premature babies require one or more transfusion during their stay in NICU. Transfusion in neonates have special consideration for their unique physiology and vary greatly between institutions. Thus, Patient Blood Management (PBM) in Neonates is an important tool to prevent unnecessary allogenic transfusion load to tiny patients.

The neonatal period is defined as the first four weeks after birth; premature infants is so termed if born before completion of 37 weeks of gestation. The Neonates weighing<2500g are termed Low birth weight (LBW), <1500 g termed as very-low birth-weight (VLBW). For the purpose of blood transfusion, child upto 4 months of age required similar consideration as a neonate.

Patient Blood Management in neonates is essential to optimise the transfusion requirement in NICU, and discussed here as -

1. **Red Blood Cell (RBC) transfusion** –
    a. RBC transfusion is a critical intervention to increase oxygen carrying capacity in the anemic neonate; often life-saving, but also have the potential to cause adverse effects. Therefore, it is essential to establish PBM guidelines to determine need of transfusion in neonate.
    b. Knowledge of optimal hemoglobin appropriate for her age is important especially in premature infants; due to their higher possibility of multiple and frequent requirement of transfusion during their stay in NICU.
    c. When evaluating a neonate for anemia or coagulopathy, one should consider gestational age, postnatal age, birth weight and comorbidity, maternal factors, and transplacental antibody transfer. These factors will guide for proper and effective PBM.

2. Reducing the need for RBC transfusion:

One of PBM Strategies is to decrease the incidence of anemia; thereby decreasing the requirement of transfusions in neonates. This can be achieved by either one or more ways -

a. **Placental transfusion —**Delayed cord clamping for 30 -180 sec increases hematocrit of neonates at birth and thus decreases the number of RBCs transfusions and reduces mortality & complication like intraventricular hemorrhage (IVH), Necrotising enterocolitis (NEC).
b. **Iron thearpy**: Premature babies have a relative deficiency of iron stores due to incomplete fetomaternal iron transport. Iron supplementation improves overall iron stores and decreases the iron deficiency anemia.
c. **Erythropoiesis stimulating agents-**such as recombinant Erythropoeitin (rEPO) is used to increase erythropoiesis & thus decrease the severity of anemia and need of transfusion.
d. Reducing blood loss
    i. Point-of-care testing: Phlebotomy-related blood losses can be minimized by changes in practicethrough the use of micromethods for testing and incorporating point-of-care devices for hemoglobin, bilirubin,ESR etc.
    ii. **Minimisingiatrogenic Phlebotomy Losses**— Phlebotomy loss is important cause of anemia in NICU and responsible for avoidable transfusion in neonates. Minimising phlebotomy, where possible, reduce the frequency and type of regular investigations, collecting appropriate volume of blood to avoid waste or repeat testing and applying group testing will help in reducing unnecessary transfusion

3. **Reduce coagulopathy and bleeding thus reducing blood demand -**
    a. **Platelet transfusion & Thrombocytopenia**: Thrombocytopenia is common in NICU affects 1-2% of newborns. About 20–25% of neonates receive at least one platelet transfusion. Platelet transfusion is indicated if count is less than 25,000/µL with no bleeding. In case of active bleeding platelet threshold is <30000/cm depending on clinical severity, risk of bleeding or associated comorbidities

ABO compatible platelets are ideal to prevent incompatible antibodies (anti-A, anti-B, or anti-A,B) transfer, resulting in potential RBC hemolysis. Increase morbidity and mortality is seen with transfusion of O platelets (containing anti-A) in A group neonates especially in VLBW babies.

    b. **Fresh frozen plasma (FFP),** PBM for Plasma is important & is often utilized incorrectly. Plasma should not be transfused for volume expansion or for an elevated INR alone or prophylactically to improve general wellbeing of infants.

Indications for FFP Transfusion are Sepsis, disseminated intravascular coagulopathy (DIC), liver disease, Vitamin K deficiency, trauma or dilutional effects of transfusion which have potential to result in coagulopathy. Plasma is also used to suspend RBCs for exchange transfusion and priming of cardiothoracic and ECMO circuits.

4. **Blood components selection**: should appropriate for an effective PBM amongst neonates.
    a. **Appropriate component**: Once the decision for transfusion has been made , the most appropriate blood component must be chosen; based on unit compatibility, volume required , immaturity, infection ,immunosuppression and future transfusion need. Anticoagulant preservative (CPDA-1 vs. SAGM)should be selected to prevent hyperkalemia and of citrate toxicity .
    b. **Fresh vs stored RBCs—**Various studies show no difference in outcome when transfusion done from fresh (≤7 days) versus standard RBCs unit .AABB recommend the use of blood from standard RBC units rather than limiting to transfusion of fresh (<10 days) RBC units.
    c. **Large Volume transfusion-**

In case of hypotensive shock, extracorporeal membrane oxygenation (ECMO), exchange transfusion, or cardiopulmonary bypass, a large volume transfusions pose a risk for neonatal hyperkalemia. Therefore, fresher, washed red cells, or plasma reduced red cells to prevent post transfusion hyperkalemia is indicated . Similarly

Serum Calcium should be monitored during large dose transfusion to prevent hypocalcemia ,a risk of citrate toxicity due to calcium chelation.

    d. **Group and Antibody Screen—**During pregnancy, maternal immunoglobulin (IgG) cross the placenta to the fetus . With maternofetal hemorrhage, IgM antibodies may also be transferred. Therefore, transfused RBCs must be compatible with both neonatal and maternal blood. Either group O RBCs to all neonates, or ABO compatible blood can be transfused if no anti-A, anti-B (IgM or IgG) antibody is present in maternal blood.
    e. **Frequency of screening of neonates for transfusion-**Maternal blood serve as the source of antibody screening for any antibodies present in neonate. A negative antibody screen need not to be repeated until 4 months of age, as the immature immune system of a neonate rarely produces antibodies in response to RBC transfusion. If an antibody is identified or detected, antigen-negative units should be provided.
    f. **Limiting multiple donor exposure—**Neonates likely to require repeat transfusions should be identified at early stage depending on gestational age, weight and associated comorbidity. Use of single dedicated unit for a neonates and removing desired aliquot with the help of sterile connecting device minimize multiple allogenic donor exposure .

g. **Irradiation-** Irradiated Blood components should be used for intrauterine transfusion, exchange transfusion, top-up transfusion, blood from first or second degree relatives and immunodeficient neonates . Irradiation affects the expiry of the component due to increase in potassium level, therefore ,must be used within 24 hours of irradiation.
h. **Cytomegalovirus (CMV)** - blood component during first year of life should be CMV seronegative. Components that have been leukodpeleted to $<5x\ 10^6$ per unit significantly decreases the risk of CMV .

PBM in neonates, therefore is a very challenging ;they need special consideration for their gestational age, postnatal age and birth weight and with comorbidity if any to achieve an effective patient blood management protocol

Platelet components: When and What to transfuse?

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Circulating thrombocytes or platelets are anuclear discoid cells that are produced in the bone marrow from megakaryocytes during fragmentation. Thrombopoietin is the main growth factor controlling megakaryocyte production. The circulating life span of native platelets is approximately 10 days, and that of transfused platelets is approximately 3 days in a stable recipient (1).

Platelets have receptors on their surface and granules inside, allowing them to participate in adhesion, aggregation and clot formation on the surface of injured endothelium, forming a haemostatic plug. The number of circulating platelets for an adult normally ranges between 150 × 109/L and 450 × 109/L. Decreased number of platelets (thrombocytopenia) refers to any situation where the patients platelet concentration is below 150 × 109/L, in an adult. Both thrombocytopenia and platelet dysfunction without thrombocytopenia can cause bleeding. Actively bleeding patients might require support from platelet transfusions. Platelets are also used for prophylactic transfusions to prevent bleeding due to decreased platelet production in patients undergoing chemotherapy, and/or hematopoietic stem cell transplantation (HSCT). In addition, platelets are transfused to some patients who have an increase in platelet destruction/consumption (2).

The causes of thrombocytopenia may be due to reduced platelet production or increases platelet destruction. Patients undergoing chemotherapy, HSCT, and those with chronic infections can have decreased platelet production. Another common cause of thrombocytopenia is an increase in platelet destruction/consumption that can have an immune or non-immune etiology. Immune-mediated thrombocytopenia (ITP) is caused by different types of antibodies (autoimmune or alloimmune) that are produced to different platelet antigens and lead to elimination of the platelets in the spleen. Non-immune mechanisms cause platelet consumption and/or sequestration due to bleeding, enlarged spleen (sequestration) or vascular thrombi formation.

People with haematological and oncological disorders are the largest users of platelet components. The main concerns related to platelet transfusions are at what level to transfuse or whether to transfuse at all. A recent Cochrane systematic review in people with haematological malignancies found that overall prophylactic platelet transfusions appeared to reduce the number of bleeding events and days with significant bleeding (3).

Platelet transfusions may be given to prevent bleeding when the platelet count falls below a certain threshold, prior to a procedure, or to treat bleeding associated with thrombocytopenia or platelet function abnormalities. The dose of platelets transfused was originally based upon the perceived need to raise the patient's platelet count above a certain 'safe' threshold.

Platelet transfusions are divided into: Therapeutic and prophylactic. Therapeutic platelet transfusions are administered to arrest active bleeds. Prophylactic platelet transfusions might be indicated in thrombocytopenic patients' pre-procedure at specific platelet count triggers. Currently, platelet count less than 10x109/L is considered to be the trigger for prophylactic platelet transfusion by Association for Advancement of Blood and Biotherapies (AABB) (4).

When to transfuse:

Platelet transfusions should be administered pre-procedure if platelet count falls below these targets:

1. General surgery (nonneuraxial) < 50 × 109/L;
2. Neurosurgery and ophthalmic surgery <100 × 109/L;
3. Central venous catheter insertion < 20 × 109/L;
4. Lumbar puncture < 50 × 109/L;
5. Bone marrow biopsy < 20 × 109/L;

6. Percutaneous liver biopsy < 50 × 109/L;
7. Thoracocentesis < 50 × 109/L.

What to transfuse:

The choice of platelet product depends on a variety of factors, including the patient's clinical needs, the availability of blood components, and the potential for complications such as alloimmunization or infection (5). Different types of platelet components may be used for transfusion as follows:

1. Apheresis platelets
2. Random donor platelets
3. Pooled platelets
4. HLA-matched platelets
5. Epitope matched platelets
6. Pathogen reduced platelets

Dose:

An adequate dose for prophylactic platelet transfusions is 1 apheresis unit or a dose of 4–6 pooled whole blood-derived platelet units for an average-size adult (70 kg). These doses result in a typical platelet increment in adults of 20,000–40,0000/μL. Apheresis platelets offer higher corrected count increment (CCIs) post-transfusion [6] but, overall, the two types of platelet products offer equivalent platelet survival and haemostatic effect in bleeding patients. In other words, higher CCIs with apheresis platelets do not translate into superior haemostatic effectiveness compared to whole blood-derived platelets.

One standard dose of platelets, either apheresis or a pool of whole blood-derived platelets, contains 3–4 × 1011 platelets on average. Interestingly, low (1.1 × 1011), medium (2.2 × 1011) and high doses (4.4 × 1011) of platelets transfused were equally effective in preventing bleeding in patients with hypoproliferative thrombocytopenia [7].

The goal of platelet transfusions is to prevent severe and life-threatening bleeding in patients with thrombocytopenia. The decision to transfuse depends on the platelet count, clinical status, and underlying cause of thrombocytopenia. Understanding the types of platelet components available, as well as the indications and appropriate thresholds for transfusion, is crucial for providing effective and safe care. As with all transfusions, careful monitoring and management of potential risks are necessary to optimize patient outcomes.

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COMPONENT SEPARATION : 6 HOURS VS 24 HOURS

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The storage and processing of blood components are critical steps in ensuring the safety and efficacy of blood transfusions. One key factor influencing the quality of blood components is the holding time between collection and processing. This article reviews the effects of 6-hour and 24-hour holding periods on blood components, highlighting the findings of various studies.

Introduction
Blood transfusions are a lifesaving medical intervention, relying on the availability of high-quality blood components. The holding time between blood collection and processing significantly affects the quality and functionality of these components. Two commonly used holding periods are 6 hours and 24 hours. Understanding the effects of these holding periods is crucial for optimizing storage conditions and processing protocols. Whole blood, when collected at a distance from the processing site, there is holding time between collection and processing. There are also various "in-process" holding times which are not well defined and poorly controlled, resulting in further prolongation of time before the final blood component is ready. Biochemical and functional characteristics of blood components are affected if length of some of these holding times is not restricted

Effects on Red Blood Cells:- Red blood cells (RBCs) are sensitive to storage conditions, with changes occurring rapidly after collection. A study by Pietersz et al. (1992) compared the effects of 6-hour and 24-hour holding periods on RBC quality [1]. Results showed significant decreases in 2,3-diphosphoglycerate (2,3-DPG) levels after 24 hours (53.4% ± 10.4% vs. 21.1% ± 6.3%). ATP levels remained stable for 6 hours, then decreased.

Effects on Platelets: - Platelets are another critical blood component, requiring optimal storage conditions to maintain functionality. Research by Pietersz et al. (1992) demonstrated that platelet yield and quality were not significantly affected by 24-hour holding periods [1]. However, van der Meer et al. (2003) reported decreased platelet count after 24 hours [2].

Effects on Coagulation Factors:- Coagulation factors, such as Factor VIII and Factor XI, are essential for blood clotting. Pietersz et al. (1992) found significant decreases in Factor VIII levels after 24-hour holding periods (80% ± 3% vs. 90% ± 5%) [1]. The Council of Europe (2013) emphasizes the importance of optimal holding times for maintaining coagulation factor potency [3].

Comparison of 6-Hour and 24-Hour Holding Periods:- Studies comparing 6-hour and 24-hour holding periods have yielded varying results. Heaton et al. (2010) reported significant decreases in ATP levels and 2,3-DPG after 24 hours [4]. In contrast, Pietersz et al. (1992) found no significant difference in platelet quality between 6-hour and 24-hour holding periods [1].

Benefits and Limitations of Extended Holding Times:- Extended holding times offer several benefits, including:
1. Improved transportation and processing efficiency
2. Enhanced platelet pool formation
3. Reduced errors due to daytime processing

However, limitations include:
1. Decreased RBC quality

2. Potential loss of coagulation factor potency
3. Increased risk of bacterial contamination

Regulatory Guidelines

Regulatory agencies, such as the Food and Drug Administration (FDA), provide guidelines for blood component storage and processing. In India, FDA guidelines mention that platelets and plasma should be separated within six to eight hours of whole blood collection. In many countries, the holding time is 8 hours to 24 hours (overnight) to allow platelet preparation. Their FDA permits 24-hour room temperature hold for apheresis plasma [5]. International guidelines recommend optimal holding times for blood components to maintain quality and safety.

Conclusion

The holding time between blood collection and processing significantly impacts blood component quality. Understanding the effects of 6-hour and 24-hour holding periods informs optimal storage conditions and processing protocols. While extended holding times offer benefits, limitations must be considered. More studies with red cells stored as components in additive solutions suggests that the regeneration rate depends on overall product quality. It is observed that the platelet yield in PCs prepared from an overnight-hold whole blood sample was significantly higher. For frozen plasma (FP), no significant differences were observed for the coagulation factors FII, FVII, FV, F IX, FX, and FXI; fibrinogen; and von Willebrand factor content between the 6 and 24 hour Frozen plasma. The FVIII was the component that was most sensitive to the prolongation of production time and it only had 80% of the activity of the 8-hour Fresh plasma. However, the overall functionality of the plasma seems unaffected [6]

Lastly, the study by Högman et al [7] demonstrates that white cells ingest bacteria, which either are killed or can be removed by buffy coat removal or filtration before the white cells starts to disintegrate and release the remaining viable bacteria. Continued research and adherence to regulatory guidelines ensure the safety and efficacy of blood transfusions.

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Topic: Blood component therapy in Hematological Malignancies

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Blood component therapy plays a critical role in the management of patients with hematological malignancies and those undergoing bone marrow transplantation. Anemia and thrombocytopenia serves as the presenting features is almost all type of blood cancer. The primary goal of this therapy is to support the patient's blood counts at presentation and during anticancer therapy, prevent complication and improve the quality of life. Blood component therapy encompasses the transfusion of leucodepleted and preferably irradiated packed red blood cells, single and random donor platelets, and granulocyte infusions.

Red Blood Cell Transfusion: Anemia is multifactorial in blood cancers. At presentation, the etiologies are marrow infiltration, immune, nutritional and it may happen during chemotherapy, immunotherapy, targeted therapies and BMT. RBC transfusions are indicated in patients with symptomatic anemia, with a hemoglobin (Hb) target of 7-8 g/dL. A restrictive strategy to maintain Hb above 7 g/dL is preferred, unless the patient has documented comorbidity warranting higher threshold. Complications during therapy, mainly sepsis, pneumonia etc may also warrant a higher threshold of 8 g/dL. A restrictive transfusion strategy has been shown to reduce transfusion-related complications (iron overload, alloimmunization, transfusion transmitted infections) without negatively affecting patient outcomes. Deferoxamine or other iron-chelating agents are often required to prevent organ damage due to excessive iron accumulation in overtly transfusion patients in diseases like myelodysplastic syndrome. A leucodepleted, irradiated and phenotype matched product is preferred. Patients on monoclonal antibody therapy like anti CD38 (daratumumab) may pose cross matching challenges and clinical information is paramount before dispensing blood product. Extended RBC antigen profiling is advisable before starting such monoclonal antibody therapy.

Patients undergoing BMT frequently develop anemia due to bone marrow suppression from the conditioning regimen, immune related in ABO mismatched transplants, graft failure, or due to viral and drug effects. A threshold similar to those in hematological malignancies, with a hemoglobin level of 7-8 g/dL being the trigger for transfusion in stable, non-bleeding patients is recommended by most guideline.

Platelet Transfusion: Thrombocytopenia is another hallmark of hematological malignancies and can be a major cause of bleeding complications. Platelet transfusion thresholds vary depending on the clinical context. The ASCO guidelines recommend prophylactic platelet transfusion for patients with platelet counts below 10,000/µL. Another strategy is to transfuse platelet on first sign of bleeding, usually employed in experienced center. Nonetheless, ongoing consumption due to multiple factors like dynamics of platelet reduction due to chemotherapy effect, sepsis, drugs known to potentiate thrombocytopenia should be considered while deciding the transfusion threshold. Invasive procedures like bone marrow can be done at any platelet count, but intrathecal therapy needs a platelet count between 30,000 to 50,000/µL based on various guideline. Similar thresholds are advised in BMT, however, irradiated platelets are recommended post-transplant.

Granulocyte Transfusions: For patients with prolonged neutropenia with severe neutropenic sepsis either following an intensive chemotherapy or BMT, granulocyte transfusions may used. However, concrete evidence is lacking in this behest, at the randomised trail needed to show its efficacy seems to be undoable. Prophylactic considered. While G-CSF is commonly used to stimulate neutrophil recovery, granulocyte transfusions may provide temporary support in cases of severe infection unresponsive to antibiotics. The ASCO and BSH guidelines recommend these therapies in carefully

selected patients, based on the risk of life-threatening infections and the failure of other interventions. Although there are no convincing data of safety or efficacy of granulocyte transfusions we concede the absence of evidence is not evidence of absence. Granulocyte transfusions remain a seemingly logical therapy of resistant infections in persons with granulocytopenia. People want to believe they are safe and effective despite no convincing data and some data suggesting they are neither.

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Therapeutic apheresis in neurological disorders

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The word "apheresis" is derived from the Greek word "apheresis" which means "to separate" or "to remove." Apheresis is a procedure performed by an automated device in which whole blood is removed from a subject and separated into its components extra-corporeally; enabling the desired blood component to be removed, while the remaining ones are re-infused with or without the use of replacement fluid (FFP, Albumin). Apheresis can be used for either the collection of blood products, or therapeutic purposes. Therapeutic procedures commonly include therapeutic plasma exchange (TPE) and RBC exchange. Therapeutic plasma exchange (TPE) is an extracorporeal blood purification technique used to remove high molecular weight substances from the plasma like immune complexes, autoantibodies, endotoxin, cryoglobulins, cholesterol-containing lipoproteins and myeloma light chains etc.

Therapeutic Plasma exchange is a well-established, first line treatment modality used in many neurological disorders in which autoimmunity plays a major role. Various studies have demonstrated that TPE plays an important role in neuro-immunological disorders (eg. Guillain-Barré syndrome, myasthenia gravis and other forms of immune neuropathies). The plasma exchange reduces inflammatory cytokines, complements activating antibodies, and leads to an improvement of neurological symptoms. TPE is no standalone treatment but often combined with immunosuppressive therapy. The treatment with TA improve the clinical outcome of patients, reducing acute or chronic neurological symptoms.

Principles of TA in Neurologic Diseases

1. The treatment with TA should improve the clinical outcome of patients reducing acute or chronic neurological symptoms.
2. The informed consent of the patient should carefully weight risk and benefit of the apheresis treatment considering alternative therapy.
3. Most prevalent indications of TPE are acute progressive neuropathies with an antibody based immune etiology.
4. The replacement fluids of TPE are albumin or saline. Electrolytes (e. g. calcium) have to be monitored and substituted. In intensive TPE protocols, depletion of plasma proteins may cause coagulation factor deficiency (e. g. fibrinogen). Monitoring is required to recognize electrolyte and immunoglobulin deficiency. Thus, replacement strategies have to be prepared and described in protocols prior to TA.
5. The processed blood volume of 1.0–1.5 plasma volumes showed the best efficiency of plasma exchange in TPE.
6. The starting frequency of TA is recommended with 3–5 treatment procedures per week for a period of 1–3weeks.
7. The therapy control in neurological disorders during TA is mainly the improvement of acute or chronic neurological symptoms.
8. The treatments of TPE or IA alone or in combination with IVIG are appropriately used as short-term treatments in patients with life threatening symptoms in MG (i.e., MG crisis), in severe GBS, or in chronic neuropathies.
9. The frequency of TA depends on the improvement of the neurological symptoms of the patients

Indications: TA in neurological disease (adapted from ASFA Guidelines, 2019)

Disease	TA MODALITY	Indications	Category	Grade	Timeline/procedure frequency
Acute disseminated encephalomyelitis (ADEM)	TPE	Steroid refractory	II	2C	5-7 treatments, every other day, clinical response within days
Acute inflammatory demyelinating polyradiculoneuropathy (GBS)	TPE IA	Primary treatment Primary treatment	I I	1A 1B	Exchange 1–1.5 plasma volumes, 5-6 times over 10–14 days; some patients may need additional treatments
Age related macular degeneration, dry	Rheopheresis	High-risk	II	2B	Clinical benefit of a single course of treatment, reported to last for up to 4 years; repeated treatment over several years not systematically investigated
Amyloidosis, systemic	TPE	Other causes	IV	2C	NA
Chronic focal encephalitis (Rasmussen encephalitis)	TPE		III	2C	NA
Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP)	TPE IA		I I	1B 1B	TPE or IA short-term benefit, rapid deterioration may occur; maintenance treatment may be necessary, with repeated TPE, IA (2-3/week or monthly until improvement); frequency tailored to symptoms and tolerability of the patient
Complex regional pain syndrome	TPE	chronic	III	2C	NA
Lambert-Eaton myasthenic syndrome	TPE		II	2C	Treatment until clear clinical and EMG response, at least 2–3-week course of TPE. Repeated courses in case of neurological relapse. TPE regimens: 5–15 TPE over 5–19 days to 8–10 TPE, at 5–7-day intervals
Multiple sclerosis	TPE IA TPE IA	Acute attack/ relapse Acute attack/ relapse Chronic Chronic	II II III III	1A 1B 2B 2B	Acute MS attack/relapse unresponsive to steroids, 5–7 TPE or IA procedures (response rate: >50%). Frequency: Acute attack/relapse: 5–7 TPE over 10–14 days NA
MG	TPE/IA TPE/IA	Acute short-term treatment Long-term treatment	I II	1B 2B	Acute attack/relapse or unstable disease activity, frequency: 3-6 treatments over 10–14 days; weekly to bi-weekly. Individually adjusted number of treatments for chronic treatment
Neuromyelitis optica spectrum disorders (NMOSD)	TPE IA TPE	Acute attack/ relapse acute attack/relapse Maintenance	II II III	1B 1C 2C	Acute attack/relapse: daily or every other day. 5 procedures on average for acute exacerbation; range: 2–20 procedures. Early initiation of apheresis (≤5 days since clinical onset). Individually adjusted intervals for maintenance treatment
N-methyl-D-aspartate receptor antibody encephalitis	TPE/IA		I	1C	5-12 treatments with TPE or IA over 1–3 weeks; individually adjusted number of and intervals between treatments. If patients do not improve rapidly after TPE or IA, longer periods are required
Paraneoplastic neurological syndromes	TPE/IA		III	2C	NA
Paraproteinemic demyelinating neuropathies; Chronic acquired demyelinating polyneuropathies	TPE TPE TPE TPE	IgG/IgA/IgM Anti-MAG neuropathy Multiple myeloma Multifocal motor neuropathy	I III III IV	1B 1C 2C 1C	Typical course is 5–6 treatments over 10–14 days, regimen guided by clinical response NA NA
Pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections (PANDAS); Sydenham's chorea	TPE TPE	PANDAS exacerbation Sydenham's chorea, severe	II III	1B 2B	Daily or every other day. Three to 6 procedures over 1–2 weeks NA

Progressive multifocal leukoencephalopathies (PMLs) associated with natalizumab	TPE	III	1C	NA
Steroid-responsive encephalopathy associated with autoimmune thyroiditis (Hashimoto's encephalopathy)	TPE	II	2C	Daily to every other day 3–9 procedures, mostly commonly 5
Stiff-person syndrome	TPE	III	2C	NA
Sudden sensorineural hearing loss	LA/ rheopheresis/ TPE	III	2A	NA
Voltage-gated potassium channel (VGKC) antibody related diseases	TPE/IA	II	1B	5–10 treatments with TPE or IA over 7–14 days adjusted to the individual curse. Disease activity/symptom severity monitored by anti-VGKC titers. Treatment course: response of clinical symptoms

Conclusion: TA is a well-established treatment and safe in acute neuropathies with an immune etiology. Recent studies also evaluate special apheresis technology (i.e., immunoadsorption [IA], small volume plasma exchange) to treat neurological disorders. The indication for IA depends on the availability of that technology and the increasing evidence by RCTs.

Patient Blood Management and Transfusion Strategies in Perioperative Settings

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The use of allogeneic blood transfusion to manage anaemia and blood loss is a concept that originated several centuries ago and has changed little over the years. In the past four decades, increased awareness of the inherent risks of transfusion has resulted in major initiatives to mitigate those risks through improvements in blood component safety. The realization that the intense focus on product safety had not been matched with a similar focus on improving transfusion decisions at the bedside, led to the concept of "optimal blood use". The concept that "our own blood is still the best thing to have in our veins" has given rise to various surgical "blood conservation" techniques.

"Patient blood management" (PBM) is a patient-centred approach that addresses iron deficiency, anaemia, coagulopathy and blood loss, in both surgical and nonsurgical patients. PBM encompasses all aspects of the transfusion decision-making process, beginning with the initial patient evaluation and continuing through clinical management. PBM views a patient's own blood as a valuable and unique natural resource that should be conserved and managed appropriately (1).

The main objectives of PBM are: 1) improving red cell mass, including treatments such as erythropoiesis-stimulating agents and iron and vitamin supplements; 2) minimising blood loss, e.g., by optimising surgical and anaesthetic techniques, treatment with tranexamic acid and autologous blood salvage; and 3) harnessing and optimising the tolerance of anaemia by promoting maximum pulmonary and cardiac function and the use of a restrictive transfusion threshold (2).

The perioperative continuum of care provides different stages to ensure that patients are properly evaluated and treated. In the preoperative setting, the optimization of anemia carries the most significant value through raising hemoglobin values to levels high enough to minimize reaching the transfusion threshold while also enhancing overall oxygen delivery (3). Intravenous (IV) iron therapy is recommended when oral iron is not tolerated. Timing of the surgery where the planned procedure is less than 4–6 weeks could also be an indication for parenteral iron therapy. Erythropoiesis stimulating agents therapy can be effective in treating patients with anaemias of inflammation, chronic kidney disease, or patients with iron deficiency anaemia not responsive to iron therapy alone (4). Autologous blood transfusion is another option wherein one study reported that the preoperative hemoglobin was significantly lower in the autologous donation group compared to control group (5).

In the intraoperative setting, the leverage of cell-saver technology, as well as optimization of coagulopathy, acute normovolemic hemodilution (ANH), can mitigate the risk of blood product use; however, awareness of appropriate indications as well as of dosing of blood products promotes a high-value approach and minimizes wastage (6). As far as the non-transfusion PBM-related therapies are concerned, a prominent role is played by TXA. Several large RCTs and meta-analyses have consistently confirmed that the intravenous administration of TXA can effectively and safely reduce perioperative blood loss and transfusion requirements in total hip and knee arthroplasty (7). TXA use after the induction of general anaesthesia in total knee arthroplasty can be a fast, inexpensive, and effective opportunity to reduce perioperative blood loss also in patients on chronic antithrombotic treatment (8). Combined intravenous and topical TXA is more effective than TXA alone in terms of reduction in blood loss, haemoglobin decline, and need for transfusion without increasing the rate of thromboembolic complications (9).

In the postoperative realm, it involves ensuring appropriate monitoring of ongoing blood losses, as well as monitoring the patient for potential complications associated with postsurgical anemia,

such as myocardial ischemia in noncardiac surgery. Many of the procedure used preoperatively and intraoperatively may also be used in the postoperative period to prevent or mitigate anaemia. Using smaller sample testing tubes, Post-operative nutrition, coagulation function assays may significantly decrease blood loss (10).

PBM is regarded as a standard of care, especially in surgical procedures associated with perioperative bleeding risk. One study reported an overall 13.9% reduction in transfused RBC units and an odds ratio (OR) of receiving RBC transfusion of 0.86 (95% confidence interval [CI] 0.85-0.87) with implementation of PBM (11). From its origins as a strategy for surgical patients, it is being applied in the care of medical and surgical patients, pregnant women, neonates, children, adolescents, elderly people and the population as a whole. The overarching aim of PBM is to improve patient outcomes, while saving health care resources and reducing costs.

More challenging than the dissemination of knowledge about PBM is its implementation. Current patterns of practice are long-standing and deeply ingrained. Implementation of PBM involves an unusually large number of disparate stakeholders whose interactions need effective management. PBM implementation requires a change in culture and behaviour, structural adjustments in health services delivery and redirection of scarce resources. Hospital transfusion committees that are product-centred should be restructured as hospital PBM committees with a focus on patient management. Robust data collection and reporting of outcomes is essential to support this change. Physicians and others must unlearn and abandon some old practices to enable them to adopt the broad, integrated approach of scientifically based PBM.

To conclude, effectively managing perioperative anemia involves several key practices. These include using iron supplements and erythropoiesis-stimulating agents before surgery, employing blood conservation techniques such as intraoperative cell salvage and ANH during surgery, and utilizing hemostatic agents. Additionally, minimizing unnecessary blood draws, optimizing nutrition, and carefully using medications in the postoperative phase are crucial. Adopting these best practices can significantly improve perioperative anemia management.

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The Value and Impact of NABH Blood Bank Accreditation Program on Blood Bank Services in India

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The Quality Council of India (QCI) is an autonomous body established by the Government of India in 1997, with the primary aim of promoting quality standards across various sectors in the country. Its mission is to establish a framework for the development and implementation of quality standards and to ensure that India's products and services meet global benchmarks. The QCI operates through different boards and councils, focusing on enhancing the quality of both private and public sector organizations. It works to ensure that businesses, healthcare institutions, educational systems, and other sectors consistently adhere to internationally recognized quality standards, ultimately contributing to India's economic growth and global competitiveness.

One of the key initiatives under the QCI is the National Accreditation Board for Hospitals and Healthcare Providers (NABH), which was established to support and promote the quality and safety of healthcare services in India. NABH provides accreditation to hospitals, healthcare providers including blood banks, ensuring they meet stringent national and international standards for patient safety, quality management, and healthcare delivery. NABH accreditation is a mark of excellence, demonstrating an organization's commitment to high standards of care, ethical practices, patient safety, and continuous improvement in service quality.

Through NABH, the QCI helps raise the bar for healthcare providers in India by setting up clear guidelines, conducting assessments, and offering a platform for healthcare organizations to demonstrate their competence and quality. The aim is not only to improve healthcare service delivery but also to foster trust among patients, healthcare professionals, and the public at large.

NABH Accreditation Standards for blood banks
NABH (National Accreditation Board for Hospitals and Healthcare Providers) Accreditation for blood banks significantly enhances the safety, quality, and efficiency of blood banking services. By adhering to stringent standards, NABH ensures that blood banks follow best practices in the collection, processing, storage, and distribution of blood and blood products, thereby reducing the risk of contamination and ensuring high-quality products. This accreditation also prioritizes patient safety, minimizing the chances of transfusion-related complications and errors such as mismatched blood types.

Moreover, NABH encourages the adoption of standardized procedures, which improves operational efficiency and ensures that blood banks comply with both national and international regulatory requirements. The accreditation process also emphasizes continuous staff training and competence, further enhancing the quality of service and minimizing risks. Blood banks that achieve NABH accreditation gain greater credibility, instilling confidence in both donors and patients. With a focus on continuous quality improvement, ethical practices, and risk management, NABH accredited blood banks demonstrate a commitment to maintaining the highest standards of patient care and safety. Ultimately, this accreditation not only strengthens the blood bank's operations but also enhances public trust and promotes global recognition.

The standards lay emphasises on Donor Screening, Testing, Storage, Processing and Safety Protocols. Presently NABH Blood bank standards are in its 3rd edition of accreditation standards and is in the process of revising the standards, which will be available soon. Presently blood banks under the NABH accreditation program have been categorised into three categories based on the number of blood units being collected i.e. < 5000 unit per annum, 5001 – 20000 unit / annum and > 20, 000 / annum.

Comparison between Blood Bank Accreditation standards 4th Edition and 3rd Edition
Here are the key points from the latest 6th edition hospital standards approach:
1. Accreditation is now granted for a 4-year cycle (previously 3 years).
2. 3rd edition approach was on ISO standards which are now changed to NABH approach of standards which now includes Core, Commitment, Achievement, and Excellence elements.
3. Final assessment requires compliance with Core and Commitment elements.
4. Surveillance assessment requires compliance with Core, Commitment, and Achievement elements.
5. Renewal assessment requires compliance with Core, Commitment, Achievement, and Excellence elements.

Salient Features of Blood Bank Accreditation Standards 4th Edition

4th Edition is incorporated by 7 Chapter approach which are specifically designed to promote quality in blood bank and ease the accreditation process.

The Responsibility of Management emphasizes the legal identity and constitution that define the scope of management's responsibility and authority. It ensures that roles, responsibilities, and interrelationships of those involved in management are clearly defined and documented.
Management is accountable for managing services ethically, while also being responsible for the design, implementation, maintenance, and continuous improvement of the Quality Management System (QMS). Furthermore, effective mechanisms are put in place to manage disaster situations and mass casualty events.

Facility Management & Safety ensures that the design and construction of the blood center comply with all relevant regulatory requirements. The environment and facilities are operated in a safe, planned manner, addressing biological, chemical, and radiation safety concerns, as well as fire and non-fire emergencies. The management team is also involved in organizing blood donation drives and mobile blood collection, ensuring that these events meet all accommodation and environmental guidelines for safety and efficiency.

A dedicated chapter on Human Resource Management covers key aspects such as staff recruitment, job specifications, and job descriptions. It also addresses the training and appraisal systems for staff, as well as measures to reduce healthcare-associated infections among staff and ensure their overall well-being.

Another dedicated chapter is focused on the Management of Equipment and Supplies, detailing the processes for the selection, installation, and performance verification of equipment. This section also covers the proper storage of blood and its components.

Technical and Process Control have been combined into a single chapter, which includes guidelines for the safe, sufficient, and timely supply of blood and blood components. It also covers essential processes such as donor screening, blood collection, post-donation counselling, the management and reporting of adverse donor reactions, and the safe storage of packed red blood cells, plasma, and their components. Additionally, this chapter addresses the transportation and storage of blood components, biomedical waste management, it also focuses on both internal and external quality control measures.

A dedicated chapter on Blood Safety and Quality Improvement focuses on safety programs that cover all aspects of blood transfusion services. This chapter emphasizes the reporting and handling of both internal and external system and process failures, including root cause analysis. It also outlines

continuous monitoring programs, quality improvement initiatives, addressing complaints and feedback, conducting internal audits, and the roles of the Hospital Transfusion Committee.

A final chapter focuses on Information Management System, which covers the information needs of donors, patients, visitors, staff, and regulatory agencies. It outlines the management and control of data, the digitization of documents and records, and the installation, validation, usage, and training of computer systems to ensure smooth operation and compliance.

Role of Transfusion Medicine Specialist in Regenerative Medicine

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Introduction:

One of the main goals of transfusion medicine is to provide a safe and effective supply of blood products for the treatment or prevention of disease. Over the years, a segment of transfusion medicine has developed broad expertise in apheresis technology, cell and tissue cryo-banking, quality management, and good manufacturing practice (GMP). It comes as no surprise that transfusion medicine in the last 15–20 years has made huge leaps forward toward novel cell therapies, immunotherapies, and regenerative medicine.

Regenerative Medicine:

Regenerative medicine is an emerging field that harnesses the body's own healing capacity to enhance tissue recovery, decrease pain, and improve functionality. Regenerative medicine comprises approaches such as cell-based therapy, gene therapy, and tissue engineering that influence cell proliferation, interaction, and extracellular matrix restoration.

Role of Transfusion Medicine:

Novel cell therapies developed in the field of transfusion medicine in the beginning relied on two major cell sources: bone marrow and peripheral blood. During the last two decades autologous platelet and leukocyte rich products such as platelet rich plasma (PRP) & platelet rich fibrin (PRF) have opened new perspectives in regenerative medicine.

Platelet-rich plasma (PRP):

It has emerged as a therapeutic approach over two decades ago and has garnered increasing attention in recent decades. These growth factors play a **pivotal role** in directing cellular fate with regard to processes such as migration, proliferation, differentiation, apoptosis, and angiogenesis

Limitations with the use of PRP in clinical therapy :

- ❖ lack of reproducibility:
  - Non-standardized separation methods
  - Platelet content in the primary source samples,
  - Donor variability
  - Storage conditions
  - Activation protocol
  - The requirement for Autologous platelets presents

a limitation in its safety application.

- ❖ PRP formulations into clinical practice requires compliance with existing regulatory frameworks.

Affect the cell profile & secretory components of the final product

•The ability of **Extra Cellular Vesicles (EVs)** to transport proteins, nucleic acids and lipids to target specific tissues and maintain the **stability of therapeutic cargo** makes EVs interesting as part of new strategies for the treatment of various diseases.

•**Platelet-derived EVs** contribute to the majority of blood EVs (up to **70%–90%).**

Extracellular vesicles and coagulation in blood from healthy humans revisited. Berckmans RJ, Lacroix R, Hau CM, Sturk A, Nieuwland R *J Extracell Vesicles*. 2019;8(1).

•Many critical **bio-molecules** are in abundance in PRP-EVs, including :
- •Growth factors, cytokines, chemokines, lipids and nucleic acids,
- •Procoagulant and anticoagulant,
- •Pro-inflammatory and anti-inflammatory,
- •Proangiogenic and antiangiogenic factors.

Fig: The components and features of PRP-EVs support their prospective *therapeutic application* in regenerative medicine.

Platelet derived Extracellular Vesicles Extracellular vesicles (pEVs):

pEVs are promising therapeutic agents that are derived from platelets and have been reported to support the paracrine function associated with progenitor cells. pEVs are small particles (50 nm to 1000 nm) released by cells in the body, are involved in cell-to-cell communication in vivo and are found in all fluids and tissues in the body.

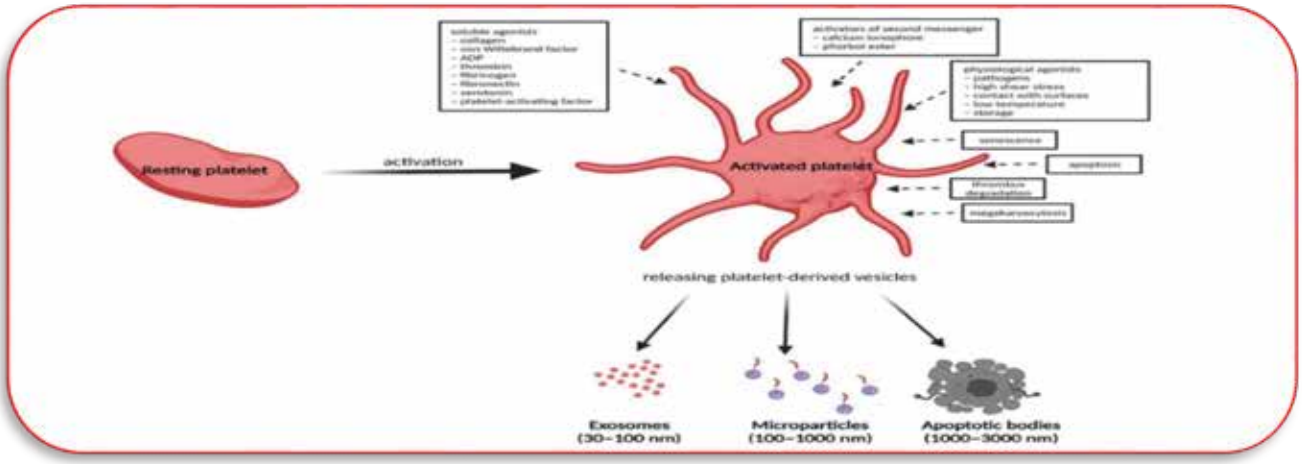

Fig: Activation process of anucleated platelets and release of multiple EVs

Role of pEVs:

Currently pEVs are being explored as "Cell Free" therapeutic tools and have been extensively studied for their role in stimulating tissue regeneration by conferring pro-angiogenic, proliferative, anti-apoptotic and anti-inflammatory actions through transport of their protein cargo and RNAs. They may be useful for developing prospective therapeutic applications in haemostasis, tissue regeneration, immunomodulation and drug-delivery vehicles.

Characterization Techniques for pEVs:

- Antibody-specific to exosome include:CD9,CD81,EPCAM, CD63
- Transmission Electron Microscopy (TEM)
- Nanoparticles Tracking Analysis (NTA)
- Protein content analysis

Advantages of pEV over cell based therapies:

1. Can be kept for long time without losing their abilities
2. Better integrate with target cells
3. Travel freely across capillaries and various barriers such as Blood Brain Barrier
4. Readily manipulated and engineered
5. Injection of Exosomes is easier than that of Cell therapy

Conclusion :

Thus pEVs based treatments are more promising because of their more well-defined processes. The bilayer architectures and chemokines, cytokines, microRNA, mRNA and immunomudulatory substance components endow stem cell derived Exosomes with excellent pharmacokinetics, properties , biocompatibilities and tissue targeting capacity.

Newer biologics in management of Hemophilia

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Intravenous factor replacement, the mainstay treatment for haemophilia, presents a number of clinical challenges, such as the need for frequent injections because recombinant factors have a short half-life, the difficulty of administering the medication intravenously (especially for patients with difficult venous access), and the possibility of inhibitor development. These have a detrimental effect on treatment compliance and quality of life, emphasising the need for better therapies. Rebalancing the clotting cascade is the goal of several innovative pharmacological treatments developed for haemophilia, which may help overcome the difficulties stated above. The circulating half-life of standard recombinant factors is extended; factor VIII cofactor activity is simulated; coagulation is rebalanced by targeting natural anticoagulants like antithrombin and tissue factor pathway inhibitors; and endogenous factor production is stimulated with gene therapy. These therapies employ a variety of different mechanisms.

In the first two decades of the third millennium, haemophilia treatment has made significant advances, although the breakthrough started in 1946 when the fractionation of plasma was first described. The first concentrates came after the first attempts at replacement therapy in the early 1960s, when FVIII was found in the cryoprecipitate of frozen plasma and FIX in the supernatant. Unfortunately, because these concentrated products were extracted from large industrial collections of plasma derived from thousands of donors, people with haemophilia (PWH) were given concentrates contaminated by hepatitis A, hepatitis C, and human immunodeficiency virus due to a lack of methods for screening for viral pathogens. Thankfully, by 1985, appropriate virucidal methods and viral screening methods had been discovered, making concentrates safe. The introduction of chromatography processes using monoclonal antibodies to the production process resulted in increasingly pure products. There is currently no effective solution to the problem of exogenously delivered concentrates' immunogenicity. The most severe side effect of replacement therapy is the formation of alloantibodies to FVIII in around 25–35% of PWH. The cloning of the F8 and later F9 genes was the next significant development, opening the door for the production of factor concentrates using recombinant DNA technology. In the plasma of individuals with haemophilia A and B, the administered FVIII and FIX proteins had a very brief circulation half-life of roughly 12 and 18 hours, respectively. By conjugating the factor molecule with the fragment crystallisable of IgG1 or albumin, or by adding polyethylene glycol, it became possible to increase the half-life of concentrates, particularly for rFIX, and to prolong the plasma half-life and the interval between injections. The introduction of permanent and possibly curative treatments, including gene addition therapy, represents the next frontier in haemophilia treatment. Haemophilia B experiments have shown long-lasting effects.

Unfortunately, gene therapy has not shown as impressive outcomes for haemophilia A, and durability needs to be proven. However, there is still uncertainty regarding the long-term safety, predictability, durability, and effectiveness of gene therapy for haemophilia A and B. Only healthy adult PWH are currently involved in clinical trials for gene therapy. Before gene therapy becomes widely used, research must also be done on its applicability to youngsters and people who already have antibodies to the delivery vector.

By minimising the current challenges associated with mainstay factor replacement, the therapies mentioned above have the potential to completely revolutionise the management of haemophilia.

Leucodepletion

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Leucocytes represent less than 1% of all blood cells and the different subtypes of leuckocytes are neutrophil, eosinophil, basophil, monocyte and lymphocyte. Leucocytes are known to recognize and eliminate a vast variety of foreign antigens such as virus and bacteria, thus, protecting the body against infections. It can distinguish between self and non-self cells on basis of human leukocyte antigen (HLA) proteins present on the cell membrane of nucleated cells. During blood transfusion, the donor leucocytes present in the blood component are transfused to the recipient. These donor leucocytes are recognized as foreign cells by the recipient's immune system, thus, leading to leucocyte mediated adverse events.

Leucodepletion (LD) is a process by which leucocytes are removed from the donated blood or blood components such as red blood cell (RBC) and/or platelets. The average content of leucocytes in donated whole human blood is 10^9 per unit and leuco-depleted (LD) blood unit contains less than 5 x 10^6 leucocytes. Leucodepletion is mandatory in Canada, France, Germany, Netherlands, England, Scotland, Wales and Portugal, whereas it is voluntary in United States. Currently, LD is not mandatory in India; however, it is recommended that it should be performed.

Methods for LD can be classified on the basis of log reduction into three categories: (i) low performance (<90%, 1 log reduction): saline wash, buffy coat removal (ii) intermediate performance (90-99.9%, 1-3 log reduction): freezing and deglycerolisation, differential centrifugation, early adhesion based filters (modified cotton wool or cellulose acetate) and (iii) high performance (>99.99%, 4 log reduction): third or fourth generation filters (combines size retention, electrostatic attachment and receptor ligand interactions).

Of all the methods available for LD, filtration remains the most efficient method which results in more than 90% leucocyte removal along with minimal blood loss. Leucocyte reduction filters are broadly of two types: (i) inline filters: integral part of the blood collection bag and (ii) post-collection filters: separate filter is attached to remove leucocytes from blood before bag is issued to the recipient or at patient's bedside. Typical leucoreduction filters have a pore size ranging from 20-40 microns for RBCs and 0.2-0.5 microns for platelets, thus, allowing for effective removal of leucocytes without damaging the blood component.

LD can be further classified into three categories based on timing of leucocyte removal (i) pre-storage: after collection of blood from blood donor, (ii) post-storage: after storage of blood but before issued to recipient for transfusion and (iii) bedside: at time of transfusion using filter at patient's bedside. Timing of the leucodepletion is the important aspect in ensuring patient safety. Pre-storage LD is more effective than post-storage LD in preventing leucocyte mediated adverse events. During storage, leucocytes degranulate, fragment or die, thus, releasing their contents that can result in febrile and allergic transfusion reactions. Accumulation of cytokines especially IL-8 during storage have been implicated for bedside LD failure to prevent febrile reactions. American and Indian standards specify that LD blood component should contain less than 5 x 10^6 leucocytes per unit, whereas the European standards specify that leucocyte content should be less than 1 x 10^6 leucocytes per unit.

The proven benefits of LD blood component transfusions are reduced risk of febrile non-hemolytic transfusion reaction (FNHTR), HLA alloimmunization that may lead to patients becoming refractory to platelet transfusions, and leucotropic virus transmission especially cytomegalovirus (CMV). Apart from this, other possible benefits of LD are reduced risk of Yersinia Enterocolitica contamination of RBC, possible reduction of Prion Disease and reduction in incidence of transfusion associated graft versus host disease (GVHD).

The clinical indications for transfusion of LD blood components are immunocompromised patients (organ transplant recipients, HIV patients, cancer patients undergoing chemotherapy),

neonates/pediatric patients, transfusion dependent patients (thalassemia, sickle cell disease) and patients with history of severe reactions to previous transfusions or recurrent FNHTRs.

Two of the major limitations of LD are cost of the leucoreduction filters which add to the cost of blood collection and loss of RBC/platelet due to adhesion to filters. This is an investment for patient safety but cost can be a barrier in resource constraint settings. Thus, there is a need for more efficient and cost effective filters. Another aspect to be kept in mind is that LD helps migitate but does not eliminate all types of transfusion reactions particularly hemolytic or allergic reactions. Despite these limitations or challenges, LD is an essential practice which aims at improving patient safety by reducing transfusion reactions, alloimmunization and risk of CMV infections. Universal pre-storage LD is best method in transfusion practice but it is not a cost effective strategy in resource constraint settings.

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HEMOGLOBINOPATHIES- THALASSEMIA-Transfusion and Transplant

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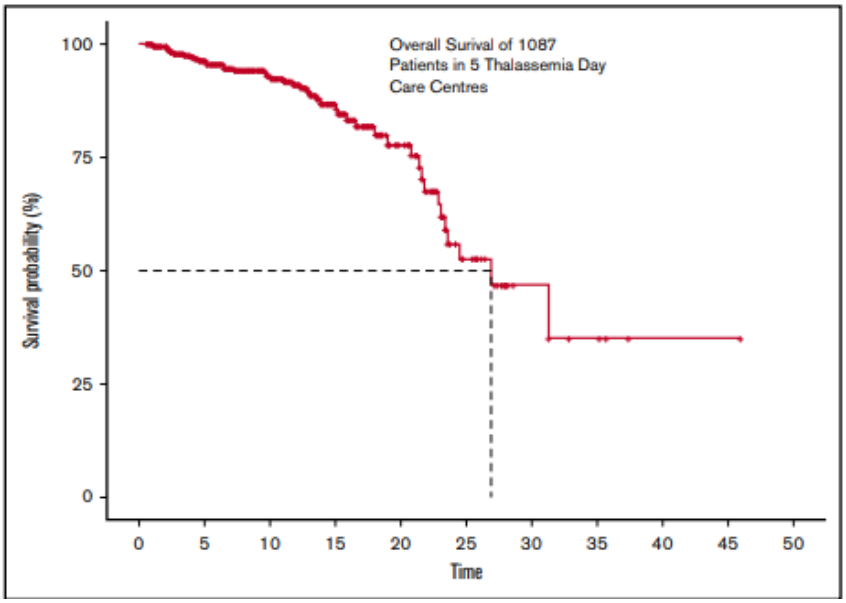
Beta- Thalassemia- is a disorder of B globin gene and is characterized by abnormal and ineffective erythropoesis.The only known approved cure is an allogeneic stem cell transplant. Gene therapy is investigational and not freely available yet.

Therapy for Thalassemia involves

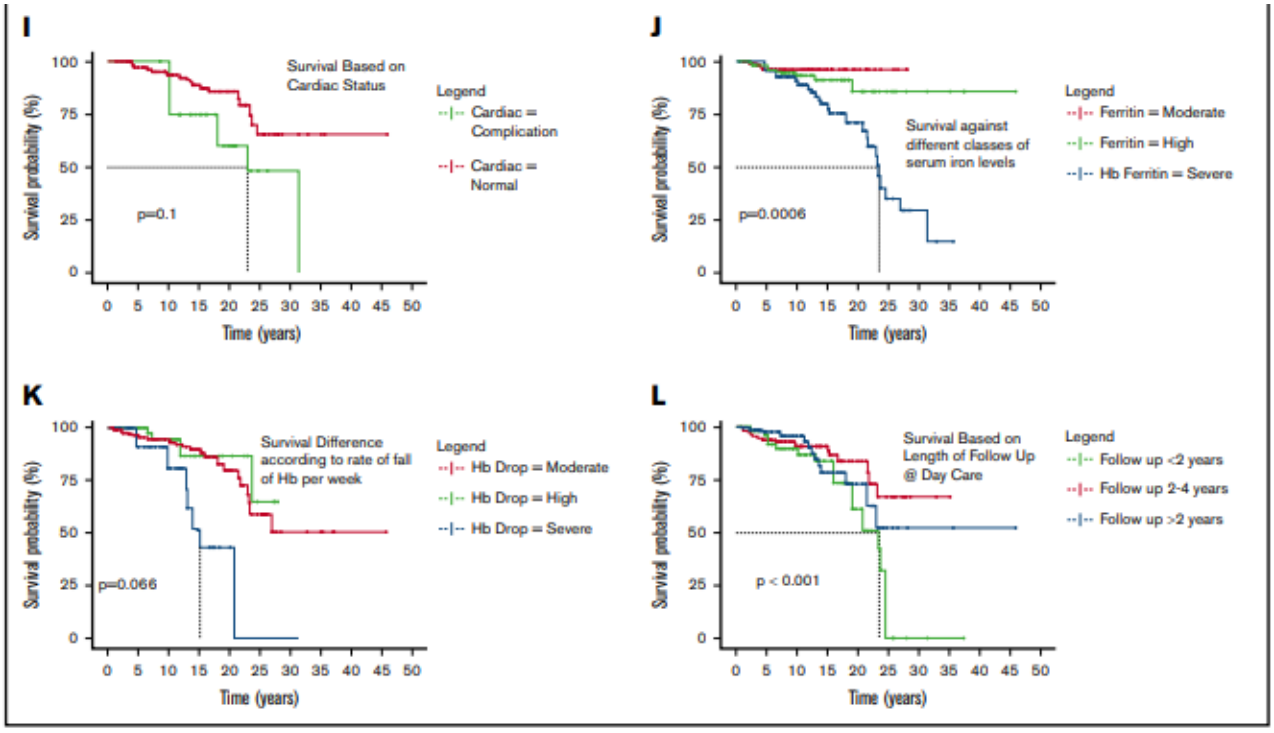
- **Transfusions**
  – Monthly for life
  – Correct anemia
- Hyper-transfuse to suppress erythropoiesis
  – Prevent bone complications
  – Improve growth and development

- **Chelation** -needed to treat iron overload

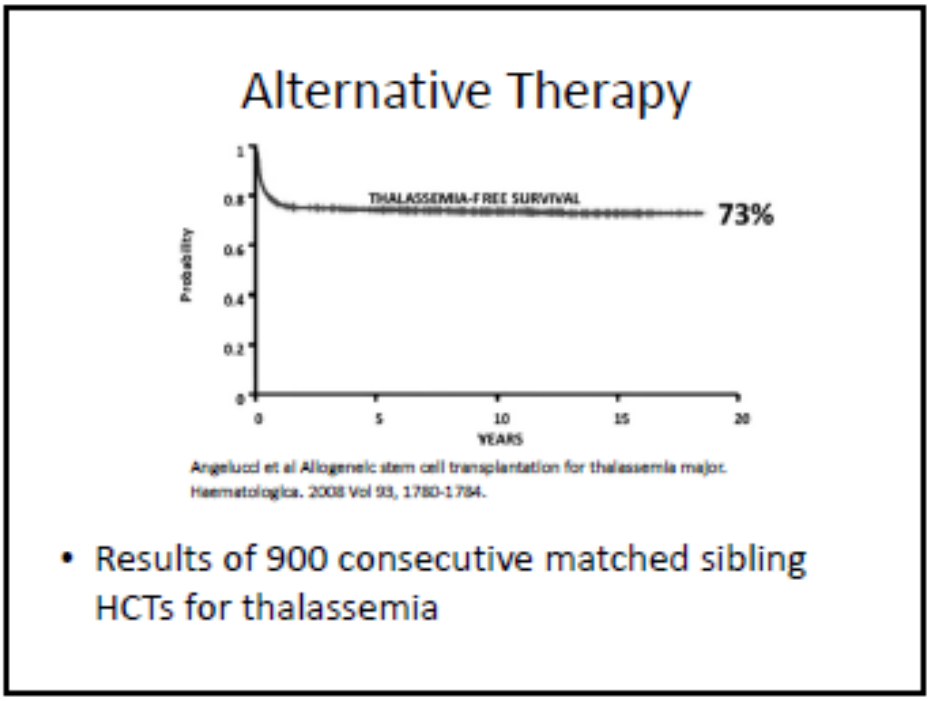
Inspite of these recommendations most children with transfusion dependant thalassemia do not reach adulthood in our country. As per this paper by Dhanya et al-Life expectancy and risk factors for early death in patients with severe thalassemia syndromes in South India in ***Blood Adv*** **(2020) 4 (7): 1448–1457.**



The most common causes are iron overload,TTI and other infections.



Transplantation- offers a long term cure for b-thalassemia major patients.



Since it was first performed in 1982 several thousand SCT have been performed for Transfusion dependant B thalassemia.

Allogenic SCT has evolved over the years with better cyto-reductive regimens, improved nursing care, blood component therapies, wider antibiotic, antifungal and antiviral medication availability and improved supportive care and ICU support.

Donor options have increased from previous matched sibling donors to matched related and unrelated donors, umbilical cord units and haplo-identical donors .

More registries are now available in our country- for matched unrelated searches- MUD registry- MDRI,DATRI,LIFE ,etc. Other registries include DKMS –germany and NMDP-USA.

Cost of transplants and awareness of options are a big hurdle in our country. To help with this many NGO's, Coal india foundation, Chief ministers fund, PM fund and other organizations are working to reduce cost or support the families seeking SCT.

Prevention is better than CURE

More than 10000 or more children are born each year adding to the pool of several lakh TDT children. Cost of care of each of these living children- with transfusions,chelation and supportive care can run to lakhs per year till child lives.

Awareness to screen each pregnant woman in first trimester and if minor ,then screen spouse and if he is positive too, arrange for an amniocentesis or CVS so birth can be prevented. Several states including Gujarat have started this program at PHC/CHC levels. More awareness is required at OBGY,pathologists level to help this program to succeed.

Other awareness methods - include screening in colleges, talks in community programs and social media campaigns.

Managing Blood Donation in Disaster

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Managing blood donation during disasters requires a multifaceted approach to meet the urgent need for safe blood supplies while addressing logistical challenges, resource constraints, and rapid mobilization. With the unique characteristics of India's diverse geography, population density, and natural disaster vulnerabilities, an effective strategy for managing blood donation during crises is crucial to ensure timely support for affected populations.

1. Understanding the Need for Blood During Disasters

Disasters in India range from natural events like floods, earthquakes, and cyclones to man-made situations such as industrial accidents and terrorist attacks. These emergencies often lead to high injury rates, requiring blood for surgeries, trauma management, and continuous patient care. Blood transfusion support becomes essential not only to treat physical trauma but also to handle medical conditions that become exacerbated due to lack of access to routine healthcare in disaster zones.

2. Preparedness and Blood Stockpiling

Blood banks in disaster-prone areas should maintain an adequate stock of all blood groups, particularly O-negative, which is a universal donor type. India has over 3,500 licensed blood banks, but ensuring their stock align with potential disaster needs requires rigorous planning, coordination with state authorities, and periodic monitoring. Regional blood centres and larger hospitals can serve as stockpiling hubs, ready to release emergency blood supplies to affected areas as needed. Furthermore, setting up buffer stocks and having strategic storage locations in multiple cities reduces the risk of blood shortages.

3. Mobilization of Donors

Rapid mobilization of blood donors during a disaster is necessary to replenish blood stocks and provide continuous support. However, disasters often affect transportation and communication channels, making donor mobilization challenging. Using social media platforms, government alerts, and collaboration with local organizations can help in **organizing blood donation camps quickly** and effectively. Targeted appeals to **volunteer blood donors** and coordination with registered blood donation groups, including NGOs and civil society organizations, can yield a rapid response.

4. Role of Technology and Data Management

Leveraging technology is vital in coordinating blood supply management efficiently. A **centralized data system** like the e-RaktKosh, maintained by the Ministry of Health and Family Welfare, integrates blood bank information across the country, helping in real-time tracking of blood availability. It can also facilitate the **sharing of blood stocks** between blood banks during disasters, ensuring that shortages are immediately addressed through redistribution.

Predictive analytics based on historical disaster data can also help estimate blood demand, enabling proactive planning. Mobile applications and SMS-based alerts can also be useful for **communicating with donors** and providing them with up-to-date information on locations where blood donations are urgently needed.

5. Logistics and Transportation

Transporting blood safely and efficiently to disaster zones is one of the most significant challenges in India due to its vast and varied landscape. During disasters, road networks may be damaged, and air transport may be restricted due to adverse weather or other logistical limitations. Establishing **partnerships with transport agencies, disaster relief forces, and local emergency services** helps to mobilize the rapid transfer of blood supplies. The Indian Air Force and the National Disaster Response Force (NDRF) can play critical roles in providing transportation in emergency scenarios.

In some cases, **temperature-controlled containers** are essential to maintain the integrity of blood products during transit. Deploying portable blood storage equipment, like battery-operated refrigerators, ensures that blood remains viable even in areas with disrupted power supplies.

6. Coordination and Communication Among Agencies

Effective blood donation management during a disaster in India demands a coordinated response among various entities, including central and state government health departments, the NBTC, the Indian Red Cross Society, hospitals, and local NGOs. The NBTC and state blood transfusion councils can take the lead in organizing relief efforts, mobilizing resources, and sharing information with stakeholders. Establishing **clear channels of communication** and periodic coordination meetings during the crisis phase can minimize delays and prevent the duplication of efforts. **Public awareness campaigns** and partnerships with media outlets are also crucial to dispel myths about blood donation, encourage eligible donors, and provide guidelines for safe donation practices during a crisis.

7. Addressing Safety and Regulatory Compliance

During disasters, the need for blood can surge, but safety standards should never be compromised. Adhering to **screening and testing protocols** ensures that donated blood is safe and free from infections. Quick testing units and adherence to NBTC guidelines for safe blood donation and transfusion practices remain essential.

Establishing **temporary screening and testing facilities** at donation sites and adhering to standard protocols prevents the distribution of unscreened or unsafe blood, thereby protecting recipients from transmissible infections.

8. Promoting Voluntary, Repeat Blood Donation

One of the challenges in disaster situations is that people may respond only during the immediate aftermath of the crisis. However, the need for blood often continues beyond the initial days. Thus, fostering a culture of **voluntary, regular blood donation** can help ensure a steady supply. Educating communities on the importance of regular donations before, during, and after disaster situations can build resilience within the blood donation system.

9. Post-Disaster Evaluation and Improvements

Post-disaster evaluations help understand the effectiveness of the blood donation management response. These evaluations, led by the NBTC or other coordinating agencies, should assess **areas for improvement** in blood reserves, donor mobilization, technology usage, transportation logistics, and inter-agency coordination. Lessons learned can then be incorporated into updated disaster preparedness plans, reinforcing India's capacity to manage future crises more effectively.

Conclusion

Managing blood donation during disasters in India involves comprehensive preparation, rapid mobilization of resources, and close coordination among various stakeholders. Through robust pre-disaster planning, leveraging technology, and ensuring strict adherence to safety protocols, India can enhance its blood donation management strategies to save lives and support affected communities during crises. By promoting voluntary blood donation as a civic responsibility and continuously improving disaster response mechanisms, India's healthcare system can become better equipped to handle the challenges posed by future disasters.

Setting up a HLA Laboratory: Basic requirements
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As exciting the prospect of setting up a new laboratory is, there are hours of hard work that go on behind the scenes before the project is initiated- and the HLA lab is no exception. Planning ahead is key to ensuring an effective , sustainable, relevant and compliant laboratory. The HLA laboratory should be in a clean, dust free environment with access to uninterrupted power supply and good internet connectivity. It should meet regulatory and accreditation requirements alongside technical requirements for specialised areas of work – such as a unidirectional flow for molecular labs.

The HLA lab typically performs an array of tests that include pre and post transplant immune monitoring, and tests for disease association and drug hypersensitivity. The profile of tests can expand with time. Most laboratories will perform HLA typing, anti HLA antibody testing, non HLA antibody testing , and these tests could be on a varied set of platforms. Depending on the anticipated workload, sufficient technical and medical personnel must be trained prior to start of the lab.

The HLA typing is almost always on a molecular platform today. The time tested planning of a molecular lab, with it's pre amp, amp and post amp rooms, with the plan facilitating a unidirectional workflow becomes compulsory.

However the equipment one invests in will be based on which molecular platform is chosen to perform HLA typing. These include the PCR SSP, PCR SSOP or the NGS based sequencing methods. Anti HLA antibody testing likewise can be on one or more of many platforms – ranging from the complement dependent cytotoxicity to flowcytometric crossmatching to the luminex based single antigen bead or virtual crossmatch. The choice of equipment for a HLA lab will be a mix of generic items, and others which are more specialised.

The HLA lab will need all the general equipment common to most laboratories such as biosafety cabinets (grade II), centrifuges, microcentrifuges, waterbaths, pipettes, a vortex, pH meters and refrigerators and freezers for reagent storage.

The more complex ordering relates to the kind of platform each laboratory chooses to perform it's testing for HLA and anti HLA antibodies on. For a molecular lab thermal cyclers and separate biosafety cabinets in the demarcated rooms is a must. The choice of thermal cyclers should be in the context of the assay to be used as some tests are standardised on specific models and standardising them on other thermal cyclers could pose a challenge. With regards more specific equipment, it could be a gel electrophoresis system if a PCR SSP is being performed,, or a luminex machine if it is a PCR SSOP, or a sequencer (NGS) for high resolution NGS based typing. Likewise for antiHLA antibody testing if the CDC crossmatch is being done a phase contrast and inverted phase contrast microscope will be required, a flowcytometer for the flowcytometric crossmatch and the luminex if the virtual crossmatch -SAB is being performed.

If not part of a larger laboratory facility, accessory facilities such as reagent preparation rooms, cleaning facilities and biomedical waste management have to be ensured.

An accurate and systematic record keeping process for data management is a must, and likewise a sample storing / banking process and protocol to ensure traceability and retrievability alongside ensuring confidentiality.

The role of high quality well trained staff – technical, scientists and medical faculty cannot be underestimated. A good lab director is key – one who is well versed in HLA and ensures good competency training of staff, setting up laboratory protocols and SOPs, and advocates clinical lab interfacing will take patient care to the next level.

The magical combination of a quality facility with passionate and competent staff, invested in quality, ethical practice and a high level of clinical lab interfacing will for sure result in a good and successful lab. It is important to remember though that the learning curves can be steep, but in Atchaya's words –" it is the learning curve that leads to a path called success".

DONOR SELECTION IN EMERGENCY AND RARE GROUP: WHERE TO ACCEPT AND WHEN TO DEFER

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Dept. of IHBT
Medical College Baroda

EMERGENCY

- the **essential role of blood donors** and blood donation in healthcare, its impact on saving lives
- blood donation **emergency**- situations requiring immediate blood donations, often due to natural disasters, accidents, health crises or sudden shortages.
- **Indicators** of a blood donation emergency- hospital alerts, high patient demand, community notifications, and depletion of blood bank reserves.
- **Regular blood donations** through public awareness and proactive measures, such as community engagement and regular donation drives help maintain an adequate supply in blood centres, thus preventing shortages.
- Understand the **critical criteria** for emergency donations, including urgency, patient needs, and health conditions of donors.
- Follow the **guidelines** for accepting and deferring blood donors.
- Situations of urgency may lead to **overlooking** thorough evaluation processes, which could risk the quality of the donation.
- Ensure proper **training** for staff to recognize emergency situations and the necessary steps for collecting blood donations.
- Implement a robust **communication** strategy to inform the community about the need for emergency blood donations and how to contribute.
- **ALTERNATIVE CHOICES-** to be considered A for A and O for All
- **Establishment and management of emergency blood donor panels**

The Emergency Donor Panels (EDP) consists of a group of volunteer blood donors who are pre-screened in accordance with Blood Transfusion Services and are available to donate whole blood or platelets in emergency situations.

- **Medical planning for the EDP**

-to advise and plan the donor selection process
-at least one month before any deployment

- **Potential donor screening , selection and deferral**

As per the guidelines; abbreviated questionnaire could be used
Key machine operators, aircrew and other transporters to be deferred
Questionnaire Triage Tool (QTT) to be used at places such as battle fields

- **Physical assessment and Hb measurement**
- **Testing of potential donor blood samples**

blood grouping & Rh typing, antibody screening, TTI testing, high titre hemolysins for O group, full blood count for apheresis
PoCT at fields

- **EDP Expiry** 7 months from the date of the initial sample (UK)
- Selected personnel on the EDP are to be used only if they are well and continue to satisfy the Donor Selection Guidelines at the time of donation.
- **Trained personnel** with the appropriate knowledge, skills and experience
- **Recordkeeping**- to permit recall of donors and lookback exercises
- The use of the EDP is associated with risk; however, it remains the simplest method of providing rapid transfusion support. The best way to manage the risk is to brief and prescreen blood donors before deployment. An abbreviated donor QTT can be an aide to decision

making at the time of donation. The tool should be tailored to requirements and underpinned by policy and training.

- **Activation of the Emergency Donor Panel** in accordance with the clinical risk assessment.

Document the rationale for this decision in the recipient's clinical notes.

- **ABO and RhD Blood Group Compatibility** Table
- If time permits or if irregular Abs present - use fully cross-matched blood
- If group known- use un-cross matched, group- specific blood in emergency
- Use O Rh D negative red blood cells in extreme emergency where blood group is not known (with low anti A/B titres)
- Donors of same national line are preferred

RARE GROUP

- The definition of rare donor varies from country to country- no std consensus
- An individual is recognized as a rare blood donor when RBCs are negative:
  a) for high-prevalence antigens with an occurrence less than 1 in 1000 (4 in 1000 in France and 1 in 100 to 1 in 1000 in Japan)
  b) for multiple common antigens with an occurrence that varies from 1 in 200 to 1 in 1000

- Alloimmunization - major complication of blood transfusion - more frequently in patients who are chronically transfused - causes serologic investigations and makes the selection of compatible blood difficult, expensive and time-consuming.
- Prompt availability of compatible units for patients requires access to an inventory of extensively typed blood and to a database of rare donors.
- Transfusion support of such patients needs cooperation between the **Immunohaematology Reference Laboratory(IRL),** transfusion specialists, blood centre and clinicians; it can involve national and international cooperation.
- Difficulty in providing compatible blood- determined by
  1) clinical significance of antibody

-Anti-M, N, P_1, Le^a, Le^b- RANDOM crossmatch-compatible blood acceptable
-in case of clinically significant antibody/ies : Crossmatch-if compatible-antigen type

2) frequency of antigen in population

- No. of units to be crossmatched/antigen typed = no. of units requested divided by frequency of antigen- negative individuals
- Knowledge of Donor's race – helpful sometimes
- Phenotypically matched blood for sickle and thal. Pts. Even if they have not formed any alloantibodies
- Phenotypically matched for Rh antigens (C, c, E, e) and Kell antigens
- **IRL and its role**
- **autologous** donation or **family studies-** to identify potential blood donors if antigen-negative units are not available,
- One strategy- To set up **rare donor registry**
  - ❖ number of ways to identify rare blood donors

- routinely carry out programmes of typing RBC antigens in large cohorts of donors with automated high-throughput molecular or serological methods.

- should continuously provide information of the phenotypes of the donor population and maintain a stable and sufficient daily inventory of antigen-negative RBC units for the more common antibodies.
- adequate number of staff - should screen an adequate number of new donors per day/week in order to increase inventory of rare and other antigen-typed units and fill urgent requests.

- testing people from the specific geographical areas or populations..

- procedures to identify rare donors when a routine antibody screening test is positive for antibodies to high-prevalence antigens.
- enrolment of patients negative for high-prevalence antigen into autologous or allogenic RBC storage programmes.
- donor selection from family members, especially siblings, of patients immunized against high-prevalence antigens.
- In cases of a single antibody to a high-prevalence antigen, approximately one in four siblings will have the same rare blood group. If other antibodies to common antigens are also involved, the chance is lower but higher than in the random population.
- The rare blood group phenotypes encountered in each country vary according to the differences in ethnicity.
- Bombay/para-Bombay,—D −/− D-, In (a+b-), Co (a-b-), I-i-, CdE/CdE, Mg, P-null and Emm are some of the rare blood group phenotypes reported in India.
- Bombay phenotype - the most requested rare blood group in India
- A robust national program is required to meet the rare blood needs of the country.

❖ **Challenges in establishing RDPI**

- Lack of genotyping/phenotyping facilities
- Challenges to form and maintain a rare blood group database
- Lack of freezing facility and maintenance of storage system
- Challenges related to transportation of a rare blood unit
- Lack of awareness and knowledge
- Inadequate training in advanced immunohematology
- Financial constraints

Proposal

- Start a national program of antibody screening for donors, patients and antenatal women on a large scale for all clinically significant blood groups using a high-throughput platform.
- Stay in touch with rare group donors and maintain regular contact to retain. Distribute letters of appreciation or encourage by using different interactive social media.
- Once recruited, a wallet-sized card with the donor's name and phenotype, address and the importance of the donor's blood for rare patients should be given to the donor for future use.
- The implementation of a patient blood management program - crucial at the hospital level to justify the need for transfusion
- Frequent training of technical and communication skills as well as proficiency testing of technical staff at a regular interval - advanced immunohaematology training for dedicated staff
- The role of a well-developed regional or national immunohematology reference laboratory (IRL) - extremely crucial not only for the identification and confirmation of a rare blood group but also for providing requisite training to the staff of different blood centers across the country
- Integrate transfusion medicine into medical curriculums at undergraduate level to improve the perceptions of physicians and strengthen the process of patient blood management.
- The e-Rakt Kosh network might be of use in future for capturing the rare donor data in India.
- National Institute of Immunohematology, Mumbai under the aegis of the ICMR has already registered the details of more than 500 rare group donors in India along with their consent .
- Financial and administrative support of the government, the educational program of technical officers and clinicians along with collaboration with other adjacent low-middle income countries is essential for establishing a successful and effective rare blood group donor registry in India.

Process improvement through continuous training and its evaluation in blood transfusion services:
Dr. Gita Negi

Continuous Training is needed in Blood Transfusion Services in all areas as follows:

1. Donor selection and management
2. Blood collection and processing
3. Testing and labelling
4. Storage and distribution
5. Transfusion management
6. Adverse event management
7. Quality control and assurance
8. Regulatory compliance

Process Improvement Areas include reducing transfusion errors to enhance blood safety, improved donor retention, optimization of inventory management and to streamline testing and processing.

Best Practices for continuous training are regular training needs assessments, standardized training programs with competency-based training.

Evaluation Methods may include

1. Knowledge assessment
2. Skill competency evaluation
3. Observation of workflow
4. Error rate analysis
5. Customer satisfaction surveys
6. Quality control metrics
7. Regulatory audit results

Challenges:

1. Resource constraints
2. Staff resistance to change
3. Keeping up with regulatory updates
4. Maintaining training records
5. Ensuring training effectiveness

By implementing continuous training and evaluation, blood transfusion services can improve processes, enhance patient safety, and maintain regulatory compliance.

Blood Donor Notification and Counselling

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Introduction

Blood transfusion is a critical component of modern medicine, providing life-saving support for patients undergoing surgery, trauma, or treatment for various medical conditions. However, a key aspect of ensuring blood safety is effectively managing the risk of transfusion-transmissible infections (TTIs), such as HIV, hepatitis B (HBV), hepatitis C (HCV), syphilis, and malaria. While stringent screening practices are employed to mitigate these risks, a cornerstone of maintaining donor and recipient health lies in the effective notification and counseling of donors when infectious markers are detected.

- **Need of Donor Notification and Counseling**

Effective donor notification and counseling processes serve multiple purposes:

- To stop future donations: By providing information on the condition, counseling helps donors make decisions regarding future donations, protecting the blood supply.
- *Early Detection and Treatment:* Informing donors of TTI-positive results enables timely medical intervention, reducing disease progression and transmission.
- *Preventing Further Transmission:* Counseling educates donors on measures to prevent spreading infections to others, particularly in high-risk diseases like HIV, HBV, and HCV.
- *To safeguard the blood centre staff:* Keeping records of TTI-reactive donors aids in identifying them during the initial screening process and enables staff to implement appropriate measures for handling these cases effectively.

- Core Principles of Notification and Counseling

- *Confidentiality:* It is important that the donor's identity and infection status are handled confidentially. Disclosure of TTI results should be shared only with the donor and authorized personnel involved in counseling and follow-up.
- *Timely Notification:* Prompt notification allows for early intervention and prevents donors from unknowingly donating infected blood in the future.
- *Accuracy and Clarity:* Communication with donors must be clear, ensuring they understand the results, potential health implications, and recommended next steps.
- *Non-discriminatory Approach:* Counselors should approach the process with empathy and without judgment, recognizing the stigma that may surround some infections.

- Steps in Donor Notification and Counseling Process

The donor notification and counseling process typically follows a structured approach (Figure 1):

Figure 1: Steps for Donor notification process

- *Pre-donation information & counselling:* Donors should be informed about the blood collection process, including testing procedures for infectious markers, and educated on the purpose of screening tests and the potential outcomes of a positive or negative result.
- *Donor informed consent:* Obtaining informed consent from donors is essential, covering both the testing process for infectious markers in donated blood and the method by which they will be notified of any results.
- *Blood Collection:* Blood is collected from donors, and samples are obtained for screening against transfusion-transmissible infections (TTIs).

- *Initial screening testing*: Screening is conducted on the collected blood samples using approved testing methods to detect TTIs.
- *Confirmatory/supplementary assay:* Before notifying the donor, laboratories confirm positive test results through repeat testing or confirmatory assays or supplementary assay to minimize the risk of false-positive notifications.
- *Initial notification & appointment scheduling:* Donors with confirmed TTI-positive results are contacted discreetly, usually via a phone call or secure mail or by post, requesting a follow-up consultation. During this initial communication, details about the infection are not disclosed to avoid misunderstandings or panic.
- Final notification and disclosure of infection: Donors are advised to attend an in-person session with a trained counselor. This session allows for a sensitive and thorough discussion of the diagnosis, health implications, treatment options, and lifestyle modifications.
- Counselling and Referral: Counseling sessions include providing referrals to specialized healthcare providers for comprehensive diagnostics, confirmatory testing, and treatment if needed.

- **Effective donor counselling**

An effective counseling approach for TTI-positive blood donors encompasses both medical and psychological support. The content of final notification and counselling should include:

- *Results with Details of Screening Tests:* Donors should receive comprehensive information about the initial screening tests, including which infections were screened and how the results are interpreted. This includes explaining what a "reactive" result means and why further confirmatory testing may be necessary.

- *Information on Confirmatory/Supplemental Tests:* Donors should be informed about the confirmatory or supplemental tests required to verify the result. He/she should be explained about the purpose of these tests, the likelihood of false positives, and the importance of confirming a diagnosis to ensure accuracy.
- *Implications on Donor Health:* Counselling should address how any confirmed infection may impact the donor's health, including short-term and long-term effects. Information on symptoms, potential health complications, and treatment options should be included, empowering donors to take proactive steps in managing their health and preventing complications associated with the infection.
- *Information on Future Donations / Family Safety:* Donors should be informed of any restrictions or guidance related to future blood donations, especially if they test positive for a TTI. They are also educated on steps to prevent transmission to family members or close contacts, such as practicing safe hygiene or vaccination recommendations for household members, where applicable.
- *Confidentiality of Records:* Donors are assured of strict confidentiality regarding their test results and personal information. Only authorized personnel involved in the counselling and follow-up processes have access to these records, safeguarding donor privacy.
- *Referral Details/Options for Donor Access:* Donors receive referrals to specialized healthcare providers for further assessment, confirmatory testing, or treatment, as needed. Counsellors should explain about the referral centres, and provide options that are accessible to the donor.

- Challenges in Donor Notification and Counseling

Implementing an effective donor notification and counseling program is not without challenges:

- *Inadequate Contact Detail:* Incomplete or outdated contact information can hinder effective communication with donors, making it challenging to reach them for follow-up counselling. Ensuring donors provide accurate, current contact details at the time of donation can reduce this issue, but addressing gaps remains a priority to ensure donors receive crucial health information promptly.

Difficult to Ensure Confidentiality: Letter Received by Family Member: Sending notification letters carries the risk that someone other than the intended recipient might open them, compromising the donor's privacy.
Telephone Answered by Family Member: When reaching out via phone, there's a chance a family member could answer, potentially leading to accidental disclosure. Staff must carefully verify the recipient's identity before sharing any sensitive information and can leave neutral messages or request a callback if necessary.

Donor Not Reachable: Sometimes, despite multiple attempts through various methods, a donor may not respond or be unreachable, which may delay or prevent critical health information from being conveyed. In these cases, centres may use alternative methods like secure messaging platforms or follow-up calls at different times to increase contact chances.
Conveying Information Without Causing Anxiety: Notifying donors of a reactive result without undue anxiety requires a sensitive approach. Counsellors should frame information clearly and calmly, emphasizing the need for further testing to confirm results. Ensuring that donors understand both the purpose of follow-up and the initial screening's limitations can help mitigate their worry.

- *Confirmatory or Supplemental Assay Not Available:* In some settings, confirmatory or supplemental tests may not be accessible due to resource constraints, delaying definitive diagnosis. When this occurs, it's essential to inform the donor of limitations and refer them to alternative facilities, if possible, to ensure they have options for accurate follow-up testing.
- *Confirmatory or Supplemental Assay is Negative / Indeterminate:* If confirmatory tests come back negative or yield inconclusive results, donors may feel uncertain or confused. In these cases, counsellors should explain the meaning of a negative or indeterminate result, emphasizing that additional monitoring may be necessary and offering guidance on future precautions or follow-up steps, if applicable.

- Ethical and Legal Considerations

In many places, donor notification and counseling are governed by national and local health regulations. Some key considerations include:
- *Informed Consent:* Blood centers should ensure that donors are aware of the possibility of receiving TTI results and the process that follows. Informed consent documents should clarify the center's policy on donor notification.
- *Liability and Accountability:* Legal obligations to inform and counsel donors may vary, and failure to adequately notify TTI-positive donors can lead to liability issues for healthcare organizations. Blood donation agencies should implement documentation protocols that verify each step of the notification process.
- *Right to Privacy:* Balancing privacy and the public health need to prevent further TTI transmission is crucial. Many countries have data protection laws that restrict the sharing of TTI results, ensuring that information remains confidential.

Conclusion
Donor notification and counseling are essential to ensuring a safe blood supply and protecting the health of both donors and recipients. This process requires a thoughtful, ethical, and compassionate approach to notify donors about TTI-positive results. Through effective notification and counseling, healthcare systems can empower individuals to manage their health responsibly, reduce the transmission of infections, and safeguard public health.

INCENTIVES TO VOLUNTARY BLOOD DONORS GOOD OR BAD

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BACKGROPUND

Blood donation is a critical aspect of healthcare, ensuring a steady supply of blood for medical emergencies, surgeries, and chronic conditions. However, despite its importance, blood centers often face shortages, especially during specific seasons or crisis. To address this challenge, various incentive schemes have been implemented worldwide to encourage voluntary blood donation.

WHAT IS INCENTIVE?

An incentive is something that motivates a person to take action. In the case of blood donation, incentives should not influence people's decision to donate blood and/or compromise the safety of the blood supply. Incentives should not be conditional on a person actually donating blood.

TYPES OF INCENTIVES

Incentives are either financial or non-financial.

Financial incentives are transferable, refundable or redeemable for cash and for which a market exists (Compliance Policy Guide, 2003 by FDA in USA) e.g. Cash or Lotteries; t-Shirts, Tickets for Concerts, Helmets, Blankets etc. These are in complete contrast with International standards like World Health Organization (WHO) & NACO. Even the Drug Controller, Jaipur has issued orders dated 25.07.2024, that financial incentives are against the rules. Critics argue that paying for blood may commodify a life-saving resource and compromise altruistic motivations and often attract first-time donors and those facing financial constraints thereby compromising the quality and safety of blood/ blood components. As per guidelines of VOLUNTARY BLOOD DONATION PROGRAMME OF GOI, nonfinancial incentives include time off work, other than reasonably needed for the donation and travel, small tokens, refreshments and reimbursement of the direct travel costs are compatible with voluntary, non-remunerated blood donation. While such incentives boost short-term participation, long-term sustainability requires addressing underlying motivations. Education and awareness campaigns play a vital role.

INCENTIVES-GOOD OR BAD

Incentives to blood donors can be both good and bad, depending on the type of incentive, the context, and the motivations of the donors. Here are some arguments for both sides:

GOOD:

1. Increased Donations:

Offering incentives can motivate more people to donate blood, helping to meet the constant demand for blood transfusions

2. Compensation for time and effort:

Donors may spend time and effort traveling to donation centers, taking time off work, and experiencing temporary discomfort. Incentives can acknowledge these sacrifices.

3. Recognition and appreciation:

Publicly acknowledging donors through certificates, badges, or social media posts fosters a sense of pride and community Incentives can demonstrate gratitude for donors' altruism and selflessness.

4. Targeted recruitment:

Incentives can encourage donations from specific blood groups or demographics with low donation rates.

5. Awareness:

Incentives can raise awareness about the importance of blood donation.

6. Regular Donors:

They can help establish a habit of regular donations among participants

BAD

1. Commodification of blood:

- Paying donors for blood raises concerns about treating it as a commodity rather than a gift.
- Undermines the altruistic nature of donation
- Potentially exploiting vulnerable individuals.

2. Safety risks/Quality Concerns:
Incentivized donors may conceal medical information or donate more frequently than recommended, to receive rewards, compromising Quality &blood safety.
3. Dependence on incentives:
Donors may only donate for rewards, rather than developing a long-term commitment to help other
4. Inequity:
Incentives may disproportionately attract donors from lower socioeconomic backgrounds, who may need the financial rewards.
Alternative approaches:
1. Non-monetary incentives: Offer recognition, free medical checks, or wellness services instead of monetary rewards.
2. Voluntary donation systems: Focus on educating and encouraging altruistic donation, emphasizing the social and moral benefits.
3. Community-based programs: Organize local donation drives and events to foster a sense of community and social responsibility
Best practices:
1. Follow World Health Organization (WHO) guidelines, which recommend voluntary, nonremunerated donation.
2. Ensure incentives are non-monetary and modest.
3. Prioritize donor safety, education, and retention.
4. Monitor and evaluate the effectiveness and ethics of incentive programs.

CONCLUSION

Understanding blood donation incentives requires a multifaceted approach. Balancing altruism, sustainability, and ethical considerations ensures a robust blood supply system that saves lives while respecting the dignity of donors.

The Role of AI in Transfusion Medicine: Revolutionizing Blood Management and Patient Care
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Artificial intelligence (AI) has rapidly gained traction across various fields of medicine, and transfusion medicine is no exception. By applying machine learning algorithms, data analytics, and automated systems, AI is transforming how blood is managed, tested, and distributed. From enhancing donor recruitment to optimizing patient transfusion protocols, AI holds the potential to improve safety, efficiency, and outcomes in transfusion medicine. This article explores the key ways AI is advancing the field and the challenges and future opportunities it presents.

1. Optimizing Blood Donation and Donor Recruitment

One of the main challenges in transfusion medicine is ensuring a stable and sufficient blood supply. Blood banks often struggle with fluctuating demand and seasonal shortages. AI-driven predictive analytics can help by forecasting demand patterns based on historical data, regional needs, and population health trends. This allows blood banks to optimize inventory levels, reducing waste while ensuring adequate supply.

Moreover, AI can enhance donor recruitment efforts. By analysing demographic data and donor preferences, AI models can identify ideal times, locations, and methods for outreach to increase donation rates. Personalized messaging can be automated to reach potential donors, reminding them of donation opportunities based on their past behaviours and availability.

2. Improving Blood Testing and Screening

Ensuring that donated blood is free of infectious agents is crucial for patient safety. Traditionally, blood screening is a labour-intensive process, involving a series of serological and nucleic acid tests. AI algorithms can streamline this process by analysing complex test data and flagging abnormalities for further review. For instance, machine learning models can detect subtle patterns that may indicate contamination or irregularities, enabling faster and more accurate detection of transfusion-transmitted infections (TTIs).

AI's role in image recognition is also gaining traction. Deep learning algorithms can analyse microscopic images to identify bloodborne pathogens or abnormalities, assisting technicians in rapid diagnostics. This has significant implications for improving the detection of diseases like malaria, syphilis, and other infections, particularly in areas with limited healthcare resources.

3. Enhancing Patient Blood Management (PBM)

AI is also being leveraged to develop more personalized transfusion strategies under Patient Blood Management (PBM) programs. PBM focuses on optimizing transfusion practices to improve outcomes, reduce unnecessary transfusions, and minimize blood usage. AI algorithms can analyse a patient's medical history, bloodwork, and clinical status to predict their transfusion needs accurately. This data-driven approach helps clinicians decide on the optimal timing and dosage for transfusions, reducing the risk of adverse reactions.

Additionally, AI can provide recommendations for alternatives to transfusion when appropriate. By predicting the patient's response to various treatments, AI can suggest less invasive methods, such as iron supplements or erythropoiesis-stimulating agents, potentially reducing the demand for blood transfusions.

4. Real-Time Monitoring and Decision Support

AI has the capability to support clinical decision-making in real-time. In emergency settings, when blood transfusions are urgently required, AI algorithms can quickly match blood types, identify compatible donors, and prioritize blood allocation to the most critical cases. Real-time data analysis can alert clinicians to adverse reactions during or after transfusion, allowing for immediate intervention.

AI-driven decision support systems (DSS) can be integrated with electronic health records (EHR) to track a patient's transfusion history, allergies, and any previous reactions, ensuring tailored care. DSS also provides clinicians with evidence-based recommendations, streamlining the transfusion process and improving outcomes.

5. Addressing Challenges and Future Prospects

Despite its advantages, integrating AI into transfusion medicine is not without challenges. Privacy and data security are major concerns, given the sensitive nature of medical data. Robust data protection frameworks are essential to prevent misuse. Additionally, the accuracy of AI models depends on the quality and diversity of the data they are trained on, necessitating constant updates and monitoring to ensure reliability.

Moreover, regulatory bodies are still defining guidelines for AI applications in healthcare, which can slow down the adoption of AI in transfusion medicine. Establishing regulatory frameworks that balance innovation with patient safety is critical for the successful integration of AI.

Conclusion

AI is poised to play a transformative role in transfusion medicine, from donor recruitment and blood testing to patient blood management and clinical decision-making. By automating complex processes and offering data-driven insights, AI can help meet the growing demand for safe and efficient blood transfusions. As technology advances and regulations evolve, AI's role in transfusion medicine will likely expand, ushering in a new era of precision and personalized care in this vital field.

AI holds remarkable potential to elevate transfusion medicine, ensuring better blood management, safer practices, and ultimately, improved patient outcomes. The integration of AI in transfusion medicine will drive efficiency and precision, contributing to a more responsive healthcare ecosystem.

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Transfusion Transmitted Diseases: Beyond the Boundaries
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Blood transfusions are life-saving procedures, but they come with the risk of transmitting infectious diseases. Transfusion Transmitted Diseases (TTDs) refer to infections passed through blood transfusions, including viruses, bacteria, parasites, and prions. The scope of TTDs extends beyond well-known viruses like HIV and hepatitis, encompassing emerging and re-emerging infections that challenge blood safety protocols worldwide. This article delves into the complex landscape of TTDs and explores the ongoing advancements aimed at mitigating their risk.

Major Transfusion Transmitted Diseases

Historically, hepatitis B and C, HIV, and syphilis have been the primary concerns in blood transfusions. These infections can lead to chronic conditions, including liver cirrhosis, immune deficiency, and cardiovascular complications. In recent years, awareness has expanded to include other pathogens, such as cytomegalovirus (CMV) and Epstein-Barr virus (EBV), both of which can cause severe complications in immunocompromised patients.

Emerging and Re-emerging TTDs

With globalization and changing environmental conditions, emerging infectious agents like West Nile virus (WNV), Zika virus, dengue, and Chikungunya have become significant threats to blood safety. For instance, WNV, primarily spread by mosquitoes, has been documented in blood donors, particularly during seasonal outbreaks. Similarly, the Zika virus has raised concerns, especially for pregnant women due to its link with congenital anomalies.

In addition to viruses, certain bacterial infections, such as *Treponema pallidum* (syphilis) and *Yersinia enterocolitica*, have been found in blood transfusions. Blood-borne parasitic infections, including malaria and Chagas disease, remain prevalent in endemic regions and pose risks due to asymptomatic donors. These examples underscore the necessity of continuous surveillance and innovation in screening techniques.

Screening Techniques and Blood Safety

Effective screening of blood donors is the cornerstone of preventing TTDs. In most developed countries, nucleic acid amplification testing (NAT) has significantly reduced the risk of viral transmission by detecting pathogens at an early stage, even before seroconversion. Serological tests for HIV, hepatitis B and C, and syphilis are standard, with protocols continually updated to address emerging threats. Additionally, pathogen reduction technology (PRT), which inactivates various pathogens in blood products, is an emerging solution to enhance transfusion safety, though it remains costly and is not widely available in resource-limited settings.

Challenges in Low-Resource Settings

In developing countries, blood safety practices often lag due to resource constraints and limited infrastructure. These regions face significant challenges in implementing NAT and PRT, leading to a higher risk of TTDs. Moreover, limited donor screening and inadequate data on local infectious disease prevalence exacerbate these risks. Consequently, organizations like the World Health Organization (WHO) advocate for international collaboration and support to improve blood safety in such areas.

Future Directions and Conclusion

As new infectious diseases continue to emerge, the need for dynamic, adaptable blood safety systems becomes more pressing. Research into advanced PRT, universal blood substitutes, and improved donor screening methods could pave the way for safer transfusion practices globally. Beyond traditional boundaries, the landscape of TTDs is constantly evolving, underscoring the importance of vigilance and innovation in ensuring the safest possible blood transfusions for patients worldwide.

The continual enhancement of blood safety protocols and ongoing research into TTDs are essential to protect patients and meet the challenges posed by both existing and emerging pathogens.

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The Paradox of Performance Measurements: A Double-Edged Sword

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The last one decade has witnessed a remarkable surge in medical advancements which unveiled further demand of blood & blood products to support increasingly sophisticated medical and surgical procedures. Transfusion medicine adds value to patientcare through its services ranging from manufacturing quality and efficacious blood/ blood products for transfusion, their safe and rational use, and also ensuring the blood donors' and patients' safety. To meet the plethora of this diverse need, there need to be a comprehensive approach in planning and operationalization of the service based on a concrete Quality management system. On the other hand we have also evidenced the evolution of Quality in transfusion medicine from being a compliance-oriented myopic focus to being the very first step in the development and implementation of new processes based on a strong Quality management system. The QMS is pillared by three fundamental processes- Quality planning, quality control and quality improvement. These are not isolated processes but they provide a framework for considering everything an organisation does, how it is done, and identifying ways to make it even better – before problems arise.

Unfortunately, with all the systems in place, no process or procedure is fault-proof and failures can occur at any phase. Identifying the potential failures, laying preventive measures before they cause harm and immediate mitigation in case of its occurrence is essential. Thus, managing failure is imperative and assists organisations in setting strategy, achieving objectives and making informed decisions. By and large it contributes to the improvement of quality management system.

There are various tools designed for the purpose of quality improvement and it is the users' decision to make a right choice of the tool in accordance with the size and scope of the organisation. One such tool is the "Performance measurements"

The Performance measurements are indicators designed to monitor one or more processes during a defined time and are useful for evaluating the service demands, production, personnel, inventory control and process stability.

Nevertheless, as with any tool, the improper application of performance measurements can lead to unanticipated paradox with its detrimental outcomes. They may become a stumbling
block rather than a conduit for improvement, an uncontrollable monster that distorts the Total Quality Management System.

Each blood centre should implement the NABH recommended Performance measurements to begin with. But as we know that each organization is different from one another, mere adoption of the measurements from peer is not the right move. Though the Performance measurements are directed to prevent the failures and achieve the desired target but their implementation is influenced by the different needs and objectives of an organization. Thus, it is obligatory to further establish organizational specific measurements.

Identification of the risk potential areas in the complete process is pivotal. Hence, the very first step is to flow-map the complete process. Establishment of the risk potential areas and also the study of the previous frequent failures if any is a must. After the possible root cause is defined, the risk assessment is to be performed by describing the event in terms of: Severity, Probability, Detection. Each category to be quantified by scoring and the risk priority number calculated. Based on the RPN scoring, criticality is determined and action is defined and implemented to reduce or eliminate the risk. The centre can then make a conscious decision as to which performance measure is to be monitored as a part of risk mitigation.

As we navigate the seemingly untangled landmines of performance measurements, it's crucial to remember that Performance measurements are "Double-edged sword", which "cuts both ways". And like any tool, their effectiveness depends not on their intrinsic properties, but how well they are wielded. We must measure wisely and thoughtfully, considering potential adverse side effects, and maintaining a focus on the ultimate goal — real, sustainable improvement rather than merely focusing on management by measurements.

Judicious use of performance measurements is an invaluable tool for improvement and is not a one-time job but an ongoing process that we need to adapt and advance to achieve quality improvement.

What more to be done in D&C Act in Blood Transfusion Services

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The Drugs and Cosmetics Act, 1940 (D&C Act) governs the regulation of Blood Transfusion Services (BTS) in India. While it has evolved over the years to improve safety, quality, and accessibility in blood services, there are still several areas where reforms or updates can enhance its efficacy. Here are some suggestions for what more could be done under the D&C Act to improve Blood Transfusion Services:

1. Strengthening Quality Control and Audits

Regular Audits and Inspections: Blood banks should be subject to more frequent and surprise inspections to ensure compliance with the required standards.

Accreditation Standards: A move towards mandatory accreditation for blood banks, perhaps through a central body, can standardize quality control across the country.

Stronger Penalties: Non-compliance with standards should result in stronger penalties, including temporary or permanent closure of facilities, to deter negligence.

2. Updated Guidelines for Emerging Technologies

Modernization of Blood Testing: Updating guidelines for adopting advanced screening technologies (e.g., NAT testing for HIV, Hepatitis B, and C) and phasing out outdated ones.

Automated Data Management: Mandating the implementation of automated data management systems in blood banks to track donor data, blood stock, and transfusion outcomes in real-time.

Traceability Systems: Introducing traceability systems for blood and its components from donation to transfusion, ensuring a clear chain of custody.

3. Increased Focus on Component Separation and Usage

Mandating Component Separation: Emphasizing the need for all blood banks to move towards 100% component separation to make better use of each donation (e.g., separating red cells, plasma, and platelets).

Guidelines for Rational Use: More stringent protocols for the rational use of blood and blood components, with a push for clinical audits on usage in hospitals.

4. Donor Protection and Screening

Updated Donor Deferral Criteria: Incorporating new global guidelines for donor deferral, including behavioural risk factors and new infectious disease screenings.

Improving Donor Care: Providing more explicit provisions in the law regarding the care of donors, including post-donation care and long-term follow-up for frequent donors.

Voluntary Donation Drive: Expanding efforts to promote voluntary blood donation and reduce dependence on replacement donations, which carry higher risks of infections.

5. Centralization and Standardization of Blood Services

Centralized Blood Bank Management System: Implementing a centralized digital registry for blood banks to ensure uniform standards of operation and improve coordination between blood banks for supply-demand management.

Blood Stock Monitoring: National-level blood stock monitoring systems can help in assessing and redistributing blood units where needed, avoiding wastage and ensuring timely availability.

6. Enhanced Reporting and Transparency

Mandatory Reporting: More stringent rules for mandatory reporting of adverse events during blood transfusion, including transfusion-related reactions and infections.
Disclosure to Regulatory Authorities : Ensuring that blood banks disclose information related to their performance, adverse event rates, and compliance with regulatory guidelines. To Regulatory Authorities

8. Regulation of Blood Products and Plasma-Derived Medicines
Focus on Plasma Fractionation:
- A regulatory framework for the plasma fractionation industry, ensuring that donated plasma is used efficiently for producing life-saving products such as clotting factors.
-To encourage establishment of Plasma Fractionation Centre at Government sectors either independently or based on PPP model
-Quality Control for Plasma Products: Ensuring that plasma-derived medicines meet international standards for safety and efficacy.

9. Training and Capacity Building
Specialized Training: Mandating that personnel working in blood banks undergo specialized and certified training in transfusion medicine, storage, and quality control procedures.
Awareness Programs: Increased focus on training healthcare providers in the appropriate use of blood products to minimize wastage and prevent unnecessary transfusions.

10. Ethical and Legal Considerations
Informed Consent: Establishing clear protocols for obtaining informed consent from patients receiving transfusions, ensuring transparency about risks and alternatives.
Ethical Guidelines: Clearer legal and ethical guidelines concerning the handling of blood and blood products, including respect for donor privacy and dignity.
Updating the D&C Act with these areas in mind could significantly improve the safety, accessibility, and efficiency of Blood Transfusion Services in India.

Molecular Applications-Next Gen Sequencing (NGS) in Transfusion Medicine

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The last ten years in the world of Transfusion Medicine have been dominated by the relentless progress of high throughput genomic analysis, termed next generation sequencing (NGS). What really positioned NGS to be considered for diagnostic applications was continuous reduction in the cost of runs, while simultaneous increase in a variety of clinical application ranging from RHD genotyping, ABO genotyping, cell-free (cf) DNA genotyping, High-Resolution (HR) HLA typing, utility in Transfusion Transmitted Infections (TTI), complex immunohematology (IH) cases and the list goes on.

The NGS platform involves fragmentation of template DNA into several hundred base pairs (bp) long fragments, end-repair and ligation to adaptor oligonucleotides. Adapted fragments are then attached to a solid phase via complementary sequences to adaptors. NGS uses clonal amplification of the template fragments through bridge amplification. The technological differences between different NGS providers are reflected in various read lengths, coverage depth, sequencing run time, data analysis and total bases per run. All in all, it is a massive parallel DNA sequencing technology and the turnaround time currently ranges anywhere between 4 hours to 6 days. Understandably, the NGS has had a dramatic effect on research, with a large number of blood group, HLA and HPA genomes, rare phenotype related polymorphism and mutation data, or whole genome studies. In India, the field is still in its developmental phase; however, its significance within diagnostics is expanding as the accessibility and applications of next-generation sequencing (NGS) technology continue to grow. Yes! We are excited. In the coming decade, this technology will require significant streamlining of procedures and access to molecular testing as more and more centres start testing, automation, further cost reduction and, above all improvements in data handling. Although the cost of the systems and reagents seems high, the cost per base is substantially lower than for Sanger sequencing. In the near future, if we can predict blood group phenotype looking at the genotype and provide antigen matched blood for hemoglobinopathies, multiple transfusions or rare blood groups, we reduce the risk of alloimmunization and the time, effort and cost associated with managing a patient with multiple alloantibodies.

Over the past two decades, HLA typing methods have evolved significantly from serological techniques to advanced genotyping approaches. Historically, serology method was regarded as the gold standard for HLA typing, a status it continues to hold within blood banking practices today. Science advanced as solid organ and hematopoietic stem cell transplantation (HSCT) advanced. It is now well recognized that HLA compatibility is better determined at the allelic than at the antigenic level. People found out that that we actually need to look at the allelic level High Resolution (HR) typing of donor and patient. Importantly, antibodies are also defined at the allelic level. Therefore, we can look for Donor Specific Antibodies (DSAs) against specific alleles through virtual crossmatch and plan transplantation after doing a thorough risk assessment. As transplant immunologists, clinicians and transfusion medicine specialists, our aim is to use the best resources available, gather comprehensive information to optimize treatment strategies, be it is resolving a simple discrepant donor blood grouping, planning a antigen matched blood transfusion for an alloimmunised sickle cell patient, figuring out tricky blood group, assessing risk of anti-HLA DSA for a renal transplantation, or mitigating the risk of hemolytic disease of fetus and newborn (HDFN) by cf-DNA. We utilize technology to optimize our practices and continually expand our knowledge in this new era of transfusion medicine, aiming to achieve the best possible outcomes for both patients and donors. While the molecular technology described may at the moment seem advanced, we will soon need to make critical decisions regarding their selection for day-to-day applications. The future is here.

Lab grown blood: where are we standing now?

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Blood transfusion services are a cornerstone of modern healthcare, essential for saving lives in treating patients following trauma, surgery, transplants, and for patients with blood disorders. However, challenges like blood shortages and concerns about the safety of the blood supply are significant barriers, especially in the face of a growing global population with increasing life expectancy and rising rates of chronic diseases like cancer.

In many countries, there is a persistent shortage of red blood cell (RBC) concentrates, and the demand for transfusions continues to outpace supply. Compounding this issue are concerns about transfusion reactions, particularly mismatched blood and the risks of iron overload in patients requiring frequent transfusions, such as those with chronic anemias like sickle cell disease and β-thalassemia. Additionally, as blood is stored, the RBCs undergo aging, and those administered to critically ill patients may not have optimal function, further complicating treatment. This underlines the urgency of finding sustainable alternatives to donor-derived blood products.

Recent breakthroughs in erythropoiesis research offer a promising solution: cultured red blood cells (cRBCs). These laboratory-grown RBCs, or manufactured RBCs (mRBCs), are immature red blood cells that are produced in vitro from stem cells, such as CD34+ hematopoietic stem cells, human embryonic stem cells, or induced pluripotent stem cells (iPSCs). The advantage of these cRBCs lies in their homogeneity and the fact that they have the potential to survive the full 120-day lifespan in circulation, similar to natural RBCs, which contrasts with the aging mix of cells found in stored donor blood.

Cultured RBCs offer multiple benefits for patients with inherited anemias. For example, patients with β-thalassemia or sickle cell disease, who require regular blood transfusions, could benefit from reduced transfusion frequency, thus lowering the risk of iron overload—a common complication of frequent transfusions. Moreover, since cRBCs are an immature population of cells, they may also exhibit better functionality than aged donor RBCs, especially in critically ill patients, which could result in improved clinical outcomes.

Kupzig et al generated cultured red blood cells from human CD34+ cells from adult peripheral blood or cord blood by ex vivo expansion, and a comprehensive in vivo survival comparison with standard red cell concentrates was undertaken. Significant amplification (>10^5-fold) was achieved generating high yields of enucleated cultured red blood cells. Following transfusion, higher levels of cultured red cells could be detected in the murine circulation compared to standard adult red cells. After transfusion into mice, the cRBCs generated from both cord blood and peripheral blood demonstrated a significantly longer survival time in circulation, with 82±5% from cord blood and 78±9% from peripheral blood remaining 24 hours post-transfusion. In contrast, the proportion of standard adult red cells in the circulation dropped to just 49±9% by this time. In addition, the survival time of cultured blood cells in mice was longer than that of standard adult red cells.

One of the most promising developments in this field is the RESTORE (REcovery and survival of STem cell Originated REd cells) clinical trial. This Phase 1 trial, conducted as a collaboration between NHS Blood and Transplant, the University of Bristol, the University of Cambridge, and other key institutions, marks a milestone in the use of lab-grown RBCs. The study aims to assess the safety and effectiveness of mini-dose transfusions of allogeneic cRBCs generated from adult stem cells. While still in progress and is scheduled to complete in 2024, this trial brings us a step closer to the potential clinical use of

manufactured RBCs. The RESTORE team recently announced that two clinical trial participants were transfused with an allogeneic mini dose of lab grown blood.

However, despite these exciting advancements, several hurdles remain before cRBCs can be widely used in clinical practice. Large-scale production of these cells is a significant challenge, particularly when it comes to producing enough cells to meet global demand. Additionally, scaling up manufacturing processes to meet Good Manufacturing Practice (GMP) standards is essential to ensure the safety and reliability of these blood products. At its core, GMP compliance entails maintaining a highly controlled environment to minimize any risk of contamination. This typically involves the use of highly trained and specialized staff, clean room and the implementation of closed processing systems. The transition from small-scale, proof-of-concept studies to large-scale GMP-compliant manufacturing presents several technical and financial challenges. For instance, scaling up cell culture systems to produce millions or billions of high-quality red blood cells is a formidable task, requiring advancements in bioreactor technology, culture media optimization, and efficient enucleation techniques.

In conclusion, while the pathway to the widespread clinical use of lab-grown red blood cells is not without its challenges, the potential for these cells to transform blood transfusion services is enormous. Ongoing clinical trials like RESTORE are paving the way for a future where transfusion medicine is safer, more efficient, and better tailored to the needs of patients worldwide. With continued research and technological innovation, manufactured RBCs could soon become a cornerstone of healthcare, addressing both the global blood supply shortages and the unique needs of patients with blood disorders.

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Significance of Rh-Kell typing in donor populations

Dr Lakhvinder Singh

Ensuring that blood donors are accurately typed for Rh and Kell antigens is extremely important in the field of transfusion medicine, particularly in diverse regions like India. The presence or absence of certain antigens on red blood cells can influence the risk of alloimmunization in recipients. Alloimmunization, which is the formation of antibodies against foreign blood antigens, poses significant threats in transfusion therapy. It can lead to complications such as hemolytic transfusion reactions (HTRs) and hemolytic disease of the fetus and newborn (HDFN). Let's delve into why Rh and Kell typing matters, the frequency of these antigens in Indian donors, and the implications for transfusion safety.

The Rh Blood Group System

The Rh blood group system, second in complexity only to the ABO system, includes numerous antigens, with D, C, c, E, and e being the most notable. The D antigen, in particular, is highly immunogenic and can provoke a strong immune response if transfused into a D-negative recipient.

- **D Antigen**: Defines Rh-positive and Rh-negative status. About 95-98% of the Indian population is Rh-positive, which reduces, but does not eliminate, the risk of anti-D alloimmunization.
- **Other Rh Antigens (C, c, E, e)**: Typing for these antigens is crucial due to their potential for alloimmunization. Anti-c and anti-E antibodies are frequently encountered in transfusion practice.

Rh Antigens Frequency in Indian Donors

Research on Indian blood donors shows the following approximate frequencies for Rh antigens:

- **D antigen**: Present in about 95-98% of donors
- **C antigen**: Present in about 68-70%
- **c antigen**: Present in about 80-85%
- **E antigen**: Present in about 20-25%
- **e antigen**: Present in about 98-99%

These frequencies vary across different regions and ethnic groups, highlighting the need for detailed typing to fully understand local donor profiles.

The Kell Blood Group System

The Kell blood group system is known for its high immunogenicity, second only to the D antigen in the Rh system. The most significant antigen here is the K (Kell) antigen. Despite its relatively low prevalence, the K antigen is highly immunogenic and can cause severe complications if not properly matched.

Kell Antigen Frequency in Indian Donors

Studies show the following frequencies for the Kell antigens among Indian donors:

- **K antigen (Kell)**: Found in approximately 2-3% of donors
- **k antigen (Cellano)**: Present in nearly 97-98% of donors

The low prevalence of the K antigen doesn't reduce its importance. Its immunogenic nature means that even a small percentage of mismatched transfusions can have significant clinical outcomes.

Risks of Alloimmunization Without Proper Typing

Developing alloantibodies can have serious implications for patients who need frequent transfusions, such as those with thalassemia, sickle cell disease, or myelodysplastic syndromes. Alloimmunization can lead to:

- **Delayed Hemolytic Transfusion Reactions (DHTRs)**: Characterized by the premature destruction of transfused red blood cells, causing anemia, jaundice, and other complications.
- **Hemolytic Disease of the Fetus and Newborn (HDFN)**: Maternal alloantibodies can cross the placenta and attack fetal red blood cells, leading to severe anemia, hydrops fetalis, or stillbirth.
- **Challenges in Finding Compatible Blood**: Alloimmunized patients face increasing difficulty in finding compatible blood units, especially if they have multiple antibodies.

A systematic review by Shamee Shastry and colleagues highlights the prevalence of anti-D, anti-C, anti-c, anti-E, and anti-Kell antibodies in Indian patients, underscoring the need for comprehensive Rh and Kell antigen typing in donors.

The Importance of Rh and Kell Typing

- **Reducing Alloimmunization**: By typing for the D antigen and other Rh antigens (C, c, E, e) and the K antigen, the risk of alloimmunization can be significantly reduced, especially in multi-transfused patients.
- **Enhancing Transfusion Safety**: Matching donors and recipients for these antigens prevents HTRs and HDFN, improving the overall safety and effectiveness of transfusion therapy.
- **Improving Patient Care**: For patients with known antibodies, having access to antigen-negative blood is crucial. Proactive Rh and Kell typing allows for better inventory management and quicker identification of compatible units.

Current Practices and Recommendations

While RhD typing is routinely performed for all blood donors in India, extended Rh antigen typing (C, c, E, e) and Kell typing are not as common. Implementing comprehensive typing practices can enhance transfusion safety.

Recommended Actions:

1. **Standardize Typing Protocols**: Blood banks and transfusion centers should adopt protocols for typing donors for RhD and other Rh antigens (C, c, E, e), and the Kell antigen.
2. **Training and Awareness**: Enhanced training for laboratory personnel on the importance of extended antigen typing can improve typing quality and reliability.
3. **National and Regional Databases**: Establishing a centralized database for donor antigen profiles can facilitate quicker matching and improve transfusion outcomes.
4. **Research and Funding**: Further studies on alloantibody prevalence and antigen frequencies can help tailor blood bank practices to regional needs. Adequate funding is essential for sustaining these initiatives.

Conclusion

The importance of Rh and Kell typing in blood donors is undeniable. Given the high prevalence of anti-Rh and anti-Kell antibodies in Indian patients, expanding typing practices beyond basic RhD is crucial. Comprehensive antigen typing reduces alloimmunization risk, enhances transfusion safety, and ensures better care for patients needing multiple transfusions. By prioritizing these measures, India's transfusion services can make significant strides in preventing transfusion-related complications and improving patient outcomes.

HOW TO RESOLVE DAT POSITIVE CASES?

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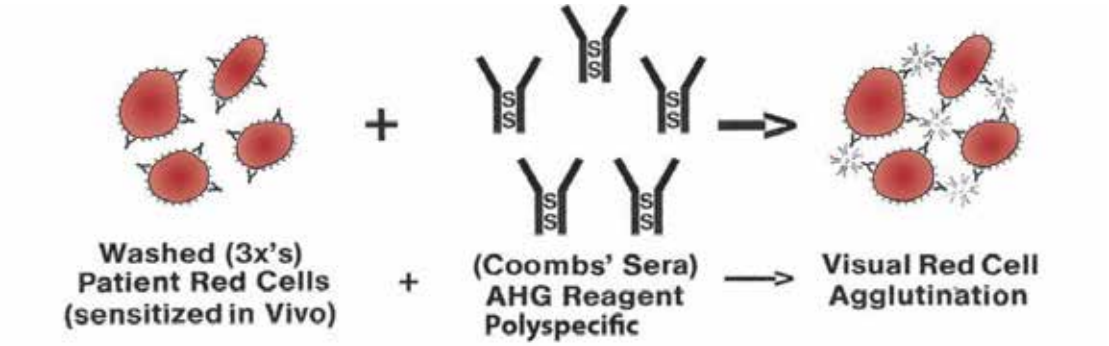
BACKGROUND:-
Direct Antiglobulin Test (DAT) is used to determine whether red blood cells (RBC) have surface bound immunoglobulin G (IgG) and/or complement. The main utility of the DAT is to categorize hemolysis as immune-dependent or immune-independent.[1]
Clinical conditions that can result in in vivo coating of RBCs with antibody or complement are: [2]
1) Hemolytic disease of the fetus and newborn (HDFN)
2) Hemolytic transfusion reaction (HTR)
3) Autoimmune and drug-induced hemolytic anemia (AIHA).

Principle of DAT Test :- [1]
Antihuman globulin (AHG) agglutinates antibody-coated cells. Testing starts with polyspecific AHG containing both anti-IgG and anti-complement, with positive reactions repeated with monospecific AHG to individually detect IgG and complement.



EVALUATION OF A POSITIVE DAT RESULT: -
A positive DAT alone is not diagnostic of hemolytic anemia.
DAT is positive in 1-3 in 10,000 normal persons and 10% of hospitalized patients without anemia or signs of hemolysis.[3]

Understanding the significance of this positive results requires knowledge of the patients diagnosis, recent drug, pregnancy, transfusion and hematopoietic transplantation history and the presence of acquired or unexplained hemolytic anemia. [4]

STEPWISE EVALUATION OF POSITIVE DAT CASE: -

STEP – I: - First Rule out False Positivity in DAT result: -
When the DAT is positive with both Anti IgM and Anti – C3d, the red cells should be first tested with an inert control reagent (eg. 6% albumin or saline) to confirm the results

Lack of agglutination with Inert control reagent

If the inert control is reactive

Test results are accurately Interpreted	DAT result is invalid Causes: - Spontaneous agglutination caused by heavy coating of IgG or rare warm reactive IgM - IgM cold agglutination that were not dissociated during routine washing in Conventional tube testing

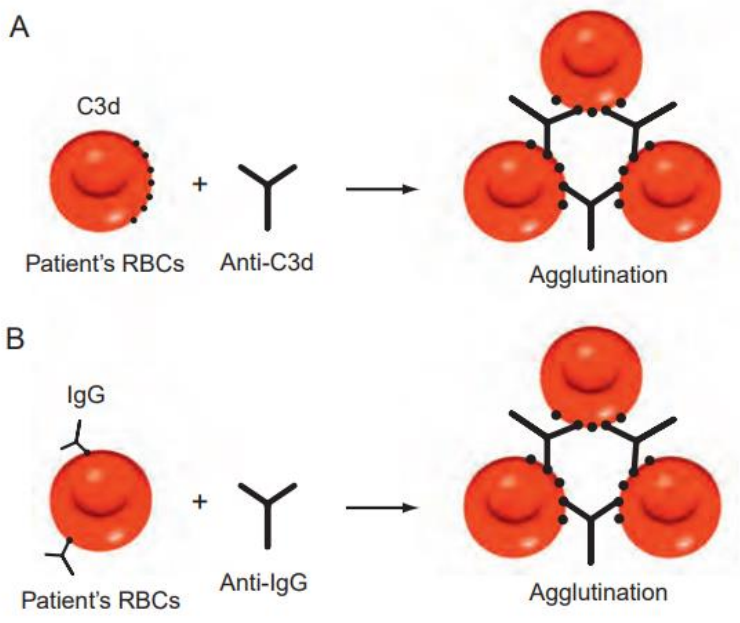
STEP – II :- Evaluate Positive DAT test Based on Patient History[4]

I	II	III	IV	V	VI
Evidence of In- vivo Administration of Hemolysis IVIG or IV Anti – D -To evaluate immune - Antibodies present etiology for haemolysis in these preparations -Prepare eluate from the DAT can cause positive + RBCs & react with reagent DAT	**Recent Transfusion Administration of History potentially interfering** - Positive DAT result **therapeutic agents that** may indicate a **may react with target** developing Immune **antigen on red cells** Response - Anti CD38 used for red cells to determine the Myeloma can give red cell Antibody specificity Positive DAT results	**Administration of Drugs associated with Immune mediated hemolysis** -To rule out or confirm diagnosis of drug induced Immune	**History of HSCT or organ transplantation** -Passenger lymphocytes from donor producing antibodies against recipients red cells causing positive DAT haemolytic anemia		

STEP – III: - SEROLOGIC INVESTIGATIONS IN DAT POSITIVE CASES: -

a) Test the DAT positive RBCs with Monospecific Anti IgG and Anti C3d reagents to characterize the type of proteins coating the red cells & to classify an Immune – mediated hemolytic anemia

DIRECT ANTIGLOBULIN TEST FOR DETECTION OF (A) ERYTHROCYTE-BOUND C3d OR (B) IgG.



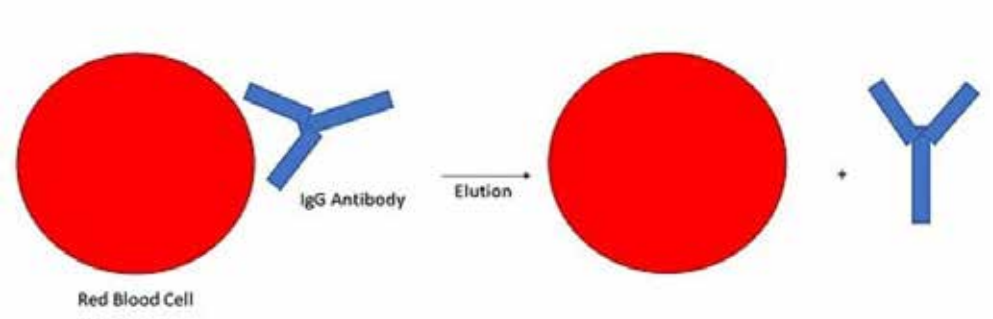
Summary of findings in patients with AIHA[5]

b) *DAT positive cells should be subjected to elution :-*

Elution :- Removes bound antibody from the surface of a red blood cell to aid in the antibody identification process or phenotyping of red cell antigens (if appropriate elution method is used).

Type of AIHA	Ig	DAT poly	DAT mono anti-IgG	DAT mono anti-C3d	IAT	Eluate	Specificity
WAIHA	IgG	+	+	+ or –	+	IgG	Pan-agglutinin Rh/others (rare)
CAS	IgM	+	–	+	+*	–	I/i
PCH	IgG	+	–	+	+*	–	P
DIIHA	IgG	+	+	+ or –	–	+ or –	Rh-like

Bound antibody may be released by changing the thermodynamics of antigen antibody reaction, neutralizing or reversing forces of attraction that hold antigen-antibody complexes together, or disturbing the structure of the antigen-antibody binding site.



Selected Elution Procedures: [6][7]

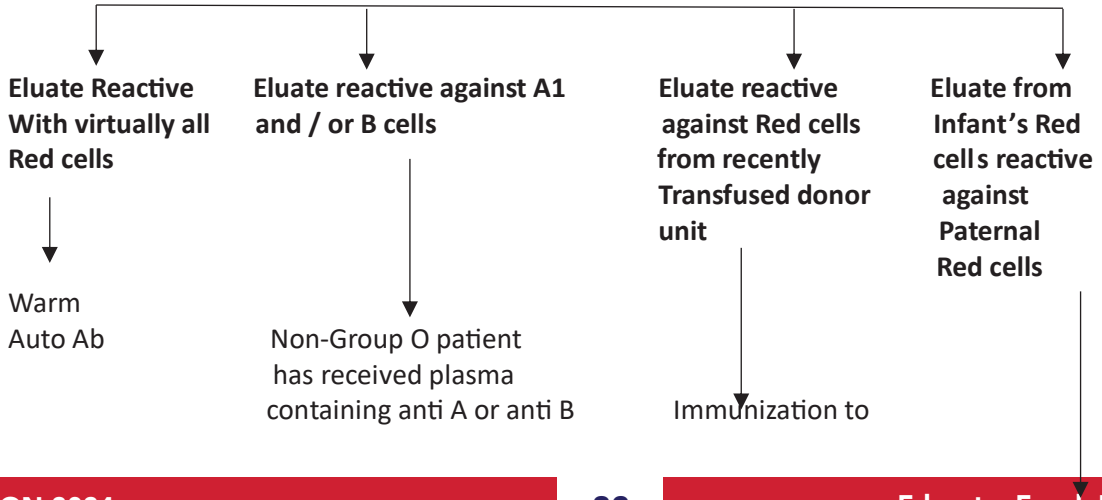
METHOD	Cold Acid	Glycine-HCL/EDTA	Heat (56 ° C)	Lui Freeze-Thaw
PRINCIPLE	Low pH result in disruption of the electrostatic bonds in proteins and changes to the tertiary structure leading to elution of antibodies.	Change the attractive forces between antigen and antibody.	Increase in temperature dissociate antibodies from red cells.	Freezing results in extracellular ice crystal formation resulting in increased Osmolarity in the extracellular fluid. Extracellular fluid then extracts water from the red cells leading to RBC lysis. As the membranes are disrupted, antibody is dissociated

USE	For recovery of warm-reactive auto and alloantibodies.	- Identification of auto or all antibodies - (used in conjunction with adsorption techniques are also useful in detecting weak antigen expression on the adsorbing red cells, as well as in separating mixtures of antibodies against red cell antigens.) - Once the red cells have been rendered DAT negative, they may be tested for the presence of blood group antigens, except those in the KEL system and Er$^{a.}$ -Red cells modified with glycine-HCl/EDTA may be treated with a protease and used in autologous adsorption studies.	Best suited for the investigation of ABO HDFN and for the elution of IgM antibodies from red cells. It should not be used routinely for the investigation of IgG auto- or alloantibodies.	-Used in ABO HDFN as IgG anti- A and anti- B are eluted. -Should not be used for the investigations of IgG auto or alloantibodies

Use of Eluate: -

1) Eluate is tested at antiglobulin phase using screening and panel red cells to determine any specificity for the dissociated antibody
2) To detect Ab in the eluate in case of HTR or HDFN.

Interpretation of Eluate Testing: [4]

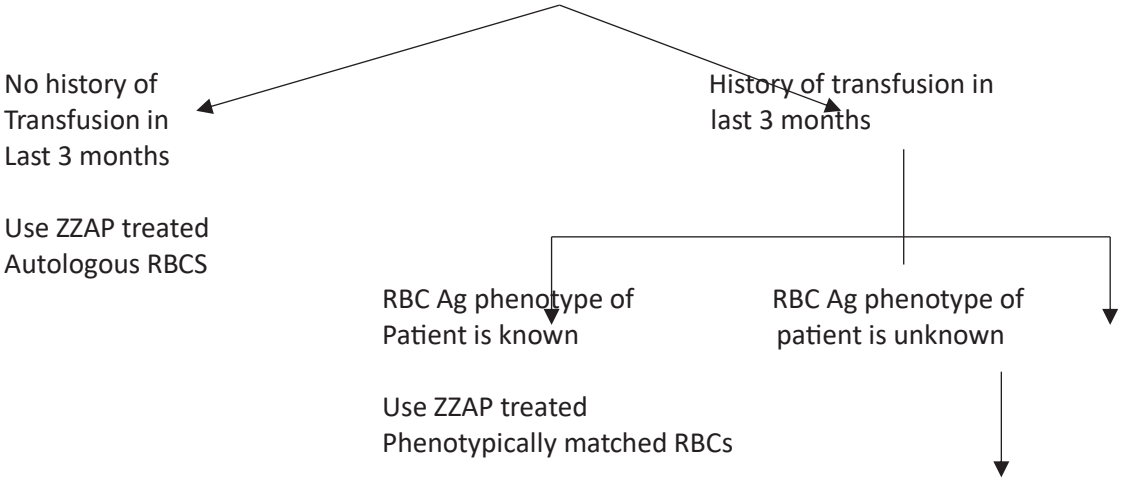


(e.g. Transfusion of group O Platelets)	Low prevalence Ag on the donor RBC	Maternally derived Ab to to a low Prevalence Ag on Paternal RBC

c) Use of Adsorption: - [4]

A DAT positive case may have alloantibodies in plasma masked by autoantibodies.
Auto or Allogenic adsorption, phenotypically matched adsorption or Differential adsorption of the patient's serum is performed to remove warm-reactive autoantibodies but not alloantibodies. The adsorbed serum then can be used for detection & identification of Clinically significant alloantibodies.

Selection of RBCs used for Adsorbing warm-reactive Autoantibodies



Step 1 - (select RBC for each Rh phenotype)

R_1R_1, R_2R_2, rr

Step 2 – On the basis of the Red cell treatment, or lack of treatment , at Least one of the RH-phenotyped cells should be negative for the antigens Listed below.

ZZAP-Treated Red Cells	Enzyme-Treated Red Cells	Untreated Red Cells
Jk(a–)	Jk(a–)	Jk(a–)
Jk(b–)	Jk(b–)	Jk(b–)
	K–	K–
		Fy(a–)
		Fy(b–)
		S–
		s–

Summary :-

Resolution of DAT positive cases is technically demanding & time consuming task. Using Steps described above & resources mentioned, DAT positive cases can be resolved leading to correct classification of Immune hemolytic anemic & providing safe blood for transfusion.

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Night Transfusion - Ethical concerns (monitoring)
Dr. Meena Siddhu

Blood products, including RBC, platelets (PLT) and fresh frozen plasma (FFP) can be lifesaving; however, their administration has also been associated with an increase in morbidity and mortality. Blood transfusion safety starts from prescription by the treating physician to completion of the whole transfusion process. The transfusion safety can be hampered at any stage of the transfusion chain starting with the clinical decision to transfuse, prescription and request, patients' blood sampling, pretransfusion testing and eventually the collection of the blood product from the blood bank and administration to the patient. All administered blood products need to be monitored closely regardless of the timing of transfusion to avoid transfusion hazards.

Guideline on the Administration of Blood Components by British Committee for Standards in Haematology reports that there is increased risk of errors if pre-transfusion testing is performed during 'out of hours' working. Requests for transfusion should only be sent 'out of hours' when clinically necessary. Organisations planning '24/7' (all day, every day) working should risk assess their processes and deploy adequate numbers of appropriately trained laboratory staff to ensure transfusion safety

Provision of right blood to the right patient at the right time remains a formidable challenge. Overnight transfusion (OT) has been defined in various ways. It is generally defined as transfusion occurred between 8 pm to 8 am or 8pm to 6.00am.

Overnight transfusion has some drawbacks that put the patients at risk

- Inadequate observation and Monitoring
- Documentation
- Inadequate timing of administration and without urgency
- Understaffing - error mainly is attributed to a lack of personnel- Laboratory and Clinical
- Inadequate communication
- Transfusion practice appeared to be worse at night than during the day. Taking longer time for the starting and completing the transfusion
- Sleep disturbances of the patient and other patients in the cubicle
- Investigations are not available-most of the time it is based on clinical judgement- not evidence based
- Investigation of a transfusion reaction are difficult to handle
- Symptoms or signs of adverse reactions to transfusion are more likely to be missed, transfusions given outside core hours are more likely to give rise to errors, the consequences of which could be even more serious than errors occurring in the daytime
- the reduced lighting at night

In 2003, SHOT reported that 65 out of 176 (37%) of Incorrect Blood Component Trafusion events, in which there was an error involving the collection of blood from the hospital storage site and/or administration to the patient, and the time of transfusion was known, occurred outside 'core working hours'(i.e. between 20:00 and 08:00 hours). There can be various reasons for overnight transfusions
Acute clinical need

- Patients with active bleeding / haemolysis at the time of transfusion
- Patients with sympatomatic anemia

Less acute clinical need

- Asympatomatic anemia
- Patients transfused while in theatre Patients transfused to raise their haemoglobin prior to surgery the following day

- Patients transfused to raise their haemoglobin prior to a procedure the following day

Pragmatic need

- Patients transfused so they can be discharged same/next day Oncology/Haematology patients with a limited line time
- Patients transfused out of hours because they are finishing off a transfusion episode

Other

- Patients transfused for reasons that do not fall into the above categories

A Clinical Audit of Overnight Transfusion was carried out In Eight New Zealand Hospitals and the results were reported in August 2011
This audit reviewed red cell units administered between the hours of 8 pm and 8 am at eight large public hospitals in New Zealand over four weeks, excluding high acuity areas

Results showed that 9% (535) of all red cell units transfused at the audited hospitals were transfused overnight in non-high acuity areas. Of the units transfused overnight:

- 66% were for symptomatic anaemia or active bleeding/haemolysis.
- 16% were for asymptomatic anaemia.
- 42% were assessed as not essential for overnight transfusion.
- 49% of post-transfusion haemoglobin levels were greater than 100 g/L, indicating a high degree of liberal transfusion.
- Transfusion practice appeared to be worse at night than during the day.
- 16% units rate of transfusions lasting more than four hours and
- Rate of Reporting of adverse reaction was low. Thirteen adverse reactions (2% of 535) were found when the case notes were examined by the auditors, with only 4(31%) being reported to Blood Bank. This is of concern as it suggests that adverse reactions may not be properly assessed or treated due to the reduced staffing levels and reduced skill set of medical staff on site overnight.

Transfusion at night is inherently unsafe, based on a SHOT recommendation (SHOT 2005) that transfusions out of core hours should be avoided unless clinically essential.
So, patients without a clinical need should not be transfused overnight. Hospitals should include guidelines for transfusion overnight in their transfusion policy. Overnight transfusions should only be started if observations can be undertaken within 15 minutes of the start time. The reason for transfusion, beneficial effects and adverse incidents must be documented in the patient's clinical notes. We must improve systems to maximize the opportunity to transfuse during the day and reinforce a restrictive transfusion strategy to reduce all inappropriate transfusions during night time

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National Standards for Quality - What do we expect?

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In the evolving landscape of healthcare, particularly in blood transfusion and immunohematology, the importance of robust national standards for quality and accreditation is paramount. The 3rd edition of the NABH standards for blood centres, has by and large remained unchanged(with the exceptions of one or two amendments) for eight years.

While continuing to lay an emphasis on complying with regulatory requirements (the minimum standards) and national guidelines, one expects that the updated standards will go beyond donor management and technical processes and foster a culture of quality and safety with greater emphasis on risk management, incident reporting, analysis and addressing adverse events, competency assessments and the need for continuous professional development. In addition, regular training programmes with evaluation of their effectiveness also being emphasised. All of these would strengthen the NABH standards but also improve the overall quality of blood transfusion services in India.

As a new update is in the offing, what should we expect from the 4th edition of the NABH?

It is noteworthy that since 2020, after the release of the 5th edition of the NABH Standards for Hospitals and Healthcare Organisations, all the new standards/editions of existing standards, have followed the same structure. It is easy to imagine that the same would apply to the 4th edition of the NABH standards for Blood Centres and Transfusion Services which would be a departure from the current adaptation of ISO 15189.

In the 5th edition standards for hospitals, the individual chapters include standards (rather than clauses). Each standard has objective elements (OE) to indicate the compliance requirement. Furthermore, each OE is categorised into one of the four categories, namely, core, commitment, achievement and excellence. Core objective elements are fundamental and need to be complied with at all times, in the entire accreditation cycle. While assessments (final, surveillance, reassessment) is based on all applicable standards and objective elements, the final assessment score is based on core and commitment OE; the surveillance assessment score is based on core, commitment and achievement; and reassessment score is based on core, commitment, achievement and excellence OEs. This is in keeping with the fact that quality is a journey in continuous improvement and the organisation should attempt to raise the bar with each assessment. The standards are supplemented by a guidebook wherein, each OE is supported by an interpretation which provides guidance on implementation requirements.

Let us consider the strengths of the existing blood centre standards and what we could take from the NABH standards for hospitals and other globally accepted standards for blood centres and biotherapies.

Strengths of the 3rd edition (existing) standards:

1. **Focus on Safety and Quality**: The standards prioritize the safety of blood products and the quality of services, which is critical for donor and recipient safety.
2. **Regulatory Compliance**: The standards align well with national and international regulations, ensuring that blood centres adhere to essential legal and ethical requirements.
3. **Structured Processes**: There is a clear framework for processes related to blood donation, testing, processing, and storage, promoting consistency and reliability in operations.
4. **Donor Management**: Emphasis on donor selection and management helps ensure that only eligible donors are recruited, reducing risks associated with blood transfusions.

Areas for Improvement which could be considered for incorporation in the 4th edition of NABH standards for Blood Centres:

1 **Comprehensive Risk Management**: While there are provisions for safety, a more comprehensive approach to risk management that addresses potential operational risks and adverse events could enhance safety further.

2 **Comprehensive Risk Assessment**: Implement broader risk management strategies that go beyond donor safety, including potential risks in blood processing and transfusion practices (donor, process and recipient haemovigilance).

3 **Incident Reporting Systems**: Establish a robust system for reporting and analysing adverse events related to blood collection and transfusion.

4 **Continuous Quality Improvement**: Although there are quality assurance measures, a stronger focus on continuous quality improvement (CQI) processes could drive ongoing enhancements in performance and service delivery. The blood centres could adopt CQI methodologies to regularly assess and enhance blood centre operations, and where applicable, aligning with hospital practices to improve service delivery.

5 **Rational use of blood/products**: through evidence based best practice guidelines and its monitoring through the Hospital Blood Transfusion Committee.

6 **Clinical audits on transfusion practices:** to ensure quality improvement of transfusion practices and clinical and effective use of blood and its components.

7 **Performance Metrics**: Review and utilise key performance indicators (KPIs) to evaluate and monitor blood centre performance and quality of services.

8 **Feedback Mechanisms**: Establishing robust mechanisms for collecting and acting on feedback from donors and staff could improve service quality and operational efficiency.

9 **Training and Competency Development**: The standards could provide more detailed guidance on the ongoing training and competency assessment of staff to ensure they remain up-to-date with best practices and technologies.

10 **Ongoing Education Programs**: Incorporate structured training programs that ensure staff are continuously updated on best practices, regulations, and technological advancements.

11 **Competency Assessments**: Regularly assess staff competencies in various procedures related to blood donation and processing.

- **Trainings**: There should be due emphasis to induction training, training specific to job description and training on quality and safety respectively.
- **Donor/Patient-Centered Focus**: Incorporating a more explicit patient-centred approach would enhance the overall experience for donors, focusing on their needs, preferences, and satisfaction.
- **Donor and Patient Experience**: The standards could emphasize the importance of donor experience and satisfaction, mirroring patient-centred approaches used in hospitals. Develop clear communication protocols to keep donors informed throughout the donation process.
- Integrated Information Systems
- **Health Information Management**: In line with global trends, the standards could procedures for leveraging technology, where applicable and/or feasible, to manage donor information, tracking blood products, and ensuring efficient communication across departments.
- **Data Analytics**: Utilize data analytics to improve decision-making processes related to inventory management and donor recruitment, where feasible.
- **Technology Utilization**: The standards could promote the use of advanced technologies for data management, inventory tracking, and donor engagement, which are increasingly important in modern healthcare, wherever feasible.
- Infection Control Protocols

- **Enhanced Infection Control Measures**: Incorporate comprehensive infection control standards to minimize risks during blood collection and processing with emphasis on standard precautions.
- **Surveillance Programs**: Utilise risk management to monitor and mitigate potential outbreaks related to blood services
- Governance and Leadership
- **Strong Leadership Structure**: Establish a governance framework that defines roles and responsibilities, ensuring accountability in blood centre operations with due emphasis on operational and strategic planning.

Incorporating these elements can help enhance the overall quality, safety, and efficiency of blood centres, ultimately benefiting both donors and patients.
If these elements are incorporated, the standards would be useful in providing a holistic and comprehensive approach to Quality and Safety, over and above assuring the quality of technical processes.

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Hemovigilance - Time to address appropriate blood usage

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Introduction:

Hemovigilance, derived from the French word "hémovigilance," which means, “watchful over blood”, plays a critical role in the modern healthcare system. Introduced in France in 1994, this concept mirrors pharmacovigilance but focuses on the entire blood transfusion chain—from donor selection to the transfusion and post-transfusion monitoring of patients. As we advance in medical technology and practices, addressing the appropriate use of blood components through comprehensive hemovigilance systems is crucial. By systematically monitoring, analyzing, and improving transfusion practices, hemovigilance ensures blood transfusions' safety, quality, and efficacy, ultimately enhancing patient outcomes and reducing risks. Now more than ever, it is time to focus on leveraging hemovigilance to optimize blood usage and safeguard public health.

Scope of Hemovigilance:

Hemovigilance has come a long way since its inception, growing to ensure the safety, quality, and efficacy of blood transfusion practices. Initially, it was all about keeping an eye on transfusion-transmitted infections like HIV, HBV, and HCV. But today, hemovigilance encompasses a much broader scope, including both infectious and non-infectious reactions—everything from minor allergic reactions to severe, potentially fatal outcomes like Transfusion-Related Acute Lung Injury (TRALI) and ABO-incompatible transfusions. Hemovigilance doesn't just stop at identifying these issues; it delves deep into incident analysis, covering errors, procedural deviations, and system failures, then works to root out their causes and implement corrective measures.

Quality improvement is the core aim—by identifying areas that need enhancement and implementing evidence-based changes, hemovigilance significantly boosts transfusion safety. Hemovigilance also focuses on the efficacy and efficiency of transfusions, ensuring optimal therapeutic outcomes. It tackles issues of under- and overtreatment and aims to reduce wastage through better inventory management. Though not widely practiced at the national level yet, monitoring efficacy and efficiency is a crucial future direction.

Global collaboration and standardization are vital. By working with networks like the International Hemovigilance Network (IHN) and the WHO, hemovigilance systems share best practices, data, and resources, striving for consistent and high-quality activities worldwide. By continuously evolving and incorporating new areas, such as near-miss reporting and efficiency monitoring, hemovigilance plays a pivotal role in enhancing transfusion safety and patient outcomes globally.

Hemovigilance to address appropriate use of blood components:

Hemovigilance is vital for ensuring the appropriate use of blood components. Comprehensive monitoring and data collection span the entire transfusion process, from donor selection to the administration of blood components. This approach helps identify utilization patterns, highlighting areas of overuse or underuse and tracks adverse events to assess the safety and effectiveness of blood components.

By analyzing the collected data, hemovigilance systems develop evidence-based recommendations that guide optimal blood use. These recommendations establish guidelines for when and how to use different blood components, such as red blood cells, platelets, and plasma, ensuring that they are used appropriately based on clinical indications and avoiding unnecessary transfusions. Hemovigilance also drives continuous quality improvement in transfusion practices. It identifies areas for enhancement, such as specific protocols that need updating, and implements corrective actions like improving inventory management.

Reducing wastage is another critical role of hemovigilance. By monitoring inventory levels and usage patterns, hemovigilance helps ensure timely and appropriate ordering and distribution of blood components. Strategies to reduce outdating, such as optimizing storage conditions and rotation policies, are also implemented. By promoting the optimal use of blood components, hemovigilance enhances patient outcomes. It ensures that transfusions are given only when clinically necessary, reducing the risk of complications and adverse reactions. Additionally, addressing safety concerns related to specific blood components improves overall transfusion safety.
Through these methods, hemovigilance ensures that the use of blood components is safe, efficient, and effective, ultimately leading to better patient care and outcomes.

Utilizing hemovigilance for monitoring the efficiency and efficacy of blood components:
Utilizing hemovigilance for monitoring the efficiency and efficacy of blood components involves a comprehensive and strategic approach. The goal here is to minimize the wastage of blood components, ensuring that every unit is used optimally and remains available for those in need. To achieve this, robust inventory management systems are essential. These systems help monitor blood supply and demand, significantly reducing the risk of expired products. Predictive analytics plays a crucial role as well, allowing forecast of blood demand based on historical data and upcoming surgical schedules. By coordinating with clinical teams, timely ordering and transfusion of blood products, cutting down on delays and wastage can be ensured. Additionally, reviewing and adjusting transfusion practices to align with evidence-based guidelines helps optimize blood utilization.
In terms of efficacy and efficiency monitoring, it's all about incorporating comprehensive oversight into hemovigilance systems. This is not just a task for individual hospitals but should be integrated at the national level to ensure a cohesive approach. Developing standardized metrics for assessing the efficacy and efficiency of transfusion practices—such as transfusion rates, patient outcomes, and blood utilization ratios—provides clear benchmarks. Leveraging advanced technologies like machine learning and artificial intelligence can further enhance data analysis, identifying areas for improvement. Benchmarking performance metrics across hospitals and regions helps highlight best practices and areas needing enhancement, ensuring continuous improvement in transfusion practices. This holistic approach ensures that hemovigilance not only maintains the highest standards of safety and quality but also enhances the overall efficiency of blood component usage.

Conclusion:
Hemovigilance is an indispensable framework ensuring the appropriate use of blood components in medical practice. By continuously monitoring, analyzing, and improving blood transfusion practices, hemovigilance safeguards both donor and recipient safety, mitigates risks, and enhances patient outcomes. It addresses the complex spectrum of transfusion-related issues, from adverse reactions to system failures, promoting evidence-based practices and continuous quality improvement. The integration of global collaboration and standardization further elevates the efficacy of hemovigilance, ensuring consistent and high-quality care worldwide. As we advance in medical science, it's imperative to leverage hemovigilance systems to optimize blood usage, reduce wastage, and ultimately safeguard public health. Now, more than ever is the time to focus on this critical aspect of transfusion medicine.

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Title: Challenges of syphilis infection testing

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Syphilis, caused by the spirochaete *Treponema pallidum*, remains a significant global public health issue, with an estimated 5 million new cases detected annually, predominantly in developing countries. The recent rise in primary and secondary syphilis rates in the United States (US) is largely due to a more than threefold increase among men, with over half of those cases linked to men who have sex with men. Additionally, a recent surge is seen in heterosexual men and women, with rates of primary and secondary syphilis among women more than doubling from 2014 to 2018. Its association with an increased risk of human immunodeficiency virus (HIV) infection further heightens concerns regarding morbidity and mortality.

Stages of Syphilis

Syphilis is a sexually transmitted infection that progresses through distinct stages, each marked by specific symptoms and health implications. The first stage, **Primary Syphilis**, typically manifests 9 to 90 days after exposure, presenting as a painless ulcer (chancre) that may go unnoticed. If left untreated, the infection can progress to **Secondary Syphilis**, characterized by systemic symptoms such as a symmetrical rash, particularly on the palms and soles, along with elevated levels of the bacterium in the bloodstream, which increases the likelihood of transmission. Following this, the infection may enter the **Latent Syphilis** phase, where individuals remain asymptomatic, and detection relies solely on serological tests. This asymptomatic stage can persist for years, making timely identification and treatment essential to prevent progression to **Tertiary Syphilis**. This final stage can occur 10 to 20 years after initial infection and can severely affect various organ systems, particularly cardiovascular and neurological health, leading to serious complications. Thus, early detection and treatment of syphilis are crucial to mitigate these risks.

Modes of Transmission

Syphilis is primarily transmitted through sexual contact, including vaginal, anal, and oral sex. It can also be passed from an infected mother to her child during pregnancy or childbirth, resulting in congenital syphilis. While non-sexual transmission is rare, it can occur in areas with poor hygiene. The risk of transmission through blood transfusions has significantly decreased in developed countries due to rigorous screening practices. Certain behaviours, including male-male sexual activity, having multiple sexual partners, a history of syphilis treatment, and co-infection with HIV, are associated with higher rates of syphilis. Additional practices, such as intravenous drug use and skin scarification, further increase transmission risk, highlighting the need for public health awareness and education.

Transfusion-Transmitted Syphilis

Historically, cases of transfusion-transmitted syphilis were reported until universal donor screening became standard. Factors contributing to the decline in transfusion-related cases include:

- **Universal Testing:** Routine blood donor screening significantly reduces transmission risks.
- **Change in Transfusion Practices:** Direct donor-to-recipient transfusions have become less common.
- **Microbial Inactivation:** *Treponema pallidum* is sensitive to cold, making it less viable in refrigerated blood components.
- **Decline in Syphilis Rates:** A lower prevalence in the general population is reflected in blood donors.
- **Self-Deferral:** Donors often refrain from donating when symptomatic during spirochetemia.
- **Risk-Based Screening:** Potential donors with high-risk behaviours are screened and deferred.
- **Antibiotic Use:** Increased antibiotic use among transfusion recipients may reduce infection severity.

- **Diagnostic Challenges:** Difficulties in identifying transfusion-transmitted syphilis in recipients may obscure its incidence.

Despite these factors, the exact impact of each has not been quantified or validated.

Blood Donation and Screening

Effective donor selection involves assessing risk behaviours and medical history. Although syphilis prevalence has decreased in developed nations, it remains significant in developing countries. Donor history questionnaires are used to identify individuals with past syphilis infections or high-risk behaviours. Challenges persist due to limitations in current diagnostic methodologies, interpretation of serological patterns in asymptomatic individuals, and the absence of a universally accepted gold standard. The significance of confirmed positive test results in blood donors raises questions about the effectiveness of detecting truly infectious donors. Efforts to enhance blood safety focus on developing efficient diagnostic algorithms and implementing hemovigilance programs.

Diagnostic Testing

Although syphilis testing in blood donors remains a challenge, data from the American Red Cross indicate that donors with positive syphilis test results have significantly higher rates of other infections, such as HIV and Hepatitis B and C, compared to those with negative results.

Various diagnostic tests are available for syphilis, with serological tests serving as the cornerstone for diagnosis. These tests are primarily categorized into non-treponemal and treponemal tests. Non-treponemal tests, such as the Venereal Diseases Research Laboratory (VDRL) and Rapid Plasma Reagin (RPR) tests, detect reagin antibodies (IgM and IgG) that react with non-specific antigens, notably cardiolipin, derived from mammalian tissues. These tests are widely used for screening blood donors, diagnosing syphilis, and monitoring treatment efficacy, as antibody levels typically decrease or revert to negative after successful treatment. However, they have notable limitations: false-negative rates can reach 30-50% in early primary syphilis, often due to technical errors or the "prozone phenomenon," while false positives can occur due to cross-reactivity with viral infections, autoimmune diseases, and other conditions, resulting in waste of blood components and unnecessary donor deferrals.

On the other hand, treponemal tests, including the Fluorescent Treponemal Antibody Absorption (FTA-ABS) test, Treponema pallidum Hemagglutination Assay (TPHA), and Enzyme Immunoassays (EIA), specifically detect antibodies against Treponema pallidum antigens. These tests remain positive for years, even after successful treatment, making them unsuitable for monitoring disease activity but valuable for diagnosing late-stage syphilis or confirming reactive non-treponemal test results. While more specific, treponemal tests can yield false positives, particularly in individuals with other treponemal infections.

The FTA-ABS test is regarded as the gold standard confirmatory test for syphilis, providing objective results that minimize interpretation errors and allow for automation suitable for large-scale testing, although its higher complexity and cost can limit accessibility. The TPHA test, utilizing sensitized sheep erythrocytes coated with T. pallidum, offers similar advantages but has limitations regarding subjective result interpretation. Meanwhile, enzyme immunoassays (EIAs) have gained popularity since the 1990s for detecting both IgG and IgM antibodies against T. pallidum, boasting high sensitivity and specificity. Recent advancements, including chemiluminescence assays (CLIA) and multiplex flow immunoassays, have further improved detection options.

Several serologic point-of-care tests for detecting treponemal and nontreponemal antibodies, as well as combinations with HIV testing, are available globally. However, only one treponemal antibody test has received US Food and Drug Administration (FDA) approval. While point-of-care tests hold significant potential in settings like resource-limited antenatal care, data on their field performance is limited, and their implementation should include a strong quality-assurance program.

Blood Donor Testing Algorithms

In India, the Drug and Cosmetics Act and Rules 1945 mandates syphilis screening tests for blood centres, allowing the choice between VDRL, RPR, or treponemal-based EIA, often influenced by cost. Recent studies have assessed the effectiveness of traditional and reverse testing algorithms. The traditional screening algorithm begins with a non-treponemal assay, such as RPR or VDRL, followed by a more sensitive treponemal test for confirmation. While this method is reliable in high-prevalence settings, it may yield false positives in low-prevalence populations. In contrast, the reverse screening algorithm starts with an automated treponemal test, followed by RPR for reactive samples. This approach enhances sensitivity for detecting late or latent syphilis but presents challenges, including increased costs and a higher likelihood of false positives. If the non-treponemal test is nonreactive, further testing with a distinct treponemal test is necessary for confirmation.

The performance characteristics of these algorithms are influenced by syphilis prevalence, with treponemal tests showing sensitivities between 93% and 99% and specificities ranging from 93% to 95.6%. Although the reverse algorithm may result in a higher false-reactive rate in low-prevalence populations, it effectively identifies latent syphilis cases that might be missed by RPR screening. Notably, employing CLIA as the initial screening test has demonstrated potential in reducing false positive rates, further supporting the reverse algorithm's efficacy. Overall, the diagnostic landscape for syphilis comprises various tests, each with its strengths and limitations. Non-treponemal tests are valuable for initial screening, while treponemal tests are essential for confirmation. The choice of testing algorithm significantly impacts diagnostic accuracy and safety in blood donation settings, highlighting the need for continuous improvement in screening methodologies.

Management of Reactive Donors

Blood donors who test reactive are referred for specialized medical care, receiving treatment and prevention advice. Many may be unaware of past infections, so public health efforts aim to ensure untreated individuals receive necessary care to prevent progression to tertiary syphilis.

Conclusion

In summary, effective syphilis diagnosis combines direct examination, serological testing, and, if needed, molecular methods. Non-treponemal tests are used for initial screening, while treponemal tests confirm diagnoses. Recognizing the strengths and limitations of each method is crucial for accurate diagnosis and management. Ongoing efforts to screen and educate blood donors are essential to prevent transfusion-transmitted syphilis, particularly in high-prevalence areas. Improving donor selection and implementing pathogen reduction technologies are vital for blood safety. While various diagnostic tests exist, no single gold standard applies to all stages, highlighting the need for future studies on the reverse algorithm's effectiveness in low-risk populations. The ultimate goal is to enhance syphilis prevention and control in blood donation settings.

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E-Records: The Need of the Hour

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Blood banking is a critical part of the healthcare system, providing life-saving blood and blood products for patients who require transfusions due to surgery, trauma, or various medical conditions like anemia, cancer, and Hemophilia. Blood banks are responsible for managing the collection, testing, processing, storage, and distribution of blood donations. In an era where technology is revolutionizing healthcare across the world, integrating electronic records (e-records) into blood banking has become an essential step towards improving efficiency, safety, traceability and accessibility.

While the manual management of blood bank records has been in place for many years, the introduction of e-records offers a more streamlined, accurate, and efficient way of managing blood donations, donor information, patient transfusion history, inventory control, and regulatory compliance. The need for an electronic record system in blood banking is becoming increasingly apparent as the demands for blood and blood products grow, the complexity of managing donor and patient data increases, and the need for more stringent regulatory compliance becomes critical.

This write-up explores the importance of e-records in blood banking, outlining their necessity, benefits, challenges, and future directions.

What is E-Record in Blood Banking?

An e-record in blood banking refers to the use of electronic systems to manage the comprehensive range of data that blood banks handle. This includes data related to blood donors, donated blood units, patient transfusions, test results, inventory management, and regulatory compliance. These records are stored digitally and can be accessed, updated, and shared through secure databases or cloud-based platforms.

The primary goal of e-records is to replace paper-based documentation with an efficient, real-time, and secure digital system that improves the management and traceability of blood and blood products. This shift ensures better accuracy, faster access to critical information, and enhanced data security.

Why is E-Record in Blood Banking the Need of the Hour?

1. Improved Accuracy and Reduced Errors

Manual record-keeping in blood banks is prone to human errors, such as misidentification of donors, incorrect documentation of test results, and confusion in blood inventory management. Mislabelling a blood unit or failing to update records promptly can have serious consequences, including transfusion errors or delays in patient care.

Electronic records provide an opportunity to automate data entry, reducing the risk of errors associated with handwriting or manual data transfer. Moreover, integrated e-record systems often include checks and validations that help prevent mistakes such as incompatible blood group matching or missing test results.

2. Real-Time Data Access and Management

Blood banks need to manage large volumes of data that are constantly changing — from blood donations and testing results to patient transfusion needs and inventory levels. With manual record-keeping, accessing this data in real time is cumbersome and time-consuming.

E-record systems allow for instant access to the latest data, whether it's the status of a blood donation, inventory count, or patient's transfusion history. This real-time management ensures that healthcare professionals and blood bank staff can make timely and informed decisions, particularly in emergencies when a blood transfusion is urgently required.

3. Enhanced Blood Traceability and Safety

One of the key safety concerns in blood banking is the traceability of blood products from donor to recipient. Manual systems often make it difficult to track blood products accurately across various

stages of collection, testing, storage, and transfusion. This can become especially problematic in the event of an adverse reaction, contamination, or recall of blood products.

With e-records, blood and blood components can be traced throughout their lifecycle, from the donor's first visit to the transfusion recipient's medical record. This ensures greater transparency and accountability, significantly improving patient safety and the ability to respond quickly in case of a safety issue.

4. Efficient Inventory and Resource Management

Blood banks must maintain an inventory of blood units that is constantly changing based on donor availability and patient needs. Managing this inventory manually can be a logistical nightmare, leading to issues such as expired blood units, insufficient supplies, or untracked blood units.

E-records streamline inventory management by automating processes such as tracking blood donations, expiration dates, and usage. Automated alerts can notify blood bank staff when certain blood types or quantities are running low, helping to prevent stockouts and ensuring that the right type of blood is available when needed. Additionally, digital systems can help manage blood collection scheduling, ensuring a steady supply of blood donations.

5. Regulatory Compliance and Reporting

Blood banks operate under stringent regulations to ensure the safety and quality of blood and blood products. Compliance with these regulations requires thorough documentation of blood collection, testing, storage conditions, and transfusion practices. In the past, ensuring that these records were complete and accurate required labor-intensive manual processes.

E-records simplify the process of maintaining compliance with national and international regulations. Automated tracking and digital records make it easier for blood banks to prepare for audits, generate required reports, and prove adherence to quality standards. With electronic systems, records can be archived securely, making them readily available for future review or inspection by regulatory bodies.

6. Cost-Effectiveness and Resource Optimization

Despite the initial investment required for implementing e-record systems, they can ultimately lead to significant cost savings for blood banks. By reducing the reliance on paper records, minimizing errors, and optimizing blood inventory management, e-record systems enhance operational efficiency.

In addition, the automation of processes such as donor recruitment, blood testing, and inventory tracking can reduce the administrative burden on staff. This allows healthcare professionals to focus more on patient care and blood donation drives rather than spending time on manual data entry or record-keeping tasks.

Benefits of E-Record in Blood Banking

The integration of electronic records in blood banking brings several key benefits:

1. Data Accuracy and Consistency

Electronic systems minimize human error in data entry and improve the consistency and reliability of records. Automated checks ensure that data entries conform to predefined standards and match up across different databases.

2. Improved Patient and Donor Experience

E-records allow for smoother, faster operations, improving both donor and patient experiences. For example, donors can receive faster feedback on their health status and blood donation history, while patients benefit from quicker transfusion procedures with minimal risk of errors.

3. Streamlined Communication

An e-record system provides better communication between blood banks, hospitals, and healthcare providers. For instance, a hospital can request specific blood types and receive confirmation and tracking information through a digital system, ensuring that the correct blood product is delivered in a timely manner.

4. Better Decision-Making

Access to real-time data allows blood banks and healthcare providers to make informed decisions based on up-to-date information, whether it concerns inventory management, donor eligibility, or transfusion safety.

5. Enhanced Security

E-records provide better security and confidentiality compared to paper-based systems. Access controls and encryption protocols can be applied to ensure that sensitive information is only accessible by authorized personnel, reducing the risk of data breaches and fraud.

Challenges in Implementing E-Record Systems in Blood Banking

Despite the clear advantages, the transition to e-records in blood banking does not come without challenges:

1. High Initial Cost

The implementation of an electronic record system requires a significant financial investment. This includes the costs of purchasing software, hardware, training staff, and ensuring data security measures are in place.

2. Training and Adaptation

Blood bank staff, many of whom may be accustomed to manual processes, must be properly trained to use the new system effectively. This requires time, resources, and ongoing support to ensure smooth adoption of e-records.

3. Integration with Existing Systems

Blood banks may already be using legacy systems that need to be integrated with new e-record systems. This can be complex, requiring specialized software and careful planning to ensure interoperability between systems and avoid data silos.

4. Data Security and Privacy Concerns

With the digitization of sensitive data comes the risk of cyberattacks, data breaches, and unauthorized access. Blood banks must invest in robust cybersecurity infrastructure to protect patient and donor information, complying with data protection regulations such as the Health Insurance Portability and Accountability Act (HIPAA) in the United States or the General Data Protection Regulation (GDPR) in Europe.

Legalities related to E-records

The IT act, 2004 mentions about recognition and acceptance of E-records and related things like E-signature, storage etc. Various sections of the IT act specify on the roles, limitations and pre-requisites for the E-record to be considered legally valid.

Future of E-Record in Blood Banking

The future of e-records in blood banking is tied to the ongoing advancements in technology. Artificial intelligence (AI) and machine learning (ML) algorithms can further enhance data analysis, improve inventory forecasting, and streamline decision-making processes. Additionally, blockchain technology may offer enhanced traceability and security for blood products, ensuring their authenticity and safety across complex supply chains.

With the integration of e-records into blood banking systems, blood banks can move towards a more efficient, transparent, and secure future. The continued advancement of digital technologies, along with the potential for global standardization of electronic records, will help make blood banking systems smarter, faster, and more adaptable to the evolving healthcare landscape.

Conclusion

E-records in blood banking are no longer a luxury but a necessity. They address the critical challenges faced by traditional paper-based systems, offering improved accuracy, efficiency, safety, and compliance. As healthcare systems worldwide continue to embrace digital transformation, blood banks must follow suit to ensure the optimal management of blood resources. The need for e-records in blood banking is indeed the need of the hour, not only to enhance operational capabilities but also to safeguard patient lives through better data management and decision-making.

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How to develop Transfusion Medicine dependent educational model for UG medical studies

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Back ground and scenario of Transfusion Medicine in India

Blood and its components transfusion are an essential part of any health care delivery. There is a significant progress in the blood transfusion services in India for the last two decades since the introduction of specialised post-graduate MD course in Transfusion Medicine (TM) from 1989-1990. Presently about 80 institutions in India are running this educational program (MD/DNB/Diploma) with an annual seat intake over 220 students. [1] TM is an independent clinical broad specialty [2] in India, which is otherwise a subspecialty of disciplines viz. Haematology, Internal Medicine or Pathology in the rest of the world.

TM in India has the prospects for developing transplant immunology, haematology, regenerative medicine. However, it's acceptance to the post graduate education is still limited. Hence the future MD, TM doctors are being unstable in India due to their limited access to the other feeder super specialties like Clinical haematology/ Immunology/ hematopathology etc. as well as the developing specialties of regenerative medicine and cellular therapies. Working only within the boundaries of the blood centre should not be a goal of establishing any clinical broad specialty discipline.

The transfusion services across the country are decentralised with an approximate annual demand over 15 million blood components for routine use, which needed a participation of over 3 per 1000 eligible voluntary blood donors. [3] On the other hand there is an increasing burden of poorly controlled hemoglobinopathy patients who are primarily dependent on blood components as their most affordable and only therapeutic option.

Apheresis blood component collections as well as the therapeutic apheresis procedures are done by TM specialists in any solid organ transplant and bone marrow transplant program. However, there are very limited concrete data on the need for the development of solid organ and bone marrow transplant facilities across the country. [4]

To monitor and generate evidence-based recommendations in minimizing the adverse events of blood transfusion, the National Haemovigilance program was established on December 10, 2012.[5] The nomenclature of blood banks was now replaced to blood centre by the Central Drugs Standard Control organization (CDSCO), the national regulatory authority, for drug under the Ministry of Health and family welfare. Presently there are more than 22 blood components which are licensed in India and in future the blood centres have the potential to generate many newer generations of blood components.[6]

Role of TM department in the teaching institutions

The knowledge, attitude and practice related to the use of newer blood components across the medical specialties should improve as a part of health care excellence as blood transfusion are one of the most common therapeutic interventions. There is a need to upgrade the functional blood centres to department of TM. The new specialty department may focus primarily on:

1. Improvement of voluntary non-remunerated blood donation activities
2. Interdisciplinary teaching and develop module for undergraduate training related to the blood collection, processing, storage and bedside transfusion practices as a part of patient safety essentiality by WHO [7]

3. Formulate and implement the policy guidelines related to blood transfusion and role of transfusion services in disaster management
4. Monitor the hemovigilance activities
5. Research and development in the field of biologics/biorepository/bio-banking, regenerative and cellular therapy

Allogenic blood transfusion is an intervention, key to the management of hemoglobinopathies, cancer and other critically ill patients.
The immunomodulatory effects of blood transfusion remain unexplored. There is limited awareness of the specialist physicians/surgeons for managing recurrent transfusion reactions, alloimmunization and rare blood group patients.

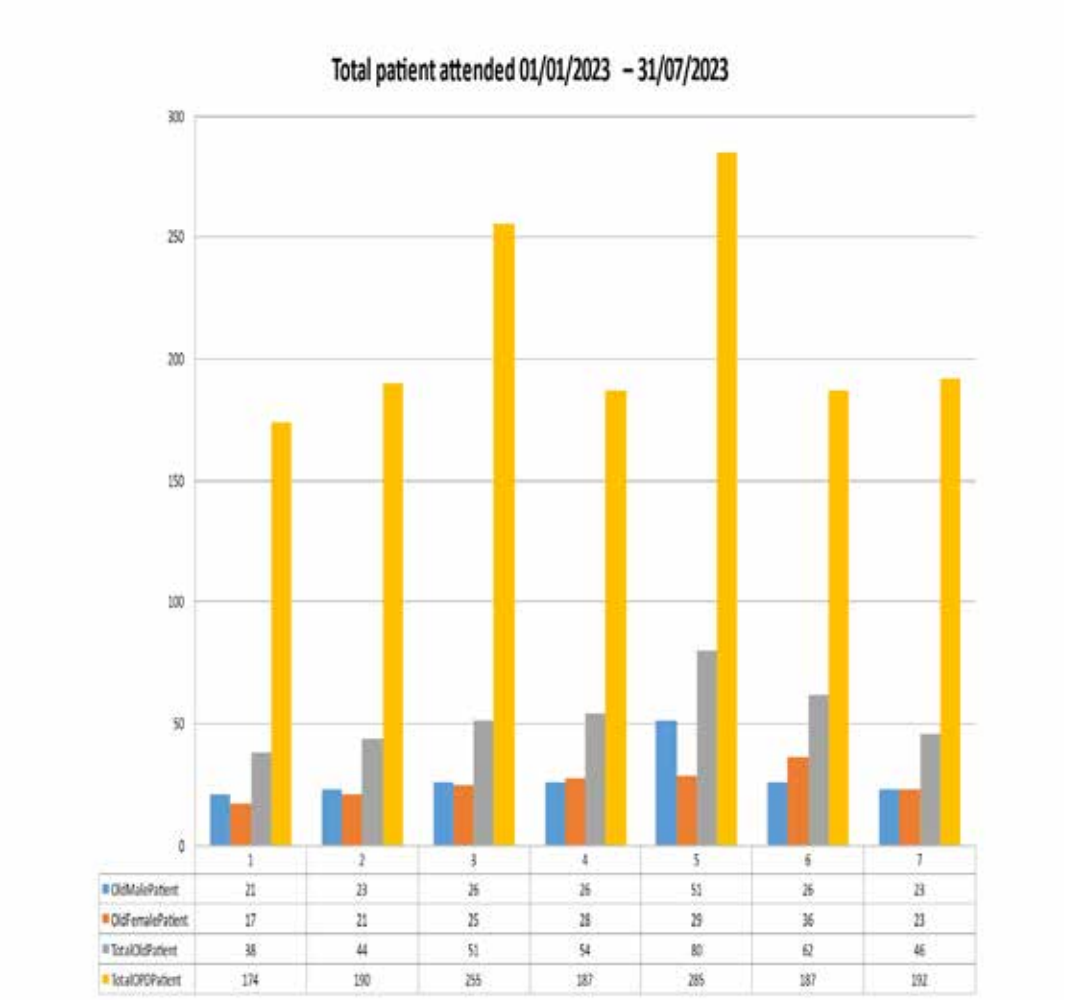
The so called 'healthy' persons considered as deferred blood donors by the blood centres do not access the general health care pool as they are primarily asymptomatic. Only counselling and referral has several limitations to guide the TTI seropositive blood donors to health.

Inclusion of the TM specialty at UG level can improve the preventive/early approach to control a significant number of non-communicable or communicable disease control by providing deferred blood donor care oriented services.

Single Centre Experience and initiative of a teaching TM department
We working at a department of TM in a government medical college at Kolkata initiated our patient-centric services of TM with:

1. Post-transfusion follow-up clinic to determine both long- and short-term effects of blood transfusion especially in transfusion dependent patients and cancer chemotherapy.
2. Pre-operative anaemia and patient blood management
3. Antenatal mothers' assessment for irregular antibody screening
4. Patient having poor tolerance to blood component therapy (viz. alloimmunization, recurrent transfusion reactions, platelet refractoriness etc.)
5. Blood donor related services (deferred blood donors, donor adverse events and post donation counselling)
6. Specialised blood component support in critical patients and regenerative medicine clinic
7. Training and teaching modules on rational use of blood components both to the doctors of other specialties as well as nursing personnel and para medical services

Our single centre experience, to run both the outdoor patient (OPD) an indoor of 15 beds under the TM department, showed an average OPD attendance of 200 patients per month on once-a-week OPD schedule (Fig I)



	1	2	3	4	5	6	7
OldMalePatient	21	23	26	26	51	26	23
OldFemalePatient	17	21	25	28	29	36	23
TotalOldPatient	38	44	51	54	80	62	46
TotalOPDPatient	174	190	256	187	285	187	192

Fig. I

We aimed to investigate the actual need of red cells in hemoglobinopathy rather than the present blanket approach of the red cells transfusion at the day care treatment. The judicious use of foetal haemoglobin (HbF) inducers to minimize the transfusion requirement, red cell alloimmunization and iron overload in transfusion dependent patients. Promotion of comprehensive care in hemoglobinopathy and blood coagulation disorders.

The burden of hemoglobinopathies and coagulation disorders in any resource constraints health care system needed a very rational approach to blood inventory management. In a state of West Bengal with an annual blood donation of 1.1 million units, we require almost 3.5 lakhs of red cells (33%) to support to 20,000 transfusion dependent thalassemia (TDT) patients.

Role of NMC in achieving the National Blood Policy objective

The supreme regulatory authority of medical education in the country, the National Medical Commission (NMC), India should consider the present utility for specialised blood components, apheresis and other areas of development in the blood transfusion services and patient safety issues as per the WHO directives on transfusion safety.

The NMC has a significant role to encourage the growth of TM specialty and organise the development of centralised blood transfusion services in the country to achieve the objectives of the National Blood Policy 2002, Govt. of India. An academic TM department is a necessity in the improvement of patient care, excellence in medical training of future medical graduates. The existing blood centres in the teaching institutions only need to upgrade themselves to the teaching TM department, already there are adequate skilled specialists in the country. This may lead to the development of regenerative medicine, biorepositories of tissues and organ; and newer biologicals which are already the upcoming areas in medical research and treatment.

A mandate for compulsory upgrading all functional blood centres to TM department in the medical colleges may be a landmark in development of quality of medical education and patient safety.

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Characteristics of Apheresis products for CAR T Cell Therapy

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Chimeric antigen receptor (CAR) T cell therapy is an individualized immune or cellular therapy where genetically modified T cells eliminate cancer cells. The manufacture of CAR-T cells consists of several steps. The first step is leukapheresis where whole blood goes through peripheral blood mononuclear cells collection.

The immune system which classically consists of the innate and adaptive parts has overlapping functions and is intimately related. The innate immune system act as the first line of defence does not require prior stimulation by antigens and includes dendritic cells, natural killer cells (NK), macrophages, neutrophils, eosinophils, basophils, and mast cells. The adaptive immune system requires the presentation by the antigen-presenting cells (APCs) for its activation and includes B lymphocytes, helper T lymphocytes, and cytotoxic T lymphocytes (CTLs) [1]. The adaptive immune system produces antigen-specific T- and B- cell lymphocytes.

Cancer immunotherapy is rapidly evolving and can now be considered as one of the important pillars of cancer therapy, along with surgery, chemotherapy, and radiation therapy. Though the limited understanding of immune regulatory mechanisms hampers the implementation of immune-based protocols in cancer treatment, its promising effects bring us closer to a future where this disease can be successfully controlled. It uses the antitumor properties of the immune system to fight cancer. Different types of cancer immunotherapies include immune checkpoint inhibitors, monoclonal antibodies, oncolytic virus therapies, cancer vaccines, immune system modulators, adoptive therapies, etc which induce, augment, suppress or release the suppression of the immune system response [2]. Cancer immunotherapy focused on T cells has surfaced as a powerful tool in the armoury against cancer.

Adoptive cellular therapy (ACT) typically refers to a cellular infusion product [2]. It implies the infusion of immunocompetent cells and is a robust form of immunotherapy for the treatment of established tumors [2]. It encompasses the isolation and in-vitro expansion of autologous or allogeneic tumor-specific T-cells, followed by infusion back into the patient. The various kinds of immune cells which have been used in adoptive cell therapy include tumor-infiltrating lymphocytes, natural killer cells, cytokine-induced killer cells, T- cell receptor (TCR) T cells, and chimeric antigen receptor T cells [3]. One of the most important and promising examples of ACT is chimeric antigen receptor T-cell immunotherapy for the treatment of B-cell hematologic malignancies.

CAR-T cell therapy is novel immunotherapy for cancer treatment involving the adoptive transfer of autologous T cells bioengineered by gene transfer to express receptors that target molecules expressed on malignant cells [4, 5]. The efficacy of CAR-T cells for the treatment of acute B lymphocytic leukemia (B-ALL) has been revolutionary and numerous clinical trials using CAR-T cell therapy in the treatment of various types of tumors have been stated [6-8]. CARs are engineered receptors that redirect most commonly the T lymphocytes to recognize and eliminate cells expressing a specific target antigen.

CAR stands for chimeric antigen receptor, which represents the genetically engineered portion of the T cell. T cells transduced with tumor-specific CAR, these cells modified to better recognize and kill the cancer. The CAR part of the T cell contains proteins that allow the T cells to recognize the specific cancer cells as well as become highly activated to kill the cancer cells. The T cells are engineered in the laboratory and then expanded to large numbers and infused back into the patient. Once in the body, the CAR T cells can further grow to large numbers, and can persist for long periods.

Structure of Chimeric Antigen Receptor (CAR)

CARs are integrated synthetic receptors that consist of the following main components:
(a) target antigen binding domain (extracellular),
(b) a hinge region,
(c) a transmembrane domain, and
(d) one or more signalling domain (intracellular)
With progressively more effort put into cancer adoptive cell research, CAR-T therapy has gone through generations.

Steps in CAR cell therapy

- **Apheresis**
  - T cells are isolated and collected from the patient's peripheral blood (leukapheresis)
- **Activation of T cell**
  - T cells are transformed into cytotoxic T cells
- **Transfection**
  - A gene is inserted using a virus that causes the CAR to be expressed by the T cell
- **Cell Expansion**
  - Cells are in culture, allowing them to expand and proliferate
- **Cryopreservation**
  - Cells are purified and cryopreserved (can be a fresh infusion)
- **Administration**
  - Cells are infused into the patient

Applications of CAR T is in:
Acute lymphoblastic leukemia
Chronic lymphoblastic leukemia
Lymphoma
Multiple myeloma
In solid tumors: limited role

Leukapheresis for T cell collection
Manufacturing CAR-T cells is a complicated process that begins with leukapheresis to obtain T cells from the patient's peripheral blood. An optimal leukapheresis product is a crucial step for a successful CAR-T cell therapy; therefore, it is imperative to understand the factors that may affect the quality of T cells. The leukapheresis for CAR-T cell production is generally well-tolerated and safe procedure.
Starting materials for the manufacture of CAR T cells are CD3+ T lymphocytes, which are found in the peripheral blood mononuclear cell (MNC) layer and derived from the unstimulated leukapheresis of patients (autologous) or healthy donors (allogeneic). The process of apheresis involves the removal of whole blood, separation of components by centrifugation, removal of peripheral blood MNCs and return of the remaining components to the patient or donor (7). Unstimulated CAR T cell leukapheresis is usually performed in a single day (rarely over 2 days) and requires experienced apheresis staff, a central venous access service and cell separator platforms.
Most CARTs are manufactured from autologous peripheral blood mononuclear cells (PBMNCs) collected by leukapheresis, followed by T cell selection, activation, gene modification, and expansion (8). There are several factors to consider when performing leukapheresis. The goal of every leukapheresis is to reach target cell dose, The blood volume is processed to achieve the target dose of T cells for infusion of CAR-T cells usually at a dose of $1–1.5 \times 10^6$/kg or CD34+ cells $\geq 2 \times 10^6$ cells/kg body weight of the recipient (9, 10). Although in general, absolute lymphocyte count (ALC) thresholds to start leukapheresis can vary between different CAR-T cell protocols, ALC of > 100 cells/µL is acceptable, while ALC of > 500 cells/µL (or an absolute CD3 + lymphocyte count of >150 cells/µL) is optimal (10). As per European Society for Blood and Marrow Transplantation (EBMT) guidance, ALC and CD3+ cell count $\geq 0.2 \times 10^9$/L is recommended prior to T-cell harvest (12).

The quality of the apheresis product affects the yield and success of the CAR-T cell production and clinical outcomes. Despite technical advances in methodology, CAR T-cell manufacture failure is reported in 1-13% of patients in clinical trials and is frequently attributed to the poor quality and poor yield of autologous T-cell harvest (11). Baseline factors associated with poor yield include low peripheral blood absolute lymphocyte count (ALC), low CD3+ count, high natural killer cell count and high circulating blast count.

The main limitations include complex and expensive manufacturing processes, and can lead to product variability and delays. CAR-T cell therapy is not widely available due to its high cost and limited availability.

CAR T cell therapy is not limited to cancer treatment and is being explored for the treatment of various pathological conditions such as autoimmune diseases, fibrotic diseases, infectious diseases etc.

Conclusion:

CAR-T cells have transformed the treatment of certain hematological malignancies however, as outlined obstacles persist. Optimization of the leukapheresis process is clearly important for achieving a high rate of CAR T-cell manufacturing success. A basic requirement for CAR T-cell manufacturing is the ability to collect a sufficient number of viable T cells during leukapheresisTo meet the demands of this complex and progressing field.

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Laboratory Monitoring of Extended Half Life Clotting Factor Concentrates

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Optimal therapy is the goal of any Clotting Factor Concentrate (CFC) replacement therapies in Hemophilia A and B. This is monitored by laboratory measurement of recovery of the factor levels post CFC therapy. This is preferably measured at 30 min post CFC replacement. Plasma Derived and Full Length recombinant CFC products do not pose any problems is achieving desired recovery levels. Extended half life CFC (EHL CFC), because of the processes used for modifications of the factor molecules, have posed many problems in assessing the recovery levels in the laboratory. Laboratory assays which establish values close to the calculated value, as per the dosing, are suitable and acceptable. 20% underestimate or overestimate is acceptable clinically. However if the assays are showing more than 25 to 30% difference, it will either lead to under dosing or over dosing.

One Stage Factor VIII or IX assay(OSA) is based on a comparison of the ability of dilutions of standard and test plasma to correct the APTT of a plasma known to be totally deficient in FVIII or FIX but containing all other factors required for normal clotting.
Chromogenic Factor VIII assay (CSA) is a two stage assay. First stage involves incubation of test plasma with excess of FIXa and FX in presence of Thrombin, phospholipids and Calcium ions. FVIII acts as a co-factor for FIXa to generate FXa. In the second stage, FXa reacts with a Chromogenic substrate to release a colored product (p-Nitro aniline). This is directly proportional to the amount of FXa - which is indirectly proportional to the amount of FVIII available in the test plasma or Standard Plasma
.
Standard plasma is a calibrator plasma with traceability to WHO concentrate international standard plasma. This is used by the CFC manufacturer for potency assessment of the CFC product. ISTH Scientific Standardization Committee (ISTH SSC) has drafted recommendations to the manufacturers for methods to be followed for potency assessment of the CFC. Manufacturer has to follow those along with national guidelines. Manufacturer must mention in the kit insert, the method of potency assessment and method to be used for recovery assays.

Laboratory is recommended to use calibration curve using the same EHL CFC as used for administration (Like vs Like). There would be practical limitations to this and hence ISTH SSC recommends to use robust assays and assay to be done in different dilutions. Recommendations from the Manufacturer must mention preferred assay(s).
There is more and more emphasis on the use of CSA for recovery assays. Availability and stability of the reagents is a major challenge in Developing world and limits the use of CSA for recovery assays. Variability in OSA is documented owing to the availability of numerous assay conditions, reagent combinations with instruments etc. Responsiveness of the EHL CFC to different reagent compositions adds to this variability significantly. Hence to avoid variability in the recovery assays, recommendations mentioned by the manufacturer need to be followed.
Assay discrepancies have been observed in the EHL CFC with B domain deleted, B domain truncated, glyco PEGylated products.

The laboratory personnel need to be aware of all the intricacies and act accordingly. Processing laboratory needs to receive Information about details the product and dosage of the administered CFC. Timing of collection of sample after administration of the CFC is mandatory. Most relevant is to follow the manufacturers recommendations. Laboratory set up needs to be updated accordingly..

Quality and Accreditation in HLA Laboratory

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Implementing an EffectiveQC/QA Program
Four major pre-requisites for this are:

- Laboratory Quality Control (QC)
- Laboratory Quality Assessment (QA)
- Monitoring indicators of QA Program
- Quality Improvement Plans

Importance of QC/QA Program

- Ensure both precision and accuracy of test results throughout the testing process
- Helps to reduce errors
- Detects issues in a process
- Allows for correction of the issue
- Compliance with regulatory bodies (i.e. NABL, ASHI, CAP, CLIA)

What needs Quality Oversight?

- Samples
- Reagents
- Testing personnel
- Instruments
- Environment

Organizing a Quality Program

- Establish written policies for how each test element will be assessed
- Determine quality indicators to be monitored
- Establish thresholds for compliance
- Monitor laboratory performance
- Documentation
- Monitor impact of corrective actions
- Be transparent and inclusive
- Good Documentation Practices

- Histocompatibility and Immunogenetics laboratories perform qualitative analyses for –

1. Transplantation immunology
2. Disease association
3. Platelet transfusion
4. Paternity testing

The purpose of laboratory accreditation is to certify that a laboratory is meeting the requirements of a given set of standards, the rationale being that if these standards are met there is a level of assurance that the service provided is appropriate and of an acceptable level of quality. Additionally in the field of transplantation, where donor organs and stem cells are exchanged across national boundaries, adoption of a common set of standards by laboratories across many different countries is an important factor.

- **Utilizing NAT to identify Occult Hepatitis B in Donated Blood**
- **Dr Rajesh B Sawant**
- **Consultant Transfusion Medicine, Histocompatibility and Immunogenetics**
- **Kokilaben Dhirubhai Ambani Hospital, Mumbai**
-
- **Occult HBV infection** is a state of infection in which surface antigen is undetectable while HBV DNA is in blood, which is undiagnosed frequently . Occult hepatitis B infection may be found in blood donors as a result of various clinical conditions, including window period of acute infections, end stage of chronic hepatitis B , low-level viral replication after recovery from hepatitis, and escape mutants not detected by current HBsAg tests .
- OBI is a challenge in virology and is a complex disease entity comprising of different clinical consequences
- OBI is transmissible by blood transfusion.
- The clinical outcome of occult HBV transmission primarily depends on recipient's immune status and the number of HBV DNA copies present in the blood products.
- Considering the very low levels of serum HBV DNA, its detection requires the use of highly sensitive and specific molecular biology techniques-IDT is preferred over pool testing due to sensitivity concerns
- OBI is a phenomenon essentially attributed to the long-lasting presence of HBV cccDNA into the hepatocytes and to a strong inhibition of HBV replication and protein synthesis.
- Hepatitis B surface antigen negative but hepatitis B virus (HBV) DNA positive blood products can evoke hepatitis in blood recipients. Anti-hepatitis B core and HBV nucleic acid testing screening tests are necessary to prevent occult HBV infection transmission by transfusion.
- Blood safety for HBV including OBI has improved substantially, following the implementation of anti-HBc and HBV NAT screening, but the potential for OBI transmission remains.
- I will share my experience of blood donor screening with ID-NAT as well as MP-NAT with specific reference to OBI during this session.

ROADMAP TO ACHIEVE PATIENT BLOOD MANAGEMENT

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Benefits of patient blood management (PBM) to the patients, to the healthcare system and to economies, calls for the urgent need of its implementation as a standard of care. The World Health Organization (WHO) supports the PBM
The roadmap strategy is decide – implement – monitor.
Knowing core principles of PBM i.e.
pillar one - optimising erythropoiesis (including red cell mass and iron stores),
pillar two – minimise blood loss (surgical) and bleeding (coagulopathy)
pillar three – harness and optimize the patient-specific physiological reserve of anaemia while treatment is initiated
is the most important step towards its implementation.

PBM is a broader clinical approach to patient care and outcomes. It emphasis on shifting focus from a fixed ratio drawn transfusion protocol in bleeding patients, to what best can be done for the patient in terms of improving patient haemostatic abilities ,arranging timely transfer to higher resourceful center followed by management by a clinical expert with availability of adequate testing facility and adequate resources.
PBM involves optimising patients own blood rather than optimal use of transfusion. It believes in the principle that our blood is still the best thing to have in our veins.

There are many barriers in its implementation, the major one being, current pattern of clinical practice which is long standing and deeply ingrained.
Establishing a PBM strategy needs leadership and support at all levels:
1)national and regional government policymakers and managers
2)executive management
3)health professionals from various clinical disciplines within hospitals
4) active participation by patients.
Active participation of the patients in the planning, implementation and evaluation of PBM programs is essential.

Still the cornerstone of a PBM program implementation is, identifying patients at risk of transfusion by forming a multidisciplinary team involving general practitioners, surgeons/paediatricians /medical specialists /obstetricians – as per the case, anaesthetists, nurses, transfusion medicine practitioner (TP)/haematologist and laboratory staff, which is involved in the development and implementation of the PBM strategy / management plan, for each patient.
As a Transfusion Medicine Practitioner (TP), key areas for action include:
1) Implementing pre-operative anaemia management pathways and anaemia clinics – implementing the first pillar.
2) Holding regular hospital transfusion committee multidisciplinary meetings – for implementing the second and the third pillar.
3) Being the personnel to support implementation by deploying point of care viscoelastic testing facility in the blood center and monitoring the correct reporting in each bleeding patient.
4) Being the personnel to support implementation by recommending to the multidisciplinary team, the resource/s required (blood components, anticoagulants, antifibrinolytics, factor concentrates, antidotes to anticoagulants) for dealing with each case of abnormal bleeding.

5) Being hemovigilant, and recording and reporting the adverse transfusion reactions and discussing the same in the multidisciplinary meets- for enhancing transfusion safety.
6) Preparing posters for the hospital and writing in hospital newsletters.
7) Auditing and collecting data and recording and reporting the outcome in patients.
8) Preparing local guidelines after review of data.
9)Reviewing information technology available to support PBM to collect blood usage data and to support audit.
10) Collecting feedback data to all relevant teams.
The WHO is all set to create PBM implementation guidelines.

SEROREACTIVE DONORS/HAPLOIDENTICAL DONORS IN NON-MALIGNANT SITUATION: ETHICAL AND LEGAL CONSIDERATION

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Allogeneic hematopoietic stem cell transplantation(allo-HSCT) is an established therapeutic strategy for many hematologic malignancies, bone marrow failure syndromes, and metabolic diseases. In allo-HSCT, a relatively small inoculum of donor hematopoietic stem cells transfused into the recipient to recapitulate a diverse and fully functional hematopoietic system in the recipient. Stem cells for HSCT may be obtained from different sources: mobilized peripheral blood stem cells (PBSCs), bone marrow (BM), and umbilical cord blood (UCB). HSCT has grown over the last three decades based on inputs of experienced transplant centres, and the creation of unrelated adult donor registries, haploidentical donor transplantation and cord blood banks has given those without an HLA-identical sibling donor the opportunity of a concrete hope to find a donor. Careful selection of potential donors, clinical evaluation and management of the entire donation/transplantation procedure by experts, and a proper communicative process represent the key points of HSCT. Haploidentical hematopoietic stem cell transplantation (HSCT) involves using a partially matched donor, often a family member, to treat various conditions, either in absence of matched related or unrelated donor or in cases of time or financial constraints limiting the option for matched unrelated transplant. The transplantation procedure is complex both from a clinical and from lego-ethical point of view. In non-malignant situations, several ethical and legal factors come into play.

Ethical Considerations

- **Informed Consent**
  - Ensuring that both the donor and recipient fully understand the risks and benefits of the procedure.
  - The donor & recipient should be made aware of potential long-term health implications.
- **Beneficence and non-maleficence**
  - The principle of beneficence requires that the procedure should provide a net benefit to the recipient.
  - Non-maleficence emphasizes the need to avoid harm to both the donor and recipient.
- **Justice**
  - Fair access to HSCT for patients with non-malignant conditions.
  - Consideration of resource allocation and prioritization in healthcare systems.
- **Psychosocial Impact**
  - Assessing the emotional and psychological effects on both the donor and recipient.
  - Support systems should be in place for both parties.

Legal Considerations

- **Regulatory Compliance**
  - Adherence to national and international regulations governing HSCT.
  - Compliance with guidelines set by organizations such as the World Health Organization (WHO) and local health authorities.
- **Donor Rights**
  - Legal protections for donors, including the right to withdraw consent at any time.
  - Ensuring that donors are not coerced into the procedure.
- **Liability Issues**

- Clarifying the legal responsibilities of healthcare providers in case of adverse outcomes.
- Understanding the implications of malpractice claims related to HSCT.

- **Confidentiality and Privacy**
  - Protecting the personal health information of both the donor and recipient.
  - Ensuring that data sharing complies with privacy laws and regulations.

As per the National Guidelines for Hematopoietic Stem Cell Transplantation 2017, allogeneic donors should be evaluated for risk factors that might result in disease transmission from the cellular therapy product by medical history, physical examination, examination of relevant medical records, and laboratory testing. Allogeneic donor suitability shall be evaluated by a licensed health care professional who is not the primary health care professional overseeing care of the recipient.

Pre-Transplant Work-up of Donor:

Donor Work-up: A thorough history and physical examination are required. Allogeneic donor infectious disease testing shall be performed using donor screening tests licensed, approved, or cleared by the governmental authority.

- The medical history should include questions to evaluate whether a transmissible disease is present.
- Vaccination history
- Travel history
- Blood transfusion history,
- To identify persons at high risk of transmission of infectious disease
- To identify persons at risk of transmitting inherited conditions,

Screening tests for infection should include tests for:

i. HBs Ag, anti-HBs Ag, anti- HBcIgG, anti-HBcIgM (optional), anti-HCV, anti-HIV1 & 2
ii. CMV IgG (for those patients undergoing allogenic transplant), CMV PCR according to the physician's discretion.

There are no national guidelines in India in on the use of an ineligible allogeneic donor, or an allogeneic donor. There are studies and data on such situations which are faced by all transplant centres at some or the other times e.g. Hepatitis B core antibody (HBcAb)-positive donors, only available donor is HCV antibody positive and may or may not be and RNA positive, the recipient is CMV IgG negative and donor is IgG positive etc.

Similar difficult situation arises when haploidentical hematopoietic stem cell transplantation (haplo-HSCT) is the only treatment option for non-malignant conditions, such as aplastic anemia and hemoglobinopathies, when other options are not available. In this procedure, healthy blood-forming cells from a half-matched donor are used to replace the patient's unhealthy ones. The donor is usually a family member

While haploidentical transplants can be used to treat non-malignant conditions, they do have risks, including:

- **Graft-versus-host disease (GVHD)**: This occurs when the donor cells attack the body, causing inflammation. GVHD can be acute or chronic, but patients can take medication to help prevent it.
- **Viral infections**: Haploidentical patients have a higher rate of viral infections, including CMV viremia.
- **BK viruria**: This is a frequent complication of hematopoietic stem cell transplantation (HSCT) that can occur in 50–90% of patients.
- **Toxicity**: Patients with non-malignant disorders may be exposed to a toxic alkylating agent.
- **Short- and long-term side effects**: High-dose chemotherapy can have many short- and long-term side effects.

Conclusion

The use of seroreactive donor or haploidentical donor HSCT in non-malignant situations raises significant ethical and legal considerations. It is crucial for healthcare providers to navigate these complexities carefully to ensure the safety and rights of both donors and recipients while providing effective treatment options.

CDSCO & ONDLS
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The Central Drugs Standard Control Organization (CDSCO) is the Central Drug Authority and headed by DCG(I) for discharging functions assigned to the Central Government under the Drugs and Cosmetics Act.
CDSCO has 09 zonal offices, 07 sub-zonal offices, 18 port offices and 07 laboratories (CDL/CDTL/RDTL) and 06 Mini laboratories under its control.
Drug Controller General of India is responsible for approval of licenses of specified categories of Drugs such as blood and blood products, I. V. Fluids, Vaccine and Sera. Central Drugs Standard Control Organization Head quarter is located at FDA Bhawan, Kotla Road, New Delhi 110002 and functions under the Directorate General of Health Services.
The Drugs & Cosmetics Act, 1940 and Rules there under have entrusted various responsibilities to Central & State regulators for regulation of Drugs & Cosmetics. It envisages uniform implementation of the provisions of the Act & Rules made there under for ensuring the safety, rights and well being of the patients by regulating the Drugs and Cosmetics. CDSCO along with State Regulatory Authorities is constantly thriving upon to bring out transparency, accountability and uniformity in its services in order to ensure safety, efficacy and quality of the medical product manufactured, imported and distributed in the country.
Under the Drug and Cosmetics Act, the regulation of manufacture, sale and distribution of Drugs is primarily the concern of the State authorities while the Central Authorities are responsible for approval of New Drugs, Clinical Trials in the country, laying down the standards for Drugs, control over the quality of imported Drugs, coordination of the activities of State Drug Control Organisations and providing expert advice with a view of bring about the uniformity in the enforcement of the Drugs and Cosmetics Act 1940.
Blood Transfusion Service is a vital part of the National Health Service and there is no substitute for Human Blood and its components. Increasing advancement in the field of Transfusion Technology has necessitated to enforce stricter control over the quality of Blood and its products.
In order to improve the standards of Blood and its components, the Central Govt. through DCG(I) formulated a comprehensive legislation to ensure better quality control system on collection, storage, testing and distribution of blood and its components.
Central Govt. amended from time to time the existing requirements of Blood Banks in the Drugs & Cosmetics Act, 1940 and Rules thereunder to meet the latest standards.
Human blood is covered under the definition of 'Drug' under Sec. 3(b) of Drugs & Cosmetics Act 1940. Hence, it is imperative that Blood Banks need to be regulated under the Drugs & Cosmetics Act and rules thereunder.
Online National Drugs licensing system (ONDLS) portal is developed by Centre for Development of Advanced Computing (CDAC) in coordination with Central Drugs Standard Control Organisation (CDSCO), Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India and State/UT Drugs Regulatory Authorities. ONDLS portal is a single window platform for online processing of various applications submitted by the applicants for issuance of manufacturing and sales licenses including Blood Banks, and other certificates like COPP, GMP, WHO-GMP, Market Standing certificate etc., and post approval changes.

ONDLS will help in establishment of Uniformity w.r.t the requirement of submission of documents for different type of applications as well as issuance of licenses/ permissions throughout India. ONDLS will also help in uniform administration of the provisions of the Act and Rules by utilizing the latest technologies tools including e-governance through this online portal for State/UT Drug Control Authorities.

As there will be uniformity w.r.t all the activities carried out by State/UT Drug Control Authorities, it will ensure transparency, accountability and consistency in their decision making process as well as uniformity across the country.

Role of Informed Consent and Patient Information Chart in Perspective of Transfusion Medicine

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Introduction and History

Although informed consent for medical procedures began evolving in the early decades of the 20th century, the idea of applying it to blood transfusion did not really begin developing until the 1980s when the transmission of infectious agents such as the human immunodeficiency virus and hepatitis C virus alarmed patients and health-care providers alike. In 1986 and 1994, AABB made recommendations to its members for obtaining informed consent from patients for blood transfusion, which eventually became a standard in 2000. **[1]**

Autonomy and Patient Rights: Informed consent upholds the principle of patient autonomy, which means patients have the right to make decisions about their own healthcare. Before a blood transfusion, healthcare providers must ensure that the patient understands:

- The reason for the transfusion (e.g., blood loss, anemia, surgery).
- The potential benefits (restoring blood volume, improving oxygenation, etc.).
- The risks involved (e.g., allergic reactions, transmission of infections, transfusion reactions, etc.).
- Alternatives to blood transfusion, if applicable (e.g., blood substitutes, medication to boost red blood cells, etc.).

The Process of Informed Consent:

- **Prevention of Harm:** Informed consent ensures that patients are fully informed about the potential risks of a blood transfusion, thereby helping to prevent harm. By understanding the risks, patients can weigh them against the potential benefits of receiving the transfusion. These “material” risks are ones that are likely to influence the decision of the patient to accept or reject the intervention. **[2]**

Risks of a transfusion may include:

  - Allergic reactions
  - Fever or chills
  - Hemolytic reactions
  - Infections (e.g., HIV, Hepatitis B and C, etc.)
  - Iron overload, especially in multiple transfusions

- **Alternatives:** There are numerous alternatives to transfusion that have been designed to stimulate endogenous production of RBCs, neutrophils, and platelets (eg, cytokines) and to minimize the loss of blood intraoperatively. Perioperative strategies to reduced blood loss include use of cell savers (capture of autologous blood during surgery and reinfusion), laboratory-guided transfusion therapy, use of tranexamic acid, and application of fibrin sealants (plasma-derived surgical hemostatic agents). **[3]**

Legal and Ethical Obligations: Informed consent is not just an ethical duty but also a legal requirement. Healthcare providers are legally obligated to ensure that patients understand the procedures and risks involved in treatments. Failure to obtain informed consent can lead to legal consequences, such as malpractice lawsuits.

If a patient is unable to provide consent (e.g., due to being unconscious or mentally incapacitated), consent must be obtained from a legally authorized representative, such as a family member or legal guardian.

Communication, Trust & Barriers: The process of informed consent fosters open communication between the healthcare provider and the patient. It helps build trust, as patients feel that their healthcare team respects their values, choices, and dignity. Clear, honest discussions about the procedure help patients make well-informed decisions that align with their personal values and preferences. **[4]**

Challenges and Special Situations: There may be situations where obtaining informed consent is difficult, such as:

- **Emergency situations**: If the patient is unconscious or incapacitated and immediate transfusion is necessary to save their life, consent may be implied based on the urgency of the situation. However, the healthcare team is still responsible for providing as much information as possible afterward.

- **Incompetence**: If the patient is mentally or legally incapable of understanding the risks and benefits (e.g., due to dementia, severe illness), consent may need to be obtained from a designated legal guardian or healthcare proxy.

- **Pediatric Patients**: In the case of minors, parents or guardians must provide consent on behalf of the child, but the child may be involved in the process to the extent that is developmentally appropriate.

- **Religious or Cultural Beliefs**: Some patients, due to religious or cultural reasons (e.g., Jehovah's Witnesses), may refuse blood transfusions despite medical necessity.
    - **No blood transfusions**: Jehovah's Witnesses refuse all blood transfusions, regardless of the situation, as they consider this a direct violation of God's commandments.
    - **Blood fractions and alternatives**: Some Jehovah's Witnesses accept certain blood fractions (e.g., albumin, clotting factors), while others may reject even these. The acceptability of specific blood components often depends on individual interpretation and the particular congregation's stance.
    - In such cases, healthcare providers should explore alternatives, such as bloodless surgery or the use of blood substitutes, and respect the patient's wishes.

Revocation of Consent: A valid consent remains valid as long as the patient has not revoked it. Revocation can occur at any point before or during the transfusion, and healthcare providers must respect a patient's decision to withdraw consent. Patients should be informed of their right to revoke consent and the potential consequences of doing so. Revocation should be documented in the patient's medical record. **[1]**

Documentation: Once informed consent has been provided, it should be documented in the patient's medical record. This documentation serves as a legal safeguard for both the patient and the healthcare provider, indicating that the patient has been informed and has agreed to proceed with the transfusion.

Conclusion: The role of informed consent in blood transfusions is multifaceted, ensuring that patients' rights are respected, they are fully informed of the procedure, and their choices are honored.

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Basics of Scientific Writing

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A Scientific paper should be written in a format that is understandable to others. It should be written in such a manner that it is judged on its scientific merit, rather than being rejected for its poor-quality writing and confusing presentation of data.

Successful writing and publication depend on the background work done while planning the proposal. An extensive review of the literature should be done while planning the research, gaps should be identified, and originality of the research should be ensured.

A scientific paper has four sections i.e. introduction, material and methods, results, and discussion. This is commonly called the 'IMARD' format. Each section of the manuscript has its specificity.

Introduction section

The introduction should be written in a manner that grabs readers' attention. It should set the stage for research by providing context, rationale, and a clear statement of the problem. The basic structure should include

- Background and context
- Current Knowledge and gaps.
- Research problem and objective
- Hypothesis or research question
- Significance of the Study

In summary, the Introduction should answer the questions: What is the study about? Why does it matter? What gap does it fill? What are the study's objectives? By the end of this section, readers should understand the relevance and purpose of the research.

Methods section

The Methods section of a scientific manuscript provides a detailed account of how the research was conducted, enabling others to replicate or build upon the work. The structure should include study design, participants or subjects, materials and equipment, procedure, measurements and data collection, data analysis, and ethical considerations. This section should provide a reproducible roadmap, so avoid unnecessary detail but include enough for transparency. By the end of this section, readers should be able to understand exactly how the study was conducted and be able to replicate the methods if needed.

Results section

The Results section of a scientific paper should present the findings of the study without interpretation or speculation. It should clearly and concisely convey the data in a logical order, often supported by figures, tables, and descriptive text. When relevant, the results should include statistical analyses, such as p-values, confidence intervals, and effect sizes. One should indicate which results are statistically significant and which are not. The most important findings should be emphasized.

Discussion section

The Discussion section of a scientific paper interprets the findings, explains their significance, and places them within the context of existing research. It's where one discusses the implications of the results, addresses limitations, and suggests future directions. Here's a structured approach:

References

It is the source used as a basis to prepare the hypothesis/research project. It guides the readers and engages them in further reading on the topic. Most recent references should be used, and the accuracy of all the references should be ensured. Unpublished data should not be used.

The conclusion of the scientific paper should put the work to prospective and describe the significance of the findings.

After finalizing the scientific paper, one should check for language, grammar, and plagiarism. Also, get it peer-reviewed. Always aim to publish in a good relevant journal with a high impact factor.

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Abstract: Diagnostic Algorithm for Anemia in Hemoglobinopathies
Dr Rima Kusumgar

Hemoglobinopathies represent a significant subset of inherited blood disorders characterized by abnormalities in the structure or production of hemoglobin. Diagnosing anemia in the context of hemoglobinopathies requires a systematic approach to differentiate between various causes and types of anemia, including those arising from genetic hemoglobin variants like thalassemias and sickle cell disorders. This diagnostic algorithm aims to streamline the evaluation process, beginning with a complete blood count (CBC) to assess anemia type, red cell indices, and reticulocyte count. A peripheral blood smear further refines differential diagnosis by revealing characteristic cell morphologies.

For cases presenting with microcytic anemia, initial iron studies help exclude iron deficiency and anemia of chronic disease, allowing the clinician to focus on hemoglobin electrophoresis and quantitative hemoglobin analysis. These tests identify hemoglobin variants and imbalances, indicative of conditions such as beta-thalassemia or alpha-thalassemia. In normocytic anemia, biomarkers for hemolysis—such as LDH, indirect bilirubin, and haptoglobin—along with hemoglobin electrophoresis, provide additional insights into hemolytic anemias linked to hemoglobinopathies like sickle cell disease. Advanced testing, including DNA analysis, is reserved for confirmation in cases with rare or complex hemoglobin variants.

By integrating these diagnostic steps, the algorithm facilitates accurate identification and differentiation of hemoglobinopathies, essential for effective management and genetic counseling. This structured approach can enhance diagnostic accuracy in clinical practice, leading to improved patient outcomes and targeted therapeutic interventions.

Managing Inventory of Platelet Apheresis components

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Inventory management of Single Donor Platelet is one of the biggest challenges faced by a modern blood centre. The high cost of production combined with the short shelf life of 5 days, prevents centres from stocking them up in advance, for the fear of expiry and subsequent loss of revenue. Consequently, SDP donation has primarily become directed or designated. Again, the stringent donor selection criteria together with the long duration of testing and processing has made the availability and Turn-around-time of SDP unusually high. This double pronged hinderance has resulted in SDP being a less preferred component among clinicians as compared to Random Donor Platelet (RDP).

Several strategies need to be implemented in order to streamline the deficiency of both the raw material, i.e. donors and the finished product, i.e. SDP. Some of these may be :

1. Preparing a voluntary SDP donor registry
2. Easing the pre- testing norm for regular repeating donors
3. Flexibility of donation timing to suit the working hour of donors
4. Conversion of regular whole blood donors into Apheresis donor.
5. Redesignating soon to be expired units
6. Conversion of RDP requisition into SDP requisition to prevent SDP expiry
7. Issuing group compatible platelets instead of group specific platelets
8. Use of PAS to prepare group neutral SDP

While every strategy may not be applicable to each blood bank, a combination of these and other strategies will help in better inventory management of Apheresis platelets.

Empowering Transfusion Medicine Through Digital Media Integration

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Today, as we stand at the crossroads of healthcare and technology, it's crucial to acknowledge how digital media integration is transforming Transfusion Medicine (TM). In an era where social media is an integral part of our daily lives, it's time we leverage these platforms for healthcare, especially in TM. Digitalization isn't just an enhancement—it's a necessity for educating, engaging, and building a community around safe blood donation and transfusion practices. The digital revolution has altered the way we communicate, learn, and engage, and its integration into TM provides a unique opportunity to extend our reach and improve the effectiveness of our work. As we continue to integrate digital tools into our work, we empower both professionals and the public to take an active role in advancing safe, effective transfusion practices.

The Growing Need for Digital Media in Transfusion Medicine

In TM, reaching a vast and diverse audience is essential for spreading awareness, fostering trust, and addressing public health needs. The need for digital media in TM arises from the **growing demand for public education, donor engagement, and information dissemination.** Traditional methods, such as flyers, pamphlets, and print ads, have limited scope and impact. An **average person spends about 2 hours and 24 minutes** on social media per day and the number of internet users in rural India is surpassing the urban population as per studies. Since the majority of the population resides in rural India, digital platforms—such as social media, websites, and mobile applications—allow TM specialists to connect with a vast and diverse audience instantly. These platforms enable us to educate the public in ways that were previously impossible.

Key Benefits of Digital Media in TM

1. **Increased Awareness and Education**

The advent of digital media has transformed the communication landscape. Social platforms like Facebook, Instagram, LinkedIn, and Twitter, initially built for personal networking, now offer significant potential for professional use. These platforms have become powerful tools to engage with the public and colleagues to share critical information on blood safety, donation, and safe transfusion practices. Through social media posts, blogs, and videos, TM specialists can share accurate, timely information about blood donation, eligibility criteria, the safety of transfusions, and the importance of donating blood regularly. Digital media also helps combat misinformation by providing credible sources and expert opinions. Engaging content, such as infographics, webinars, and educational articles, can directly address public concerns, dispelling myths and building trust in transfusion practices.

2. **Enhanced Donor Engagement**

Digital media has revolutionized the way we engage with donors. Social media helps build **emotional connections through storytelling**. These platforms are a powerful tool to share personal stories and testimonials from blood donors and recipients to show the **life-changing impact of blood donation and transfusions.** Such campaigns resonate on an emotional level and inspire individuals to donate blood and encourage others to do the same. Publicly recognizing and engaging with donors through these platforms strengthens retention and motivates repeat donations. Acknowledging milestones, sharing their experiences, and celebrating their contributions fosters a sense of appreciation and loyalty within the donor community.

3. **Real-Time Communication**

In **emergencies**, timely communication is critical. One of the strongest benefits of digital media is real-time communication. Social media allows transfusion professionals to quickly communicate urgent needs, shortages, or upcoming blood drives, ensuring a timely response to patient requirements and **mobilizing the community in real-time** to save lives.

4**. Community Building and Advocacy**

Digital media platforms allow TM professionals to build **supportive communities.** These online communities can **include blood donors, recipients, healthcare professionals, and blood advocates.** By fostering this sense of community, we can build a network dedicated to safe transfusion practices and create opportunities for interaction and support. By engaging in **conversations about blood safety, transfusion practices, and donor experiences, transfusion specialists**, build a group of committed individuals who become ongoing advocates for blood safety and donation.

5. **Cost-Effectiveness and Data Insights**

Compared to traditional advertising, social media is a **cost-effective** way to reach the public. Platforms like Facebook and Instagram allow TM specialists to **reach a large audience** at a fraction of the cost of traditional media. Additionally, social media platforms provide valuable data insights, enabling us to track the effectiveness of our campaigns and adjust our **strategies for better engagement tailored to our target audience's needs**.

Addressing Challenges in Digital Media Integration

While the benefits are substantial, there are also challenges to effectively using digital media in TM. Resource constraints, privacy concerns, and the need for staff training can hinder implementation.

A significant challenge is ensuring **data privacy and compliance** with **healthcare regulations**. TM professionals must handle sensitive information responsibly, particularly when dealing with donor and patient data. **Digital platforms must adhere to strict guidelines** to ensure that personal information is protected and that ethical practices are maintained.

Finally, digital media requires **skilled personnel to create and manage content effectively**. This highlights the need **learning new skills for training staff and volunteers** to use digital platforms responsibly and ethically.

With creative content, effective use of hashtags, and collaborations with influencers, even resource-constrained organizations can harness the power of digital media.

Integrating Digital Media into Education and Professional Development

The integration of digital media into education is transforming the way we learn and interact with colleagues in TM and other specialties. Younger generations of healthcare professionals, such as millennials and Gen Z, are increasingly turning to digital platforms for education. This presents an opportunity to network and expand the reach of educational materials, making them accessible at any time, from anywhere. These platforms allow for real-time interactions, discussions, and the exchange of ideas, providing educational opportunities for transfusion specialists and students alike

Platforms like **LinkedIn offer transfusion specialists a way to share research, updates, and professional insights.** These platforms allow for networking and collaboration, helping to build a **global community** of TM professionals, and **helping improve the skill set of practitioners worldwide.** Moreover, webinars, online workshops, and e-learning modules allow busy clinicians to access ongoing education on TM protocols and best practices. This remote learning approach is accessible to professionals at any time, helping maintain high standards of patient care and safety.

Empowering Transfusion Consultants to Take Center Stage

Transfusion consultants often work behind the scenes, contributing significantly to patient safety without receiving the recognition they deserve. **Digital platforms offer an opportunity for transfusion consultants to** bring these professionals into the spotlight and **build a professional online presence, share their expertise, and advocate for blood safety.**

1. **Establishing an Online Presence**

Through profiles on LinkedIn, Instagram, and Twitter, consultants can share clinical insights, and updates on transfusion practices, and educate the public on the science behind blood safety.

2. **Creating Educational Content**

Blogs, videos, and live Q&A sessions allow consultants to demystify transfusion processes, answer concerns, build trust in the public, and position themselves as thought leaders in the blood sector of healthcare.

3. **Advocating for Patient Safety**

By sharing posts about blood safety protocols transfusion-related regulations, and ethical standards, consultants can clarify safety measures and this transparency reassures the public about blood safety.

4. **Recognition Through Professional Achievements**

Sharing certifications, awards, and professional milestones validates their expertise and further establishes their credibility, eventually raising the profile of the TM community as a whole.

5. **Collaborative Networks**

Sharing research, participating in discussions, and cross-promoting with specialists from other fields, such as hematology or oncology, enhances the visibility of TM and showcases its integral role in patient care.

6. **Humanizing the Role**

Sharing patient success stories and testimonials allows consultants to demonstrate the real-world significance of TM and connect personally, translating behind-the-scenes efforts into visible, relatable outcomes for patients making their role in healthcare visible and relatable.

Looking Ahead: The Path Forward

Digital media will continue to reshape TM, enhancing public engagement, patient education, and donor management. As new tools emerge, the opportunities for TM will expand, making the field more accessible and responsive to public needs. The future of digitalization is, AI (Artificial intelligence). And the future is here.

AI, for example, can play a role in predicting blood demand, and by leveraging predictive analytics, blood centers can forecast demand, and optimize inventory and supply chains. While chatbots can address donor queries in real-time. These automated systems can free up valuable staff time and resources while keeping donors engaged and motivated to contribute regularly to blood centers. It is up to all of us to embrace this transformation and use it to benefit our patients, our communities, and the healthcare system as a whole.

In conclusion, digital media integration offers TM a pathway to connect with a broader audience, enhance patient and donor engagement, and facilitate ongoing professional development. By embracing digital platforms with strategic intent, we can create a well-informed, engaged community dedicated to safe blood donation and transfusion practices. I encourage all professionals in TM to harness these tools thoughtfully, and work together to shape a safer, more accessible, and connected future for our field.

Co-trimoxazole dependent auto-anti-Sd^a-like specificity detected only by CAT.

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Introduction

Anomalous serological reactions are occasionally encountered during the pre-transfusion compatibility tests. Some of these reactions due to the presence of certain chemicals in the reagents.[1] We report here, a patient whose plasma posed problem in cross-matching on gel cards when BLISS was used. Aim of this research was to find the causative factor(s) for this spurious reaction.

Materials and Methods

Routine serological tests were performed using various test approaches by standard protocol and using commercial and in house prepared reagents. Other required chemicals, such as antibiotics and dialysis tubes, were purchased from local markets. Soluble antigens like hydatid cyst fluid, saliva, milk, and guinea pig urine, were obtained from local sources. Dialysis membrane tubes were used as described previously.[2]

Results

The Case. A 13y female, diagnosed with Germ-cell tumor of ovary, was admitted to the hospital where she received 3 cycles chemotherapy. Her blood specimen was referred to the blood bank for transfusion requirement. Grouped B RhD+. DAT, IAT and auto control test were negative tube method but positive by CAT. Cell panel and Cross-match tests showed agglutination on gel-card. A well-organized mixing experiments with permutation combination of the dialyzed BLISS/ LISS/ patient's serum/ and fortifying with putative drug revealed that co-trimoxazole was culprit to cause anomalous reaction (Fig 1-A, B).

The pan-reactive autoantibody showed a mix-field agglutination showing two layers of cells, one with agglutinating on top and another one with un-agglutinating at bottom of micro-tube in the gel card. The content from both the layers were skillfully aspirated, mounted on the slide and viewed microscopically. While the top layer showed distinct hemagglutination (Fig 2.2), the bottom one showed no agglutination (Fig 2). This observation prompted us to perform neutralization test on the antibody using urine from guinea pig for its specificity to Sd^a antigen that to vindicated our assumption (Fig 2).

Discussion.

Blood bank services may face difficulties in finding compatible blood for transfusion due to various reasons. One such difficulty would be due to artifacts present in the reaction medium, be it antisera or reaction-potentiators or preservative substances.[1] A few reports have shown an involvement of co-trimoxazole, as we have observed in present case.[3] Through diligent approach of removal of offending molecule from the reagent by dialysis and then fortifying the same with suspected substances we could prove the causative factor for spurious reaction.

Anti-Sd^a show a typical mix-field agglutination.[4,5] Soluble Sd^a antigen is present in human urine but is more pronounced in guinea pig urine so is useful in identification of its specificity.[6,7] This feature was used to determine the specificity of the autoantibody in present case.

A unique feature of this anomalous reaction was only happened when the test was performed on CAT but not by conventional tube method. Similar observation was made by other as well.[7] While this phenomenon remains an enigma for the moment, one can speculate that the antibody with low affinity to antigen may agglutinate the red cells within the gel card reaction chamber where, after incubation the sensitized RBCs may continue to remain in close proximity and do not percolate through the gel matrix during centrifugation. On the other hand, in the tube method, that needs extensive washing of the sensitized RBCs during which the antibody molecules on the sensitized RBCs get elute off showing no agglutination.

The Co-trimoxazole was found to be associated with hemolytic anemia, renal failure or development of thrombocytopenia.[8-10] However, no such clinical features were associated with our patient. It remains a mystery on why this patient has developed anti-Sd^a. Sd^a antigen is expressed on human normal colonic mucosa but down-graded in colon cancer.[11] Our patient with cancer condition might have produced auto-anti-Sd^a presumably in face of such phenomenon of degradation of Sd^a antigen on her RBCs allowing her immune system to develop antibody to corresponding antigen. This hypothesis, however remains as speculation only. Neither we have studied reduced level of Sd^a antigen in our patient nor was found an autoanti-Sd^a in the reported case.[11] Further exploration is required to testify this hypothesis.

Conclusion

An autoantibody with anti-Sd^a specificity was detected exclusively by the column agglutination technique using BLISS, a reagent containing the preservative antibiotic co-trimoxazole.

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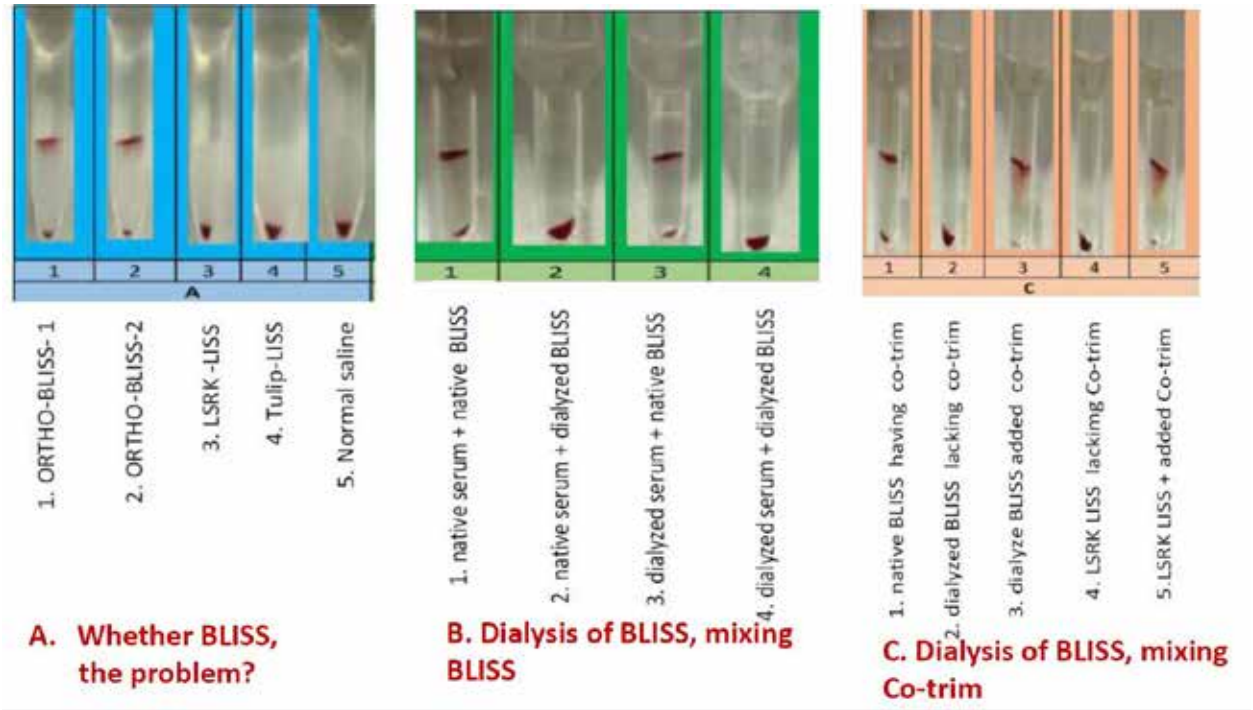

Figure 1. Showing testing approach to prove the role of Co-Trim to induce an unusual agglutination reaction.

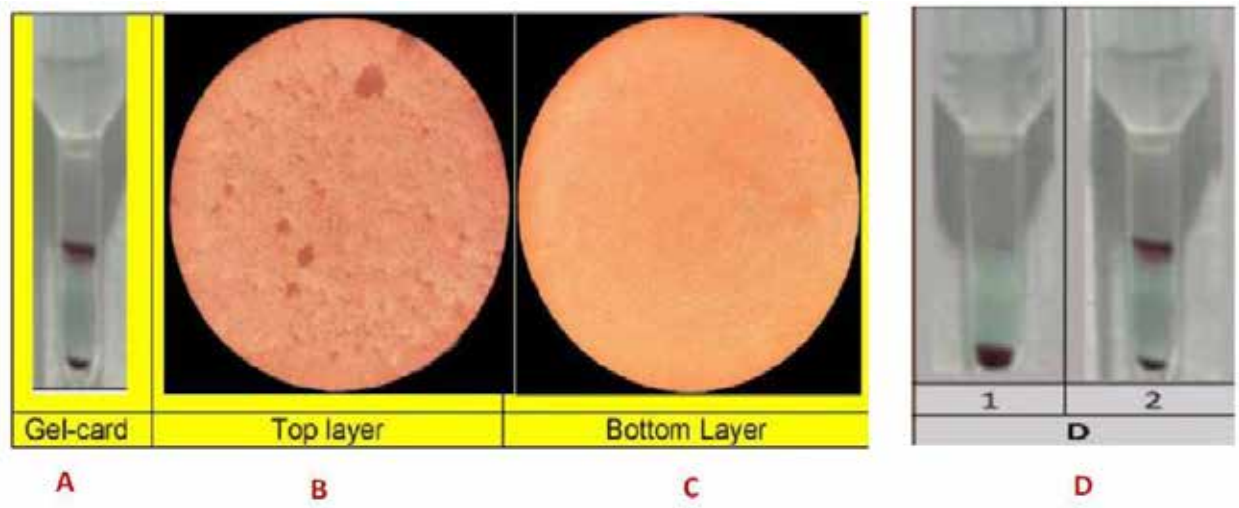

Figure 2. Showing identification of autoanti-Sd[a] in the patient's serum

Is Best Match Blood a safe path in multi-transfused Patients

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The importance of serologically safe blood transfusions in clinical settings cannot be overstated, as they play a critical role in saving lives, especially for patients requiring multiple blood transfusions. Blood transfusion although lifesaving is associated with inherent risk of development of antibodies to red blood cell (RBC) antigens leading to development of auto- or alloimmunization. Managing **multi-transfused patients** who have been **immunized** is complex and requires a carefully tailored approach to blood transfusion and patient care. Risk of immunization is high in patients receiving multiple transfusions such as patients having Thalassemia Major, Aplastic Anemia, and Sickle Cell Disease, hematologic malignancies, chronic renal failure and Cancer patients receiving chemotherapy. Selection of the most appropriate red cells is crucial when the urgency of the need for transfusion demands that serologically compatible blood will not be available. The most important determination for any transfusion is to exclude the presence of clinically significant antibodies in patient's blood before selecting RBC for transfusion.

Donor red cells that are incompatible with the recipient for ABO blood group antigen are likely to be rapidly destroyed as a result of IgM (and some IgG) antibodies that bind complement and cause intravascular hemolysis, which can result in death in 10-30% of recipients even if identified swiftly and actively managed. ABO incompatible red cell transfusion must therefore be avoided.

Risk of development of alloantibodies depends on number and frequency of transfusions, pregnancy, antigen immunogenicity, recipient's immune response, ethnicity of patient and difference in antigenic pattern of donor and recipient. Incidences of alloimmunization in various populations studied vary depending on transfusion policy, time and frequency of testing, sensitivity of test methods and technical expertise of transfusion laboratory.

Majority of blood centres provide only ABO- and Rh (D) - antigens matched blood so the risk of alloimmunization to minor blood group antigens is very high. Patients who have warm auto antibodies (WAAs) in their serum have a higher rate of alloimmunization. Exclusion of newly formed alloantibodies in patients requiring transfusion having WAAs is of primary concern. Monitoring of evidence of RBC destruction due to alloantibodies is difficult in patients, who already have auto-immune hemolytic anemia (AIHA).

Although red cell alloimmunization is one of the complications of multiple RBC transfusions, it causes difficulty in interpretation of cell typing, obtaining compatible blood (compatibility testing), antibody detection and antibody identification. Blood centres with limited resources and technical facilities need to take these complications into consideration when planning the long-term transfusion support to transfusion dependent patients. Usually, majority of alloantibodies are of the Rh blood group specificity, extended antigen matching (C, E, c, e, K) can prevent RBC alloimmunization to a great extent. Multi-transfused patients requiring blood transfusion should be matched for other antigens other than ABO and D antigens to prevent alloimmunization.

Available techniques for limiting auto-antibody interferences:

- Serum Dilution
- Adsorption techniques
- In vitro compatibility tests
- Removal of Cold-reactive antibodies by denaturation with 2-mercaptoethanol or DTT

In **multi-transfused patients** with **alloimmunization**, the optimal approach is to:

- **Prioritize ABO and Rh compatibility** for red cell transfusions.
- **Identify and match minor antigens** to minimize the risk of further alloimmunization and haemolytic reactions.

- **Conduct antibody screening and cross-matching** regularly, especially in patients with complex antibody profiles.
- **Consider antigen-negative blood**, **leukoreduced blood**, and potentially **HLA-matched platelets** for patients who have formed multiple antibodies.
- In severe cases, **splenectomy**, **plasma exchange**, and **immunomodulatory therapies** like **rituximab** may be considered to control alloimmunization.

Early detection and identification of alloantibodies, along with the provision of antigen-negative blood, are crucial for preventing adverse reactions and improving patient outcomes. Extended antigen matching and careful long-term monitoring can reduce the need for transfusions, extend the life expectancy of patients, and reduce the incidence of complications associated with red blood cell alloimmunization.

Selecting best matched blood after testing for underlying alloantibodies in this group of patients is the best approach when transfusion becomes essential in presence of life threatening anemia. Collaboration between haematologists, transfusion medicine specialists, physicians and blood centres is essential for effectively managing these patients and ensuring safe and effective transfusion therapy.

Blood Donor Deferral: The Science Behind It
(Based on Indian and WHO Blood Donor Selection Guidelines)

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Blood donor deferral, the process of temporarily or permanently disqualifying potential donors from giving blood, plays a critical role in maintaining a safe blood supply. While the decision to defer a donor might seem disappointing or confusing to the individual, it is rooted in scientific guidelines that prioritize both the health of the donor and the safety of the blood recipient. In India, donor deferral practices follow the standards set by the National Blood Transfusion Council (NBTC) and align closely with the World Health Organization (WHO) guidelines. Understanding the scientific reasoning behind these guidelines offers valuable insight into the importance of donor selection.

The primary goal of blood donation guidelines is to ensure a safe and sustainable blood supply. To achieve this, authorities set criteria that identify individuals who are eligible to donate blood. These criteria are carefully established based on scientific research, population health patterns, and risk factors associated with infectious disease transmission. Both Indian and WHO guidelines specify age, weight, health status, and lifestyle criteria that must be met to qualify as a blood donor.

Both the NBTC and WHO require donors to be between the ages of 18 and 65 years, weighing at least 45-50 kg. Younger or underweight donors may face health risks from blood donation, such as hypotension or fainting.

Adequate hemoglobin levels (12.5 g/dL) are crucial, as they reduce the risk of anemia in donors. Hemoglobin tests before donation help ensure that blood donation does not compromise the donor's health.

Temporary deferrals prevent individuals from donating blood during periods of higher health risk. These deferrals help protect both the donor and potential recipients by temporarily restricting blood donations during illnesses or after certain events.

Donors with a recent history of viral infections (e.g., common cold, flu, or hepatitis) are deferred for several weeks after symptoms subside. This deferral minimizes the risk of viral transmission through blood transfusion.

Travel to areas with a high prevalence of infectious diseases (e.g., malaria or Zika virus) results in a temporary deferral. According to WHO guidelines, such individuals are deferred for a minimum period post-travel to prevent the potential spread of endemic infections.

Vaccinations and Medications: Vaccines, especially those with live virus strains, can affect immunity. Some medications, such as antibiotics, anticoagulants, or those affecting blood clotting, lead to temporary deferrals. In India, the deferral period depends on the type of vaccine or medication.

Some medical conditions lead to a permanent deferral to avoid risk to both donor and recipient. Permanent deferrals are implemented for individuals with chronic or high-risk health conditions, preventing situations where donation could worsen the donor's health or increase the risk of disease transmission.

Infectious Diseases: Individuals with HIV, hepatitis B or C, and syphilis are permanently deferred due to the high transmission risk of these infections. High-Risk Behaviors: Donors with a history of high-risk behaviors, such as intravenous drug use or commercial sex work, face permanent deferral. Both Indian and WHO guidelines recommend these exclusions to lower the chance of disease transmission.

Chronic Diseases: Conditions such as cancer, chronic kidney disease, or diabetes complications disqualify donors permanently. These conditions may increase donor vulnerability to post-donation complications and compromise the health of blood recipients.

In recent years, the emergence of diseases like COVID-19 and monkeypox has brought attention to evolving deferral guidelines. Both Indian and WHO guidelines are adaptive, incorporating new scientific findings to update deferral periods for new diseases. For instance, COVID-19 guidelines were developed to defer individuals who recently recovered from the virus or were vaccinated, with varying deferral periods depending on symptom severity and type of vaccine.

Deferral decisions are ultimately a safeguard for public health, maintaining a balance between blood supply needs and safety. WHO encourages the establishment of high-quality blood donation systems, including accurate record-keeping, donor communication, and regular review of deferral criteria to prevent unnecessary exclusions while enhancing safety.

For India, with a high demand for blood and blood components, these deferrals sometimes lead to shortages. Efforts to expand the pool of eligible donors while preserving safety—such as improving donor screening and leveraging advanced testing for infectious agents—are central to both NBTC and WHO initiatives.

Blood donor deferral protocols, based on science and research, aim to protect both the donor and the recipient by minimizing health risks. These guidelines reflect a sophisticated understanding of infectious diseases, health risks, and the variability of individual health statuses. Through carefully balanced guidelines and continual adaptation to new health data, both Indian and WHO blood donation frameworks contribute to safer, more reliable blood donation systems worldwide.

Quality Assurance in HPCT products

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Introduction

Hematopoietic Progenitor cells (HPC) are an example of well researched cell type. They are already in clinical use for hematopoietic reconstitution. Hitherto, bone marrow (BM) was the only source of such cells; however alternate sources like mobilized peripheral blood, and cord blood are now being increasingly recognized for their potential clinical use. Hematopoietic Progenitor Cell Transplantation (HPCT) is an important treatment modality for various malignant and non-malignant disease conditions.

Quality assurance

The actions, planned and performed, to provide confidence that all systems and elements that influence the quality of the product or service are working as expected or exceed expectations individually and collectively. Standard Operative Procedures (SOPs) for collection, transportation, processing, storage (cryopreservation) and release for clinical use of HPC should be clearly laid down to ensure the same.

Process Flow for Quality Assurance of HPCT products

HPC Donor Assessment→ Mobilization → Collection → Processing→ Cryopreservation→ Storage/Thawing/Infusion

↓

Distribution ← Acceptance ← Quality Control

Harvesting Hematopoietic Progenitor Cells

- Adult stem cells obtained by large volume marrow biopsy/aspiration (1-2L)
- Cord blood stem cells obtained at delivery by sterile emptying umbilical cord and placenta into blood donation bag
- Increasingly obtained by processing of peripheral blood of patients and healthy donors by apheresis (PBPC)
  - Isolated in “real time” from blood after stimulation with blood cell growth factors (G-CSF)

HPC Donor Assessment

- Counselling regarding entire procedure including risks and benefits
- Brief history and physical examination similar to apheresis donors
- Check venous access: Peripheral or Central for PBPC collection

Mobilization in PBPC

The goal of PBPC collection is to collect an adequate number of CD34+ cells in as few apheresis collection procedures as possible. Usually by stimulating the donor/patient with either hematopoietic growth factors, or chemotherapy and growth factors, a sufficient number of circulating stem cells for marrow rescue can be collected in one to three apheresis procedures. The PBPC mobilization regimen for autologous patients can be cytokines alone or cytokines combined with chemotherapy. Allogeneic donors are generally mobilized with daily subcutaneous injections of G-CSF 10 µg/kg for 5 days.

Collection

Timing of collection

- Leukocyte count > 1×10^9/L
- Mononuclear cells 3×10^8 cells/kg body weight is reached
- If CD 34 + cell count:
  < 10/ul → Failure of Mobilization
  > 20/ul → Satisfactory Mobilization
- $20\text{-}40 \times 10^6$ CD 34 + cells/L

Target Collection

CFU-GM : 15×10^4/kg - 50×10^4/kg
CD 34 + : 1 - 8×10^6/kg
Mononuclear cell : 7 - 8×10^8/ kg

In majority of the patients the required minimal cell dose of $2.5–5.0 \times 10^6$/kg CD34+ cells can be collected in one or two apheresis collections. A few of autologous transplant patients who mobilize poorly require several collections.

Processing

Aims

- To enrich the target cell population
- To deplete T cells, tumor cells
- Reduction of volume of the component
- Removal of contaminating cells (red cells, granulocytes, platelets, plasma proteins etc)

Advantages

- Decreased number of bags to be frozen for cryopreservation
- Less storage space needed
- Decreased amount of cryoprotectant transfused
- In Pediatric patients, circulatory overload prevented

Methods of Processing

Cell separation and concentration

- Plasma removal: Centrifugation
- Red cell depletion:
  Sedimentation

Centrifugation

Purging

- Autologous: Tumor cell Depletion
- Allogeneic: T cell Depletion

Cryopreservation

Cryopreservation is among the most critical manipulations performed in clinical cell processing laboratories. Techniques vary slightly among institutions; however, in all cases, the objective is to adjust the volume to the container of choice, add a cryoprotectant solution and then freeze the cells at a controlled rate, in a manner that preserves cell viability and proliferative potential after thawing.

Cryoprotectant

There are numerous cryoprotectant solutions being used with good results. All contain a colligative agent such as dimethyl sulfoxide (DMSO); one or more polymeric agents such as Human Serum Albumin (HSA), autologous plasma, or hetastarch; an anticoagulant; and an isotonic diluent or culture media. The standard freezing mixture contains 20% DMSO (final concentration, 10%), ACD-A (final concentration 10%), an isotonic electrolyte solution, and a source of protein, usually autologous plasma or HSA, although several laboratories prefer a lower DMSO concentration (8.7% with final concentration of 4.35%).

Freezing of Hematopoietic Stem Cell Harvest Product

- Whichever cryoprotectant is used, the freezing rate is also important for viable cell recovery.
- Cryopreservation can be done by computerized control rate freezing or passive dump freezing in mechanical freezers.

Computerized programmable freezing chambers

- Freezer is programmed to cool cells at an optimal rate of 1-3°C /min until a temp of –90°C to –100°C is reached.
- Cells are subsequently transferred to liquid nitrogen (–180°C) freezer for storage

Passive controlled rate freezing

- Mechanical Freezers are used
- Simple, reliable and cost effective
- Products can be cooled without the aid of a programmable freezer or liquid nitrogen
- Done usually at the rate of 3°C / min.
- The final freezing mixture is placed at –80°C

Storage of Cryopreserved Hematopoietic Progenitor Cells

When the freezing program is completed, the bags can be removed from the chamber and placed in pre-chilled and labelled protective canisters/cassettes for storage. Although the storage of HPCs at –80°C does not seem to cause obvious damage during short periods, there is evidence that complete cessation of enzymatic and metabolic activity does not occur until a temperature of at least –135°C has been reached. It has been reported that HPC products stored at –80°C have successfully engrafted in patients after 8 years of storage.

Thawing and Infusion

For all canisters/cassettes, final identification of the product is performed according to institutional policies by the appropriate medical staff performing the infusion. Location and patient details can be matched from the HPC inventory sheet prior to thawing and infusion.

Quality Control

1. **SOP:** Detailed SOP; timely up dating
2. **Documentation, Record keeping:** record of all activities from collection to dispatch
3. **Personnel qualification-**Trained competent staff
4. **Management of all critical equipments** used in HPC enumeration, collection, processing, cryopreservation and storage.

AABB Acceptance Criteria of Hematopoietic Progenitor Cell (HPC) Products

Characteristic	**HPC (Apheresis)**	**HPC(Marrow)**	**HPC(Cord)**
Total Nucleated Cell (TNC)	Depend on desired function of final product	Depend on desired function of final product	>60 to 100 × 10^7
MNC content (%)	>60	As Measured	As Measured
Viability (%)	>90	>70	>70
Expiration time	48 hours	24 hours	48 hours
Bacterial cultures	No growth	No growth	No growth
Fungal cultures	No growth	No growth	No growth
Potency assays			
CD34	Yes	No	Yes
CD3	No/Yes*	No	No

*Only in allogeneic transplant products

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The use of Fresh Frozen Plasma and Cryoprecipitate in Clinical Practice

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Plasma contains coagulation factors, albumin and immunoglobulins. The plasma components available for transfusion are:

- Fresh frozen plasma (FFP,
- Plasma frozen within 24 hours (PF24)
- Thawed plasma (TP)
- Liquid plasma (LP)
- Solvent-detergent plasma.

The **clinical indications for transfusion of FFP, PF24, TP, and LP**:

- The management of bleeding patients who require replacement of multiple factors (liver disease, disseminated intravascular coagulation [DIC])
- Massive transfusion
- Urgent warfarin reversal
- Transfusion or plasma exchange in thrombotic thrombocytopenic purpura (TTP)
- Congenital or acquired coagulation factor replacement when specific factor concentrates are unavailable
- Rare specific plasma protein deficiencies

The current guidelines recommend transfusion of FFP in patients with coagulopathy only when a specific therapy or factor concentrate is unavailable. Use of FFP is discouraged as a treatment to improve international normalized ratio (INR) for low-risk procedures.
However, the use of FFP to treat the acquired coagulopathies of DIC and liver diseases may still be relevant, as the replenishment of coagulation factors in these patients could be critical to treat the endothelial dysfunction associated with these conditions. Endothelial cells exert control of coagulation at critical steps of the clotting cascade. Thus, endothelial dysfunction in these patients disturbs the finely tuned coagulation and fibrinolysis equilibrium. In such cases, FFP transfusion, by supplying the adequate coagulation factors and fibrinolytic proteins helps to re-establish endothelial hemostasis.

Massive transfusion: Patients requiring massive transfusion could potentially benefit from the clotting factors available in plasma transfusion, and a high FFP to RBC ratio (ie, 1:1) is advocated.
In acquired coagulopathies arising from trauma and in other settings, an equal ratio of FFP, platelets, and RBCs (1:1:1) is recommended to restore hemostasis. Conversely, when trauma patients who did not require a massive transfusion were transfused with FFP, a dose-related increase in adult respiratory distress syndrome, multi-organ failure, pneumonia, and sepsis was reported.
The management of bleeding due to warfarin or related vitamin K antagonists (VKA) treatment, or those undergoing urgent invasive procedures and need only transient reversal of warfarin effect are benefited by FFP transfusion.
The challenges of FFP transfusion in such cases are the varying levels of coagulation factors which may result in incomplete reversal of INR, and the large volume of FFP required to reverse the coagulation defect which can lead to cardiogenic pulmonary edema. Transfusion-related acute lung injury (TRALI) is another adverse effect due to formation of alloantibodies.

The 4-factor prothrombin concentrate complex (4F-PCC) is currently considered optimal for treating warfarin reversal compared to FFP as it corrects INR more quickly with a lower volume of product infused. FFP use in this setting is relegated to when 4F-PCC is not available.

Management of TTP: FFP or cryo-poor plasma transfusion or plasma exchange to replace the VWF-cleaving protease, ADAMTS13 is an important part of the management of TTP. ADAMTS 13 enzyme prevents the formation of small-vessel platelet-rich thrombi, and the resulting thrombocytopenia, and the microangiopathic hemolytic anemia that characterizes TTP. TTP may be an acquired syndrome arising from an autoantibody against ADAMTS13 or a congenital syndrome, resulting from ADAMTS13 gene mutations. Acquired TTP requires plasma exchange along with other treatments including rituximab and immunosuppressive agents.

In summary, FFP is recommended in patients with complex coagulopathies such as liver disease and DIC. Plasma has an established role in major hemorrhage and in TTP. Use of plasma is declining in warfarin reversal since the introduction of 4F-PCC.

Cryoprecipitate was routinely used in the 1970s-1990s for hemophilia A and various factor deficiencies. However, its use has become increasingly confined to the treatment of hemorrhage with the development of individual factor concentrates. It derives its name from its own collection process, whereby FFP is thawed at 1°C to 6°C permitting precipitation of its cold-insoluble proteins. Its official name, cryoprecipitated antihemophilic factor, reflects its historical use to stop bleeding in patients with hemophilia A. Due to its high concentration of factor VIII, it significantly enhanced overall survival in patients with hemophilia A.

Cryoprecipitate contains fibrinogen, factor VIII, factor XIII, von Willebrand factor, and fibronectin.

A unit is typically stored at -18°C in 10 to 20 mL volumes of re-suspended plasma for up to 12 months. After thawing, infusion is mandated within 4 hours. It is recommended to use cryoprecipitate when fibrinogen levels are less than 100 mg/dL in the setting of hemorrhage. or DIC. In the absence of bleeding or active consumption, 1 unit of cryoprecipitate per 10 kg body weight typically raises the plasma fibrinogen concentration by approximately 50 mg/dL.

Until the early 1990s, most factor replacements were derived from human plasma. In 1992, the FDA-approved recombinant factor VIII. Since then, **individual factor concentrates** have surpassed cryoprecipitate as front line for replacement therapies for hemophilia A, FXIII deficiency, hypofibrinogenemia and in von Willebrand disease. Moreover, clinical guidelines have recommended against cryoprecipitate for these conditions unless specific factor replacement products are unavailable. This is because individual factor concentrates generally are associated with fewer transfusion reactions and episodes of TRALI, and lower infections risk compared to cryoprecipitate.

Cryoprecipitate is primarily used as a **concentrated source of fibrinogen** in the setting of acquired fibrinogen deficiencies

- Massive blood loss from trauma
- Hemorrhagic obstetric complications
- Liver transplant
- DIC.

Fibrinogen is the most abundant coagulation factor in plasma. However, it is highly susceptible to hemodilution from fluid resuscitation and blood loss, both of which are common in the setting of massive transfusion. It is the earliest clotting factor to become depleted in hemorrhage and thus is targeted for replacement in such patients.

Cryoprecipitate transfusion is indicated in:

Major hemorrhage from trauma: Trauma-induced coagulopathy is a phenomenon resulting in accelerated fibrinolysis, induced hypofibrinogenemia, and subsequent dysfibrinogenemia. It heralds increasing transfusion requirements and mortality as acquired hypofibrinogenemia is associated with coagulopathy and inferior outcomes in haemorrhage control. Cryoprecipitate is integral to massive

transfusion protocols as a fibrinogen source. It can be utilized when plasma fibrinogen is less than 150 to 200 mg/dL or viscoelastic test values indicate a functional fibrinogen deficit.

Obstetric hemorrhage: Cryoprecipitate has a role when fibrinogen is less than 150- 200 mg/dL. Given current guidelines indicating focus on single factor replacement, cryoprecipitate's role in obstetric hemorrhage may soon become historical or limited to resource-constrained settings

Dysfibrinogenemia is associated with liver disease, ranging from cirrhosis, biliary obstruction, or acute and chronic liver failure. When synthetic liver function is compromised in such disease states, fibrinogen synthesis is reduced. During liver transplant, the ischemic liver graft releases tissue plasminogen activator that disseminates into circulation after reperfusion. The ensuing fibrinolysis diminishes fibrinogen levels which may promote intraoperative hemorrhage. Thus cryoprecipitate is advised in the setting of clinically significant bleeding after liver transplant with a target fibrinogen level of 150 to 200 mg/dL.

DIC: a consumptive coagulopathy is the most common cause of acquired hypofibrinogenemia. It is secondary to an underlining disorder such as malignancy (including due to treatment of acute lymphoblastic leukemia with asparaginase), infection, trauma, or complication of pregnancy. Cryoprecipitate is transfused in patients with fibrinogen levels below 100 to 150 mg/dL to mitigate hemorrhagic complications.

Congenital hypofibrinogenemia is typically seen in heterozygous carriers of afibrinogenemia mutations. International guidelines advise use of cryoprecipitate only if fibrinogen concentrates are unavailable

The current FDA and AABB practice guidelines mandate that cryoprecipitate be transfused within 4 hours of thawing (or 6 hours if prepooled in a closed system prior to freezing). These current guidelines were established in the 1970s to ensure adequate FVIII levels for treatment of hemophilia A and reduced risk of bacterial growth. However, given that cryoprecipitate is now mostly limited to use in hemorrhage, recent studies have sought to expand this shelf life and expand availability in emergencies. It has been recently shown that refrigerated cryoprecipitate

retains hemostatic function for 14 days after thawing. Moreover, the fibrinogen concentration was not significantly changed with storage at 4 weeks in room temperature or in a refrigerator for 5 weeks after thawing. Even longer shelf life may be possible through use of lyophilization and pathogen reduction technologies.

Suggested Readings:

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- B. Nascimento, L. T. Goodnough and J. H. Levy Cryoprecipitate therapy British Journal of Anaesthesia 113 (6): 922–34 (2014)
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Rare donor registry program

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India relies heavily on blood transfusions due to a higher prevalence of blood-borne diseases, complications during pregnancy, surgeries and accidents. Thalassemia and SCA itself contribute to 1L-1.5L patients who require recurrent transfusions. Well-structured and effective blood transfusion service is vital for the health-care delivery system.

In a transfusion setting, only ABO and RhD blood groups are matched, but more than 360 antigens belonging to 45 blood group systems have been recognised by the ISBT. Blood banks do not routinely perform testing of all these minor blood group antigens. A mismatch of these antigens can result in red cell alloimmunization leading to need for antigen negative blood units. The rate of immunization in India is 1-3% in the general patient population and 8-18% in thalassemics. Many alloimmunized patients receive unsatisfactory transfusion support. It is especially difficult to obtain compatible unit if patient is of rare blood type which lacks High frequency antigens (HFA) (1:1000 or less) or negative of a combination of common antigens (frequency varies from 1:200 to 1:1000) or is Null phenotype or has a phenotype frequency of less than 1% of the population.

In case of alloimmunized patients, the problem comes to light when finding compatible blood units is difficult and blood centres have to crossmatch with a large number of donors. This is a time consuming process which delays transfusion therapy. It is especially difficult to manage patients with multiple antibodies or antibodies against HFA. Such patients may also sometimes receive least incompatible blood units due to delay in finding compatible units.This is because a national donor registry or an antigen negative inventory enlisting regular blood donors with typed blood group profiles is not available.

With the need to have a list of pre-typed donors for all blood group antigens and constant effort & perusal by ICMR-NIIH, work on Rare blood donor program in India was initiated in 2019. We have developed the ICMR-Rare Donor Registry of India (RDRI) where 4000 'O' group regular donors (from four regional centers) were recruited and tested for more than 300 antigens of 41 blood group systems. More than 500 rare donors negative for a combination of common antigens have been identified. RDRI also enlists 250 very rare phenotype donors (informed consent taken). Indigenous reagent red cell panels & select cells for identification of specificity of antibodies prevalent in the Indian patient population have been prepared and these have been distributed to 80 different blood centers from 15 Indian states (to identify more rare donors through family studies).

The need of the hour is expansion of this program of large scale extended blood group phenotyping to one blood centre in each state of India. This will increase the database of antigen typed donors and preparation & distribution of screening panel cells to every blood bank, and in turn identify more rare blood group donors.

Pathogen inactivation
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Pathogen inactivation- A recent technology for inactivation of known and unknown pathogens was established in Asia for the first time in Department of Transfusion Medicine, KGMU Lko.
We have done pathogen reduction in many cases of transplants and SDP and are supplying safe plasma and platelets to the patients

Tiers of blood safety

- To ensure safe blood :
- First major level : careful blood donor screening , optimization of processing and storage.
- Second level : pathogen detection.
- Third level :pathogen inactivation

Definition: Pathogen inactivation is a technology which calls for addition of various additives to blood product to inactivate viruses, bacteria, protozoa and other transfusion transmitted infections.
Rationale:

- Inactivation of residual infection
- Reduction of known viruses , bacteria and protozoa
- Reduction of emerging and unknown pathogens
- Reduction of prions.

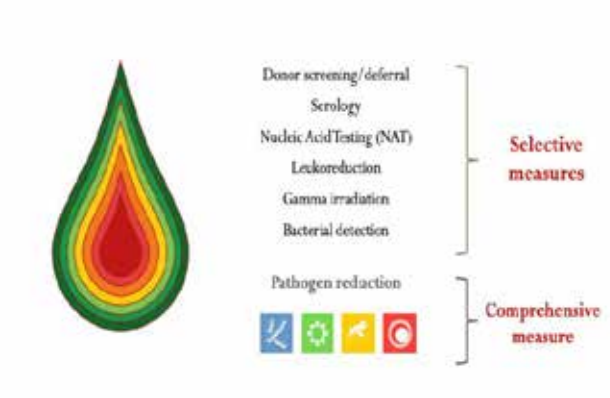
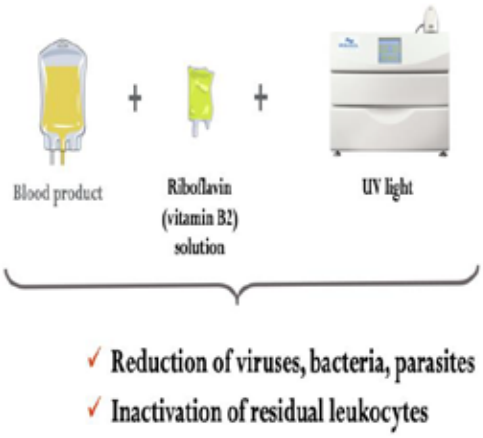


Fig 1: stages of safety

Blood Safety:
Bacteria: Platelet products are stored up to 5 to 7 days at room temperature. This environment permits the growth of bacteria which could lead to sepsis in the patient.
Tested Pathogen: Highly prevalent pathogens such as HIV, HBV and HCV are routinely tested in most countries. A residual risk exists from the window period.
Untested Pathogen: Emergence of new pathogens in untouched geographies.
Known pathogens that are not routinely tested or pose a threat to the blood supply.
WBC: Despite the many approaches to eliminate white blood cells, residual amounts can still cause (serious) adverse reactions in patients

Mode of action:



UV light only: reversible inactivation, UV light alone breaks chemical bonds in thenucleic acids of pathogens

UV light + riboflavin: irreversible inactivation, Riboflavin molecules form complexes with nucleic acids

UV light from the Mirasol Illuminator activates the riboflavin molecule in the complex . Photoactivated riboflavin induces a chemical alteration to nucleic acids, making pathogens unable to replicate

Fig 2: Mirasol System

Effectiveness of pathogen inactivation system

1. Infectious pathogen load shown to be reduced by 99.9% for the majority of pathogens investigated
2. Eleven out of the fifteen (>70%) inactivated at the limit of detection (LOD)
3. Reduces the infectious pathogen load of several clinically relevant non-enveloped viruses such as Hepatitis A (HAV) and Hepatitis E (HEV), a category of viruses shown to be resistant to other pathogen reduction technologies[1]
4. The Mirasol process, in combination with leukoreduction, can be used as an alternative to CMV testing for prevention of CMV transmission through blood.
5. Suppressing the ability of donor WBCs to proliferate is critical in reducing the risk of TA-GVHD
6. *Prevents cytokine expression and may reduce FNHTR*
7. Animal studies have shown that Mirasol system treatment prevents alloimmunization

	Leukoreduction	**Gamma irradiation (25 Gy)**	**Mirasol system treatment**
WBC inactivation	Residual amount of viable WBCs	>5 to 6 log reduction	>5 to 6 log reduction
Cytokine production	Reduced but not prevented	Not prevented	Production prevented
TA-GVHD	Not prevented	Prevented	Prevented in animal studies
Alloimmunization	Reduced but not prevented	Not prevented	Prevented in animal studies

Mirasol-treated platelets:

- Meet pH requirements throughout storage (>6.4)
- Are viable and contain functional mitochondria
- Continue to consume oxygen
- Have intact membranes and intact pumps to prevent osmotic stress as shown by hypotonic shock responses
- Show good adhesion and aggregation properties throughout storage

Donor Vigilance in Ensuring Blood Donor Safety: Differences in Reporting Strategies by Blood Centers
Dr. Varoon Capoor

Introduction

Blood donation is a life-saving healthcare service, with significant attention often placed on the safety of recipients. However, the safety of blood donors is equally important. Donor vigilance—the monitoring, reporting, and analysis of adverse events during blood donation—helps protect donor well-being. This article examines the importance of donor vigilance, explores varied reporting practices in blood centers across northern India, and reviews insights from the Hemovigilance Program of India (HvPI). We conclude with recommendations to standardize reporting practices, ensuring consistent donor safety nationwide.

Importance of Donor Vigilance

Donor vigilance systematically tracks adverse reactions from donation, ranging from minor dizziness to serious complications. This vigilance has three main benefits:

1. **Ensuring Donor Safety**: Donors are healthy volunteers, so protecting their well-being during the donation process is paramount.
2. **Improving Donor Retention**: Negative experiences can discourage repeat donations, which impacts the blood supply. Through vigilance and proper management of adverse events, blood centers can encourage donors to return, contributing to supply stability.
3. **Building Public Trust**: Transparent vigilance systems assure the public of safety in blood donation, promoting donor confidence and supporting a stable pool of repeat donors.

While vigilance is essential, reporting practices vary across blood centers due to factors such as resources, regulatory compliance, and institutional culture, all of which impact donor safety and vigilance standards.

Reporting Strategies in Donor Vigilance

Blood centers in India use various approaches to report adverse reactions, from detailed active reporting to selective passive methods. Key factors influencing these strategies include:

- **Regulatory Framework**: Blood donation in India is overseen by the National Blood Transfusion Council (NBTC) and State Blood Transfusion Councils (SBTCs), but enforcement and adherence vary by region.
- **Institutional Resources**: Larger hospitals and corporate blood centers often have better resources for donor vigilance, while smaller centers may lack staff, technology, or structured protocols for monitoring events comprehensively.
- **Reporting Culture**: Centers with a strong safety culture report even minor events and emphasize transparency, while others may underreport due to resource limitations or concerns over reputation.
- **Training and Personnel**: Blood centers with well-trained staff tend to have more robust vigilance practices than those with limited specialized training.

Case Studies on Reporting Approaches

1. **Active Reporting at a Major Delhi Blood Center**: A large blood center in Delhi employs an active reporting strategy, logging all adverse events into an electronic system that integrates with HvPI. This real-time tracking enables quick follow-up, providing support when necessary. For instance, the center identified a pattern of dizziness among donors with borderline hemoglobin levels, prompting it to adjust pre-donation screening and defer donors with low hemoglobin. This adjustment improved donor safety, enhanced retention, and reinforced public trust, boosting the center's overall donation rates.
2. **Passive Reporting in a Small Rural Uttar Pradesh Center**: A smaller blood center in rural Uttar Pradesh practices passive reporting, recording only severe adverse events. Due to limited resources, minor incidents such as dizziness or fainting are often overlooked, with staff

focusing on maintaining the blood supply over comprehensive monitoring. As a result, repeat donations declined, as donors experiencing unaddressed discomfort were less likely to return. This case underscores the relationship between detailed reporting, donor trust, and retention.

3. **Hybrid Reporting in a Government Hospital Blood Bank in Chandigarh**: A government hospital in Chandigarh uses a hybrid reporting strategy. While severe adverse events are formally reported, minor reactions are noted informally, especially in high-risk groups. The hospital also uses a helpline for post-donation support, following up with donors within 48 hours. This flexible approach enabled the hospital to identify cases of donor fatigue linked to low-sugar pre-donation snacks, leading to an adjustment in donor snack offerings. This hybrid strategy highlights how even limited resources, when used effectively, can improve donor experience.

Insights from the Hemovigilance Program of India (HvPI)

Since its inception in 2012, the Hemovigilance Program of India (HvPI) has been instrumental in standardizing adverse event reporting across centers. Recent HvPI data indicates that most adverse events are mild (15-18%, including dizziness and nausea), with moderate reactions like hematomas making up 5-7%, and severe events under 1%. Data also shows higher rates of mild reactions reported by urban centers than rural ones, suggesting underreporting in areas with limited resources. HvPI encourages digital reporting tools and feedback mechanisms to support uniform reporting, underscoring the importance of standardized practices to improve donor safety.

Challenges in Achieving Uniform Reporting

Despite HvPI guidance, several challenges hinder uniform reporting across blood centers:

- **Lack of Standardized Tools**: Many centers lack standardized systems for adverse event reporting, leading to inconsistent data collection and analysis.
- **Resource Constraints**: Smaller centers, especially in rural areas, may lack funds, technology, and trained personnel, limiting their ability to comprehensively monitor donor safety.
- **Inconsistent Guidelines**: Without universally enforced guidelines, reporting practices vary widely, affecting the reliability of vigilance data across different regions.

Best Practices for Enhancing Donor Vigilance

To strengthen donor vigilance and improve donor safety, blood centers can adopt these best practices:

1. **Standardize Reporting Protocols**: Implementing national or international reporting standards can help create a consistent framework across institutions, making it easier to monitor and address donor safety trends.
2. **Invest in Training**: Ongoing training for staff in donor vigilance improves the accuracy and thoroughness of reporting, impacting donor safety and retention.
3. **Leverage Technology**: Electronic systems simplify reporting, analysis, and follow-up, making it easier to track adverse events and implement preventive measures.
4. **Post-Donation Follow-Up**: A follow-up system allows centers to detect delayed reactions, improving donor care and building trust in the donation process.

Conclusion

Donor vigilance is fundamental to ensuring a safe, effective, and trusted blood donation system. Although reporting practices vary across centers, standardizing these practices nationwide can elevate donor care and retention, ultimately supporting a stable blood supply. By investing in reporting tools, staff training, and a safety-first culture, blood centers can improve the well-being of both donors and recipients, strengthening India's blood supply chain. Through collective efforts to prioritize donor vigilance and standardize reporting practices, India can better protect its blood donors and support a resilient healthcare system

Disseminated Intravascular Coagula□on (DIC): Overview and Role of Blood Transfusion Services
Dr. Velu Nair

Disseminated Intravascular Coagula□on (DIC) is a severe and complex condition marked by widespread activation of the coagula□on cascade, which can lead to both clot forma□on and excessive bleeding. Blood transfusion services play a vital role in DIC management, addressing the dual issues of thrombosis and hemorrhage. DIC is generally a consequence of an underlying systemic disorder, leading to simultaneous pro-coagulant and fibrinolytic activation, consumption of coagula□on factors, and potential organ damage or failure. Septicemia is a common trigger, but various other conditions can precipitate DIC as well. Diagnosis should be supported by both a causative factor and repeated laboratory tests for coagula□on markers. Scoring systems, such as those provided by the International Society on Thrombosis and Haemostasis (ISTH), help identify overt DIC and correlate with patient prognosis, including mortality risks.
According to the ISTH, DIC is defined as an acquired syndrome marked by widespread activation of coagula□on, resulting from different causes. This activation can disrupt the microvasculature and, in severe cases, lead to multi-organ dysfunction.
Role of Blood Transfusion Services in Managing DIC
1. Plasma Transfusions: Plasma provides necessary clotting factors that are depleted in DIC. Replenishing these factors through plasma transfusions helps mi□gate bleeding complications.
2. Platelet Transfusions: Thrombocytopenia, or low platelet count, is common in DIC due to excessive consumption. Platelet transfusions help restore platelet levels, reducing the risk of severe bleeding.
3. Red Blood Cell (RBC) Transfusions: Pa□ents with DIC often suffer from anemia as a result of significant blood loss. RBC transfusions are crucial to maintaining adequate oxygen delivery and stabilizing the patient.
4. An□coagulant Therapy: Despite the risk of bleeding, an□coagulants may be used in some DIC cases to prevent further clot forma□on. This requires careful monitoring and balancing with transfusion therapy.

Challenges in Managing DIC

- Balancing Thrombosis and Hemorrhage: One of the most difficult aspects of DIC management is the need to prevent further clotting while controlling active bleeding.
- Identifying the Underlying Cause: Successful treatment of DIC depends on addressing the root cause, such as infection or trauma, in collaboration with multidisciplinary medical teams.
- Continuous Monitoring and Treatment Adjustments: DIC is a dynamic condition that requires ongoing assessment of coagula□on parameters. Adjustments in transfusion protocols and medication are often needed to respond effectively.

Impact on Patient Outcomes

- Reducing Mortality: Timely and appropriate use of blood transfusions has been shown to significantly decrease mortality in pa□ents with DIC.
- Enhancing Quality of Life: Effective management of DIC can prevent serious complications like organ failure and reduce severe bleeding episodes, ultimately improving the patient's quality of life.

Future Directions

- Advances in Research: Current research aims to refine transfusion strategies, explore new an□coagulant therapies, and develop improved diagnostic tools for early detection and intervention in DIC.

• Personalized Treatment Approaches: There is a growing focus on tailoring transfusion and therapeutic protocols to meet the specific needs of individual pa□ents based on the underlying cause and clinical presentation of DIC.

Conclusion

Blood transfusion services are fundamental to the effective management of DIC, providing essential support in addressing the delicate balance between clotting and bleeding. Their involvement is crucial in identifying and treating the underlying cause, stabilizing pa□ents, and improving overall outcomes. Continuous advancements in research and personalized approaches promise further improvements in the management of this life-threatening condition.

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Therapeutic Cytapheresis: New challenges in the therapy of patients

Dr. Vijay Kumawat

Therapeutic cytapheresis is removal of a specific cells with the use of apheresis to achieve clinical benefit to the patient in certain clinical conditions. The various procedures are defined as follows

Therapeutic erythrocytapheresis (ET) is a procedure in which patients' RBCs are selectively removed to reduce excessive RBC mass. It has been used for treatment of polycythemia vera, reactive erythrocytosis, and hereditary hemochromocytosis.

RBC exchange (RBCx) is a procedure in which the patient's RBCs are replaced with allogeneic RBCs. RBCx is mostly used to treat patients with sickle cell disease (SCD).

Therapeutic thrombocytapheresis is used in primary and sometimes secondary thrombocytosis to rapidly remove platelets for prevention or treatment of hemorrhage and/or thrombosis.

Therapeutic leukocytapheresis (or leukapheresis) is a procedure in which white blood cells (WBCs) are selectively removed from patient's circulation, generally with the aim of treating hyperleukocytosis and/or hyperviscosity. Leukocytapheresis has been performed prophylactically, such as to prevent tumor lysis syndrome before initiation of chemotherapy.

Selective leukocyte apheresis incorporates adsorptive columns into extracorporeal stage of apheresis procedure with the goal of removing circulating leukocytes and immune system modulation. This procedure has been used for the treatment of inflammatory bowel disease (IBD), systemic lupus erythematosus, psoriasis, Behçet's disease, rheumatoid arthritis, and exacerbations of idiopathic interstitial pneumonias.

Therapeutic cytapheresis indications

Leukapheresis

- Hyperviscosity/leukostasis syndromes
  - Selected cases of acute or chronic leukemia and in conjunction with other therapy
- Chronic myeloid leukaemia
  - Storage of chronic phase cells
  - Storage of pH negative cells
  - Pregnancy
- Chronic lymphoid leukaemia
  - Conventional therapy failed or contraindicated

Thrombopheresis

- Essential thrombocythemia
  - Preoperatively
  - Pregnancy
  - Thrombotic crisis

Erythrocytapheresis/exchange

- Polycythemia rubra Vera
- Fulminant falciparum malaria
- Babesiosis
- Sickle cell disease

Therapeutic cytapheresis may be performed with either centrifugal based blood-cell separator (apheresis equipment) with the dedicated program or adsorption-based systems to remove primarily leukocytes with fiber or beads.

Cytapheresis procedure operators should refer to the

- Manufacturer's manual for specific recommended protocols
- Optimum anticoagulation ratios,
- Blood flow rates ranges,
- Cell collection parameters,
- Speed of centrifuge and relative g force required, and
- Separation chamber configuration

Centrifugal speed and the separation chamber configuration will vary based on the apheresis equipment used. The appearance and the haematocrit of the targeted cells population collected majorly depends on the result of operator interventions and the characteristics of the cell of interest.

Paediatric patient population requires additional considerations to adapt to the procedural needs. These may include priming of apheresis circuit with allogenic blood to combat low blood volume of patients and high risk of hypovolemia, close observation of the fluid balance including amount of replacement fluids, venous access, parental involvement to alleviate anxiety of paediatric patient, and age of the child and stage of development.

Most of the modern apheresis equipment support a wide range of anticoagulant (AC) ratio (1:10 to 1:22) but a caution is must for execution as potential clumping of cells or clotting is a constant threat that may occur with higher ratios as well as the hyper viscosity due to the increased numbers of cells. Acid citrate dextrose (ACD-A) is most used anticoagulant during cytapaheresis. The increased volume of AC used has potential to lead to citrate toxicity necessitating slower processing rates by lowering inlet flows and calcium replacement. Heparin is not to be used routinely as it may cause PLT clumping or bleeding.
Removal of large number of platelets and white blood cells (WBC) from the intravascular space may result in fluid imbalances and further compromising the patient. The AC volume returned to the patient should be considered a portion of the replacement fluid volume and is calculated into the final intake/fluid balance. Patient may require colloids such as plasma or albumin to replace the volume of cells removed.

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Dendritic Cell Vaccines in Cancer Immunotherapy: Promising Potential and Advantages

Dr Vikesh Shah

Cancer immunotherapy has rapidly emerged as a groundbreaking approach in oncology, harnessing the body's immune system to fight cancer. Among various immunotherapy strategies, **dendritic cell (DC)-based vaccines** have garnered significant attention due to the unique role of dendritic cells in initiating and regulating adaptive immune responses. These **professional antigen-presenting cells** (APCs) are capable of capturing, processing, and presenting **tumor-associated antigens (TAAs)** to T-cells, triggering a potent immune response against cancer cells. This immunotherapeutic approach offers the advantage of selectively targeting cancer cells while minimizing harm to normal tissue, thus it has negligible side effects unlike those associated with traditional therapies like chemotherapy and radiation. **Dendritic Cell Vaccines are also known as Personalised Cancer Vaccines.**

Dendritic Cell Vaccines and the 2011 Nobel Prize In 2011, the Nobel Prize in Physiology or Medicine was awarded to **Ralph M. Steinman**, **Bruce A. Beutler**, and **Jules A. Hoffmann** for their pioneering discoveries in immunology. Steinman was recognized for his identification of dendritic cells and their central role in immune activation. He demonstrated that DCs were not passive participants in the immune system but were actively involved in initiating immune responses against pathogens and tumors. His research laid the foundation for the development of DC-based vaccines and validated their use as a therapeutic tool in cancer treatment. The Nobel Prize highlighted the significance of dendritic cells in immunotherapy and continues to inspire ongoing research aimed at improving cancer immunotherapy efficacy.

Dendritic Cell Function in Immunity Dendritic cells are central to the immune system's ability to recognize and respond to pathogens, including tumors. They are a type of Antigen Presenting Cells. Upon encountering antigens, DCs process and present them on their surface in the context of major histocompatibility complex (MHC) molecules. They then migrate to lymph nodes, where they activate naïve T-cells, leading to the generation of effector T-cells capable of attacking infected or tumor cells. The effectiveness of this process depends not only on the DC's ability to present the antigen but also on its maturation and co-stimulatory signals, which are required for full T-cell activation.

In the context of cancer, tumors frequently evade immune detection through a variety of mechanisms, including the suppression of DC function. Tumor cells can downregulate antigen expression or release immunosuppressive factors that inhibit DC maturation, thereby undermining the body's ability to mount an effective anti-cancer response. This has driven the development of therapeutic strategies aimed at enhancing the ability of DCs to recognize and activate immune responses against tumors.

Advantages of Dendritic Cell Vaccines Dendritic cell-based vaccines offer several notable advantages over other immunotherapies:

1. **Activation of a Broad Immune Response** DC vaccines can activate both **CD8+ cytotoxic T-cells** (which directly kill tumor cells) and **CD4+ helper T-cells** (which enhance cytotoxic T-cell function and bolster immune memory).

This ability to stimulate multiple arms of the immune system provides a more comprehensive immune response, increasing the specificity and efficiency of the anti-tumor response compared to therapies that target a single immune effector cell.

2. **Tumor Antigen Presentation** DC vaccines can be customized using tumor-associated antigens. This **personalized approach** improves the likelihood of the immune system recognizing and attacking the cancer. Moreover, DCs can present multiple antigens at once, helping to overcome **tumor heterogeneity**, where different cancer cells express different antigens.

3. **Long-Term Immunity** One of the key benefits of DC vaccines is their ability to induce **long-lasting immune memory**. Once activated, T-cells have the potential to recognize and destroy recurring or

metastatic tumor cells, offering protection or delaying tumor recurrence —a significant challenge in cancer therapy.

4. **Favorable Safety Profile** DC vaccines are generally well-tolerated and have a better safety profile than traditional cancer treatments. Since they stimulate the body's own immune system they tend to cause fewer side effects, making them a safer option for patients

5. **Customization and Versatility** DC vaccines can be tailored to each patient's unique tumor profile and thus these vaccines can be adapted for a wide range of cancers.

Mechanism of Action

DC vaccines work by activating the patient's own immune system. The DCs, after being loaded with tumor antigens, present these antigens to T-cells in the lymph nodes, inducing a broad, adaptive immune response that can target and kill cancer cells. This strategy involves multiple immune effector cells, including T-cells, natural killer (NK) cells, and macrophages. DC vaccines also promote immune memory, allowing the body to recognize and respond to tumor recurrence or metastasis

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Clinical Applications Across Tumor Types DC vaccines have shown promise in treating a wide variety of cancers, including **solid tumors** like prostate cancer, melanoma, glioblastoma, etc. These vaccines have demonstrated efficacy in both early- and late-stage cancers, thanks to their ability to target multiple tumor antigens simultaneously. This broad applicability makes DC vaccines a versatile therapeutic strategy for different types of tumors.

Challenges: Cost and Manufacturing One of the challenges of dendritic cell vaccine therapy is the **high cost and complexity** of production. This process is resource-intensive and this makes such therapies expensive and logistically challenging.

Conclusion Dendritic cell-based cancer vaccines represent a promising and versatile approach to immunotherapy, offering several advantages over other treatment modalities. By stimulating a broad, multi-faceted

immune response, DC vaccines have the potential to overcome challenges such as tumor heterogeneity and immune evasion. Their favorable safety profile and ability to induce long-term immunity further enhance their appeal as a therapeutic option. The Nobel Prize recognition of dendritic cell biology underscores the importance of this immunotherapeutic approach and paves the way for future breakthroughs in cancer immunotherapy.

Mentoring Instrumentation in Transfusion Medicine - Purchase, Installation, Calibration, Service and Maintenance…

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Instrumentation has been elaborately discussed by many stalwarts in transfusion medicine.
Protocols have been implemented by MHFW and NABH on criteria for proper equipment selection, purchasing, installation, calibration, validation and maintenance for types of blood centres. It is important to correlate the type of equipment required with the scope of the blood centre.
Evaluation of suppliers: Shortlisting vendors based on the workload, locality of the blood centre, shortlisting the brand-inclusions and exclusion, Identify the work load and expansion potential and the need for the type of machine required- Fully automated, Semi automated or manual, collect data on various makes of the said instrument. Compare the facilities as a third-party assessor. Compare the cost- along with given detailed facility. **–UPMOST importance.**

Purchase: Each equipment should have all below given documents. Purchase Order-specifying-model-terms & conditions of purchase. Supplementary items included. Service Contract if any included. Instrument installation protocols and manual. Service Manual. Broacher and Model no. Uninterrupted power supply (UPS). Stabilizer

Annual maintenance contract and comprehensive maintenance contract -AMC –helps in getting free vendor service to inspect the equipment if ok—ok, but if part is defective we have to replace at our cost, while CMC means the vendor will not only visit for free but also service the entire equipment ,ensuring the working is optimal as required., guarantee-warranty-guarantee-is a promise of the vendor to fully replace the equipment in case of defect, while warranty again means replacing the defective part at our cost with no service charge by the vendor ,

Post purchase installation: Most IMPORTANT; Installation is not placing/reaching the machine and just switching on. It means complying all details mentioned in the Boucher and Installation manual. (You should insist, local vendors have none) Check the described details – speed, time, velocity, aerosol count and all requirements specified in the Installation manual Check if uninterrupted power supply/battery backup id required and reassure the details in purchase order. Verify calibration certificate issued by the production company as your calibration certificate. There is a possibility only Xerox copies of some other equipment with similar model no are issued to you All Documents issued to you should be original, the delivery challan, the Calibration certificate (with equipment ID), the service report, the production check certificate – Just all papers should be surrendered to you in original. a good brand of equipment has an id no for every spare part used in it. a) Installation qualification (IQ), b) Operational qualification (OQ) and c) Performance qualification before being used (PQ) lastly daily maintenance and documentation.

Calibration-validation- **Calibration** determines the accuracy of an instrument by comparing it to a known standard. E.g.: blood bag centrifuge is calibrated with tachometer, time and temperature by mother equipment calibrated by traceability with ERTL **Validation:** Ensures that a system, process, or equipment is fit for its intended purpose. Validation relies on standards for outputs Eg: blood bag centrifuge set at 1400 rpm for ten minutes for highest platelet yield is Validation of RPM and Time, and platelet yield for the said centrifuge using said traceable mother equipment and for time, temperature RPM and CBC –platelet count.

Training of technical staff: The main focus of this presentation is on the need for intricate, simple work friendly DOs and DONTs on caring for equipment on daily basis. Technical in-house awareness of standard equipment performance, protocols for daily maintenance and monitoring with start-ups and relevant checklists. The responsibilities of every member of the blood centre from Director level to Housekeeping level.

OP 2

Immunohematology

Co-trimoxazole dependent auto-anti-Sda-like specificity detected only by column agglutination technique.

Dr. Sanmukh R. Joshi

Revathy Nair, Akshay Batra* Mayuri Vekariya, Priya Radadiya

Background and objectives:

In vitro serological reactions due to antibodies reacting in the presence of certain chemicals are rare occurrences. Although such antibodies are often considered harmless, their innocuous nature requires verification. We investigated a pan-agglutinating antibody that reacted by a gel-card device and using BLISS, a proprietary version of low ionic strength solution provided with the commercial kit.

Materials and Methods:

Standard serological methods were employed including gel-cards from commercial sources (Ortho diagnostics, USA, Tulip Diagnostics, India and in house preparations). Soluble antigens of various blood groups were locally obtained and certain antibiotics and dialysis bags were procured from local market.

Results:

A 13-year old female cancer patient with pan-reactive antibody exhibited mix-field agglutination. The antibody reacted only by gel-card system using BLISS solution provided along with the kit. The auto-antibody specificity was identified as anti-Sda-like as to showing mix-field agglutination pattern and by neutralization test using guinea pig urine.

Conclusion:

The auto-antibody with anti-Sda-like specificity was detected on gel card only in the presence of antibiotic co-trimoxazole added as preservative to the commercial BLISS reagent provided with the kit.

ET 41

Blood Components

ENVIRONMENTAL AND HEALTH IMPLICATIONS OF BLOOD BAG DISPOSAL AND DEPARTMENTAL USAGE ANALYSIS IN A TERTIARY HEALTHCARE CENTRE

Dr P S Gowtham, Dr Anubhav Gupta, Dr Muthukumaravel

Background: The use of DEHP in PVC blood bags has improved flexibility and cell survival, but its effects in environment and health, have raised concerns over its continued use. This study evaluates the utilization of blood products by various departments and wastage generated by those blood bags in a tertiary care hospital and the potential health risks associated with di(2-ethylhexyl) phthalate (DEHP) in blood bags.

Objectives: The study aims to quantify blood product usage, the weight of discarded blood bags, and the potential risks posed by DEHP, ultimately contributing to a reevaluation of DEHP's safety and the search for safer alternatives.

Methods: This retrospective, cross-sectional study was done over a period of 12 months from July 2023 to june 2024 in the Department of Transfusion Medicine at a tertiary teaching hospital equipped with 960 beds. We collected data, encompassing on whole blood collection and the issuance of packed red blood cells (PRBC), fresh frozen plasma (FFP), random donor platelets (RDP), single donor apheresis platelets (SDAP), and cryoprecipitate (CPP). We also looked at the percentage of blood bag discards based on biomedical waste management records. We assessed the levels of PVC (mainly DEHP) discarded and we analysed. All data were compiled in Microsoft Excel and subjected to analysis using SPSS version 21.

Results: We evaluated daily blood collection and the discard rates of blood bags. The analysis included data on 11,200 PRBC collections and 35,711 requests, resulting in 14,778 crossmatches and 11,306 transfusions. Of the 11,200 FFP units collected, 7,228 were issued, while 7,134 RDP units were collected, with 6,495 issued. These transfusions led to the disposal of 453.501 kg of PRBC bags, 195.156 kg of FFP bags, and 175.365 kg of RDP bags, totaling 453.25 kg of PVC, of which 181.30 kg comprised DEHP. The incineration of these bags leaves behind 4.5325 kg of PVC residue. Monthly blood bag discard percentages were calculated from biomedical waste management records.

Conclusions: Incineration releases toxic gases such as dioxins and polychlorinated biphenyls, contributing to air pollution and climate change. The implementation of patient blood management (PBM) strategies significantly reduced the percentage of discarded blood products. While DEHP has been advantageous in reducing hemolysis and serving as a plasticizer for red blood cell (RBC) storage, concerns about its health and environmental toxicity persist. Although exposure levels from blood transfusions are relatively low, DEHP’s continued use warrants reevaluation. The precautionary principle advocates for eliminating DEHP from blood supplies to safeguard health, in line with the American Medical Association’s recommendations. This underscores the need for research into safer alternatives that maintain RBC storage quality.

OP 20

Blood Components

EVALUATION OF QUALITY PARAMETERS AND PLATELET ACTIVATION MARKERS BY FLOWCYTOMETRY IN BUFFY COAT POOLED PLATELET CONCENTRATES AND SINGLE DONOR PLATELETS.

Dr. Sanket Kamleshbhai Patel, Brig. Dr. Tathagata Chatterjee, Dr. Geetika Sharma, Dr. Sujata Raychaudhuri, Dr. Gini Garima, Dr. Shilpi More, Dr Saroj Rajput.

Background & Objectives

Four to six units of pooled leukofiltered Buffy Coat Pooled Platelet (BCPP) has comparable platelet yield, efficacy and leukoreduction as SDPs. Activated platelets express activated adhesion molecules such as P-selectin and activated gp-IIb/IIIa which cause functional impairment and accelerated destruction in vivo. Flowcytometry is gold standard for detection of platelet activation, apoptosis and platelet-derived micro-particles. Objectives are to evaluate and compare the in vitro quality parameters and platelet activation markers by flowcytometry in BCPP and SDP.

Methods

In this prospective, observational analytical study, 20 SDPs (AP-PC) & 10 BCPPs made by pooling 5 BC-PCs were included after determining their quality parameters as per DGHS Technical Manual. Serial samples were collected on Day-1, Day-3 and Day-5 for evaluation of quality parameters (Volume, pH, Swirling, RBC, WBC and Platelet counts), IL-6 and flowcytometry markers [CD-62P (P-selectin), PAC-1, CD-41 (gp-IIb/IIIa)].

Results

Mean residual leucocyte count per platelet concentrate (PC) bag varied ranging from 4.3 ± 0.32 x 10^7 in BCPP-NLF to 3.8 ± 0.6 x 10^6 in BCPP-LF and 2.2 ± 1.3 x 10^6 in SDP, showing >log 3 leucoreduction in SDP & BCPP-LD samples. The difference between SDP and BC-PC (NLF) IL-6 levels was statistically significant ($P < 0.05$) on Day 5. On flowcytometric evaluation, the decrease in CD 41a %-positivity is not significant among various PCs. The increase in CD 62P %-positivity is significant in comparison among BCPP-LD vs SDP & BCPP vs SDP ($p < 0.05$). The increase in PAC-1 % positivity is not significant among various PCs. All samples sent for sterility testing were negative.

Conclusion

BCPP (especially leukofiltered) have shown equivalent or even better quality parameters, biochemical marker and activation marker profile than SDP and conventional PC. BCPP-LD could be a good alternative for meeting platelet transfusion requirements of critical patients in a resource constraint setting.

OP 26

Blood Components

Exposure to High altitude modulates plasma lipid levels

Dr Iti Garg, Dr Swati Srivastava, Lt Col Dharmendra Kumar, Babita Kumari, Sunanda Arya, Rashi Khare, Prince

Background & Objectives: High altitude (HA) ascent involves various physiological challenges such as exposure to low barometric pressure and partial pressure of oxygen (hypoxia), extreme cold conditions, dry and chilly winds etc. Natives of high altitude (HAN) have several adaptations that enable them to survive and remain fit under HA conditions however, acclimatization process in lowlanders to travel to HA require several physiological and biochemical changes. The purpose of the present study was to evaluate the difference in lipid profiles of the high altitude natives and lowlanders in order to establish the role of plasma lipids in the process of HA acclimatization.

Methods: A case control study was conducted on serving Indian Army soldiers; 110 high altitude natives were compared to 180 lowlanders who were posted to high altitude region of Leh, Ladakh, India (Mean ht above sea level>11500 ft) and had spent over two months at HA. The study volunteers were physically fit, young males in between the age group of 20-45 years. The overnight fasting blood was collected and physiological parameters were recorded form the volunteers after having written and informed consent from them. The study protocol was approved by institutional ethical committee. Lipid parameters such as total cholesterol (CHL), low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides were measured on biochemistry analyser using standard protocols.

Results: Total cholesterol and LDL levels were significantly down in HAN subjects compared to lowlanders. No statistically significant change was observed in triglycerides levels and even HDL amongst the two study groups. Conclusion: Our preliminary findings suggest that acute exposure to high-altitude environments may adversely affect cardiovascular health in lowlanders while high altitude natives maintain optimal cholesterol levels. Recent reports have demonstrated that the acclimatization process and hypoxia conditioning diminishes the risk and protects the cardiovascular system.

OP 27

Blood Components

Association of High Altitude Exposure with increased Thrombotic Propensity due to Hyper-coagulation of blood

Dr. Swati Srivastava, Iti Garg, Sunanda Arya, Rashi Khare, Babita Kumari, Prince

Background & Objectives: Exposure to high altitude areas result in hyper-coagulability of blood, thus increasing the propensity of thrombo-embolic disorders (TED). Previous studies have shown that extreme weather conditions prevailing at high altitude such as cold and hypobaric hypoxia results in use of constricted clothing, enforced stasis, concentration of plasma and increase in coagulation factors. Present study aims to elucidate the relationship between increased blood coagulability with high altitude exposure.

Methods: A case-control study was conducted on 110 individuals who were natives of high altitude (HAN) and compared to 180 ethnic lowlanders, who were posted to high altitude (Leh, Ladakh region, Ht. >11500ft) and had stayed there for atleast two months. The study subjects were healthy and serving Indian Army soldiers. The basic physiological parameters and blood samples were collected from the study subjects after obtaining written informed consent from them, in accordance to Helsinki's declaration.

We evaluated the differences in their thrombotic parameters such as platelet count, D-dimer levels, prothrombin time (PT) and activated partial thromboplastin time (APTT) using standard biochemical protocols.

Results: High altitude natives had significantly higher PT and APTT levels compared to ethnic lowlanders. Subsequently, international normalized ratio (INR) levels were also significantly higher in HAN group. There was minor increase in platelet count in ethnic lowlanders but not upto the level of statistical significant.

Conclusion: Our preliminary findings suggest prolonged average PT and APTT values along with higher average INR levels in high altitude natives compared to the ethnic low lander population, although with therapeutic range. This suggests low levels of vitamin-K dependent clotting factors in HAN, thus having lower thrombotic propensity. Low-landers on the other hand have decreased PT and APTT and mildly increased platelet count indicative of increased coagulation factors in blood upon ascent to high altitudes.

ET 45

Blood Components

Comparative Quality Control Analysis of Automated vs. Manual Blood Processing for PRBC and RDP Using the Buffy Coat Method

DEEREJ P, Dr Somnath Mukherjee, Dr Satya Prakash, Dr Ansuman Sahu, Dr Debashish Mishra

Background & Objectives:-

Automation in blood component preparation (BCP) laboratories is implemented for two primary reasons: to manage repetitive tasks that can be manually or partially automated, and to improve efficiency in the preparation process. This study aimed to compare the quality of blood components processed through the Archimede Automatic Blood Component Extractor system and manual methods, focusing on buffy coat-reduced bags. The key quality control (QC) variables analysed were packed red blood cells (PRBCs) and random donor platelets (RDPs), with the objective of identifying the advantages and limitations of each method.

Methods:-

A retrospective study was conducted from January 2024 to August 2024 at the Department of Transfusion Medicine and Blood Centre, AIIMS Bhubaneswar. Blood components prepared using the Buffy coat method from Q350 and Q450 blood bags were analysed. Two groups were compared: one processed using the Archimede automated system (Terumo BCT), and the other using manual methods. QC variables for PRBCs included visual inspection, product volume, and hematocrit, while RDPs were assessed for product volume, platelet count, WBC contamination, sterility, and pH levels. Statistical analyses were conducted to determine significant differences between automated and manual methods, with significance set at p-value < 0.05

Results:-

PRBC Comparison:

For PRBCs, no significant difference was observed in packed cell volume (PCV) between the two methods for Q350 bags ($p = 0.089$). In Q450 blood bags, no significant differences were found in hemoglobin levels ($p = 0.864$) or PCV ($p = 0.416$) between the automated and manual methods. However, a significantly higher product volume was achieved in Q450 bags using the automated system compared to manual processing ($p = 0.04$), indicating a volume advantage with automation. Also, One manually processed PRBC unit tested positive for bacterial culture.

RDP Comparison:

For RDPs, no significant difference in volume was observed for Q350 bags ($p = 0.224$), but a significant increase in volume was noted for Q450 bags using the automated method ($p = 0.037$). In terms of platelet count, no significant differences were observed between the two methods across both Q350 and Q450 bags ($p > 0.05$), indicating comparable platelet yields. Additionally, no significant differences in WBC contamination were found between the methods ($p > 0.05$). pH

levels were consistent across both methods, with no significant differences for Q350 bags (p = 0.314) or Q450 bags (p = 0.519).

Conclusion:-

The Archimede automated system showed a significant advantage in volume for Q450 bags for both PRBC and RDP. Also comparing the sterility among the methods the automated system proved to be better due to its limited mechanical manipulations. However no significant difference was noted in the other Quality control parameters. Major limitations include the study's retrospective design with limited sample size and limited scope in evaluating sterility and long-term product outcomes, necessitating further research.

OP 78

Blood Donation and donor apheresis

Prevalence of Latent Iron Deficiency in Regular Voluntary Blood Donors in Eastern India

Dr. Abhra Barman, Suman sudha Routray, Gopal Krushna Ray, Nirupama Sahoo, Devi Prasad Acharya, Sukanta Tripathy

Background/ Introduction:

In Eastern India, where dietary iron intake may be suboptimal due to various socio-economic factors, the prevalence of latent iron deficiency among voluntary blood donors warrants careful examination. Regular blood donation can deplete iron stores, leading to a higher risk of deficiency. Latent iron deficiency (LID), characterized by reduced ferritin levels without overt anemia, can affect donors' health and overall well-being. Understanding the prevalence of this condition in this demographic is crucial for implementing effective screening and management strategies, ensuring the safety of donors, and maintaining the quality of blood supplies.

Objective: This study aims to investigate the prevalence of LID among regular voluntary blood donors in Eastern India.

Methods: This was a cross-sectional study performed on 333 donors (163 cases/ repeat donors & 170 control-1st time donor) selected as per the Drug and Cosmetic Act, over a period of 06 months. Extended CBC parameters comprising Ret-He (<28 pg) and iron studies (serum Ferritin <30 µg/L) with normal hemoglobin levels were used to diagnose LID. Statistical analysis is done by Graph pad version 8.4.3.

Results: Repeat donors have notably lower serum ferritin levels and a higher prevalence of LID, with 49% showing ferritin <30 ng/ml compared to 11.76% of first-time donors. Median Serum Ferritin is significantly lower (30.40 ng/dl) in repeat donor compared to first time donor (61.60 ng/ml). Ret-He levels (<28pg) are also lower in repeat donors (31%) compared to first-time donors (21.18 %). Median Ret-He in repeat donor (29.40 pg) is lower compared to first time donor (30.40 pg). These results highlight the cumulative effect of regular blood donation on iron stores, emphasizing the need for targeted interventions to monitor and manage iron status in this population.

Conclusion: A significant prevalence of latent iron deficiency among repeat blood donors in Eastern India warrants the need for increased awareness and proactive management of iron status. Addressing latent iron deficiency not only supports donor well-being but also contributes to the overall quality and safety of blood supplies.

Key words: blood donors, latent iron deficiency, reticulocyte haemoglobin equivalent

(Ret-He), serum ferritin,

ET 55

Blood Donation and donor apheresis

A Potential of Acute Normovolemic Hemodilution in Cardiac Surgery: A Prospective study

Rajvi Vora, Dr. Ripal Shah

Background & Objectives: Acute Normovolemic Hemodilution (ANH) has gained attention in cardiac surgery as an effective approach to minimize the need for allogeneic blood transfusions and hence reduce the associated risks. This study aimed to evaluate the potential of ANH in improving patient outcomes during cardiac surgical procedures.

Method: We conducted a prospective study involving 50 patients undergoing various cardiac surgeries. The patients were randomized into two groups: those undergoing ANH and those receiving standard allogeneic transfusions. Key outcome measures included postoperative hemoglobin levels, transfusion requirements, complication rates. The data were collected preoperatively, intraoperatively, and postoperatively, and analyzed using appropriate statistical methods.

Result: The ANH group demonstrated higher postoperative hemoglobin levels (mean difference of 1.2 g/dL, $p < 0.01$) and a reduced need for allogeneic transfusions compared to the control group (25% vs. 55%, $p < 0.001$). Complication rates, including infection and thromboembolic events, were similar between groups.

Conclusion: ANH during cardiac surgery improves postoperative hemoglobin levels and reduces the need for transfusion of allogenic blood without increasing complication rates. These findings support the implementation of ANH as a safe and effective practice in cardiac surgical settings, contributing to better patient outcomes and resource utilization.

Keywords: Acute Normovolemic Hemodilution, Cardiac surgery, allogenic blood transfusion

ET 69

Blood Donation and donor apheresis

From Quantity to Quality: Change in donor deferral rates post amendments in Drug & Cosmetics Act, March 2020

DR ADITI GOEL, DR RICHA GUPTA

Background & Objectives: Donor screening plays a crucial role in ensuring the safety of donated blood. In March 2020 second amendments were implemented to ensure safe selection of blood donors. Present study aims at studying the shift in donor pool post amendments.

Methods: The present retrospective study was conducted in Regional Blood Transfusion Centre,in North India. Donor deferral records of 6 years were collected and analysed. Data was divided into two study groups 'A' (March 2017 till February 2020; 3yrs prior to ammendments) and 'B'(April 2020 till March 2023: 3 years post amendments). Reasons for deferrals were divided into four categories based on the amendments -

Category 1 Medical and surgical History ;

Category 2 Physical Health & condition:

category 3 Lifestyle and behaviour :

category 4 Others

Statistics - Shapiro wilk W was used for data normality. Chi square test and Kruskal wallis Test were used to compare normal and non-normal data between the two groups respeectively.

Results: Total donors screened in group A and B were 1,09,935 and 71,145. In group A 12,552(11.41%) donors while 10,406(14.62%) donors in group B were deferred and the difference was non significant($p = 0.1609$). Most of the donors deferred were males and belonged to 18-30 yrs age group in both the groups (79.84% & 86.87% , 54.37% & 54.27% respectively). The donors deferred in category one significantly increased to 36.88% in Group B from 32.53% in group A($p = 0.015$) . The number of donors deferred in category Two significantly decreased from 47.27 % in group A to 37.18% in group B($p = 0.0013$). Category three had least donor deferrals with no significant difference between two groups($p=0.3001$). Category four has also seen a statistically significant rise in donor deferrals from 15.92% to 19.49%($p=0.0555$).

Conclusion.The new guidelines are more comprehensive and ensure safety of the donated blood but with a significant decline in donor pool in category one and three where more stringent criterias are introduced, and a significant increase in donor pool in category two where weight and pulse criteria have been relaxed. But overall , the difference in donor deferral rates in between two groups has been found not significant($p=0.1609$).

OP 14

Blood Donation and donor apheresis

Unveiling the keys to donor satisfaction : a path to improve donor retention

Rashmi Kumari, Dr Meena Sidhu , Dr Sahil Gorka

Background : Amid an ever-increasing demand for blood components, continuous donor recruitment and retention is essential to maintain the nation's blood supply. To address this, it is important to understand the key factors that contribute to donor satisfaction including efficient pre-donation processes, attentive staff, and comfortable amenities as these offers critical insights for enhancing the donor experience. These improvements can enhance retention strategies, ensuring a steady blood supply.

Aim: The study aims to assess overall satisfaction with the blood donation process, examine donor demographics, and explore their correlation with donor retention.

Method : An anonymous survey form was given to donors post donations to gather information regarding donor demographics and their satisfaction with the quality of blood donation services at our centre and their intention to donate in future. The Five Point likert scale was used to asses the response. The study was conducted from April 2023 to March 2024

Results: . A total of 2000 donors were surveyed ,after excluding 60 incomplete forms a total of 1940 forms were considered evaluable for the study. The survey of blood donors revealed that the majority were male (96.8%) and repeat donors (68.2%), with most being graduates (46.2%) and aged 18-30 years (43%). Overall, 81.3% of donors were satisfied with their experience, with younger donors showing higher satisfaction. Pre-donation screening and staffs behavior received the highest satisfaction scores, while post-donation care and amenities were areas needing improvement. A significant association was found between a positive donation experience and the intention to donate again (Chi-square = 1747.52, $p < 0.0001$), with 99% of satisfied donors willing to donate again. Socio-demographic factors did not significantly influence future donation intentions.

Conclusion: The results indicate that donor satisfaction positively influences the likelihood of future donations, emphasizing the significance of ensuring a satisfactory donation process to enhance donor retention.

OP 43

Blood Donation and donor apheresis

Correlation between hemoglobin and Prothrombin time:Can hemoglobin alone predict the coagulation profile?

Shubhi yadav, Dr Tulika chandra

Background:

Coagulation profile is an important tool to determine various disorders in patients for which a prompt action is needed.But in our country at present , 60 percent of the population is residing in rural areas where facilities are not available for a complete coagulation profile and hence patients face delayed treatment and sometimes develop complications further.So if an easy and accessible modality can be standardised,outcome of the whole healthcare facility can be improved.

Aims and objectives:

1.To determine the correlation between haemoglobin and coagulation factors(Fibrinogen and Factor VIII) and also between haemoglobin and PT,APTT.

3.To assess the interfactorial correlation among PT,aPTT,Fibrinogen and Factor VIII.

Methods:

1. 110 random whole blood donors was selected and allowed to donate.

2.Whole blood was collected under strict aseptic measures within 6 to 8 minutes of phlebotomy.

3.FFP was prepared from these units within 6 to 8 hours.

4.Samples were taken from FFP for assessment of PT,aPTT,Fibrinogen and FactorVIII using a Stago coagulometer.

Results:

1.The correlation between haemoglobin and fibrinogen ,factor VIII values is insignificant as the p value is 0.562 and 0.440 respectively.

2. Heamoglobin is significantly correlated with PT as the p value for the same is 0.049.

3.There is a strong correlation between PT and aPTT for the p value of 0.0001 and also PT and Factor VIII (p value 0.044).

Conclusion:

1.As low Haemoglobin levels have been found to be related with increased PT levels ,it can work as an excellent predictor of coagulation profile in patients in the peripheral areas where coagulometer is not available and PT ,aPTT can not be assessed early in cases where immediate intervention is needed.

2.In the patients who need to be assessed for factor VIII quite frequently for diseases such as pubertal abnormal uterine bleeding and who cannot afford the testing of factor 8 more often,PT alone or along with aPTT can give an approximate idea of Factor VIII to start with the treatment and reducing the cost of whole treatment to an extent

OP 32

Blood Donation and donor apheresis

Spectrum of Adverse Reaction in Blood Donors at Tertiary care Hospital in North India

PRIYANKA ROY, DR. RAVI RANI MISHRA , DR. VATSALA MISRA

Introduction:- Before, during and after blood donation, an untoward feeling by the blood donor is known as an adverse donor reaction.

Aims and objectives:- To determine the incidence and analysis the associated risk factors (age, sex, weight, frequency of donation etc.) and severity of reactions.

Methods:- This prospective cohort study was conducted at MLNMC over a period of 18 month from 1st January 2023 to 31st June 2024 on healthy individuals who meet standard blood donation criteria and give consent to participate in the study were included and previous history of severe adverse donor reactions and all other deferred donors were excluded from this study. Acute reactions are recorded during the time of donation and delayed are recorded at 24 hours, 7 days, 14 days after donation.

Result:- Total 10746 donors were finally included in this study, among them 233 donors had been developed adverse reactions. Of them 75% (177/233) donors were 1st time donors and 24% (55/233) donors were repeat donors. 94 % donors are male and females were 6 %. The mean (SD) age was 25 (6.3) years and the mean weight (SD) was 60 (7.7) kg and the mean hemoglobin was 13.4 gm/dL. The Vasovagal reaction had significantly associated with first time blood donors (p=0.00076) (Mann whitney U test). Of them 93% donors had (219/233) Vasovagal reaction, 3.4% haematoma, 0.85% pain at the site of venipuncture, 0.01% citrate toxicity.

Conclusion:- The incidence of adverse donor reaction was 2.1% (233/10746), the grade of severity is Zero and the vasovagal reaction had significantly associated in first time blood donors in MLNMC, Prayagraj, North India.

OP 64

Blood Donation and donor apheresis

Smart Strategies: Leveraging Laboratory Predictors for Safe and Effective Plateletpheresis

Dr.Anusha Thangaraju, Dr.B.Latha, Dr.G.Kavitha, Dr.S.Ashwin

Background:

Single Donor Platelets (SDPs)are most commonly used to prevent and treat bleeding in Thrombocytopenic patients.Unlike pooled Platelets SDPs lowers the risk of Transfusion Transmitted Infections, Alloimmunisation and Febrile Non-Hemolytic Reactions.Plateletpheresis procedure should give optimal yield and Donor comfort.

Aim:

Aim of the study is to analyse the impact of various Procedural Parameters in Platelet yield and Anticoagulant Citrate Dextrose (ACD) infusion to donors.And to strategies Donor selection for optimal yield with lesser ACD infusion.

Methods:

A Prospective observational study conducted in Rajiv Gandhi Government General Hospital from June 2023 to June 2024. A total of 207 procedures were done.Data was collected and compiled.Correlation between BMI, Predonation Platelet Count with Platelet yield and Total Processed Blood Volume (TPBV), Run time with ACD infused to the donor was analysed using Pearson Correlation Coefficient (r).

Results:

BMI and Predonation Platelet Count had significant Positive correlation with Platelet yield.High Predonation Platelet Count has shorter Run Time and less ACD infusion to Donors.47% of procedures with Platelet Count >3X10^6 had less number of Cycles, Run Time and ACD Infusion with Maximum yield.

Conclusion:

Donor with high Preplatelet Count had better yield with minimal Run Time and ACD infusion to the donor thus preventing adverse effects on the Donor.

ET 15

Blood Donation and donor apheresis

Evaluating the effectiveness of communication modes in promoting repeat voluntary donation behavior in first-time blood donors at Stand Alone Blood Centre in West India

Dr Tejal Ahuja, Dr Ripal J Shah

Introduction: Blood donation plays a crucial role in medical care; in the Past, due to a lack of technology, there was low awareness of blood donation. But now, due to rapid technological advancements, several new methods such as telephone (TP), e-mail, social media, WhatsApp (WA), and Short Message Service are being used as effectively among blood centers worldwide for post-donation communication with blood donors' education and motivation to recruit and retain them as repeat and regular voluntary non-remunerated blood donors. The present study aimed to determine the effectiveness by which way mode of communication to recruit and retain first-time blood donors to become repeat and regular voluntary blood donors.

Materials and Methods: This 1-year observational prospective study was conducted in the Stand Alone Blood Centre, Prathama Blood Centre – Ahmedabad. Four hundred fifty first-time blood donors selected for the study were divided into three comprising 150 blood donors each as per the mode of communication strategy adopted, namely Post-donation Personal Care (PC), TP, and WA groups.

Results: The repeat donation rate was highest in the TP groups (67%), followed by the PC group (26%) and WA group (7%). The mean repeat donation was found to be significant in the TP group and PC group as compared to the WA group.

Conclusion: In this technology-driven world we have many options to increase blood availability. In the present study, by the TP group, recruitment of donors is increased and is found to be the most effective mode for blood retention.

Keywords:

Blood donors, donor motivation, donor recruitment, repeat blood donation, Telephone, WhatsApp.

ET 17

Clinical Transfusion Therapy and Patient Blood Management

A Quasi Experimental Study To Implement Patient Blood Management Program For Platelet Therapy Among Hemato-Oncology Patients.

Vaidehi Prasanth, Daljit Kaur, Gita Negi, Ashish Jain, Gaurav Dhingra, Xavier Belsiyal

Background=

Paucity in data pertaining to PBM for platelet transfusion created purpose. Study aimed for implementing effective PBM program for platelet transfusion through evaluating transfusion appropriateness and educational intervention for dedicated platelet transfusion practitioners (PtP).

Methods=

Quasi experimental study for 1 year [Pre-intervention (January to April 2022) Intervention (May to August 2022) and Post-intervention (September to December 2022)]. Pre- and post-intervention included online survey, component stock assessment and platelet audit. During intervention, multiple interactive educational sessions were given. Feedback based on Kirkpatrick's model was collected.

Results=

1.Platelet audit

• Out of 556 platelet requisition forms, 254 (45.7%) for 55 patients received during pre-intervention and 302 (54.3%) for 75 patients during post-interventional phase.

• Total of 89.6% requisition forms were appropriate, 20% were inappropriate (75% inappropriate during pre-intervention). After educational sessions, increment of 11.2% appropriate forms during post-intervention (statistically significant [SS] $p<0.001$).

• SS ($p<0.01$) increment in appropriately mentioning patient's status (chemotherapy/bleeding) and increment of 43% in SDP during post intervention phase.

• SS ($p<0.001$) decline in ABO incompatible transfusions and platelet refractory cases during post-intervention.

• Component stock assessment showed decline of 6% expiration rate during post-intervention.

2.Questionnaire

Online survey (20 questions) for 56 participants [resident doctors (n=14) nursing officers (n=31) technical officers (n=14)]. For doctors, average median score for self-perception during pre- and post intervention was 4.1 (range 2-5) and 4.45 (range 4-5) respectively. Increment of 31% and 19% for knowledge and practice observed during post-intervention. For nursing officers and technical officers, 25% and 16% increemnt for knowledge and practice observed. Thematic analysis of two open ended questions suggested for interdepartmental continuous medical education sessions, training and feedback.

3.Feedback

Out of 48 responses, 45 (96%) gave very satisfactory responses. Majority responded time constraints (n= 31; 65%) as major hindrance. Repeat sessions should be every 6 months.

Conclusion=

• Introduction of PtP, educational sessions they underwent, have enhanced their knowledge and standard evidence-based platelet transfusion guidelines.

• Patient outcome improved by achieving transfusion appropriateness, prioritizing medical emergencies, optimize platelet inventory management and minimize wastage.

ET 24

Clinical Transfusion Therapy and Patient Blood Management

Evaluating Implementation of Patient Blood Management Strategies in Fracture Hip Patients

Palak Mehta, Sadhana Mangwana, Suneel Kumar

Background and Objectives: Hip fractures in elderly people are common; surgical management is the primary treatment. Older individuals are frequently anemic due to complex etiology. Transfusions to these patients in the perioperative period cause concern for morbidity, mortality, and hospital discharge. The aim was to evaluate transfusions in these patients and identify predictors, short-term sequelae, and opportunities to decrease length of stay.

Methods: A prospective study was undertaken on fracture hip patients in tertiary care centre from April 2023 to March 2024, enrolling 100 patients. Statistical analysis was done using student's t test, with a P-value <0.05 as significant.

Results: Mean age of patients was 74.5 ± 10.6 years, with female preponderance. Extracapsular hip fractures were more common than intracapsular fractures ($p \leq 0.005$). Hemoglobin at admission was 10.53 ± 2.28 gm/dl, lower in females ($p<0.05$), at transfusion - 6.90 ± 0.7 gm/dl and post-transfusion - 8.5 ± 1.2 gm /dl ($p <0.001$). 33 patients required transfusion; majority (N=30) required PRBC transfusion ($p<0.001$), more in females ($p<0.05$). 80-89 years' females required highest multiple transfusions, more in extracapsular fracture ($p<0.05$), more in pre-operative phase (N=17). 60% patients with comorbidity and 17% patients without comorbidity required blood transfusions ($p<0.001$). Length of stay was 5.21 ± 4.25 days, more in female, transfused patients, with comorbidity. Majority of patients discharged. Four patients did not survive, having comorbidities, majority having CAD and sepsis ($p <0.001$). 60% of patients with comorbidities and 85.45% without comorbidity were discharged within 5 days ($p<0.001$).

Conclusion: Hip fractures, especially extracapsular, are commonly seen in elderly females and are anaemic. Older age, females, extracapsular fractures, presence of comorbidities are predictors of transfusion requirements, affecting length of stay and outcome. There was no impact on patient's health following restrictive transfusion strategies. A timely application of Patient Blood Management is significantly associated with reduction of blood transfusions, length of stay; improve patient outcome and utilisation of organizational resources.

OP 19

Clinical Transfusion Therapy and Patient Blood Management

Effect of high ratios of plasma and platelets to red blood cell transfusions during early resuscitation on the mortality of severely injured trauma patients

APARNA KRISHNA, Dr.Arulselvi S, Dr.Rahul Chaurasia, Dr.Tejprakash Sinha, Dr.Shivam Pandey

Background/Objectives Recent studies have suggested that increasing fresh frozen plasma and platelet transfusions can improve survival rates in patients requiring massive transfusions. This study evaluated the impact of different ratios of plasma/platelet to red blood cell transfusions on the mortality of severely injured trauma patients who received blood transfusions during resuscitation.

Materials and methods

This prospective observational study was conducted in the emergency department of a trauma center from August 2017 to August 2018. Patients aged ≥18 years, ISS ≥16, and who required □ 2 PRBC unit transfusions in the first four hours of presentation to the emergency were included. Four groups were identified based on the FFP: PRBC and PLT: PRBC ratios. The patients were grouped into only PRBC, low (<1:1), balanced (1:1), and high (>1:1) ratios.

Results

Eight hundred fifty-two patients met the inclusion criteria, with a mean age of 36.1±14 years, 85.7% males, and 89% blunt injuries. The 24-hour mortality was higher in the LR group of the FFP: PRBC ratio (13.6%) and the PLT: PRBC ratio (16.1%). The overall in-hospital mortality rate was higher in the high PLT: RBC ratio group (45.3%) but comparable in low and high FFP: PRBC ratio groups. Multivariate logistic regression showed high FFP: PRBC (OR-0.9, p<0.0001) and PLT: PRBC (OR-0.28, p<0.0001) ratios reduced mortality at 24 hours.

Conclusion

High FFP: PRBC and PLT: PRBC ratios reduced 24-hour mortality but not overall hospital mortality in severely injured patients who received multiple transfusions. Prospective trials are necessary for further evidence.

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Clinical Transfusion Therapy and Patient Blood Management

ANALYSIS OF HEMOSTATIC ABNORMALITIES BY ROTATIONAL THROMBOELASTOMETRY IN PATIENTS WITH SEPSIS

Dr Franzine Marie Syiemlieh, Dr. B. Latha, Dr G. Kavitha, Dr Aswin Kumar S.

BACKGROUND:

Sepsis is a life-threatening condition with coagulopathy being a leading factor for mortality in these patients. Physiological hemostasis involving the pro and anticoagulant pathway is disturbed in response to the infection resulting in haemorrhage and multi-organ failure. In this setting, ROTEM is a point of care test that can provide a comprehensive evaluation right from the coagulation initiation and clot formation to clot dissolution and fibrinolysis.

OBJECTIVES:

To describe Coagulation profiles using Rotational Thromboelastometry in patients with sepsis admitted in a tertiary care hospital

METHODS:

This prospective observational study was conducted between January 2024 to June 2024. The study population included 42 patients diagnosed with sepsis admitted during this period. ROTEM was performed and coagulation profiles characterised.

RESULTS:

Out of the 42 patients enrolled, ROTEM showed 71.4% had hypocoagulation, 9.52% had hypercoagulation, 11.9 % had hyperfibrinolysis and 7.14 % displayed mixed hypo-hypercoagulation patterns.

CONCLUSION:

Although standard coagulation tests are most commonly used to assess hemostatic system however they are unable to accurately reflect the derangements incited by sepsis. Thromboelastometry, on the other hand, can rapidly measure pathologic changes even when standard test results are still within normal limits and can detect the early activation of coagulation that leads to hypercoagulability. Hence it can serve as a promising tool to assist clinicians in the administration of therapies that interfere with the coagulation system and in turn improve survival and outcome.

ET 43

Clinical Transfusion Therapy and Patient Blood Management

Blood transfusion practices in Adult Cardiothoracic and Vascular surgery patients in peri-operative settings: experience from a tertiary care centre

Dr Ruchi, Dr.Gopal Kumar Patidar, Dr. Manoj Sahu, Dr. Hem Chandra Pandey, Dr. Rahul Chaurasia, Dr. Anjali Hazarika

Introduction: Blood transfusion plays a critical role in the management of patient undergoing Cardiothoracic and vascular surgery (CTVS). There is high variability in transfusion practices in these patients.

Aims: Evaluate the current transfusion practices among CTVS patients in peri-operative settings at our centre.

Materials and methods: A prospective study was conducted over a period of 7 months (January 2024-July 2024). All patients ≥18 years of age who received transfusion were included. Basic demographic details, diagnosis, investigation and transfusion details were collected from patient and blood centre records. A descriptive analysis of data was done using Microsoft excel.

Results: Out of 346 patients, majority were males (67.9%) and 73.1% were of age group 18-58 years and 51.7% were of weight 50-70 kg. Patients who underwent Coronary artery bypass graft surgery (CABG), Mitral Valve Replacement (MVR), Atrial Valve Replacement (AVR), Double Valve replacement (DVR), Atrial septal defect (ASD) closure, and Bentall surgery were 31.5%, 20.2%, 10.6%, 7.8%, 6.6%, and 4.9%, respectively. Median number of red cell units transfused was maximum in Bentall, followed by CABG, heart transplantation (HT), MVR, DVR, AVR, ASD, and others which were 6, 5, 5, 4, 4, 4, 3 and 4, respectively. Median number of platelet units transfused in Bentall, HT, CABG, MVR, DVR, AVR, ASD, aneurysm repair and others were 4, 3, 2, 2, 2, 2, 2, 2, and 4, respectively. Median number of plasma transfused in Bentall, HT, CABG, MVR, DVR, AVR, ASD, aneurysm repair and others were 4, 3, 2, 2, 2, 2, 2, 2, and 2, respectively.

Conclusion: There is high variability in blood transfusion practices taking into account patient-specific factors, including comorbidities, age, clinical presentation, vital signs, and laboratory values and complexity of surgeries.

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Clinical Transfusion Therapy and Patient Blood Management

Characterising Coagulopathy of Acute Liver Failure Using Thromboelastogram

Ganesh Mohan, Shamee Shastry, Kavya Babu, Chenna Deepika, Ancy Ninan

Background:

Rebalanced state of coagulation in chronic liver disease (CLD) is well documented however, coagulopathy in acute liver failure (ALF) is not well characterised.

Objectives:

To define the characteristic changes of coagulation observed in ALF using thromboelastogram (TEG).

Methodology:

This was a retrospective study from 01/2021 to 12/2023 and adult patients presenting with ALF and those with a TEG 5000 report were included in study. Parameters like cause of ALF, admission time Hb, HCT, Platelet count, PT, aPTT, Fibrinogen, liver function tests (LFT) and TEG were collected. The outcome of the study was characterisation of changes in the coagulation system, correlating TEG to disease severity and disease outcome. Mean and standard deviation, median and inter quartile range, independent t test, Pearson Correlation study for parametric data and Spearman Correlation for non-parametric data was used for analysis.

Results:

We had a total of 51 TEG from 43 patients who met the inclusion criteria with a mean age of 36.15 (SD= 16.67). The commonest cause of ALF was Yellow phosphorous poisoning (43.13%) followed by viral hepatitis (A and B) (36.67%). The most common abnormality observed was reduced MA (49.01%) followed by reduced K time (45.09%) and the least common finding was prolonged R time (17.6%). Among 51 patients, prolonged PT and aPTT was found in 60.78% and 38.77% respectively. Hypocoagulable TEG was observed in 29 patients (56.86%) and hypercoagulable in only one patient. K time and α-angle were significantly correlated with mortality. Pearson coefficient for K was 0.33 (0.07 – 0.59, P=0.03) and for α-angle was -0.422 (-0.12 to -.65, P=0.007).

Conclusion:

Hypocoagulability was the predominant manifestation in ALF and most predominant changes were observed in TEG was platelet-fibrinogen interaction and clot initiation (R time) was not significantly affected unlike PT or aPTT.

OP 11

Clinical Transfusion Therapy and Patient Blood Management

Paving the Way to Patient Blood Management through Detection and Management of Red Cell Alloimmunization

Daljit Kaur, Dixa Kumari, Ashish Jain, Sarika Agarwal, Pradip Banerjee, Juhi Bhatia, Deepali Chauhan, Latika Chawla, Jaya Chaturvedi, Gita Negi

Abstract

Background: Patient Blood Management oversees the optimization of blood component utilization. Hence, a prompt alloantibody identification and transfusion of phenotype-matched red cell units to target patients can lead to prudent transfusion practices. The study aimed to analyze the specificity and prevalence of red cell alloantibodies in the patient population attending an apex medical institution in the region.

Methods: A cross-sectional, retrospective, and observational study was conducted in the Department of Transfusion Medicine at a tertiary care academic hospital in Northern India from January 2017 to December 2023 utilizing data from immunohematology laboratory records and patient requests. Data compilation was done using Microsoft 365 Excel and the quantitative data was analysed using mean and percentages.

Results: During the study period,1,73,562 blood requisitions were received and 158(0.09%) patients[38male(24.1%):120 female(75.9%)] were observed to have developed red cell alloantibodies(n=175). Of the total Rh (92) alloantibodies, anti-D alone constituted half (45/92)while anti-E was observed in 20% (18/90) followed by other specificities like anti-c, anti-D+C, anti-C, D+G, anti-e, anti-G, and anti-G+C. The clinically significant, non-Rh alloantibodies as observed were anti-M, anti-Jka, anti-Fya, anti-S, anti-Kell, anti-Fyb, anti-s, anti-Jkb and anti-Vel. Anti-Le(a), anti-Le(b), anti-Le(a)+Le(b), anti-N and anti-P1 were among other noteworthy alloantibodies that were also encountered while compatibility testing. The alloimmunized patients were managed utilizing SAGM-suspended ABO-compatible, specific antigen-negative packed red cell units, crossmatched in the antiglobulin phase. Timely provision of best phenotype matched, or partially matched red cell units led to haemoglobin increment and reduced the imminent requirement of additional red cell units.

Conclusion: The most frequent red cell alloantibodies identified were anti-D followed by anti-M and anti-E constituting 25.7%,12.6% and 10.3% respectively followed by anti-c(6.3%),anti-Jka(5.7%),anti-D+C(4%),anti-Lea(4%) and others. Establishing a red cell phenotype donor registry in the region, along with universal antibody screening for at-risk populations, would pave the way forward to Patient Blood Management.

ET 56

Hemovigilance

Hemovigilance in Pre-Transfusion Chain by Analyzing delays in start of blood transfusion & steps to reduce it

Ms.Amruta Indulkar, Dr. Abhaykumar Gupta

Title: “Hemovigilance in Pre-Transfusion Chain by Analyzing delays in start of blood transfusion & steps to reduce it”.

Background & Objectives

Transfusion of blood and blood components is a life-saving intervention. The time taken for starting blood transfusions (turnaround time) is an important quality indicator for patient safety. This study was aimed to analyze the pre-transfusion chain for delays in start of blood transfusion (>30 mins) and to assess the impact of training and education of staff members on this.

Methods

Departmental records were used to extract data for time intervals from time of request for issue received at Blood Centre up to the time when the corresponding transfusion process started. Retrospective data was collected from June to August 2023 for the pre intervention period. All delays were audited. Non compliances reviewed & quantified. Training session of duty doctors & nursing staff was started in September 2023, as an intervention to reduce the delays in start of blood transfusion. The post intervention prospective data was collected from October to December 2023. The data was analyzed using SPSS version 23.0

Results

A total of 1458 Packed Red Blood Cells (PRBCs) were transfused in pre intervention phase as compared to 1559 PRBCs transfusions in post intervention phase. Average delay in blood transfusions has decreased after intervention (3.15% vs. 1.47%, p=0.001, OR: 0.278-0.0.771). Main reasons for delayed blood transfusions were unavailability of doctor/nurse (1.10%), lack of knowledge regarding blood transfusion (0.96%), unavailability of patient (0.82%), delays in blood transport (0.28%); these parameters reduced to 0.38%, 0.44%, 0.38% and 0.26% respectively after the interventions.

Conclusion

Training and education of transfusionists actively reduces delayed blood transfusions. Regular audits and training sessions will reduce the delays in start of blood transfusion and improve patient care. Multi-center large trails are needed to further substantiate these results.

OP 80

Immunohaematology

Evaluatng the Prevalence of inhibitor development in Hemophilia Patents at a Tertary Care Hospital in Gujarat

Dr. Shivangi Vaghela, Dr. Nidhi Bhatnagar, Dr. Sangita Shah, Dr. Mamta Shah, Dr.Kamini Gupta

Background & ObjecƟves: Hemophilia is an X-linked inherited hemorrhagic diathesis characterized by a deficiency in coagulaton factor VIII in Hemophilia A (HA) or factor IX in Hemophilia B (HB). Inhibitors are polyclonal IgG alloantibodies that target hemophilia treatment products, interfering with their functon. Their persistence may lead to increased morbidity and mortality. The development of inhibitors is the most serious complicaƟon of hemophilia treatment and creates a substantal economic burden. The emergence of inhibitors against factor VIII or IX represents a significant challenge in the management of patents with Hemophilia A (HA) and Hemophilia B (HB). Comprehensive screening and testng for the development of these inhibitors are essential for implemenƟng effectve therapeutic interventions and their subsequent eradication, which can significantly enhance patents' quality of life. The objective of this study was to evaluate the prevalence of inhibitors in hemophilia patients and to analyze their associated clinical presentations.

Materials and Methods: The study involved 1,157 hemophilia patients from a terƟary care hospital in Gujarat. Screening for FVIII, FIX, and inhibitors was conducted on all paƟents from January 2016 to August 2024. All functional coagulation assays were performed using a fully automated Elite Procoagulation analyzer (Manufacturer: Instrumentation Laboratory, USA). Patients who tested positive in the inhibitor screening were subsequently evaluated with a Bethesda assay.

Results: Out of 1,157 patients, 1,044 (90.23%) had Hemophilia A (HA) and 113 (9.7%) had Hemophilia B (HB), with the highest number of paƟents aged between 1 and 30 years. The prevalence of inhibitor development was 27.58% in HA (288 paƟents developed inhibitors among 1,044) and 14.16% in HB (16 patients developed inhibitors among 113). The concentration of inhibitors >5 BU(Bethesda unit) was observed in 68.75% of HA paƟents and 50% of HB patients with inhibitors.

Conclusion: The development of inhibitors imposes significant economic and health burdens on patients with hemophilia. The severity of the disease is directly correlated with the likelihood of innhibitor development. It is essenƟal to establish or enhance exisƟng laboratories to ensure they have the capability to perform high-quality coagulation tests. This advancement is criƟcal for early diagnosis, effective treatment, and prevention of inhibitor development.

OP 81

Therapeutic Apheresis and cellular therapies

SEVERE DRESS SYNDROME WITH ACUTE LIVER FAILURE MANAGED WITH THERAPEUTIC PLASMA EXCHANGE-A CASE REPORT

Dr. Monika Verma, Dr. Nidhi Bhatnagar, Dr. Sangita Shah, Dr. Mamta Shah, Dr.Rahul Rajvanshi.

INTRODUCTION

The American Society for Apheresis(ASFA) defines the term Therapeutic Plasma Exchange as the procedure in which plasma of the paΘent is separated from other components of blood, either by membrane filtration or centrifugaΘon. The plasma is removed with subsΘtuΘon of a replacement solution.It plays a key role in management of various diseases as it can remove pathogenic substances such as autoantibodies,lipoprotein,immune complexes and toxins in plasma. Drug reaction with eosinophilia and systemic symptoms (DRESS)Syndrome is a rare but increasingly described phenomenon of immune acΘvaΘon and organ dysfuncΘon with a wide variety of medications. Presenting a pediatric case of DRESS Syndrome associated with phenytoin,leading to multiorgan involvement and life-threatening complications of respiratory failure and cardiac arrest. AÕer failing to improve with removal of these medicaΘons and administration of systemic corΘcosteroids, patient showed dramaΘc,sustained clinical response to therapeutic plasma exchange. DRESS syndrome comes under category of 3 of AFSA guidelines.

CASE DESCRIPTION

A 11 year old Dress Syndrome with Acute Liver Failure male paΘent presented with complaint of fever,papular rash on face,abdomen and neck,loose stool and vomiΘng from 20 days and diagnosis of Dress syndrome with Acute Liver Failure. He took anΘ- convulsant drug phenytoin 20 days back after which he developed above clinical features. Systemic steroid were started but showed not much improvement, paΘent was intubated and showed signs of mulΘorgan dysfuncΘon and his condition was worsening aÕer which paediatrician elected to proceed with plasmapheresis. Three cycles of Therapeutic Plasma Exchange was done alternate days. There was marked improvement in patient's general condition, hemolytic parameters and systemic inflammation after each cycle of Therapeutic Plasma Exchange.

CONCLUSION

Systemic steroids are the cornerstone treatment of DRESS syndrome but the outcome supports that Therapeutic Plasma Exchange can effectively reduce mortality and morbidity in patients with DRESS Syndrome that are resistant to steroids. Therapeutic Plasma Exchange reduce systemic cytokines which likely contribute to the pathogenesis of DRESS.

OP 47

Immunohematology

Utility of transfusing best-matched versus antigen-matched best-matched red cell unit in allo-immunized patients of severe auto-immune hemolytic anemia

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BACKGROUND & OBJECTIVES: Multiply transfused patients with auto-immune hemolytic anemia(AIHA) are at risk of allo-immunization. Due to absence of advanced immuno-hematological facility at many places, AIHA patients are transfused 'least-incompatible' or 'best-match' unit without detection of underlying allo-antibody. This study aims to analyze the utility of providing best-matched antigen-negative blood to allo-immunized patients of AIHA over best-matched blood.

METHODOLOGY: Allogenic-adsorption study was performed on AIHA patients having history of transfusion/pregnancy. Patient blood-reports and transfusion details were obtained from Hospital Information system. Inter-transfusion interval(ITI) was calculated from the time of issue between the two red blood cell components. Post-transfusion hemoglobin increment(PTHI) was calculated by subtracting hemoglobin value obtained within 6-24 hours after transfusion to pre-transfusion hemoglobin. If more than one PRBC was transfused, the increment was divided by the same value to obtain increment/unit. AIHA patients were divided in three groups based on presence/absence of underlying allo-antibodies and transfusion of 'best-match' vs 'best-match antigen-negative' PRBC units:

Group I –Non-Antigen matched, best matched blood transfused before antibody identification

Group II –Antigen-negative best-matched blood transfused after antibody identification

Group III –Best-matched blood transfused and no alloantibody present

RESULT: Allo-adsorption was performed in 138 patients of which red cell allo-antibodies were present in 74 patients (53.6% frequency) with 42 patients having single allo-antibody and rest with multiple allo-antibodies. The ITI was shorter in groupI compared to groupII and groupIII[(Mean±S.D.); 2.1±1.1 days vs 4±1.8 days vs 3.6±1.5 days respectively]. PTHI was higher groupII and groupIII compared to groupI[(Mean±S.D.);0.94±0.29g/dl vs 0.86±0.27g/dl vs 0.67±0.29g/dl respectively].

CONCLUSION: There is dearth of literature regarding transfusion efficacy of antigen-negative PRBC unit for allo-immunized AIHA patients. Transfusing antigen-negative units will not only prolong survival of transfused red-cells but also prevent further allo-immunization and simplified pre-transfusion testing in later visits. Since detailed IH-workup is time-consuming, effective communication of clinical team with transfusion specialist is necessary and transfusion-decision should be based on urgency of clinical condition.

OP 79

Therapeutic Apheresis and cellular therapies

IMPROVED OUTCOME WITH EARLY INITIATION OF THERAPEUTIC PLASMA EXCHANGE FOLLOWING RED CELL EXCHANGE IN SICKLE CELL CRISIS - A CASE REPORT

MIHIR BALU GHUGRETKAR. Dr. Nidhi Bhatnagar, Dr. Sangita Shah, Dr. Mamta Shah, Dr.Kamini Gupta

INTRODUCTION: Sickle Cell Disease (SCD) is a chronic condition caused by abnormal hemoglobin (HbS), leading to rigid, fragile red blood cells prone to vaso-occlusion and hemolysis. This triggers life-threatening complications, including stroke, acute chest syndrome, priapism, and organ dysfunction. According to ASFA guidelines in cases of sickle cell crisis with Acute chest syndrome RBC exchange is a category II grade IC indication. However, despite RBC exchange, patients remain at risk of developing multiple organ dysfunction syndrome (MODS), highlighting the need for further research on adjunctive therapies like Therapeutic Plasma Exchange (TPE). AIM: To describe the role of early initiation of TPE for the management of multi organ dysfunction associated with severe sickle cell crisis in a young male in conjunction with Automated Red cell exchange.

CASE DESCRIPTION

A 15-year-old male patient presented with complains of respiratory distress and a history of fever and progressive jaundice for over 6 days. Patients reports revealed high levels of bilirubin and sickling test was positive, deranged liver and renal function tests with hyperbilirubinemia and positive DAT. Chest X ray findings suggested presence of ARDS. HPLC revealed Compound Heterozygous state for Sickle Cell and Beta Thalassemia with HbS% to be 78.1% and patient was considered for automated red cell exchange. The procedure was completed within 6 hours of admission with decrease in HbS% to 23.3%. Following Red Cell Exchange, TPE was initiated in hopes of improving oxygenation, decreasing hyperbilirubinemia and reversing multiorgan dysfunction. First cycle of TPE was initiated within 8 hours after RBC exchange and subsequently 5 more cycles of TPE were performed. His oxygenation saturation improved, and his oxygen support was weaned off after first 2 sessions with improvement in liver function tests with subsequent cycles of TPE. Patient was discharged on day 12 of admission in stable condition.

CONCLUSION: In Sickle Cell Crisis with ACS associated with MODS, Therapeutic Red Blood Cell exchange with adjunctive Therapeutic Plasma Exchange (TPE) enhances outcomes by reducing mortality and morbidity. TPE removes inflammatory cytokines, free haemoglobin, and bilirubin, restoring essential proteins. Therefore, TPE should be initiated as early as possible to improve clinical outcomes and reduce hospital stay

OP 58

Quality Management

Trend analysis of blood centre Quality indicators at a blood centre in a Quaternary care hospital in south India.

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Introduction

Quality indicators (QIs) are key performance measures to monitor the process flow in various sections of transfusion services from blood collection to blood issue to bedside for a defined period. They can be process-based or outcome based. Monitoring of such indicators should be done regularly and deficiencies are to be corrected for effective blood transfusion services as a part of continuous quality improvement program.

Aims and Objectives

To study the trends in Quality Indicators (QI) in a blood centre in a Quaternary care hospital in south India.

Materials & methods:

In this retrospective study from 2019 to 2024,study period is divided into two phases (May 2019 to Dec 2021 and Jan 2022 to Aug 2024) of 2.5 years each. All the 11 NABH blood centre mandatory indicators were captured on monthly basis. The analysis was expanded by subdividing wastage and Transfusion Transmissible Infection (TTI) QIs, along with evaluating delayed transfusions. All the results were tabulated in Microsoft excel and means analyzed with SPSS software. Independent sample T test was used to find the significant difference in means of more than two independent groups ($p<0.05$ significant). The mean of two phases were compared and trends analyzed for shifts and root cause analysis (RCA) was done and Corrective action and preventive action (CAPA) taken.

Results:

The comparative analysis of QI of the two halves of the study period showed a significant increase of TTI% from 1.27% to 1.51% along with Adverse Transfusion Reaction. Turn around time (TAT) of blood issues was documented initially as overall blood requests with an average of 39.9 minutes in phase 1. In phase 2, TAT was subdivided into three categories. Wastage rate (Red cells), donor reaction rate(ADR), quantity not sufficient(QNS) ,deferred donor rate and delayed transfusions were significantly improved in phase 2 with a p value of <0.05.

Conclusion:

The QIs that showed improvement with targeted interventions implemented during this period which reflect the progress towards achieving the desired quality outcomes and underscore the importance of continuing such initiatives. Each BTS should conduct trend analysis to assess QMS performance and identify areas for continuous improvement.

ET 5

Quality Management

Quality Indicators for Blood Utilization in a Tertiary Care Center of South Gujarat

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Background & Objectives

Blood and blood component is vital part of any blood transfusion services.

Over ordering of blood components to treat patients increases load on health care and cost. Blood component should be used appropriately to maintain inventory as well as patient benefits. In our country, voluntary blood donation is less to fulfill the blood requirement. So continuous monitoring of blood utilization is needed to strengthen blood transfusion services. The objective of the study was to analyze the trend of blood utilization by various medical and surgical specialties by determining the blood utilization quality indicators at our center.

Methods: A one year retrospective and cross-sectional study was carried out in the Blood centre (Department of Immuno Hematology & Blood Transfusion), Government Medical College & New Civil Hospital; Surat-Gujarat. Duration of Study was from January 2023 to December 2023. The department wise utilization of blood and its components C:T ratio, Transfusion Probability and Transfusion Index were calculated.

Results: During one year study, total 10,180 patients required blood transfusion. Out of this only 6584 patient were transfused. Total number of units cross matched was 21345. Out of this, 15923 blood units were transfused. Orthopedic department have highest CT ratio (2.25) among other department. Department of Pulmonary Medicine has a highest TP ratio (84.15). TI (2.10) was highest in Department of medicine. In present study, the overall C:T ratio was 1.34. The T% and TI values obtained were 64.68% and 1.56 respectively.

Conclusion:

Blood utilization indicators are very important tool for efficient utilization of blood. In Present study all indicators value were comparable with standard value. The CT ratio, transfusion probability and transfusion index demonstrated that there is significant blood utilization at our hospital. Regular audit of blood transfusion service should be done to asses adequacy blood unit uses.

OP 16

Quality Management

Quality Control Evaluation of Chemiluminescence Testing for Transfusion-Transmitted Infections: A Westgard Rules-Based Review

Dr Meethu Muraleedharan, Dr.Debasish Gupta, Dr.Amita R,Dr.Vinu Rajendran

INTRODUCTION

Valid laboratory results hinge on the accuracy and precision of testing methods. All tests conducted in the blood center should be validated to prevent medicolegal consequences. (1). Implementation of IQC and EQC is a step in this direction. In this study, Internal Quality Control of Chemiluminescence assay was analyzed using Westgard Rules.

Aim: To evaluate the frequency and patterns of Westgard rule violations on the Levey Jennings chart of chemiluminescence assay for TTI testing during a 6-month retrospective analysis and review the rectifications.

METHODOLOGIES

Study Setting: A tertiary care blood center in Kerala

Study period: January 2024 to June 2024 (6 Months)

Methodology: During the beginning of January 2024 a true positive sample for HIV,Hepatitis B and HCV was identified and serially diluted to prepare inhouse IQC (IIQC) as per our SOP. LJ chart was plotted with Y axis as mean and decision limits (SD) and X axis as runs. Before each test run, the control sample was run to assess the acceptability of the run. The resultant E ratios were plotted on a daily basis on the LJ Chart for next six months. The Westgard rule was applied time to time to analyze any deviation.

RESULTS

In HIV run we encountered 6 warnings and 4 rejections.

In HCV run we noticed 6 warning and 9 rejections

In HbSAg run we noticed 10 warnings and 43 rejections.

The final rejections were based on the SOP which is being followed in our centre.

The rectifications done was reviewed and reasons for deviations analysed in detail in this study.

CONCLUSION

Rather than following the IQC by the manufacturer, as a step to improve quality of our centre it is a good practice to use inhouse prepared IQC along with regular quality analysis and timely CAPA in case of any deviation

OP 55

Recent Advances (including molecular tests)

The predominance of the RHD*01W.150 (weak D type 150) in the Indian population: mutational hotspot or a potential founder mutation?

Dr. Disha Sadashiv Parchure, Dr. Swati Kulkarni and Dr. Manisha Madkaikar

Background and Objectives: Founder mutations are pathogenic variants that present themselves very often in high frequency in geographically or culturally isolated groups whose shared ancestor(s) carried the pathogenic variant. Mutation hotspots on the other hand are segments of DNA that are especially prone to genetic alteration leading to recurrent mutations. The RHD*01W.150 allele (weak D type 150) identified for the first time in the Indian population in 2018 (58% cases) has been shown to be the most common cause of D variants in India.

Methods: To evaluate whether the RHD*01W.150 allele has a common origin (founder), haplotype analysis was carried out. A haplotype refers to a set of DNA variants (SNPs) along a single chromosome that are inherited together. Haplotyping involves genotyping of flanking regions in cases and controls. A total of 20 D variant RHD*01W.150 allele positive cases were compared with ethnically matched control samples (unrelated healthy individuals without the RHD*01W.150). Next Generation Sequencing was used for genotyping a 2 Mb region flanking (upstream and downstream) the allele.

Results: On comparison of the case and control samples, all the cases presented a unique haplotype flanking the RHD*01W.150 allele. The said haplotype was found to be missing in the control samples. Since, the mutation is found within a conserved haplotype it displays the founder effect.

Conclusion: This data suggests that the RHD*01W.150 appears to have an Indian ancestry. Hence, RHD*01W.150 allele should be screened in all phenotypically D variant Indian individuals (including those residing overseas). Barring a few studies, founder effects have not been well studied in blood groups. Such studies lead to a better understanding of the population migration and geographical events that could have taken place leading to the high frequency of a particular alteration. Population based blood group genotyping can benefit from such studies.

OP 72

Recent Advances (including molecular tests)

Recognizing Donor Emotions: A prospective tool to develop donor retention strategy?

Dr Rut Hasmukhbhai Naik, Dr Vilasini Patil, Dr Romesh Jain, Dr Pratul Sinha

Background & Objectives:

Despite of common belief about 'feeling good' or 'feeling bad' after donation affects donor retention, we do not know how different spectrum of emotions are related to willingness of blood donors to return back again. Aim of the study is to recognize specific emotions which can be used as tools for targeting donor retention.

Methods:

Using the Positive and Negative Affect Schedule (PANAS scale), 20 emotions were assessed at different stages of the donation process.

This observational time series study was conducted on first time whole blood donors over the period of 1 year in the blood centre of All India Institute of Medical Sciences. Fit donors were asked to mark PANAS scale in the waiting area. Repeat PANAS scale was applied during phlebotomy and third time in the refreshment area. Before leaving the blood centre, all donors were asked question about their 'willingness' for return in the feedback form. The data was analysed using SPSS and R software and nonparametric tests were used to compare emotions of two groups of donors (with willing and not willing to donate) at different time points.

Results:

Out of 360 donors,who successfully completed feedbackform, 83.3% showed willingness to return(n=300,CI=79.0%-87.0%). Friedman tests were performed to explore the statistical significance (at 95% confidence interval) for the changes in emotions from the waiting area to the various follow-up timepoints. Wilcoxon-Mann-Whitney Test was used to compare the two groups in terms of emotions at each of the timepoints.

Donors who were willing to return back for donation, felt significantly higher guilt,higher shame in waiting area (p=0.046, 0.040 respectively) and felt higher nervousness during donation in comparision to donors who are not willing to return back(p=0.026)

Conclusion:

Current strategies mainly focus on education and information about blood donation.

Instead, strategies for donor retention may be targeted to induce feelings of shame and guilt about not returning in donors after certain interval through different modes of communication.

ET 8

Recent Advances (including molecular tests)

Characterization of blood cell derived microparticles using dynamic light scattering

Dr Amita Radhakrishnan Nair, Dr Priyanka SH, Dr Anugya Bhatt, Dr Manju S

Introduction:

Blood cell derived microparticles (MPs) are small phospholipid vesicles or ectosomes, which are formed during the physiological senescence or pathologically on exposure to oxidative stress, complement, cytokines or high shear stress.

In vivo, the MPs are rapidly removed by the Kupffer cells, but during storage, MPs accumulate.

Rationale: MP content of stored blood units varies depending upon donor characteristics and processing methods. We have tried to assess the feasibility of using dynamic laser light scattering (DLS) method as a quick and economical method for detection and characterization of MPs in resource limited settings. Quantification of MP can be used as quality parameter, and this will help in restricting transfusion of blood units with high MP count to patients with thrombotic and pulmonary co-morbidities.

Objectives:

1. Use DLS to characterize the size distributions of MPs.

2. Confirm the findings of DLS with gold standard method of flow cytometric determination of cell of origin of MPs.

Methods: 100-1000 nm spherical polystyrene latex MPs suspended in saline were exposed to 520 nm laser light. Signals were captured and processed as to frequency and amplitude. Calibration curves were used to size and quantify the MPs. The findings of DLS were further confirmed with flowcytometry.

Results:

RMPs had a size range above 200 nm and PMPs below 200nm (at expiry). t-test revealed a significant difference between RMP and PMP average size ($t = -3.15$, $p = 0.002$).. Average size of RMPs was 361.33 nm with PRP and 281.4 nm in Buffy coat method. Flow-cytometric analysis using antibody to CD 235 and CD 61 showed, higher percentage positivity of RMPs in PRP method, as compared to Buffy coat method and Apheresis collection.

Discussion: DLS offers an inexpensive method to characterize the MP content of stored blood. The main advantage of DLS over alternative methods such as flow cytometry is the ease of sample preparation, direct measurements, and doesn't require expensive antibodies and fluorescent markers.

Future work: DLS based MP characterization and study of adverse transfusion events in the recipient.

ET 3

Therapeutic Apheresis and cellular therapies

Effect of Low MCV in Red Blood Cells on Stem Cell Apheresis Outcomes

Anju Radhakrishna Kurup, Mohandoss Murugesan, Chandran K Nair, Sangeetha K Nayanar

Background & Objectives:

Red cell abnormalities could represent additional factor responsible for unexpectedly poor CD34+ cell harvests despite successful mobilization for stem cell apheresis by interfering with the separation of cell layers during apheresis. The main objective is to evaluate the impact of low mean corpuscular volume (MCV) of red blood cells (RBCs) on the outcomes of stem cell apheresis

Methods:

Only first stem cell apheresis procedures for autologous recipients and allogenic donors were included. Subjects receiving Plerixafor were excluded. The collections were categorized into subjects with normocytic RBCs (MCV ≥ 80 fL) and microcytic RBCs (MCV < 80 fL) for outcomes of stem cell harvest. Parameters such as Collection Efficiency (CE %), CD 34 Yield (x10^6), Fold Enrichment (FE), Captured Cells, Performance Ratio (PR) were compared using Mann Whitney U test between them.

Results:

A total of 114 procedures, 69 autologous and 45 allogenic were included. Seventeen (14.9%) subjects had microcytic RBC. Median CE% of all included procedure was 43.5%. In microcytic RBC, 65% (11/17), while in normocytic RBC, 47% (45/96) had CE<43.5%. Significant differences were observed between microcytic and normocytic RBC groups in terms of CE% (36.8 vs. 44.5; p=0.03), CD34 yield (259 vs. 357 x 10^6; p=0.02), FE (13.1 vs. 19.7; p<0.01), captured cells (96.4 vs. 116.7; p=0.03), and PR (88.2 vs. 106.3; p=0.03). When stratifying subjects based on preapheresis CD34 count, significance in efficiency noted only in those with CD34+ count > 50 cells/microL. Similarly, impact of MCV was observed in CD34 Yield & FE (p<0.01) only in allogenic setting not in autologous.

Conclusion:

Subjects with microcytic RBC experienced reduced efficiency during stem cell apheresis, with this effect being particularly significant when preapheresis CD34+ count >50cells/microL and in allogenic collections. Therefore, low MCV should also be considered when evaluating apheresis harvests to optimize collection.

ET 50

Therapeutic Apheresis and cellular therapies

ESTIMATION OF FETOMATERNAL HEMORRHAGE USING FLOW CYTOMETRY IN ANTE NATAL CARE PATIENTS AT A TERTIARY CARE HOSPITAL IN WESTERN MAHARASHTRA

Dr Ujjwal Dimri, Dr Rajat Jagani, Dr Ajay Baranwal, Dr Anurag Gairola, Dr Amit Kumar Biswas, Dr Amit Ajay Pawar, Dr Sudeep Kumar

Background and objectives

Fetomaternal hemorrhage (FMH), where fetal red blood cells enter maternal circulation, can cause fetal anemia, fetal hydrops, intrauterine growth restriction (IUGR) and even unexplained mortality. Accurate detection & quantification of fetal RBCs in the maternal blood is critical to managing FMH. Traditional tests like Rosette and Kleihauer-Betke lack accuracy. Flow-cytometry (FCM) provides enhanced sensitivity and reproducibility but is costlier and requires specialized skills. This study estimated FMH using FCM in antenatal patients, focusing on the Indian population.

Method

This single-Centre, prospective observational study was conducted over two years at a tertiary care hospital, including 100 consenting antenatal patients that underwent caesarean/vaginal delivery in our institution. Maternal venous blood samples were analyzed for maternal hemoglobin, ABO and Rh grouping, indirect Coombs test and by dual-colour flow cytometry to quantify fetal red blood cells. FMH volume was calculated and further segregated into with severe (fetal blood loss exceeding 30 ml) and non-severe FMH cases. ABO & Rh grouping and direct Coombs test was done on new born cord blood samples.

Results

Among the 100 antenatal patients, 54% were primigravida with a mean age of 25.68 years. Severe FMH (>30 ml) was detected in 40% of participants using FCM. Most mothers (94%) and newborns (97%) were RhD positive, with no active alloimmunization cases. Statistical analysis showed no significant links between FMH and maternal age, blood group, parity, delivery type, hemoglobin levels, gestational age, or newborn gender, except for Rh factor status, which was significant ($p = 0.032$). FCM's accuracy highlights its importance for managing FMH complications.

Conclusion

This study brings out that severe FMH is a considerable problem in Indian antenatal patients. Given FCM's accuracy, it should be implemented in major hospitals and transfusion centres. Batch testing and timely blood collection can reduce costs and integrate FCM into routine practice.

OP 15

Therapeutic Apheresis and cellular therapies

Therapeutic Plasma Exchange in Acute Liver Failure: Unraveling its Efficacy and Clinical Impact

Dr. Sonal Sonu, Dr. Rajesh Kumar, Dr. Gulinder Singh, Dr. Aamanpreet Kaur

Background: Acute liver failure (ALF) presents a significant medical challenge due to its rapid onset, progression, and high mortality rates, often necessitating liver transplantation. Therapeutic plasma exchange (TPE) has emerged as a potential intervention to modulate the underlying pathophysiological mechanisms of ALF and to reduce the need for immediate transplantation.

Methods: This retrospective monocentric study was conducted at a tertiary referral hospital from June 2023 to March 2024 to assess TPE's efficacy in patients with ALF. Clinical parameters, including biochemical markers, coagulation status, and Model for End-Stage Liver Disease (MELD) scores, were analyzed pre- and post-TPE. Additionally, hospitalization duration and adverse events associated with TPE were documented.

Results: In 25 patients (mean age 21.48 years, 84% males), 48% presented with hepatic encephalopathy grades II/III. Patients underwent a mean of 3.1 TPE sessions, exchanging 3.2 ± 0.8 liters of plasma using 10-12 units of FFP per session. Ammonia levels significantly decreased from 92.45 to 45.62 µmol/L ($p=0.002$). Total bilirubin reduced from 27.48 to 14.64 mg/dl ($p=0.001$), direct bilirubin ($p<0.001$), indirect bilirubin ($p=0.008$), AST ($p<0.001$), and ALT ($p<0.001$) also declined. INR improved from 2.62 to 1.47 ($p<0.001$). Platelets dropped slightly ($p=0.063$). MELD scores decreased significantly in discharged patients ($p=0.001$), while non-survivors showed no significant change ($p=0.080$). Hospital stay was shortest in mortality cases (8.86 days), and longest in discharged patients (56.00 days) ($p<0.001$). Adverse events included hypocalcemia (20%), itching (15%), and urticaria (14%), with no severe complications.

Conclusion: TPE demonstrates promising efficacy in stabilizing patients with ALF, improving biochemical markers, and potentially mitigating the urgency for immediate transplantation. Despite challenges such as donor scarcity and adverse events, TPE's safety profile remains favorable, suggesting its potential as a valuable adjunct in ALF management. Further research and clinical scrutiny are warranted to fully ascertain the role of TPE in optimizing patient outcomes in ALF.

Keywords: Acute liver failure, Therapeutic plasma exchange, Model for End-Stage Liver Disease (MELD) scores.

OP 39

Therapeutic Apheresis and cellular therapies

Are we using the right machine? A comparative analysis of Collection Efficiency of Peripheral Stem-cell Harvest in Different Cell Separators.

Dr. Surangama Singh, Dr. Shashank Ojha, Dr. Suryatapa Saha, Mr. Kalpesh Chawan

Background & Objectives:

Collection efficiency (CE) can be retrospectively calculated to aid in better prediction of the cell separators for adequate collection of CD34+ cells.

The study aims to assess the efficiency of CD34+ cell collection in autologous and allogeneic harvest setting using different cell separator machines and evaluate how vascular access type and blood volume processed affects collection efficacy. It will help to reduce the number of PBSC harvest sessions required by the patient, thereby helping in treatment cost reduction.

Methods: All Peripheral blood stem cell harvest(PBSC) was performed on three systems, namely, AMICUS(n=58), Fresenius COMTEC(n=113) and COBE SPECTRA(n=78).Procedural parameters like Total blood volume processed, type of venous access, product volume, ACD used were analysed. Total Nucleated Cells(TNC)count, Mononuclear cell count(MNC) and CD34 cell enumeration was done by flow cytometry to calculate Product yield and CE. The chi-square test and Mann-Whitney test were used for statistical analysis. p value<0.05 was considered significant.

Results: Amongst allogeneic versus autologous PBSC procedures, product yield was significantly higher in allogeneic procedures. Overall mean CE of PBSC harvest by COMTEC(47.7%) was significantly higher than COBE-Spectra(47.43%) and Amicus(44.9%) ($p<0.001$). The mean CE of COMTEC(51.7%) was also significantly higher in autologous collections compared to COBE-Spectra(50.1%) and Amicus(46.8%). However, mean CE in allogeneic collections was higher for COBE-Spectra(43.7%) compared to COMTEC(37.6%) and Amicus(37.7%). In COBE-Spectra, significantly more blood volume was processed to get the target yield thereby resulting in significantly higher product volume $p=0.02$. The mean CE of procedures using central venous catheter(CVC) access was comparable to peripheral venous access(PVA).

Conclusion: The overall CE was better with COMTEC followed by COBE-Spectra and Amicus, in autologous setting. In contrast, CE was highest with COBE Spectra followed by COMTEC and Amicus in allogeneic setting. The collection efficacy of procedures conducted by CVC and PVA was comparable.

OP 69

Therapeutic Apheresis and cellular therapies

Desensitisation in ABO-Incompatible Living Donor Liver Transplantation: A Single-Center Retrospective Study

Dr Himani Aneja, Dr Rashmi Jain, Dr Mohit Chowdhry, Dr Varun Madaan, Dr V. Arun, Dr Neerav Goyal

Background & Objectives: The timely initiation of a desensitisation protocol incorporating serial therapeutic plasma exchanges (TPE) with or without a secondary plasma device (SPD) have significantly improved the outcomes in patients requiring ABO-incompatible living donor liver transplant (ABOi LDLT) for end-stage liver disease. In the present study, we aim to report our experience with 52 consecutive patients who underwent ABOi LDLT from January 2017- June 2024 following the institutional desensitisation protocol.

Methods: The institutional ABOi LDLT protocol involved rituximab administration (300 mg/m2 body surface area) with subsequent serial plasma exchanges to target IgG antibody titre at <1:8. The double volume plasma exchange was done to reduce antibody levels in patient's plasma, replacement fluid used was in the ratio 50:50 albumin and plasma. Crossmatched, AB group or donor-compatible plasma was used as choice of fluid. The hospital archives were analysed for the procedure details, patient's pre-operative, intraoperative and post-operative details. The compiled data was analysed using IBM SPSS v29.0.

Results: The most common indication for liver transplant was extrahepatic biliary atresia (15 patients, 28.8%) followed by cryptogenic CLD (14 patients, 26.9%). The mean age was 29.5 years (Median 39.0, range 0.66- 61 years). The median baseline anti-ABO IgG antibody titre was 72 (range, 1 to 512). Desensitisation using TPE was done in 26 cases (50%), which included 20 cases of major incompatibility in solid organ transplants (O Recipient with A or B group donor) while 6 were bidirectional (A to B, or B to A). Plasma exchange using SPD was employed in 4 cases (7.7%) to decrease specific ABO antibody titres. In 13 cases, intraoperative plasma exchange was done to decrease perioperative antibody titres intending to prevent hyperacute graft rejection. Only 2 patients (3.8%) had antibody-mediated rejection during the admission period. Splenectomy was done in 22 cases (42.3%).

Conclusion: For patients undergoing ABOi LDLT, the desensitisation protocol including plasma exchange with or without SPD, is the key intervention enabling successful ABOi liver transplant with reduced risk of antibody-mediated rejection.

ET 20

Therapeutic Apheresis and cellular therapies

Granulocytapheresis – A good hope for immunocompromised patients

Krupali Vaidya, Dr.Ripal J. Shah, Dr.Rajvi Vora, Dr.Tejal Chhabria

Prathama Blood Centre, Ahmedabad

Background

Granulocytapheresis is an emerging therapeutic procedure designed to selectively collect neutrophils from the bloodstream. This technique presents a potential solution for managing severe infections and inflammatory conditions, particularly in immunocompromised patients when conventional treatments are ineffective. This review summarizes recent cases and outcomes from the Prathama Blood Centre over six months.

Methods

A comprehensive analysis was conducted on granulocytapheresis procedures performed between January to July 2024.The data collected encompassed patient demographics, indications for procedure, clinical outcomes, and procedural specifics. Key metrics included donor selection, mobilization, and whole blood processing volume, product volume, and yield. Clinical outcomes were evaluated through response rates, adverse events, and patient improvement to assess the procedure's efficacy and safety.

Results

During the review period, 29 granulocyte apheresis procedures were performed for 8 patients (5 males & 3 Females). The average donor age was 32.5 years, and the patient's average age was 26 years. The average donor weight was 78.5 kg. The total WBC count of 7555/ µL was recorded before mobilization, with56% of neutrophils and after mobilization, the same was 32000 per µL with 87% of neutrophils. On average, 9.5 L of whole blood was processed and the product volume collected was 432 ml. Sedimentation agent was not used in any of the procedure. The final product yield was 2.1×10^{10} per bag on an average. Most procedures were performed for patients with severe infections resistant to conventional therapy. The procedure demonstrated a high success rate, with almost 90% of patients showing significant clinical improvement or resolution of symptoms. Adverse events were not observed in any of the procedure.

Conclusion

Granulocytapheresis has demonstrated efficiency as a secondary treatment, providing significant therapeutic benefits and a favorable safety profile for immunocompromised patients dealing with complex challenges. Its potential role in specialized patient care is promising.

Keywords

Granulocytapheresis, therapeutic apheresis, clinical outcomes

OP 31

Therapeutic Apheresis and cellular therapies

DEVELOPING COMPREHENSIVE SUPPORT FOR PERIPHERAL STEM CELL COLLECTION IN ALLOGENEIC PEDIATRIC DONORS: AN INDIAN EXPERIENCE

Dr Rizwan Javed, Jeevan Kumar,Arijit Nag, Debranjani Chattaopadhyaya, dibakar podder, shouriyo ghosh, deepak mishra, reena nair, mammen chandy

Purpose

Peripheral blood is steadily becoming a preferred source of hematopoietic stem cells in allogeneic transplants because the collection is less invasive, easily accessible and has a short engraftment period. However, due to lack of resources and absence of standardized protocols, pediatric donor care practices in low/ medium income countries are highly variable

Aim: To develop a multi-disciplinary support to ensure safe peripheral stem cell collection (PBSC) in allogeneic pediatric donors as per International (FACT-JACIE) standards.

Methods: A multi-disciplinary team (see Table-1) was established within the available resources. Baseline audits of personnel training records, facilities and critical processes were performed to assess preparedness of the collection unit. Subsequently, periodic review meetings were held to improve coordination, discuss challenges and optimize strategies to implement the protocols and improve care. Audit of all pediatric PBSC donations from 1st January'2020 to 31st December'2023. All donors eligible for PBSC collections underwent medical examination, investigations, mobilization and PBSC collection after guardian consent and/or donor assent as per the Institutional protocol. Based on FACT-JACIE standards, all records pertaining to allogeneic donor screening, testing and eligibility determination were reviewed.

Results Twenty eight allogeneic donors underwent PBSC collections in four years (see table-2). Assent was recorded in 71.4% (20/28) donors. Donor compatible, irradiated blood was required in 28.5% (8/28) for priming of the apheresis system. The target CD34+ cell dose achieved in 92.8% (26/28). Mild procedure-related adverse reaction (Grade 1 & 2) was observed in 2 cases and none of the products were microbiological culture positive.

Conclusions

A multi-disciplinary initiative consolidates diverse expertise, strengthens capacity and fosters shared commitment towards implementation of protocols to ensure safety of allogeneic pediatric donors during peripheral stem cell collection (PBSC) in resource constraint setting. We are among the first in the country to have successfully standardized the Apheresis program as per International (FACT-JACIE) standards.

Table-2

Median Age (Range) 9.5 (2-16) years

HLA Matching 19 full matched and 8 partially matched donors

Access of Inlet blood flow Femoral line= 20 , Jugular line=1 , Peripheral veins= 6 , Arterial line= 1

Median procedure duration (Range) 4.4 (1.5-6.9) hours

Requirement of sedation during line insertion 50% (14/28)

Procedure-related Adverse reaction rate

No. of donors having adverse reactions (Grade I & II)

Total no. of donors undergoing apheresis

7.1%

(2/28)

Target CD34 + cells yield achieved

No. of HPC products (CD34+ >3million/kg in allogeneic collections)

Total no. of donors underwent PBSC collection

92.8 %

(26/28)

Microbiological Culture positive rate

No. of Microbiological Culture positive HPC products

Total no. of HPC products prepared

0%

Mean Collection Efficiency of Equipment

(measured in 7 procedures) Efficiency = Total CD34+ cells obtained from apheresis peripheral CD34+ cells/µL x apheresis volume processed (µL) 49.3 %

ET 73

Therapeutic Apheresis and cellular therapies

Hematological Changes in Allogenic Stem Cell Donors Following G-CSF Mobilization.

Yadhu P Mukundan, Alan Tom Varghese ,Biji George, Sabitha K. B, Sheejamol VS,Linda John, Veena Shenoy,Neeraj Sidharthan.

Background:

Recombinant Granulocyte colony stimulating factor is utilized to mobilize hematopoietic stem cells in allogeneic donors. According to Pulsipher et al.2009, white blood cell counts increase markedly following G-CSF administration. While it is noted that G-CSF may decrease platelet counts and hemoglobin levels1, there is a lack of comprehensive data on changes in hematological parameters among Indian stem cell donors after G-CSF mobilization.

Aims:

To study the changes in hematological parameters in allogenic stem cell donors undergoing mobilization using G-CSF.

Methods:

Hematological parameters of allogeneic hematopoietic stem cell donors were retrospectively analysed. Donors received G-CSF at a dosage of 10 micrograms/kg/day subcutaneously for five days (Days 1-5). Peripheral blood stem cells were collected on Day 5 via leukapheresis. Parameters such as platelet count, WBC count, neutrophil percentage, hemoglobin, and hematocrit were measured before the administration of G-CSF (Day 0), and on Days 3 and 5 prior to apheresis.

Results:

A total of 263 stem cell donors were studied, with males constituting 77.2% (n=203) and females 22.8% (n=60). Mean age was 30.33 ± 10.65 years. Mean Body Mass Index was 23.79 ±3.9 Kg/m2. The WBC count on Day 3 was significantly higher than the baseline WBC count ($p<0.001$). WBC count on Day 5 was significantly higher than both Day 3 and Day 0 ($p<0.001$). The neutrophil percentage was significantly elevated on Days 3 and 5 compared to baseline ($p<0.001$), with significant difference observed between neutrophil percentages on Days 3 and 5.

The mean baseline lymphocyte percentage decreased from 33.8 ± 7.50 % to 10.98 ± 3.94% on Day 5. Platelet counts fell from 274.58 ± 58.82 × 10^9/L on Day 0 to 245.37±59.77 on Day 3 and 224.67±56.12 on Day 5. There was a significant difference in platelet counts between baseline and on Days 3 and 5 ($p<0.001$).

Mean hemoglobin levels on Days 0, 3, and 5 were 14.65 ± 1.55, 14.19 ± 1.65, and 14.34 ± 1.61, respectively. There was significant difference between pre-mobilization haemoglobin and hematocrit levels and those measured on Day 3 and 5.

Conclusion:

During stem cell mobilization, platelet counts decrease while WBC counts increase. Understanding these variations is essential for effectively counselling donors about the short-term effects of G-CSF on their health.

ET 84

Transfusion Transmitted Diseases (including NAT)

KODECYTE BASED SYPHILITIC ASSAY IN BLOOD DONORS

Dr. Naveen Reddy. A, Dr. B. Abhishekh, Dr. Aparna Krishna

BACKGROUND & OBJECTIVES:

In the post-COVID era, there is a resurgence in the incidence of Syphilis among Blood Donors. Multiple false positive results in non-treponemal tests like RPR is being noted. Kodecyte technology offers a novel approach to syphilis antibody screening. Kodecytes, are living cells that have been altered (koded) to acquire a new or unique biological, chemical, or technical function by inserting one or more function-spacer-lipid (FSL) constructs. In this study, we compared the agreement between Non-Treponemal RPR testing with the Kodecyte syphilitic test.

METHODS:

The study was done between August 2024 and September 2024. Syphilitic Kodecytes were prepared by koding 'O' group RBCs with Treponema pallidum Lipoprotein (TmpA1) FSL construct, given from Tata Memorial Centre, Kolkata. Donor samples were initially screened by Rapid Plasma Reagin test (Arkray RPR Test Kit) and then tested with kodecytes (2.5 µmol/L concentration) by Column Agglutination Technology (using Biorad CAT LISS/Coombs AHG (IgG+C3d) and Anti-IgG rabbit). Kodecyte positives were tested with Chemiluminescence ImmunoAssay (VITROS 3600)

RESULTS:

178 Donor samples were tested with both RPR and Kodecytes, 14 samples which were RPR reactive, were also kodecyte positive, giving a 100% positive agreement between both tests. Of 164 RPR non-reactive samples, 11 were Kodecyte positive, showing 93.3% negative agreement with RPR. All the 11 Kodecyte positive RPR negative samples tested negative in CLIA, 4 RPR and Kodecyte Positive samples tested Positive in CLIA, 5 RPR and Kodecyte negative samples tested Negative in CLIA. 5 Kodecyte positive CLIA negative samples were tested Positive in CAT (anti IgG).

CONCLUSION:

Testing for syphilis by kodecytes is highly sensitive and feasible for screening blood donors. However the false positives are higher and needs standardisation before adopting for routine testing.

OP 59

Transfusion Transmitted Diseases (including NAT)

Pattern of Seroreactive blood donors, Notification, Counselling and Referral at a blood centre in quaternary care hospital in Tamil Nadu.

Dr.Deepthi Krishna G, Dr. Deepti Sachan, Dr. Jyotsnaa Grace, Dr. Varnisha, Dr. Laavanya sree

ABSTRACT:

Background:

In India, blood donors are screened for transfusion transmitted infections (TTI) as mandated by Drugs and Cosmetics (D&C) Rules, 1945 to ensure the safety of the blood supply. The reactive status of the blood donor has to be notified, which is a crucial step in preventing TTI transmission with adequate counseling and referral to an appropriate clinic for further evaluation, confirmation, and necessary management.

AIM & Objective:

- To study the percentage of notified RDs
- To study the response rate of notified RDs for counseling.
- To analyze risk factors in RDs.

MATERIALS & METHODS:

This retrospective study was done from Jan 2023 to June 2024 All the blood donors in the pre-donation counselling were given adequate information regarding the notification of the test results and consent was taken for notification. The counsellor notifies the RD for minimum three attempts with a gap of 7 days between the calls for non-responders. at blood centre, RD were counselled by the medical officer and then referred to the counselling and testing centres. All the data was entered in microsoft excel and analyzed for frequencies and percentages.

Results:

Of the 135 (1.31%) RDs, 78 donors were responded to telephonic communication and notified. A total of 92 (68.1%) donors were given counselling, of which 24/41 HBV, 32/46 HCV, 28/44 syphilis, and 8/8 were HIV donors. The response rate was significantly higher in married and also in IT professionals compared to students. Among the responders, 41% were referred to Hepatology department; and 26.6% to ICTC. RD counseling revealed 12(13%) had high risk history.

Conclusion:

RD notification is important blood centre activity to curtail TTI. Proper pre-donation counselling by a trained competent counsellor is the corner stone in bringing back the RDs. However, training of the counsellors should be strengthened to achieve a maximum response rate.

OP 71

Transplant Immunology

Harmonizing HLA Genotyping: Conquering Informatics and Version Challenges in the IPD-IMGT/HLA Database

Gayathiri Kaduveti Chellaiya, Sam Arul Doss, Divya M, Stephen, Dolly Daniel

Background and objectives

HLA typing is crucial for clinical and research purposes, including organ transplantation and disease studies. However, the complexity of HLA data has significantly evolved, necessitating a comprehensive understanding of factors such as typing methods, gene coverage, interpretation databases, and criteria for assigning HLA types. While tools have been developed to standardize variable data, they often have limitations that can impact result accuracy. Additionally, version consistency with the IPD-IMGT/HLA Database, updated quarterly, is also a significant consideration. Therefore, we aim to evaluate the challenges associated with HLA genotyping data using a case report, specifically focusing on version consistency and informatics issues within the IPD-IMGT/HLA Database.

Case report

A 34-year-old male with relapsed Acute Myeloid Leukemia (AML) was scheduled for a stem cell transplant. High-resolution HLA typing using NGS Illumina MiniSeq was performed on the patient in the Department of Transfusion Medicine and Immunohaematology in April 2024. In May 2024, two daughters of the patient were assessed as potential stem cell donors, and their HLA high-resolution typing was also conducted. Ideally, the daughters should be a halpomatch for the patient. However, both daughters showed a complete mismatch at the DRB1 locus. The patient had DRB1*16:64, while both daughters had DRB1*16:75. Further investigation revealed that the patient was typed using Version 3.50.0 of the IPD-IMGT/HLA database, whereas the daughters were typed using Version 3.54.0. Finally, all three samples were analyzed using Liftover to Version 3.54.0, and the discordance was resolved, confirming the presence of DRB1*16:75 in all three samples.

Conclusion

The IPD-IMGT/HLA database undergoes updates every three months to incorporate new alleles and uphold the current nomenclature. Upon analyzing the haplotype of the family members, we observed conflicting results, prompting us to verify the database version. This study underscores the crucial nature of confirming database versions when presenting high-resolution HLA genotyping data. It also underscores the importance of reviewing family data to enhance the accuracy of HLA typing for improved clinical care.

ePOO1

Blood Components

Comparative study for measurement of quality parameters in leucoreduced RBC prepared by three different methods.

Dr.B.Visali, Dr.Farzana kothari (Professor and Head)

Background and Objectives: Leucoreduced RBC are Red cell components from which WBC's are removed. It prevents Febrile Non hemolytic Transfusion Reaction, HLA Alloimmunisation in multitransfused patients and Transfusion of leucotropic viruses especially CMV. Also it improves the invivo 24 hour red cell survival by removing the metabolically active cells.

1.To differentiate the efficacy of leucoreduction by buffy coat method and during prestorage RBC leucofiltration compared to post storage RBC leucofiltration.

2.To evaluate the leucoreduction carried out by different methods and finally to establish the best method to prepare leucoreduced RBC.

Materials and Methods: In this Retrospective study, 60 units of blood were divided into three groups of 20 each. Now two groups were subjected to leucoreduction using two types of filtration methods ie., prestorage and poststorage PRBC filtration. Leucoreduction by buffy coat method was applied to 3rd group.

Result: For prestorage pRBC means post filtration residual leucocyte count range from 0.01 to 0.03 x 10*3 with leucofilteted bags showing log 3 leucoreduction. For poststorage PRBC Mean post filtration residual leucocyte count range from 0.02 to 0.04 x 10*3 with leucofilteted bags showing 3 log leucoreduction. For Buffy coat leucoreduction, post filtration residual leucocyte count range from 2.1 to 6.6 x 10*3 with leucofilteted bags showing 1 log leucoreduction.

Conclusion: This study suggests that leucofiltration (both pre and post storage) is preferable over Buffy coat method. We recommend selective log 3 leucodepletion using prestorage filtration for patients with specific indication

ePOO2

Blood Components

Are the factor 8 levels in group O plasma too low? It's time to reevaluate the dose of group O plasma

Dr. Safnasafeer, Dr. Ashish Jain, Dr. Priyanka Rathod, Dr. Dixa Kumari, Dr. Daljit Kaur, Dr. Gita Negi

INTRODUCTION: The structural differences between the antigens of the ABO blood group system can have an impact on the levels of coagulation factors in different blood components.

MATERIALS AND METHODS: A cross-sectional study took place in the Department of Transfusion Medicine of a tertiary care hospital from March 2023 to February 2024. Blood grouping was done, and factor 8, fibrinogen, PT, APTT, and INR levels were measured

RESULTS: Blood group B was the prevailing type, accounting for 38.29%. The activity of coagulation factor 8 was highest in blood group B (mean = 236.44% and blood group O had significantly lower activity (mean = 134.51%) (p value = 0.014). Blood group A had the highest mean level of fibrinogen at 411.01 mg/dl and group O had the lowest mean level at 332.78 mg/dl. The PT values were lower in blood group AB (mean = 11.511 sec) and lowest in group A (mean = 12.15 sec). The APTT values were found to be lower in blood group AB (mean = 25.992 sec) and higher in O (mean = 28.531 sec). The INR levels were found to be lower in blood group AB (mean= 0.9877) and higher in group O (mean = 1.007).

The average factor 8 levels in an O group FFP was 254 IU / unit, while in group B it is 448.4 IU/unit. A patient weighing 70 kg and with a hematocrit of 40 needs 2900 IU of factor 8 to achieve a 1% increase which is achieved after 11 group O plasma transfusions as opposed 7 group B plasma transfusions.

CONCLUSION: It has been observed that blood group O tends to have lower levels of factor 8 and fibrinogen. Therefore, it may be worth considering adjusting the dosage of FFP in patients of the O blood group who require a transfusion.

ePOO3

Blood Components

Evaluation of serum biochemical markers of skeletal muscle damage during hypobaric hypoxic stress

Dr. Richa, Dr. Geetha Suryakumar

Background & Objectives: High altitude stress leads to several pathophysiological conditions, one of them is hypobaric hypoxia induced skeletal muscle atrophy. Skeletal muscle is the key factor for physical performance and endurance. It has been reported that chronic hypobaric hypoxia exposure leads to decrease muscle loss with compromised physical performance. Nevertheless, data about changes in muscle damage enzymes in serum are sparse. Therefore, the present study was planned to search out possible serum biomarkers which changed due to hypobaric hypoxia induced skeletal muscle damage.

Methods: Ten rats were exposed to hypobaric hypoxia exposure for 0 and 7 days. After exposure, a serum level of biochemical markers of muscular damage was elucidated. Skeletal muscle cross sectional area (CSA) was also quantified.

Results: A significant increase in serum CPK, LDH, myostatin and myoglobin was observed in 07d HH exposed rats. Ergo, a significant positive correlation analysis between HH exposed skeletal muscle CSA and muscle damage markers were established.

Conclusion: Our study could demonstrate relevant hypobaric hypoxia induced muscle injury was accompanied by significant increase in CPK, LDH, myostatin and myoglobin in serum. Further, the validation in large sample size is required to establish the same.

ePOO4

Blood Components

The efficacy of Platelet-rich Plasma in treatment of Ligament injuries and its potential in regeneration and healing

R.Praveen Shankar, Dr Latha B , Dr Kavitha G

BACKGROUND

Platelet concentrates like Platelet-rich Plasma (PRP) and Platelet-rich Fibrin are autologous biological blood-derived products used to enhance Tissue and Ligament repair

AIMS & OBJECTIVES

To evaluate patient reported outcomes, Physical examination findings of various ligament injuries following treatment with a intra-articular injection of PRP compared to a control group

METHODS

Ligament injuries like ACL tear, Medial Meniscal Tear of Knee and Supraspinatus tendon tear from period of March 2024-July 2024 were treated non-operatively and were prospectively evaluated after 2 months. PRP was prepared by Platelet-rich plasma method. Patients were treated with single intra-articular injection of PRP along with specific Physical therapy Protocol. Control group were given only specific Physical therapy protocol.

RESULTS

A total of 25 patients were included, 11 treated with PRP injection and rest control. Patient reported outcomes evaluated by Visual Analog Scale(VAS), Numerical rating scale(NRS) and Physical examination like Tegner activity Scale and failure rate(patients with clinical instability at follow-up who needed subsequent ligament repair)

CONCLUSION

All evaluation parameters showed mild to moderate clinical improvement for the patients who received single dose PRP than the control group.

ePOO5

Blood Components

Critical analysis of quality control standards of fresh

frozen plasma in India as given by DCA and DGHS Manual

Dr Aishwarya sharma, DR. Hari Krishan Dhawan, Suraj Pardhan, DR. Sheetal Malhotra, DR. Ratti Ram Sharma

Background & Objectives: Quality standards of Fresh frozen plasma (FFP) are included in Drugs and Cosmetic act (DCA, Second Amendment) 2020 and Directorate General of Health Services (DGHS) Manual 3rd edition 2022.

Objective of this study to analyse the quality control data for FFP done at our centre during last one year based on these standard and critically analyse the Indian standards (specially for the volume and Factor VIII content of the bag for FFP) and compare these standards with international Standards

Methods: Quality Control data of 234 FFP units (109 from 350 ml and 125 from 450 ml collection) was analysed for volume Factor VIII and Fibrinogen content of the bags. QC criteria for of volume: 180-220ml from 350 ml bag, 220-300 ml from 450 ml bag, Factor VIII : at least 70 IU/ bag and Fibrinogen 200 to 400 mg /bag were taken as given in DCA and DGHS Manual.

Results: 62 out of 109 (57%) FFP prepared from 350 ml bags and 16/125 (13%) prepared from 450 ml bags passed the QC criteria for volume. If we take 350 ml bags where PC was not prepared and only FFP was prepared 60 out of 82 (73%) of the bags passed the QC criteria for volume. This shows that the newer QC criteria for volume does not count for 50 to 70 ml PC prepared from the 350 ml bags along with FFP. This is why FFP prepared from most of 450 ml bags failed the volume QC criteria as PC is always prepared along with FFP from these bags. For Factor VIII, the earlier QC criteria was 0.7 IU/ml which is same as given by European union, as per this criteria 181 out of 234 FFP (77.3%) pass the QC criteria. In DCA 2020 Amendment, Factor VIII QC criteria is lowered to 70 IU/ per bag, as per the newer criteria 225 out of 234 (96%) of FFP pass the QC criteria. QC criteria of 70 IU/ per bag for FFP looks inappropriate as criteria for Cryoprecipitates which are prepared from FFP is 80 IU/ per bag.

Conclusion: A relook needs to be done in DCA QC criteria for FFP specially for volume and factor VIII content so that these criteria can measure the quality of FFP prepared in a blood centres appropriately.

ePO11

Blood Donation and donor apheresis

Experience of Follow up of TTI reactive donors at our centre

ABHAY G. JHAVERI, Dr. Kruti Dumaswala

Background & Objectives: It is important to inform and counsel initial TTI reactive donors for confirmation of result; and take appropriate measures for health of self, family and persuade not to donate again. We tried to evaluate follow up rate of TTI reactive donors for retesting and counselling.

Methods: Data of follow up of TTI reactive donors from January 2020 to June 2024 was analysed in MS Excel every month. We tried to contact initial TTI reactive donors by phone or courier and persuade them to come for retesting and counselling. Total 2608 calls were made (average 4 calls/donor). As per guidelines, we made at least three calls to each donor (one week apart). 176 couriers were sent.

Results: Total 644 (0.61%) units out of 108549 total collections from January 2020 to June 2024 were found reactive. Out of these 355 (51.96%) were HBV, 105 (15.81) were Syphilis, 81 (12.20%) were MP, 80 (11.90%) were HCV, and 43 (6.48%) were HIV reactive. We succeeded in tracing overall in 397 (61.65%) cases. Success rate was 70.59% in 2021, 61.94% in 2022, 52.84% in 2023 and 60.56% in 2024 (till June). We counselled them at our centre and referred to appropriate place for confirmatory tests and treatment. We convinced the donors not to donate again. Common causes for failure were 1) wrong or incomplete contact number/correspondence address, 2) living at a faraway place, 3) working in industries or offices where mobile phones are not allowed and 4) Correspondence address is given of a large enterprise where thousands of workers are employed.

Conclusion: If we follow up the donor properly, we do succeed in counselling the TTI reactive donors and prevent them to donate again. We must take care to collect correct and complete contact details during registration especially in mega camps.

ePO12

Blood Donation and donor apheresis

BLOOD DONATION IN RURAL AREA

DEEPAK SHAMSUNDER SHUKLA, MRS.PRITI D SHUKLA CHALISGAON

BLOOD DONATION

ePO13

Blood Donation and donor apheresis

Insights into Availability and Exploring the Unavailability Factors in Unrelated Blood Stem Cell Donors

M P Dechamma, Chandrashekar R, Nitin Aggarwal, Patrick Paul,

Alexander Schmidt

BACKGROUND & OBJECTIVE:

DKMS is a global non-profit organization founded by Mr.Peter Harf (1991) to provide as many blood cancer and blood disorder patients with a second chance at life. We have a global presence in 5 continents, 7 countries, 13 entities with a Life-Saving Impact of Over 115,00 blood stem cell donations.

This retrospective study aims to investigate the availability of potential blood stem cell donors and to identify the reasons contributing to their unavailability for donation in India.

METHOD:

The retrospective data was gathered for a period of 2.7 years (Jan 2022 - July 2024). A thorough analysis of the data resulted in categorizing the reasons for a better understating of the donor unavailability in India.

Total Availability = (Total Number of Successful cases/Total Requests Received) ×100

RESULTS:

Total Potentially Matched Donors – 1602

Total Availability – 431 (27%)

Total Unavailability – 1171 (73%) – (Temporary Unavailability (TU) – 510 + Permanent Unavailability (PU) – 661)

Donor Unavailability:

Reasons:

Family -TU:43% ; PU:25%

Personal -TU:41% ; PU:56%

Abroad-TU:5% ; PU:2%

Medical -TU:6% ; PU:7%

Recent Blood Donation-TU: 0.4% ; PU: NA

Pregnancy / Breast Feeding-TU:4% ; PU: NA

Unable to Contact-TU: NA ; PU:10%

CONCLUSION:

• Every 17 seconds, someone somewhere in the world is diagnosed with Blood Cancer, Sickle Cell Disease or Thalassemia and currently, more than 10 million people worldwide are affected. Unfortunately, only 1% of the worldwide population is registered as a blood stem cell donor and hence a dire need to increase their availability is necessary.

• Our study reflects two major reasons that affect unavailability: unexplained personal circumstances and lack of awareness in general public that leads to family concerns and denial of permission to donate.

• To increase our availability, we have measures in place that build trust among our donors (Ex: patient–donor meet-ups, counselling sessions and many more).

ePO14

Blood Donation and donor apheresis

Whole Blood Donor Deferral in a Tertiary Care Centre In Maharashtra

vineeth pynadath, Vineeth Pynadath

Background: Blood donor deferral is a critical issue that affects the availability of blood supplies, especially in countries like India where demand frequently outstrips supply. Understanding the reasons for donor deferral is essential for developing strategies to optimize donor recruitment and retention, ensuring a safe and adequate blood supply.

Objective: This study aims to analyse the patterns and reasons for whole blood donor deferral in a tertiary care centre in India, providing insights into improving donor selection criteria and reducing deferral rates.

Methods: A retrospective cross-sectional study was conducted at a Bharati Hospital in Maharashtra India. Data from all prospective whole blood donors who visited the blood centre of the hospital between 01/01/2023 and 01/12/2023 were reviewed. Donors were categorized into eligible and deferred groups based on the standard selection criteria. Deferred donors were further classified according to the reason for deferral, such as low haemoglobin levels, medical history, or lifestyle factors.

Results: A total of 6500 prospective donors were screened, of which 560 were deferred. The most common reasons for deferral included low hemoglobin levels, recent medication use, fungal infection, tattoo, Male donors were predominantly deferred due to hypertension, surgical history and recent infections. and hypertension, while female donors were more often deferred for low hemoglobin and recent pregnancy.

Conclusion: This study highlights that low hemoglobin is a leading cause of deferral among both male and female donors. Strategies to address this issue, such as targeted pre-donation counselling and nutritional support, may help in reducing deferral rates. Understanding local deferral patterns can guide recruitment strategies and improve donor retention, ultimately enhancing the blood supply chain in the region.

ePO15

Blood Donation and donor apheresis

Understanding Blood Donor Deferral: A Comprehensive Review

Ms. Jyoti R. Shetty, Dr.Vishvas Amin, Dr. Jhalak Patel, Mr. Emmanuel Christian, Mr. Bharat Parmar, Mr. Akib Mansuri, Ms. Palak Panchal

Background and Objectives: Voluntary Blood Donors are the main stay for safe blood. These blood donors often go through negative experience of donor rejection due to screening criterias. These donors are highly enthusiastic and motivated. This study of analysis of donor deferral will help us in evaluating the different reasons of deferral and thereby forming various strategies to redefine their experience.

The objective of this study is to evaluate the reasons for deferral amongst potential blood donors.

Materials and Methods: This is the retrospective study done at Indian Red Cross Society, Ahmedabad Blood Centre from period of January 2023 to December 2023. The Donor deferral reasons are evaluated and categorized into temporary and permanent deferrals and its distribution gender wise.

Results: A total of 77,467 voluntary blood donors came to donate blood out of which 59,701(77.07%) were accepted for blood donation and 17,766 (22.93%) were deferred in which 7,329 were female and 10,437 were males having low haemoglobin to be main reason for temporary deferral with various other reasons like hypertension, underweight, medical causes etc.

Conclusion: The knowledge of this study will help us in identifying the reasons of deferral amongst the potential blood donors and help us in forming donor recruitment strategies. Voluntary blood donation recruitment through these strategies will lead to safe donor pool.

ePO16

Blood Donation and donor apheresis

CAUSES OF WHOLE BLOOD DONOR DEFERRAL IN A TERTIARY CARE HOSPITAL

SHARON JOY, DR SASIKALA N,DR KALA V L

Introduction:- Blood transfusion is a vital lifesaving procedure in current medical and surgical fields for which adequate safe blood supply must be maintained, for this sufficient supply of blood components is necessary. Donor deferral means that an individual is not eligible to donate blood based on current requirements. Donors are given a predonation counselling and medical examination before acceptance/deferral. .Deferred donors can be mainly temporarily deferred or permanently deferred donors.

Aims:- To study the cause of donor deferral in a tertiary care hospital

Materials and Method:- Retrospective study of 9 months duration (January 2024 to September 2024). Data was taken from donor deferral registry maintained in blood centre. Donors who came to blood centre as well those attended voluntary blood donation camps were included. Out of 20642 registered 19764(95.75%) were males and 878(4.25%) were females.

Results:- Out of 20642 donors registered 18493(89.59%) were found to be fit for donation and 2149(10.41%) were deferred.

Prevalence of deferral is 10.41%.

Out of 18493 donated 18210(98.47%) were males and 283(1.53%) were females. Out of 2149 deferred 1582 (73.6%) were males and 567 (26.4%) were females. 2059 were deferred due to temporary (95.8%) and 2 (4.2%) were deferred due to permanent causes. Most common cause for deferral was lack of sleep((16.6%) followed by anaemia(15.6%).Other causes for temporary deferral were regular medication intake for various diseases, hypertension, rashes at phlebotomy site, underweight, dengue within 6 months. Reasons for permanent deferral were high risk behaviour, using inhaler, diabetics on insulin

Conclusion:- This study shows lack of sleep and anaemia as major causes of donor deferral. This shows the need to teach the general population about the need of proper sleep, iron supplementation as well as the need to do regular screening of vitals and intake of proper medications.

ePO17

Blood Donation and donor apheresis

Assessing Whole Blood Donor Deferrals in Eastern India: Insights from a Tertiary Care Hospital

Dr Bhavyaa Beriwal, -

Background

Whole blood collection is a critical component of blood transfusion services, ensuring the safety of both donors and recipients. Donor screening and deferral, coupled with stringent blood bag testing, are essential to maintain the quality of donated blood. While deferrals are necessary to mitigate risks, they can also lead to a loss of potential donors. Analysing donor deferral patterns is crucial for optimizing blood collection practices and maximizing the availability of safe blood products.

Aim and objectives

To determine the deferral rate and categorize the reasons for blood donor deferrals

To develop evidence-based recommendations for reducing donor deferrals

Methods

This study was conducted in the Department of Transfusion Medicine and Blood Bank of AIIMS Patna using the donor deferral records of 6 month from January 2024 to June 2024. National guidelines laid by Drug and Cosmetic Act 1940(amendment 2020) were used for donor deferral criteria.

Results

Of 11774 total registrations, 10169 donations were accepted and 1605 prospective donors deferred. Males had a higher deferral rate of 82.05%. The total deferral rate 13.63% and major reason was low hemoglobin (24.23%), hypertension (21.37%), inadequate sleep (11.4%). Other causes are underweight (6.72%), medical cause (6.66%), tattooing (3.17%), alcohol (3.3%), typhoid (3.11%), tachycardia (1.49%), bradycardia (0.12%), fungal infection (1.12%), dengue (2.28%), vaccination (1.74%), underage (1.8%), hypotension (0.31%), Miscellaneous (11.4%)

Conclusion

Blood donor deferral serves as a crucial quality marker in the donor selection process. In this study, anemia and hypertension were identified as the leading causes of deferral. To address these issues, targeted interventions such as fortifying commonly consumed foods with iron and encouraging individuals with hypertension to seek timely medical intervention can help improve donor eligibility. Temporarily deferred donors should receive proper counselling regarding their deferral reasons and the necessary steps for requalification

ePO18

Blood Donation and donor apheresis

Adverse donor reactions in platelet pheresis donors

Dr. Aifa Hashim, Dr. Meena Sidhu/ Dr. Naveen

Background : Despite significant technical advancements in automated cell separators, more emphasis has been placed on the quality of platelet concentrates rather than on donor safety. We designed this prospective study to investigate donor safety by analyzing adverse events in healthy plateletpheresis donors, focusing on the occurrence of such events during nearly 175 apheresis procedures conducted over 2 year period in a hospital-based program.

Study design & Methods :

The study involved 175 healthy plateletpheresis donors, consisting of 125 first-time and 50 repeat donors, all of whom provided informed consent. Procedures were conducted using the Spectra Optia Terumo BCT apheresis machine , during which adverse events were documented and categorized. Donors' hematological profiles were assessed using an automated cell counter and serological testing using ELISA.Data were collected apheresis adverse event registers. Adverse events were analyzed in several categories, including complications like hatoma formation, machine errors, citrate toxicity, hypotensive or vasovagal episodes.

Results:

A total of 20% (n = 35) of the plateletpheresis donors experienced adverse events, with 8% related to hematoma formation, 5.7% related to tingling sensations, followed by vasovagal reactions (4%), and kit-related events (2.3%). Multivariate analysis indicated that factors such as first time donors and donors within age group 30-45 years were substantially related to adverse donor reactions.

Conclusion:

Identifying donors at risk for complications can help modify the apheresis procedure to minimize adverse events. Increasing public awareness about the ongoing need for blood and blood products is essential. Common adverse events in plateletpheresis donors include hematoma formation, tingling sensations, vasovagal reactions and kit related events which can be mitigated through pre-donation education and adjustments to machine configurations. However, further prospective studies are needed to develop guidelines for donor safety in apheresis and to evaluate donor suitability, particularly with the rising trend of double product apheresis collections.

ePO19

Blood Donation and donor apheresis

Decoding Deferral Patterns: A 9-Year Retrospective Study from a Tertiary Care Center of North India

Dr Sangeeta Kumari, Divjot Singh Lamba, Preeti Paul, Rekha Hans and Ratti Ram Sharma.

BACKGROUND AND OBJECTIVES

Platelet donor selection criteria should be periodically evaluated to modify any criteria to maintain balance between safety and sufficiency.

To analyze demographic profile of deferred donors and attribution of different causes of donor deferral.

MATERIAL & METHODS

Retrospective study of platelet donor deferral was conducted over 9 years (2012-2020). Donors for SDAP were screened as per SOP based on donor selection criteria in the Drug and Cosmetic Act of 1940 & Rules of 1945 and its time-to-time amendments.

Results

Out of 24505 screened platelet donors, 23.9% were deferred. 23.6% males and 55.3% females were deferred. Maximum (62.9%) deferred donors were of ≤30 years age group and replacement donors were (62%). Most donors were deferred temporarily (81.6%). Significant odds of being temporarily and permanently deferred were following-

1.3 and 0.9 times respectively in 41-50 years as compared to age ≤30 years.

1.2 and 0.85 times respectively in replacement as compared to voluntary donors.

1.4 and 0.72 times respectively in repeat as compared to first-time donors.

Maximum (37.1%) donors were deferred for the safety of both donors and patients. Most common categories for deferral were abnormal lab investigations (24.6%), physiological conditions (23.6%), and risk of TTI (20.7%). Poor venous access (15.5%), jaundice (13.6 %), low platelet (11.7 %), and low hemoglobin (8.8%) were individual most common causes.

Conclusion-

This comparative analysis of donor deferral underscores importance of strict adherence to donor selection guidelines to maintain a safe SDAP supply. Educating temporarily deferred donors about deferral period, treating causes of temporary deferral, and encouraging them to return can expand the donor pool. Comprehensive multicentric studies on donors with platelets ranging from 150 to 140 × 10^9/L and Hb 12.5-11.5gm/dl are required to assess any additional health risks and frequency limits for these donors to ensure donor health and product quality.

ePO20

Blood Donation and donor apheresis

Analysis of adverse reactions among whole blood donors at a tertiary care hospital

Dr. Lalmalsawmsanga, Dr. J. Ravishankar

Background and Objectives

Blood donation is a very low risk procedure and donors usually tolerate blood donations very well. Adverse reaction can occur any time during or after donation, which are usually mild and does not pose much effects on the health of the individual, but may dissuade or deter donors from future donations. The aim of this study was to describe the incidence, severity, grade and pattern of adverse reactions among whole blood donors at a tertiary care hospital blood centre.

Methods

This was a retrospective observational study conducted during August 2023 – July 2024 at the Department of IH & BT, Tirunelveli Medical College and Hospital. Demographic details of donors, previous donation history and grade of adverse reaction were retrieved from donor adverse reaction register. Data was entered and analysed in Microsoft excel. Descriptive data were given in summary statistics.

Results

Of the 11180 total donors, 7090 were repeat donors (63.42%) and 10,752 were male donors (96.17%). Adverse donor reaction rate was 0.71% (n= 79/11180) with male to female ratio of 25:1. 97.47% (n=77/79) were Grade 1 severity of which vasovagal reaction was 89.61 % (n=69/77) and hematoma 10.38% (n=8/77). 2.53% (n=2/79) developed Grade 2 severity: vasovagal syncope requiring IV hydration. There was no Grade 3/4/5 reaction during this study period. Majority of reactions (78.48%, n=62/79) were seen in donors ≤30 years and in first time donors (55.69%, n=44/79). Incidence of adverse reaction in First time donors was 1.07% (n=44/4090) and in female donors was 0.70% (n=3/428).

Conclusion

Analysis of adverse donor reactions helps in identifying the donors at risk and in adopting better strategies like pre donation counselling, reassurance & post donation monitoring until adequate hemodynamic recovery that ensures prevention of adverse reaction.

ePO21

Blood Donation and donor apheresis

Abstract Title:Hematological Impact of Plateletpheresis on Donor Hemoglobin Levels

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Name(s) of Co-Author(s): Dr Y Divya Prafulla Abstract:

Background & Objectives:

Plateletpheresis is critical in transfusion medicine for platelet supply, but it can lead to reductions in donor hemoglobin (Hb) levels. This study evaluates Hb reductions in plateletpheresis donors, specifically those experiencing decreases of 0.8 gm to 1.5 gm, to assess the hematological impact.

Methods:

A prospective study was conducted on 15 plateletpheresis donors. Pre- and post-procedure Hb levels were measured. Data collection spanned six months, and analyses were performed to evaluate Hb level changes and identify influencing factors.

Results:

Of the 15 donors, 10 exhibited Hb reductions of at least 0.8 gm, and 5 showed reductions of 1.5 gm. The mean Hb reduction was significant, with donor age, initial Hb levels, and donation frequency influencing the extent of reduction.

Conclusion:

A substantial proportion of plateletpheresis donors experience significant Hb reductions, with some up to 1.5 gm. Monitoring Hb levels and revising donation guidelines may enhance donor safety.

ePO22

Blood Donation and donor apheresis

Impact on whole blood donor deferral criteria during pre and post covid pandemic: a retrospective analysis.

Dr. Poonam Saini, Dr. Saroj Rajput, Dr. Brig. Tathagata Chatterjee, Dr. Sumit Barik, Dr. Col. M.S. Bindra

Background & Objective

Healthy blood donors are crucial for maintaining safe and adequate blood transfusion services, which are vital for patients undergoing surgeries, trauma care, or managing chronic conditions like anemia and cancer. Understanding the reasons for donor deferral is essential for improving recruitment, retention, and ensuring blood safety.

This study aims to analyze the deferral patterns of whole blood (WB) donors and comparing the periods before and after the COVID-19 pandemic. By identifying the primary causes of deferrals and any significant shifts due to the pandemic, the study seeks to inform future strategies to optimize donor recruitment and ensure a stable and safe blood supply.

Methods

This retrospective comparative study analyzed WB donor deferral patterns at a tertiary care institute in northern India. Data were collected from donors who were deferred from donating blood during both the pre-COVID and post-COVID periods. The variables studied included the sex of the donor, donor type (voluntary or replacement), type of deferral (temporary or permanent), and reasons for deferral. All data were systematically recorded using a standardized proforma.

Results

A total of 13,457 donors donated blood during the study period, which was divided into two phases: pre-COVID and post-COVID. Of these, 2,026 donors were deferred, resulting in an overall deferral rate of 15.05%. Pre-COVID Deferrals Were 640 donor and the majority of deferrals were temporary, with anemia(24.21%) being the most common cause, followed by high haemoglobin. Post-COVID Deferrals Were 1386 donors were deferred after the pandemic. Similar to the pre-COVID period, anemia remained the primary cause of deferral. Across both periods, 87.79% of deferrals were temporary, allowing for the possibility of future donations and 12.21% were permanent deferrals.

Conclusion

COVID-related deferral criteria (recent illness, vaccinations, exposure) temporarily affected eligibility but did not significantly alter overall deferral patterns. Anemia remained the primary cause of deferral before and after the pandemic, highlighting its ongoing impact on donor eligibility. The study concludes that while pandemic-related challenges existed, medical deferral criteria remained stable.

During stem cell mobilization, platelet counts decrease while WBC counts increase. Understanding these variations is essential for effectively counselling donors about the short-term effects of G-CSF on their health.

eP023

Blood Donation and donor apheresis

Pre-donation Transfusion Transmitted Infection Screening in Single Donor Apheresis Platelet (SDP) Donor: Prevalence and Psycho-Social Issues

Dr Ansuman Sahu, Prof. Dr. Somnath Mukherjee, Dr. Satya Prakash, Dr Debasish Mishra

Background and objectives:

Pre-donation Transfusion Transmitted Infection (TTI) screening (PDS) is vital in Transfusion Medicine, particularly in high endemic areas, to improve blood transfusion safety and cost-effectiveness. While PDS is commonly performed in whole blood donation settings in other parts of the world, it is regularly conducted before single donor platelet (SDP) collections in India either by chemiluminescence or other serological methods. However, the prevalence of TTIs in SDP donors using chemiluminescence remains unreported, as does the psychological impact on donors with reactive results. The objective of the study is to determine the prevalence of TTIs in SDP donors using chemiluminescence.

Material and Methods

A retrospective study was conducted to trace the PDS results of SDP donors over five years in the Department of Transfusion Medicine at AIIMS Bhubaneswar. When a platelet transfusion is indicated, the patient's representative must bring a donor to the department. The donor completes a pre-donation questionnaire, undergoes a physical examination, and is assessed for vein suitability. Blood grouping and a complete blood count (CBC) for platelet count and haemoglobin levels are performed. If the donor meets all eligibility criteria, PDS is performed using chemiluminescence-based serology. If results are non-reactive, platelet collection through apheresis is carried out, and donors are counselled and referred if reactive. The prevalence percentage was calculated by dividing the total number of reactive by the total number of PDS multiplied by 100

Results

A total of 893 prospective donors were screened for TTIs. Among these donors, all were male except for one female. Platelet donations increased from 36 in 2020 to 335 by September 2024. Three individuals tested reactive for TTIs during PDS: two for HBsAg and one for syphilis, resulting in a prevalence rate of 0.36%. HBsAg reactive donors were referred to the Gastroenterology OPD, and the syphilis reactive donor was referred to the Venereology and Dermatology OPD.

Conclusion

We found that the prevalence of TTI in PDS was 0.36%, which is much less when compared to post-donation screening of whole blood donors. While PDS in SDP donation offers economic benefits by preventing product discard, it also presents challenges such as regulatory compliance issues, extended donor waiting times, potential psychological impacts to the donor due to the complexities involved in result disclosure, and the risk of patients being deprived of timely platelet transfusions. Additionally, highly sensitive testing methods increase the likelihood of false positives. To address these challenges, voluntary SDP collection should be instituted, while smaller centres should maintain a group-wise stock reserve and ensure proper inventory management.

ePO24

Blood Donation and donor apheresis

Descriptive analysis of Therapeutic Phlebotomy procedures in a tertiary care center

Dr. Shallu, Co-Authors: Dr. Shallu[1], Dr. Ashish Jain[2], Dr. Gita Negi[3], Dr. Daljit Kaur[4], Dr. Dixa Kumari[5], Dr. Safna safeer[5]

[1]Junior Resident [2]Associate Professor [3]Prof and HOD [4]Associate Professor [5]Senior Resident [5]Junior Resident

Background & Objective:

Therapeutic phlebotomy is a blood-drawing procedure used to treat conditions like hemochromatosis, polycythemia vera, and secondary erythrocytosis. By reducing blood volume or concentration, it helps alleviate symptoms and prevent complications associated with these disorders.

Methods:

A retrospective study was conducted from January 2022 to August 2024 in the Department of Transfusion Medicine, examining patients who underwent therapeutic phlebotomy. Data on demographics, diagnoses, and indications for the procedure were collected. The procedure's effectiveness was assessed by analyzing hematological parameters, frequency of procedures per patient, and symptom-free periods. Safety was evaluated based on recorded adverse events.

Results:

In total, 264 therapeutic phlebotomy procedures were performed on 161 patients, 125 males and 36 females. Among them, 104 had single procedure while 57 required multiple procedures. The most common indications were primary polycythemia vera (95 patients) and secondary polycythemia (66 patients). Of the secondary polycythemia cases, 10 were related to heart diseases and 72 to respiratory conditions. Heart conditions included 3 cases each of Tetralogy of Fallot (TOF), Transposition of the Great Arteries (TGA), and congenital heart disease, plus 1 case of congestive heart failure. Respiratory cases consisted of 68 with Chronic Obstructive Pulmonary Disease (COPD), 2 with Pulmonary Arterial Hypertension (PAH), 1 with Ischemic Heart Disease (IHD), and 1 with bronchiectasis. One patient had hereditary hemochromatosis. Out of the 95 patients with primary polycythemia, 89 were JAK2 positive, while 6 were JAK2 negative. The age distribution of the patients was: 12 between 0-15 years, 28 between 15-30 years, 51 between 31-45 years, 47 between 46-60 years, and 23 over 60 years with hemoglobin levels between 17 g/dL and 23 g/dL and hematocrit between 50% and 73%. Following one phlebotomy session, hemoglobin decreased by 1-2 g/dL and hematocrit by 3-5%. Fluid replacement done using normal saline in admitted patients. No adverse events were reported following the procedure.

Conclusion:

This descriptive analysis showed that primary polycyethemia with JK2+ and secondary polycyethemia with respiratory indication are the common indication for therapeutic phlebotomy. Based on the changes in the hemoglobin and haematocrit after the procedure, patients showed improvement after the procedure

ePO25

Blood Donation and donor apheresis

Analysis and evaluation of adverse donor reaction in a tertiary care blood centre- enhancing safe blood donation practices

Dr Bharti, Dr Ravi Rani Mishra

Introduction: An untoward feeling by the blood donor before ,during or after blood donation is known as adverse donor reaction, these reactions can compromise donor safety and the efficiency of blood collection.Appreciating the nature and frequency of the reactions is essential for improving donor management and enhancing the overall blood donation experience.

Objective - To analyse and evaluate the frequency, incident, types and risk factors associated with these adverse donor reactions which is important for safe blood donation practices.

Methods - This is a retrospective study conducted at our tertiary care centre from December 2022 to July 2024.

Result - a total of 13958 Donation happened in the duration of 20 month

Replacement donors were 1413

Family donors were 9638

Voluntary donors were 2904

Total no of donors who experienced adverse donor reactions were 313

Majority were mild reactions which doesn't need any action, most common reaction was mild vasovagal attack f/b nausea/ vomiting f/b hematoma at needle site.

Conclusion - The study summarises the ADR reported during blood donation. We concluded that younger age, first time and female donors are more prone to ADR. Participation of blood centres in donor vigilance is a very positive step towards safe blood donation practices. CMEs can be conducted to increase awareness among blood centres as well as donors. There is a psychological element to most reactions, So a friendly cheerful atmosphere can reduce donor anxiety and perhaps reduce adverse reaction.

ePO26

Blood Donation and donor apheresis

DEFERRALS OF BLOOD DONORS IN NORTHERN INDIA

DR VIJAY PRATAP, PROF. DR TULIKA CHANDRA. DR ARCHANA SOLANKI, DR ASHUTOSH SINGH

BACKGROUND - Pre donation screening is important for safe donor selection and blood collection. Deferral is also an integral part of donor screening to ensure safe blood.

OBJECTIVE - To analyse and study the various causes of pre donation deferral and rate of deferral in Northern India.

METHODOLOGY - Retrospective study of various causes of deferral at our center for a period of one year from Sept 2023 to Sept 2024. The data collected was statistically analysed.

RESULT - Total 82522 donations were done, 7512 donor were were deferred among which 7371(98.12) were males, 141(1.87) were females. Temporary deferred donors were 6730(89.58) and permanently deferred were 782(10.41).

Male deferrals were (48.32%) with a count of 3537 due to anemia , followed by 1311(17.79%) on medication, alcohol 719(9.82) , unwilling to donate 610(8.27%).

Permanently deferred were 782 because of liver diseases, HIV, Syphilis.

Among 151 female donors 84(59.57) were anemic, 39(27.65%) were deferred for some sort of medication and 18(12.76%) donors were underweight.

CONCLUSION - The deferral rate is 9.10% at our center. The temporary deferred donors were educated about deferral period and counsel them to donate in future. Motivation and awareness among women's and in rural areas must be done for blood collection.

The highest factor for deferral was Anemia hence awareness and counselling regarding of prevention of anemia should be done at priority.

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ePO42

Clinical Transfusion Therapy and Patient Blood Management

Title: Evaluation of Blood Utilization Practices in Urology Patients at Tertiary Care Center from Southeastern Part of Rajasthan.

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Background : In developing countries, blood transfusion was decided by treating physicians. Development of Maximum surgical blood ordering schedule (MSBOS) for surgical procedure can mitigate over-ordering of blood. Implementation of MSBOS can cause cost reduction because of unnecessary compatibility tests.

AIM: This study aimed to assess the practices of blood requisite and transfusion in Urology patients.

Method: An institutional-based prospective study was conducted from October 2023 to March 2024, in Govt. medical college and hospital, Kota, Rajasthan. Socio-demographic data like age, sex, type of anesthesia, and type of surgeries were taken preoperatively. The number of cross-matched and transfused data were collected from blood center record. Efficacy of blood utilization was evaluated using the following indices like cross-match to transfusion ratio (C/T ratio), transfusion probability (%T), and transfusion index (TI); a ratio of 2.5 and below, A value of 30% and above, and values of 0.5 or more respectively were considered indicative of significant blood usage.

Result:

In all procedures, among cross-matched blood units, 78.7% were unutilized. The overall blood transfusion indices result was C/T ratio, %T, and TI and utilization rate was 4.69, 24.3%, and 0.30, 21.3% respectively.

Conclusion:

Preoperative grouping, screening, and hold (GSH) are sufficient for elective surgical procedures to decrease the wastage of valuable supplies.

Keywords:

Blood transfusion indices, C/T Ratio, Transfusion Probability, Transfusion Index, Maximum surgical blood ordering schedule, Blood utilization Practices.

ePO43

Clinical Transfusion Therapy and Patient Blood Management

Patient Blood Management (PBM)in Obstetrical Cases in ESI tertiary care Model Hospital Delhi.

Dr. Bharat Singh, Surubhi Srivastava, Radha, Hanisha Jain

Aims & Objectives:

1. To study the pattern of blood demand in obstetric cases

2. To minimize the demand for blood & Blood components in the obstetrical cases

Introduction: Patient blood management (PBM) is relevant in all patients requiring blood transfusion, more so in elective surgical procedures Patient blood management is evidence based multidisciplinary approach to optimize the care of patient who needs blood transfusion. PBM covers the entire stay of patients in the hospital, before the admission to the hospital, treatment and outcome.

Material & Method: It is a prospective study in the department of immunohematology and blood transfusion, the duration of study was six months from October 2023 to March 2024. Every blood request raised by obstetricians was reviewed and analyzed daily. The accelerated request was noted, and the obstetrician was communicated by personal meeting and through WhatsApp message and advise to raise justified demand for blood.

Result: The monthly demand for PRBC in the first month of study (October-23) was 673 units whereas the blood unit's utilization 105 units. It was just 15% of the demand raised. Similarly, for FFP the utilization was 28% and for platelet it was 23%. After multiple intervention with the clinicians via talks on rational used, WhatsApp messages in the last month of study (March 24 the utilization % was 41%,43% and 53% for PRBC, FFP and platelets respectively.

Discussion: Multiple intervention through lectures, seminar discussions and WhatsApp message and using mass multimedia with consultant, senior residents and the post graduate students we could reduce the unjustified raise of request for blood and blood components. The utilization has increased from 15% to 41% for PRBC, 28% to 43% for FFP and 23% to 53% for platelet concentrate.

Conclusion: Multiple interventions like meeting, seminars and use of multimedia helps in achieving rational utilization of blood & Blood products. Role of HTC is crucial in spreading the information to clinicians and resident doctors.

ePO44

Clinical Transfusion Therapy and Patient Blood Management

Assessment Of Transfusion Reaction To Fresh Frozen Plasma In Surgical Patients

DR. RAJEEV KUMAR, PROF. TULIKA CHANDRA , Dr. Archana Solanki, Dr. Ashutosh Singh

Introduction:

Fresh frozen plasma (FFP) is the fluid portion of a unit of whole blood frozen in a designated time frame, usually within 8 hours. Fresh frozen plasma contains all coagulation factors except platelets. Fresh frozen plasma contains fibrinogen, albumin, protein C, protein S, antithrombin, and tissue factor pathway inhibitors. The judicious use of FFP can significantly impact surgical outcomes, reducing intraoperative and postoperative complications associated with excessive bleeding. However, their administration is not without risks. The adverse effects of fresh frozen plasma administration are similar to those that pertain to whole blood and all blood components.

Aims & Objectives:

1. To assess the frequency and characteristics of transfusion reactions to FFP in surgical patients.

2. To assess the impact of standard transfusion practice in the prevention of adverse transfusion reactions and clinical outcomes.

Methodology:

This prospective study was conducted at the Department of Transfusion Medicine, KGMU, in collaboration with surgical departments. Surgical patients who received FFP transfusions were included in this study. Data on demographic characteristics, surgical procedures, clinical history, transfusion practices, and any documented transfusion reactions were collected. Transfusion reactions were classified according to standard criteria.

RESULTS:

In this study, 230 patients were included who were admitted to surgical departments for surgical procedures. The adverse reaction rate during the transfusion was minimal, with 94.3% of patients reporting no reactions. A small percentage experienced itching (3.1%) and fever (2.6%). The most common adverse reaction was mild allergic reaction. No cases of transfusion reactions of TRALI and TACO were reported in the present study. The majority of reactions were managed with standard protocols, resulting in favourable patient outcomes.

Conclusion

The incidence of transfusion reactions to FFP in surgical patients is relatively low, with allergic reactions being the most common. Awareness of potential risk factors can help optimise transfusion practices and improve patient management.

ePO45

Clinical Transfusion Therapy and Patient Blood Management

Managing Post Transfusion Hyperhemolysis in E-β-Thalassemia With Multiple Red Cell Alloantibodies and Subsequent Support Without Transfusion-A Case Study

Dr. Suchismita Paul, Bhattacharya P, Maity C, Talukder B, Das A, Pandey S, Dutta P, Das A

Background and Objectives:

Hyperhemolysis syndrome is a lifethreatening complication of blood transfusion. We report a successful management of an adult female with E-beta thalassemia and multiple alloantibodies who developed hyperhemolysis syndrome.

Methods:

A 43 years old female was referred to the transfusion medicine (TM) clinic due to crossmatch incompatibility with history of infrequent transfusion frequency of 1-2 unit per year for last 22 years since her first pregnancy. However, in last six months, her transfusion requirements increased to 1 U/week.

Presentation: Initially hemoglobin (Hb) was 3.3 g/dL. A fully compatible unit was transfused initially. Extended phenotype was done of this unit.

She was admitted after 3weeks with Hb 3.7 g/dL. A best-matched unit, phenotypically same as previously compatible unit, was transfused, resulting in delayed hemolytic transfusion reaction (DHTR) and hyperhemolysis syndrome.

Laboratory Results: Post-transfusion Hb dropped to 2.7 g/dL, LDH: 2965 U/L.

Management:

She was treated with IV Methylprednisolone(500mg) & immunoglobulin(2g/kg) and addressed for uncompensated heart failure and intravascular hemolysis related organ damage.

Results:

Patient was discharged with single HbF inducer i.e. thalidomide and oral corticosteroids along with anti-heart failure measures. One month later, her Hb was 3.5 g/dL, and she received phenotype-matched packed red blood cells (PRBCs). Her Post-transfusion Hb remained stable.

Second HbF inducer, hydroxyurea was introduced. Subsequent follow-up showed:

1 Month Later: Hb 4.9 g/dL

2 Month Later: Hb 5.2 g/dL

3 Month Later: Hb 7.5 g/dL

Conclusion:

Complicated DHTR has to be managed aggressively. Non transfusion measure like HbF inducer can help to bypass complicated transfusion situation. The use of HbF inducers played a crucial role in stabilizing hemoglobin levels and in enhancing the patient's quality of life.

ePO46

Clinical Transfusion Therapy and Patient Blood Management

Evaluating Blood Usage Efficiency in Obstetrics and Gynaecology: Charting a Path for Patient Blood Management at a Tertiary Care Center

Dr. Priyanka Rathod, Dr. Daljit Kaur, Dr. Safna Safeer, Dr. Deepali Chauhan, Dr. Ashish Jain, Dr. Gita Negi

Background & Objectives : Effective blood management is crucial in obstetrics and gynaecology due to the potential for significant blood loss during procedures and childbirth. This study aims to assess blood usage efficiency within a tertiary care center which can further help in developing strategies for improving patient blood management.

Methods: In a retrospective observational study spanning from August 2023 to July 2024, the Department of Transfusion Medicine focused on patients from the Department of Obstetrics and Gynaecology(OBGYN) who required blood components, including Packed red blood cells (PRBC), fresh frozen plasma (FFP), Random donor platelets (RDP), Single donor platelets (SDP), and Cryoprecipitate (CRYO). Detailed patient information, including diagnoses and clinical indications, was meticulously extracted from blood requisition forms and the Hospital Information System database. Additionally, blood utilization data was obtained through the blood bank software, allowing for a comprehensive analysis of transfusion practices within this specific patient population

Results:

A total of 2,665 blood requisitions for 2,424 patients were received from the Department of OBGYN during the study period. Of the 3,714 PRBC units crossmatched, 937 were issued to 738 patients, resulting in an average cross-match to transfusion ratio (C/T ratio) of 3.9. The Transfusion Probability (T%) was 38%, and the Transfusion Index (TI) was 0.38. Following PRBC, RDP were the second most common component transfused, with 128 patients receiving 319 units, while 282 units of FFP were transfused to 86 patients. SDP and CRYO were notably underutilized among OBGYN patients. The most common indication for transfusion was severe anaemia in antepartum phase followed by Emergency LSCS, Hysterectomy, Obstetrical Haemorrhage and others.

Conclusion: Our study showed underutilisation of blood in terms of Cross-match to transfusion ratio and Transfusion Index while Transfusion Probability was appropriate. The common indication of transfusion was severe anaemia in pregnant females which can be corrected in prepartum phase and subsequently reduce need for transfusion.

ePO47

Clinical Transfusion Therapy and Patient Blood Management

Analysis of Blood Transfusion Practices during Chemotherapy in Acute Myeloid Leukemia Patients in a Tertiary Care Oncology Centre

Priya S, Priti Desai, Anisha Navkudkar, Abhaykumar Gupta

Background and Objectives:

Blood transfusions are important in managing patients with Acute Myeloid Leukemia (AML). The objective of this study was to analyse the blood transfusion practices among AML patients undergoing chemotherapy.

Methods:

This retrospective study was conducted over a period of 8 months (January to August 2024). A total of 107 AML patients who received different blood components transfusion were included. Data was retrieved from Electronic Medical Records and departmental records. The parameters analysed were age, gender, pre-transfusion hemoglobin count and platelet count, type and number of blood components transfused, adverse reactions etc by using appropriate statistical tools.

Results:

During study period, 107 AML patients (70 males, 37 females) with mean age of 36 years (range 25-48) received total of 3812 blood components, 27.5% were Random Donor Platelets (RDP), 35% Single Donor Platelets (SDP), 26.5% Packed Red Blood Cells (PRBC), 8.5% cryoprecipitate, 2% Fresh Frozen Plasma (FFP) and 0.5% Granulocyte. These patients received a mean of 9 (4-14) PRBC, 12(4-17) RDP, 13(5-18) SDP, 21(3-44) Cryoprecipitate, 12(2-48) FFP over an average period of 60 days. More than 75% of patients were undergoing the induction phase of chemotherapy. Additionally, 23 patients received granulocyte products. Mild transfusion reactions occured in 5(4%) patients. Low pre-transfusion platelet counts($<20,000/\mu L$) predicted higher platelet transfusions which was statistically significant($p<0.001$). For PRBC transfusions, 55 patients were transfused with pre-transfusion hemoglobin($<7g/dL$). FFP and cryoprecipitate were transfused to patients experiencing active bleeding with deranged coagulation profile. More than 92% of transfusions were found to be appropriate as per institutional guidelines.

Conclusion:

The transfusion patterns among AML patients showed that platelets were required more frequently than other blood components probably due to chemotherapy induced thrombocytopenia. Anticipating transfusion needs of AML patients during chemotherapy induction phase will aid in resource allocation and planning which will positively impact the patient services and care.

ePO48

Clinical Transfusion Therapy and Patient Blood Management

Is PBM the need of time in current era? - CTVS surgeries experience from a tertiary care hospital

Dr Para K Trivedi, Dr Archana Bajpayee, Dr Sathish S

Background & Objectives

Patient blood management (PBM) is a patient-focused, evidence-based and systemic approach to optimize the management of patients and transfusion of blood products for quality and effective patient care. It is not blood in the blood center that is managed but the patient's own blood that is taken good care of and managed in accord with the physiology of blood management. This study is conducted to understand where PBM stands in this modern era with multiple available modalities in cardiac surgery.

Methods

The study was done from starting of July to end of September 2024. It is a retrospective observational study. Data was collected and analyzed from the Department of CTVS surgery and transfusion medicine, AIIMS Jodhpur. Lab results were collected from CDAC.

Results

Total number of surgeries conducted in 3 months were 132 out of which 57 (43.18%) were CABG. 72 (55%) patients were allogeneically transfused. 13 (9.85%) patients had autologous transfusion in form of ANVH out of which 3 (2.27%) patients had additional allogeneic transfusion. Pre-operative anemia incidence was 64.39%. Patients undergoing on pump CABG required a greater number of transfusions compared to off pump CABG. Transfusion probability was 85% and transfusion index was 1.8 suggesting significant blood utilization.

Conclusion

All efforts should therefore be made to detect and treat preoperative anemia and to prevent blood loss during and after surgery. Patients having preoperative anemia should be preferred for off pump CABG. Even with the availability of drugs and biocompatible bypass machines, without basic correction of anemia will predispose patient to unnecessary transfusion and lower survival rates. A reduction in the use of blood products will be the earliest and clearest result, and maybe the only one directly measurable in the short term.

ePO49

Clinical Transfusion Therapy and Patient Blood Management

EFFECT OF HEMATOCRIT AND STORAGE TIME OF RECONSTITUTED BLOOD ON SERUM BILIRUBIN, HEMOGLOBIN AND HEMATOCRIT OF NEONATES UNDERGOING EXCHANGE TRANSFUSION

SHIVAM AZAD, Prof. Tulika Chandra, Dr. Archana Solanki, Dr. Ashutosh Singh, Prof. Mala Kumar

BACKGROUND & OBJECTIVES

Exchange transfusion is the use of whole blood or equivalent to replace the neonate's circulating blood and simultaneously removing bilirubin and maternal antibodies. Reconstituted blood for exchange is prepared by mixing RBCs (compatible with maternal serum or neonates' serum) and AB plasma.

Objective is to compare the differences of pre and post exchange parameters on the basis of different hematocrits and storage time of blood units.

METHODS

On receiving the request for reconstituted whole blood for exchange transfusion, both mother's and baby's samples were tested and reconstituted blood was prepared by mixing O negative PRBC with AB plasma. Total no. of patients were divided into two groups on the basis of target hematocrit of reconstituted whole blood:-

1. GROUP A (hematocrit 45%-52%)

2. GROUP B (hematocrit 52.1%-60%)

They were also divided into another two groups on the basis of storage time of RBCs.

1. GROUP C (PRBC 0-5 days old)

2. GROUP D (PRBC 6-10 days old)

RESULTS

For bilirubin levels, a significant difference in mean percentage change was observed between Group A and Group B (t-value = -2.40, $p = 0.027$). For sodium levels, a significant difference in mean percentage change was observed between Group C and Group D (t-value = -4.83, $p < 0.001$). Additionally, for glucose levels, a significant difference in mean percentage change was observed between Group C and Group D (t-value = 3.11, $p = 0.005$).

CONCLUSION

These findings suggests that in case of hematocrit of the reconstituted blood, higher hematocrit is better as is it associated with better reduction in serum bilirubin. In case of storage time of reconstituted blood, O negative units less than 10 days old should be used.

eP050

Clinical Transfusion Therapy and Patient Blood Management

Optimizing Perioperative and Postoperative Management: Harmonizing the use of Allogeneic Blood Components in Liver Transplantation

Dr.M .S .VESHIKA ABINAYA, Dr B. Latha, Dr G.Kavitha

Background:

Despite advancements that have significantly reduced the necessity for blood components, Liver Transplantation remains a complex procedure often requiring substantial allogeneic blood transfusions due to the significant blood loss.

Objectives:

1. To assess the perioperative and postoperative utilization of allogeneic blood components.

2. To identify preoperative parameters that predict the requirement for allogeneic blood components in Liver transplant recipients.

Methods:

A retrospective study on utilization of allogeneic blood components were analyzed for a total of 11 Liver Transplant Procedures performed between February 2023 and September 2024 at a tertiary care hospital. The data on utilization of perioperative and postoperative (up to 48 hours) blood components were collected from Blood Bank Records.

Results:

The data were analyzed for a total of 11 patients who utilized allogeneic blood components during Liver Transplantation and the first 48 hours of Intensive Care Unit (ICU) stay. The common indications were Alcoholic Cirrhosis and Chronic Liver Disease related to Viral disease (Hepatitis B Virus)

Intraoperative utilization:

- 81.8% (n=9) of patients received Red Cell Concentrate when their Hemoglobin levels were less than 8g/dl.

- Pooled Cryoprecipitate and Fresh Frozen Plasma were transfused to patients with abnormal Rotational Thromboelastometry (ROTEM) test results.

- 72.7% (n=8) of patients received Single Donor Platelets (SDP) when their Platelet count was less than 75×103/microliter.

Postoperative utilization:

- 54.5% (n=6) of patients required Red Cell Concentrate when their Hemoglobin levels were less than 10g/dl.

- 18.2% (n=2) of recipients did not require any allogeneic transfusion.

Conclusion:

Point of care testing particularly ROTEM, preoperative Hemoglobin level and Platelet Count assessments play a critical role in anticipating perioperative and postoperative transfusion needs. This allows healthcare professionals to better manage transfusion strategies, optimize resource allocation and improve patient outcomes in liver transplantation.

eP051

Clinical Transfusion Therapy and Patient Blood Management

MANAGEMENT OF MASSIVE TRANSFUSION IN POST PARTUM HEMORRHAGE-Formula based Approach vs Goal Based Massive Transfusion

Dr Hadhiya Thahir, Dr Shiffi Fazal, Dr Greeshma S

INTRODUCTION:

Obstetric-Haemorrhage is the major cause of Maternal-mortality/morbidity. With transfusion------blood-component-therapy------as an important indicator of Obstetric-morbidity, there is a need to initiate Quality-improvement by reviewing cases of postpartum-haemorrhage(PPH)with management.Massive-Transfusion have been advocated as an essential tool in managingPPH.The most accepted/tested strategy is the Formula-based-approach. But due to the overexposure to blood-components;Point of care testing–TEG/ROTEM is now being employed widely.Below are two cases of Atonic PPH- one managed by Formula-based-approach and other using ROTEM and is meant to compare and identify the advantages and limitations of each.

AIMS and OBJECTIVES:

To analyse two cases of Postpartum-Haemorrhage:one managed by Formula-based-approach and other by Goal-based-Massive-Transfusion.

METHODOLOGY:

Following are two-cases of Atonic-PPH------one managed by formula-based-approach and other using ROTEM.

CASE 1:

24-Year-old-female------G3P2L1NND1

Atonic-PPH(following-vaginal-delivery)

VITALS:

- Pulse:120/min BP-90/50mmHg

Laboratory-Parameters:

- Hb:6g% Platelet count:1.1 Lakhs PT/INR:40.3/3.39 Fibrinogen:80 mg%

MTP-activated.

Total of 8unitsPRCs,8UnitsFFP,6unitsPlatelet-concentrate,10 unitsCryoprecipitate transfused

Patient-HemodynamicallyStable.Laboratory-parameters-----within normal-limits

CASE2:

29-year-old-Female;weighing70kg-----G3P1L1A1,presented with Atonic-PPH

VITALS:

- Pulse:110/min BP-90/60mmHg

Laboratory-Parameters:

- Hb:9g% Platelet count:2.1Lakhs PT/INR:31.3/2.39 aPTT:47.4s Fibrinogen:80 mg%

Transfused-----4 unitsPRC,2unitsFFP

Bleeding-still persisting.ROTEMdone.

ROTEMFindings-----EXTEM:

• CT-215seconds(38-79)

• CFT-849seconds(34-159)

• A5-10(34-55)

• A10-17(43-65)

• A15-21(48-69)

• □-angle---23(48-69)

• MCF-20(50-72)

FIBTEM:

• CT-59(38-62)

• A5-5mm

• A10-5(7-23)

• MCF-5(9-25)

According to evidence-basedROTEM-A5-PPH-Algorithm(2019),10 units-Cryoprecipitate, 5unitsFFP-Transfused.

Patient----Stable.No further bleeding-episodes.Laboratory values---within normal limits

RESULTSandDISCUSSION:

Formula-based-approach have been advocated as an essential-tool for facilitating early transfusion of sufficient volume and types of blood products for patients with massive-obstetric-haemorrhage.Its implementation shown to improve the timeliness of transfusion and cost-effective.

Disadvantage:May lead to

• Unwanted exposure to blood-components

• Increased risk of acute-respiratory-distress-syndrome,sepsis and multiple-organ-dysfunction.

• Wastage of BloodProducts.

According to Goal-Based-Massive-Transfusion, instead of"One size fit all"rule,Management is according to physiological-status of patient.There is individualised patient care-better patient-management.Early achievement of haemostasis----earlyFibrinogen-replacement.

Disadvantages:

• Difficult to validate and standardise.

• Patient-to-Patient-variability

• Inter-user-variability.

• DifficultQuality-Assurance.

CONCLUSION:

Further studies should be conducted to assess whether,Formula-Based-Approach or Goal-based-Massive-Transfusion-therapy,is better in improving-MaternalOutcome inPPH and to comment on the superiority of one over-the-other.

ePO52

Clinical Transfusion Therapy and Patient Blood Management

Transfusion Management in a Toddler with Sickle Cell Anaemia for a Major Neurosurgery Procedure: A Case Report.

Dr SAJIMOL M K, Dr SASIKALA N

Introduction: In sickle cell anaemia, there is abnormal form HbS for majority of Hb. Preoperative red cell transfusions can reduce the complications during & postsurgery.

CASE REPORT: A 1yr 8m old female child with sickle cell anaemia, Lumbosacral Lipomyelocele, admitted for corrective surgery Neurosurgery unit. The first child, term AGA from FTND, B W 2.5 kg, uneventful other than, received phototherapy for 6 hrs in neonatal period. No previous hospital admission/ past transfusions. Mother & maternal grandmother known case of sickle cell anemia. At the age of 1 yr mother noticed gait abnormality when the baby started walking. On admission child weight: 9.5 kg, alert, moving all four limbs. Her HbS was 72%, Hb electrophoresis suggestive of homozygous for HbS with hereditary persistence of HbF. Sickling Test was Negative. Cardiac Echo was normal.

Blood group:O Rh pos, DAT, IAT -Neg, Autocontrol-Neg Antibodyscreening – Negative, Extended Phenotyping of the child -Neg-c, E, K & positive for s, P1, Fya, k.

We decided to issue crossmatch compatible c, E negative Leucoreduced Fresh PRC unit

MANAGEMENT: Selected c, E negative O rh positive donor from the Extended phenotype Registry pool. We traced locally available 3 donors from our registry. Screened and reserved the units and simple transfusion of the PRC unit in alliquots. Transfusion done in 10-15 ml/kg in 4 hrs. Her Hb level improved, HbS percentage reduced to 40% after 3 successive transfusions of 120 ml. Intra-0peratively 120 ml PRC and surgery was uneventful without any complications. Child discharged on the 7th day.

CONCLUSION: This was a multidisciplinary approach and a team work, concluded in a successful major neurosurgical operation with sickle cell disease. From our effort of Extended Phenotype Donor Registry, we were able to do our task in a swift way planned approach and concluded into a success story.

ePO53

Clinical Transfusion Therapy and Patient Blood Management

Audit of single donor platelet in a tertiary care center in South India

Dr. Rutvi Modh, Preethi N

Background & Objectives: To assess the appropriate utilization single donor platelets (SDP); a six-month retrospective audit was carried out in a tertiary care hospital.

Materials and methods: A six-month retrospective platelet audit was carried out from March to August 2024 to estimate its preparation, appropriate utilization. Patient's demographics, diagnosis, Underlying condition & transfusion triggers assessed.

Results: About 355 units of single donor platelets were prepared and transfused to 355 patients. Adult Critical care unit patient (CCM) & High dependency unit (HDU) were the main user utilizing 39.1 and 78.4 % of SDPs prepared. 24 % SDPs transfusions were of group specific platelets. 63% of prophylactic platelet transfusions were appropriate as per the recommended BCSH guidelines. However, 37% of the prophylactic platelets were transfused inappropriately with normal platelet counts and no evidence of bleeding related to platelets.

Conclusions: Regular audit of blood and blood components is a must so that necessary remedial measures can be taken to maximize appropriate and judicious utilization of each component.

ePO66

Hemovigilance

Error Analysis in Transfusion Service: A tool for quality improvement

Suman Sudha Routray, Dr Sukanta Tripathy, Dr Nirupama Sahoo, Dr Devi Prasad Acharya

Introduction: Errors in the blood transfusion process significantly contribute to adverse events, highlighting the need for identification and mitigation.

Methodology: A retrospective analysis of documented errors was conducted from Jan to June 2024 at KIMS blood centre, categorizing them by type and location within the transfusion chain. Significant errors underwent root cause analysis (RCA), with statistical calculations of percentages and trends and severity classified as minor, moderate, or major.

Results: A total of 144 errors were recorded, primarily in the cross match laboratory (59%, n = 85). Mislabelling errors (55.2%) and missing records (20%) were most frequent, with blood grouping errors at 2 per 1000 tests. Among 11,057 samples, 10 (1 in 1105) had wrong blood in tube (WBIT), with six identified pre-releases. Moderate harm occurred in two WBIT cases, while two others resulted in minor harm. Component lab errors included outdated platelet inventory (3.4%, n = 6) and storage failures (0.6%, n = 1). Donor section errors involved mislabelled blood bags (6.9%, n = 10) and donor screening errors (3.4%, n = 5). The TTI screening section had 11 near-misses. Most errors were internal, with nine affecting external incidents, leading to five minor and two moderate harm cases.

RCA indicated that 81.4% of mislabelling and documentation errors occurred during afternoon shifts, suggesting uneven workforce distribution. Emergency night requests were linked to missing records, while WBIT errors stemmed from nursing non-compliance with standard operating procedures (SOPs).

Conclusion: The study identifies critical error areas—mislabelling, WBIT, and inventory mismanagement—necessitating targeted interventions. The correlation between error rates and workforce distribution underscores the need for an improved duty schedule. Recommended actions include schedule adjustments, retraining, and further automation for sustained improvement.

ePO67

Hemovigilance

Prevalence of adverse transfusion reaction and its temporal association in a tertiary care center

Dr. Umesh Kumar Singh, Dr. Daljit Kaur, Dr. Dixa Kumari, Dr. Gita Negi, Dr. Ashish Jain

Background and Objectives: Blood transfusion is an underappreciated medical procedure worldwide. Even a minor mistake in any one of this multi-step process covering vein to vein transfusion could be fatal for the patients. Hence, the study was aimed to identify any correlation between Adverse Transfusion Reactions (ATR) and the time (routine vs non-routine) of blood components transfusion.

Methods:

A retrospective observational study was conducted in Department of Transfusion Medicine of a tertiary care center. The data for the study was collected from the ATR records for a period of 1 year from April 2023 to March 2024. The time duration between 8 PM to 8 AM was considered as non routine hours and all the blood components issued during this time period was assessed. A comparison was done for ATRs on the units issued during routine and non-routine hours.

Results:

During the study period total number of components issued to patients were 50,463 units, out of which 31,611 (62.64%) units were issued during routine and 18,852 (37.35%) units during non-routine hours. A total of 108 ATRs were reported during the study period out of which 63 (58.33%) occurred during routine hours where 45 (41.66%) were reported during non-routine hours. ATRs as observed to the number of units issued during routine hours accounted to 0.19% and during non-routine hours to 0.23%. The most frequent ATRs occurring during routine and non-routine hours was FNHTR (57.14%; 48.88%) (febrile non hemolytic transfusion reaction) followed by Allergic (22.22%; 37.77%), TAD (6.34%; 4.44%) (transfusion associated dyspnea), TACO (4.76%; 6.66%) (transfusion associated circulatory overload) and TAH (3.17%; 2.22%) (transfusion associated hypotension).

Conclusion:

The study demonstrated a higher number of ATRs were associated with non-routine hour transfusions as compared to routine hour transfusions. Hence regular audits of non-routine hour transfusions should be conducted by all the institutes to curtail the unnecessary non-routine hours transfusions.

ePO68

Hemovigilance

Bedside transfusion audit: manual monitoring v/s RFID system

Deepak Kumar, Dr. Rahul Katharia, Dr.Swati Pabbi, Mr Tarun Kumar, Mr Amit Bisht, Mr,Omprakash Mandal, Mr Ashok kumar & Shivam Dwivedi

Background & Objectives:

Traceability from blood unit to patient is crucial to ensure the availability and the quality of blood products transfusion. RFID based system would help in optimization of transfusion process with fast and contact less communication with real time traceability and monitoring on the ongoing bed side transfusions

To assess the utility of RFID based system for bedside monitoring

Methods:

RFID based inventory as well as bedside transfusion monitoring was implemented in March 2023.A total number of 6200 Packed Red Blood Cell and 2700 platelet requisition were assessed for completion of transfusion details. The units are tagged with RFID from Biolog-id.

Ethical clearance has taken the from the institute ethical committee.

Results:

A total of 8900-blood component requisition were analysed. Transfusion follow-up forms which were received within 12 hours were 8374(94.1%) versus form which were not sent back within 12 hours were 523(5.9%)

On comparison of RFID system verses manual data capture of transfusion, 87 %(n=7607) had concurrence. Whereas 13% (n=1137) of requisition there was mismatch of transfusion timing details.

We also observed that there was incomplete data capture on RFID system amounted up to 11%(n=).There were 9.2%(n=819) request were only start time was captured verses 1.79%(n=160) request where only end time was entered.

Conclusion:

There was no mismatch transfusion reported, it was suggested for regular training of staff would help to reach 100% compliance from 87%.

Similar result were also observed by Clive Hohberger.et.el, 2011

Reference:

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2. Good Blood Transfusion Practices –Guidance for Rational use of Blood,2022

3. AABB Guidelines 19th Edition,2020

4. Basic & Applied Concepts of Blood Banking and Transfusion Practices, 5th Edition -

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ePI50

Transfusion Transmitted Diseases (including NAT)

Seroprevalance, Risk Factors And Sero-Positive Donor Compliance Response Rate Among Blood Donors in Corporate Hospital

Dr Nandini Raval, Dr Prabhat Sharma , Dr Vikram Shah

BACKGROUND & OBJECTIVES :

High risk population of blood donation increase the prevalence of transmission of blood borne diseases & thus it leads to compromised blood safety

Objective of this study is to investigate the sero-prevalence of syphilis , syphilis seropositive donor compliance response and assessing the risk factors on syphilis among blood donors & thus analyzing the donation status of high risk population

METHOD:

Present study is a retrospective study and data is taken from Jan-2021 to Dec 2023 and analyzed for seropositivity to T .Pallidum and Donor Compliance Response Rate and history given by syphilis positive donor after councelling .

RESULT :

Out of 5247 blood donors screened for TTIs , 42 donors have been found sero-reactive for syphilis from Jan-2021 to Dec 2023 , among them 6 were 1st time donors & 36 were repeat donors with syphilis sero-positive donor compliance response rate of 13.79% ,1.72% and 20.68% for donors responded & come, donors not responded and given wrong phone no. & donors responded but talk over telephone respectively .

CONCLUSION :

Positive donors were more likely to have multiple sexual partners & positive travelling history with unsafe sex with commercial sexual workers .

Health consultation and screening of high risk groups before blood donation is one of the important aspect to improve blood transfusion service.

In addition , syphilis positive donors need councelling as the majority of syphilis positive donors did not turn upto collect the reports & receive treatments .

All blood bank staff should be trained to identify high risk behaviour through proper history taking while giving the confidence to the donor regarding confidentiality .

ePI51

Transfusion Transmitted Diseases (including NAT)

Seroprevalence of Cytomegalovirus among Voluntary Blood Donors

Ms. MONALI VALERA, Dr. Yogesh Domadiya, Dr. Nishith Vachhani, Dr. Meera Kangad, Dr. Sanjiv Nandani

Background:

Cytomegalovirus (CMV) is a Herpes virus that usually causes mild symptoms like flu or glandular fever in healthy individuals but can remain in the body for life. The virus can reactivate and is often present without symptoms in bodily fluids such as nasopharyngeal secretion and urine. Serious illness can occur in fetuses, new-borns, and people with weakened immune systems, such as those undergoing immunosuppressive treatments.

Most adults have been exposed to CMV and develop an immune response marked by the presence of CMV IgG antibodies. CMV can spread through direct contact with body fluids and from mother to child during pregnancy or breastfeeding. In immunocompromised individuals, disease can result from reactivation of the virus or new infections. This study aimed to assess the prevalence of CMV antibodies among blood donors to understand the risk of transfusion-transmitted CMV (TT-CMV), particularly in vulnerable populations like low birth weight infants and immunocompromised patients.

Methods:

A prospective study was conducted to screen 54 voluntary blood donors for CMV IgG antibodies, following the necessary consent procedures.

Results:

Of the 54 blood donors, 51 (94.44%) were found to be seropositive for CMV IgG, indicating prior exposure to the virus. Only three (5.56%) of the donors were seronegative.

Conclusion:

The high prevalence of CMV antibodies in blood donors poses a risk for TT-CMV. To improve blood safety, it is recommended to use leucodepleted blood components, which reduce white cells and are considered 'CMV safe'. These components should be used for high-risk patients, as leucodepletion is as effective as using CMV IgG negative blood. This practice can help prevent TT-CMV in vulnerable recipients.

ePI52

Transfusion Transmitted Diseases (including NAT)

Economic Impact of Nucleic Acid Testing in the Blood Transfusion Services in a Developing Country: An Economic Modelling Study

Angel Mary Sam, Rakhal Gaitonde, Debasish Gupta

Background & Objectives

Around the world, more than 53 million units of blood are screened with Nucleic Acid Testing (NAT). Latest WHO data depicts that 55 countries across the globe carry out NAT on donated blood units mandatorily. NAT testing of collected blood started in India around late 2000s and was subsequently implemented by only a few centres across India. This study aims to understand the importance of NAT of donated blood by mapping out the economic impacts of transfusion transmissible viral infections (HIV, HBV and HCV), to perform a costing of outcome pathways with and without NAT and to project the long-term economic savings by implementing NAT.

Methods

An economic modelling study was carried out by analysing 5-year data obtained from a blood centre in a tertiary care centre in South India. Serological screening reports were compared with nucleic acid testing. The key steps involved were:

Step 1: A protocol map showing the blood donor pathway in various scenarios was developed

Step 2: Cost analysis

a) Imputed costs from Indian literature were applied to the protocol.

b) Costs for provision for NAT testing in this institute was calculated

Step 3: The experience from our blood centre was applied to create an economic model.

Results

Out of the 50,731 donors who registered, 33,578 donors donated blood. Seroreactivity was seen in 165 units while NAT was reactive for 71 units only. A NAT yield of 6 (1 in 5596) was obtained. Sensitivity analysis revealed 2.6% false positive testing using serological testing alone. Expenses for NAT testing was INR 5,12,83,500 (US$ 6,12,669). Lifetime total expenses incurred if these 6 donations took place leading to TTI was INR 10,95,67,250 (US$ 13,08,969).

Conclusion

NAT should be made a mandatory test in India, at least by Government intervention to perform centralized blood testing in each state as it is more cost-effective than the lifetime expenses incurred in transmission of HIV, HBV and/or HCV via blood transfusion. If NAT is made mandatory, testing costs can subsequently be reduced.

ePP153

Transfusion Transmitted Diseases (including NAT)

Review of donor testing algorithms: Ethical dilemmas

Arjun U, Rahul Chaurasia, Gopal Kumar Patidar, Hem Chandra Pandey, Poonam Coshic,

Background & Objectives:

Screening of Transfusion-transmitted diseases (TTIs) is an essential step to ensure safety of blood components. Notification of TTI status among the reactive donors' aids in early diagnosis and management of infected donors. It also helps in preventing reactive donors from future donations and further transmission of the incriminated infectious agent. However, notification of indeterminate and false positive reactive status can lead to emotional and social distress amongst the donors. Thus, it is imperative to review the TTI testing, prior to notification.

Methods:

A retrospective study was conducted over a period of 6 months, to review the donor testing algorithms of HIV, HBV and HCV by both serological (Chemiluminescence) and Nucleic acid amplification testing (NAT), prior to donor notification. The data was collected from blood bank information software (BIS) and descriptive analysis was done using Microsoft Excel.

Results:

A total of 30675 donors were assessed during the study period. Amongst these, 797(2.6%) donors were found initially reactive for either of the tested infectious markers. This included 355(1.16%) concordant reactivity (serology-reactive and NAT-reactive), and 442(1.44%) discordant reactive (394(1.28%) Serology-reactive but NAT-nonreactive and 48(0.16%) serology-non-reactive and NAT-reactive).

All discordant reactive samples were repeat tested in duplicate (both serology and NAT) using fresh sample from plasma units to ascertain its reactive status. It was found that 189(42.76% of 442) donors showed reactivity in repeat testing whereas 253(57.24% of 442) donors showed non-reactive status for both serology and NAT.

Conclusion:

Reactive blood donors with concordant TTI results can be notified in appropriate and timely manner, whereas notifying donors with non-reactive repeat testing, further warrants confirmatory testing and their follow-up. It also raises serious concerns, for false yet permanent deferral of such donor, which can lead to serious emotional and social distress among such blood donors.

ePP154

Transfusion Transmitted Diseases (including NAT)

Cost-benefit analysis of implementing Nucleic Acid Amplification Testing for Transfusion Transmissible Infections: 6.5-year experience from a tertiary care centre.

Dr Akshay Kumar Chopra, Dr Shamee Shastry, Dr Ganesh Mohan, Dr Deepika Chenna

Introduction – Despite safety measures, the risk of Transfusion Transmissible Infections (TTIs) remains due to testing limitations. Nucleic Acid Testing (NAT) improves transfusion safety by reducing both residual risk and the window period for detection. The cost-benefit of NAT is assessed by comparing its costs to the economic benefits of preventing infections and related morbidity.

Objectives – To perform the cost-benefit analysis of universal NAT screening for HIV, HBV, and HCV by comparing the costs of NAT to the economic benefits of preventing infections.

Methodology – This retrospective study at a tertiary hospital from June 2017 to December 2023 reviewed donor data, serological screening, and NAT results for HIV, HBV, and HCV. MiniPool (6 samples) PCR-based NAT was performed using Cobas s201 (Roche Diagnostics). The additional infections detected by NAT that were missed by serology represent the NAT yield. A cost-benefit analysis, using value of statistical life in India, assessed the infections prevented relative to cost of NAT.

Results – A total of 102,929 donors were screened - 93.23% males and 6.77% females. 61.5% aged 18-32. The serological reactivity rate was 0.79%, while the NAT reactivity rate was 0.114%. The NAT yield was 0.0136%, detecting 13 HBV, 1 HIV, and no HCV cases. In total, 42 TTIs were averted, with residual risks of 0.0029 for HIV, 0.027 for HBV, and 0.00043 for HCV. Investing 600 rupees in NAT-tested blood products saves each recipient about 15 lakhs in treatment costs and prevents 7 DALYs. For tertiary care centres, NAT enhances blood safety and reduces legal implications from TTI, underscoring the benefits of advanced testing for better health outcomes and lower costs.

Conclusion – NAT is a cost-effective tool for TTI screening in tertiary hospitals. The cost-benefit analysis shows that it reduces TTI incidence and healthcare costs, underscoring its value in enhancing blood safety and saving lives.

ePP155

Transfusion Transmitted Diseases (including NAT)

Seroprevalence of Cytomegalovirus among Voluntary Blood Donors

Ms. MONALI VALERA, Dr. Yogesh Domadiya, Dr. Meera Kangad, Dr. Nishith Vachhani, Dr. Sanjiv Nandani

Background:

Cytomegalovirus (CMV) is a Herpes virus that usually causes mild symptoms like flu or glandular fever in healthy individuals but can remain in the body for life. The virus can reactivate and is often present without symptoms in bodily fluids such as nasopharyngeal secretion and urine. Serious illness can occur in fetuses, new-borns, and people with weakened immune systems, such as those undergoing immunosuppressive treatments.

Most adults have been exposed to CMV and develop an immune response marked by the presence of CMV IgG antibodies. CMV can spread through direct contact with body fluids and from mother to child during pregnancy or breastfeeding. In immunocompromised individuals, disease can result from reactivation of the virus or new infections. This study aimed to assess the prevalence of CMV antibodies among blood donors to understand the risk of transfusion-transmitted CMV (TT-CMV), particularly in vulnerable populations like low birth weight infants and immunocompromised patients.

Methods:

A prospective study was conducted to screen 54 voluntary blood donors for CMV IgG antibodies, following the necessary consent procedures.

Results:

Of the 54 blood donors, 51 (94.44%) were found to be seropositive for CMV IgG, indicating prior exposure to the virus. Only three (5.56%) of the donors were seronegative.

Conclusion:

The high prevalence of CMV antibodies in blood donors poses a risk for TT-CMV. To improve blood safety, it is recommended to use leucodepleted blood components, which reduce white cells and are considered 'CMV safe'. These components should be used for high-risk patients, as leucodepletion is as effective as using CMV IgG negative blood. This practice can help prevent TT-CMV in vulnerable recipients.

ePP156

Transfusion Transmitted Diseases (including NAT)

Rising Syphilis Positivity in Blood Donors: A Review of Our Experience and Strategies for Mitigation

Dr. Vidhi Jain, Dr. Devanshi Gosai

Introduction:

Syphilis is treatable bacterial infection caused by Treponema Pallidium. Various epidemiological studies report a diminishing prevalence of syphilis including other bacterial STIs and a rising incidence of viral STIs. However, a resurgence of syphilis has been observed and reported. The aim of our study was to find out the trends of syphilis among blood donors in Vadodara region of Gujarat.

Materials and Methods:

This study was carried in a blood centre, attached to the Medical College in Vadodara, Gujarat. This was a retrospective study. A total of 11,924 blood donors were screened for syphilis during 5 years (from 2019 to 2023) by Syphicheck Rapid Dipstick test (Modified Treponema pallidum hemagglutination assay) and data was analyzed with respect to sero-reactive cases.

Results:

Out of 11,924 blood donors screened for transfusion transmitted infections, 47 donors were sero-reactive for syphilis, while one donor had syphilis with human immunodeficiency virus (HIV) infections. Prevalence of syphilis was more in replacement donors than voluntary donors and was in raising trend.

Conclusions:

Prevalence of syphilis among blood donors was in raising trends in last five years, especially last year in this region and was more in replacement donors. To mitigate this trend, we recommend enhance screening, serological testing, donor education, and collaboration with public health authorities. We also purpose strategies for early detection, prevention, and control of syphilis transmission through blood transfusion.

ePI57

Transfusion Transmitted Diseases (including NAT)

A Multifaceted Approach to Hepatitis B Screening: The Role of Anti-HBc and Anti-HBs in Blood Transfusion Safety

Ramesh Kumar, Dr.S.Shanmugam M.D.

Background & Aim:

Transfusion transmitted hepatitis B has always been with incidence of increased transmission through donated blood. The screening test for hepatitis B infection is detection of HBsAg ,that does not rule out the risk of transmission of hepatitis B as the donor may be in the 'window period'. The presence of antibody to the hepatitis B core antigen (anti-HBc)- Total in serum usually means a past infection of the hepatitis B virus (HBV). Therefore, the present study was undertaken to find the possibility of obviating the need of screening of Anti HBc Total with Anti HBc-IgM and Anti HBs so as to optimize the resource

Materials & Methods:

Between January 2023 and December 2023, a total of 5,540 blood donor samples were collected and tested for anti-HBc Total, Anti HBc-IgM, Ant HBs and HBsAg using the chemiluminescent microparticle immunoassay (CMIA) method. All anti-HBc Total reactive samples were subsequently tested for anti-HBs. Among the anti-HBc Total reactive and anti-HBs negative samples, anti-HBc-IgM was also tested.

Results:

Of the 5,540 samples, 1.99% (110) were reactive for HBsAg, while 10.1% (560) were reactive for anti-HBc Total. In the 450 anti-HBc Total reactive samples that were negative for HBsAg, 386 were reactive for anti-HBs (≥10 IU/ml), and 64 were negative (<10 IU/ml). Among those anti-HBs negative samples, only 4 were reactive for anti-HBc-IgM.

Conclusion:

Routine screening for anti-HBc Total is not mandatory in India; however, the high incidence of anti-HBc necessitates careful evaluation. Unlike Western countries, where positive units can often be discarded, this is not feasible in India. Testing for anti-HBs and anti-HBc-IgM can reduce blood discard rates while enhancing the safety of the blood supply. Our findings support a strategic approach to screening that optimizes resource utilization while ensuring transfusion safety

ePP158

Transfusion Transmitted Diseases (including NAT)

Study of Major Transfusion Transmitted Infections (TTI)

dr faisal, dr sohail malik

Abstract

Background

Major Transfusion Transmissible Infections (TTI's) as human immune-deficiency virus (HIV-I/II), hepatitis B virus (HBV), Hepatitis C virus (HCV), Malaria parasite (MP) and syphilis can spread through blood or blood products These TTI are a threat to blood safety. The objective of a BTS is thus to ensure safe and efficient supply of blood at all levels. Efforts to increase blood supply through family/replacement donations can lead to dangerous outcomes in patient care.

Aim

Study aims to find out the prevalence of transfusion transmitted infection (TTI) in blood Donors in a government tertiary care hospital and formulate strategies.

Material and Methods

A Retrospective Cross Sectional study was done on 5168 donors from 2021 - 2023 in Department of Immuno haematology and Blood Transfusion Medicine at SKIMS, MCH, Jammu and Kashmir India. The donors were properly screened as per blood donor selection criteria and guidelines laid down by NACO and Drug and Cosmetic Act 1940.

Results

Out of 5168 donors comprising of both voluntary and replacement donors. Males comprised of 4861 (94.06%) and females 307 (5.94%) donations. Male to female blood donor ratio is 15:1. 3676i.e. (71.13 %) of total donors were on replacement basis 2020 – 23. In this study the total number of male donors 4861 (94.06%) exceeded than female donors 307 (5.94%).Replacement blood donors 3676 (71.13%) comprised two thirds of blood donations in comparison to voluntary donations 1492 (28.87%). Overall seroprevalence of TTI was found to be 39 (0.75%).Prevalence of HIV, HBsAg, HCV and Syphilis (VDRL) was 0%, 0.25%, 0.48% and 0.04% respectively.

Conclusion

A relatively low prevalence of TTI was found.

ePP159

Transfusion Transmitted Diseases (including NAT)

A Retrospective Analysis of Co-infection Patterns and Prevalence Among Blood Donors at a Tertiary Care Centre in Southern India (2008–2023).

Dr.M.PUSHPAJA, Dr.B.Shanthi, Professor and HOD

Background and objective: Blood is a potential source of infections like HIV, HBV, HCV, malaria, and syphilis. Despite improved detection through molecular techniques, transfusion-transmissible infections (TTIs) remain a significant risk, especially with coinfections that can worsen disease outcomes.

Materials and Methods: A retrospective analysis of all blood donors during the study period from January 2008 to December 2023 was done. From 2008 to 2014, blood donors were screened using the 4th generation Enzyme-Linked Immunosorbent Assay (ELISA) and from 2015 to 2023, by using the Chemiluminescence Immunoassay (CLIA) method for anti-HIV I and II, HBsAg, and anti-HBC and for Malaria and syphilis by using ELISA. Donors were grouped as mono-infected and co-infected.

Results: During the study period from 2008 to 2014, a total of 118188 donors screened by using, ELISA 4th generation out of which, 3433 (2.9%) donors were serologically reactive, with 3393 (2.87%) having mono-infections and 40 (0.033%) showing co-infections. From 2015 to 2023, a total of 159885 donors screened by using CLIA, 3278 (2.05%) donors were reactive, with 3227 (2.018%) mono-infections, and 51 (0.0318%) co-infections. Throughout the entire study period from 2008 to 2023, 91 (0.0327%) donor samples exhibited co-infections. The most common combinations HIV and syphilis in 28 donors, HBV and HCV in 21 donors, HIV and HBV in 17 donors, and HBV and syphilis in 15 donors. Additionally, there were 4 cases each of HCV and syphilis, and HIV and HCV, 1 case of malaria and syphilis, and 1 case of HIV, HBV, and syphilis. The mean age of donors was 30.49 years, with 95.8% being males.

Conclusion: We conducted a first-time assessment of co-infection patterns among blood donors at our tertiary care centre. Since co-infections impact disease progression, future prospective studies are needed to rule out cross-reactivity and potential false-positive results.

Key words: Blood donors, Co-infections.

ePO73

Immunohematology

Beyond “dangerous O": Anti-A and anti-B titers in A, B and O whole blood donors

Dr Amit Kumar Chatterjee, Dr. Amit Kumar Chatterjee, Dr. Pandeep Kaur, Dr. Davood Bava, Dr. Akarshan Gupta, Dr. Amit Kumar, Dr. Anuneet Tripathi, Dr. Ankita Nigam

Background and Objectives: Despite advancements in component preparation and cross-matching reducing hemolytic transfusion reactions, concerns remain, particularly with apheresis-derived platelets, which can still cause hemolytic responses if transfused to an ABO-incompatible patient due to high titer anti-A and anti-B antibodies. This study aimed to determine the prevalence of high anti-A and anti-B titer among A, B, and O blood group donors and to explore factors associated with high titers.

Methods: A cross-sectional observational study was conducted over 18 months, enrolling 978 participants from a tertiary care teaching hospital in Western India. Anti-A and anti-B titers were determined by Serial 2-fold doubling dilutions using the Conventional Tube Technique. Samples with IgM titers ≥64 and IgG titers ≥128 were labeled as high titer. Statistical analysis assessed correlations between high titers and demographic factors.

Results: Among the participants, majorities were males (98.8%), with an age range of 18-60 years (mean: 28.9 years). Blood group distribution was A: 26.1%, B: 39%, and O: 34.9%, with 90.6% being RhD positive. The prevalence of "dangerous O" was 14.1%. High antibody titers were observed in 3.52% of A group donors and 10.5% of B group donors. For anti-A, 12.2% had high IgM titer and 2.5% had high IgG, In case of anti-B, high IgM was found in 2.3% of donors, while high IgG titer were seen in 0.2%. High IgM titers correlated with younger age, female gender, and vegetarian diet. High IgG titers were linked to female gender, vegetarian diet, and O RhD-positive blood group.

Conclusion: The study sheds additional light and provides supplementary information regarding the prevalence and correlation of high anti-A and anti-B titers among O, A and B blood donors. Understanding these factors is crucial for optimizing transfusion safety protocols, including selective screening of platelet units and tailored transfusion strategies based on donor characteristics.

ePO74

Immunohematology

Antigen & phenotype frequencies of Rh & Kell blood groups among 500 donors at a tertiary care center in Punjab

DR. RAJARSHI CHATTERJEE, DR. VANEETA BHARDWAR, DR. MANINDER KAUR

BACKGROUND & OBJECTIVES: Karl Landsteiner & Weiner discovered the Rh blood group system. Due to the immunogenicity of the Rh antigen, Rh D antigen testing was mandated in the pre-transfusion testing along with A & B antigen. The most important irregular red blood cell alloantibodies are directed towards Rh (Anti D, C, c, E, e) & Kell (Anti K & k) blood group antigens. The study aims to determine the phenotype frequencies of the Rh & Kell blood group antigens among voluntary blood donors attending the blood center, PIMS, Jalandhar, Punjab. The prospective cross-sectional study was conducted on 500 voluntary blood donors attending the blood center from August 2023 till June 2024.

METHODS: The antigen typing was carried out using the Galileo fully automated immunohematology analyzer (Immucor, Germany) which uses the microplate hemagglutination technique for antigen typing. The Rh (D, C, c, E, e) & Kell (K) antigen typing was done using IgM monoclonal antisera from Immucor.

RESULTS: Out of 500 donors, 491 (98.2%) were male & 9 (1.8%) were female donors. 88 (17.6%) donors were first-time donors & 412 (82.4%) were non first-time donors. e antigen was most common (98.2%) followed by D (96.8%), C (88%), c (57%), E (12.4%), and K (1.8%). In order of descending frequency, the phenotypes were DCCee (42.4%), DCcee (38%), DCcEe (7%), Dccee (4%), dccee (3.2%), DccEe (3%), DccEE (1.8%), and DCCEe (0.6%).

Conclusion: This study aimed to determine the antigen & phenotype frequencies of Rh & Kell blood group systems & also the most probable genotype of the Rh blood group system among voluntary blood donors.

ePO75

Immunohematology

Evaluation of presence of anti-D antibody in breast milk of Rh D negative mothers

Kshitija Mittal, Ravneet Kaur, Harshita Agarwal, Paramjit Kaur, Gagandeep Kaur

Background and Objectives: The objective was to identify anti-D antibody in breast milk of Rh D negative mothers.

Methods: The descriptive observational study was conducted over 8 months. Sixty-four RhD negative pregnant mothers with gestational age ≥ 34 weeks were enrolled. Two ml breast milk and 5 ml blood sample in an EDTA vaccutainer were obtained within 7 days of delivery. ABO grouping and Rh D typing on maternal plasma and reverse grouping on breast milk samples was performed using tube technique. Indirect Antiglobulin test (IAT) was performed using microcolumn gel technique on both samples. If IAT was positive, antibody screen, identification and doubling dilution titers of antibody identified were performed. ABO grouping, RhD typing, and Direct Antiglobulin Test (DAT) was performed on neonate sample within 24 hours of delivery. Neonate was followed up for requirement of phototherapy, double volume exchange transfusions (DVET) or for PRBC transfusions during hospital stay.

Results: Of 64 mothers, majority (n=41, 64.1%) were multigravida. Anti-A and anti-B antibodies in breast milk corresponded to respective maternal blood groups. IAT was positive in 22 (34.4%) maternal plasma samples with anti-D in 21 and anti-D along with anti-C antibody in 1 sample. Among 22 mothers with anti-D antibody, 13 (59.1%) had received Rh immunoprophylaxis and alloanti-D was seen in 9 (40.9%) cases. Anti-D titers due to Rh immunoglobulin ranged from 1:1 to 1:2 and due to alloanti-D from 1:4 to 1:32. IAT was positive only in 17 (26.6%) breast milk samples with anti-D antibody identified in all samples. Anti-D titers due to Rh immunoglobulin ranged from negative to 1:1 and due to alloanti-D ranged from 1:1 to 1:4. DAT was positive in 7 neonates. Phototherapy was required in 4 neonates and phototherapy plus DVET in 2 neonates.

Conclusion: Our study demonstrated presence of anti-D antibody in breast milk.

ePO76

Immunohematology

THE LEAST INCOMPATIBLE CROSSMATCHED PRBC TRANSFUSION BY BIOLOGICAL IN VIVO

COMPATIBILITY TEST

DR. Manoj Kumar Dubey, Dr. Tulika Chandra (Prof. and Head), Dr. Ashutoh Singh, Dr. Archana Solanki

BACKGROUND- Biological in vivo compatibility test is an essential serological test in patients who's crossmatched PRBC not showing compatibility.

Aim/Objective- This study aimed to determine the safety and efficacy of the least incompatible/best matched

PRBC transfusion through the biological in vivo compatibility test.

Method- This is a prospective observational study conducted at Dept. of Transfusion Medicine at kgmu. Till now 25 patients are included in our study, for whom appropriate red blood cells (RBC) could not be found.Total 36 best matched PRBC units transfused by applying the "in vivo compatibility test" patients were observed during and after the transfusion with respect to acute hemolytic reactions that could develop. The biochemical parameters (S.LDH, S.Bilirubin, Hct,retic count, Hb) of hemolysis were examined before and after at 24 hrs. of transfusion.

Result- Most of the transfusion were completed successfully with no complication or symptom observed.Some of them got mild increase in body temp. urticaria and palpitation but transfusion were completed.Only in two case symptoms found mild to moderate along with dysnea after that unit were dicarded and another selected unit transfused successfully. A statistically significant increase in hematocrit (~2.7) and hemoglobin(~0.9), Retic count(~1.4),And significant decrease in serum bilirubin total (~0.3), S.LDH(~13.1) was seen post transfusion.

ePO77

Immunohematology

Detection of Unexpected Antibodies in Blood Donors and Patients- A Prospective Study

Dr Abhipsa Shrotriya, Dr J Philip,Dr R Mallhi,Dr R Basnotra

INTRODUCTION:

Unexpected red cell antibodies pose a significant threat in providing safe blood. These antibodies can be categorized into alloantibodies and autoantibodies, arising from pregnancy, transfusion, transplantation, or occurring naturally. Detecting clinically significant antibodies in pretransfusion testing is crucial to prevent immune haemolytic transfusion reactions. This study assesses the prevalence of unexpected antibodies among blood donors and transfused patients.

AIM:

To detect unexpected antibodies in blood donors and patients.

MATERIAL&METHODS:

This prospective study was conducted over a period of 18 months. Indirect antiglobulin tests (IAT) was done for all donors and for those patients with incompatible crossmatches. These IAT positive donor and patients, were further analysed by Direct Antiglobulin Test(DAT) and Auto-control with antibody screening and identification.

RESULTS:

During the period of study 11,726 donor and 69,667 patients were evaluated for all abnormal antiglobulin test results.

Among the blood donors, 22 were found to have unexpected antibodies, with the distribution as follows :13 donors tested positive only for IAT, 5 only for the DAT, and 1 for both IAT and DAT,1 for IAT and Auto-control, and 2 for all three tests.

Among the patients, 27 were identified with unexpected antibodies, The distribution among these was: 21 tested positive only for IAT, 1 for both IAT and DAT,2 for both IAT and Auto-control and 3 for all three tests.

The commonly identified antibodies were anti-M followed by anti-c, anti-E and anti-D.

CONCLUSION:

Our findings indicate a notable prevalence of unexpected antibodies, underscoring the critical need for thorough pre-transfusion testing. Many of the antibodies detected are clinically significant and have potential to cause harm to the patient. Therefore, the screening for unexpected red cell antibodies in both donors and recipients should be reinforced as a routine practice.

ePO78

Immunohematology

Antibody identification in general patient population at tertiary care Hospital in Haryana for safe blood transfusion.

Dr . Akash Ghansham Gore, Dr. Saroj Rajput

Background and objectives

Ensuring transfusion safety necessitates not only the exclusion of infectious agents but also the averting of haemolytic episodes due to alloimmunization against erythrocyte antigens. . Although antibody screening is customary in certain regions, it remains under-implemented in India. The objective of this study is to determine the prevalence and frequency of allo immunization in the general patient population, focusing on a gap in existing data that primarily covers multi transfused individuals.

Methods

This retrospective study was conducted in the tertiary care centre of North India. All patients between (Jan-Dec 2023) with a positive indirect antiglobulin test(IAT) regardless of age, gender and number of prior transfusions were included in this study. Transfusion and clinical records of these transfused patients were analyzed. The variables analyzed were ABO group, Rh system, IAT, direct antiglobulin test (DAT) and autoantibodies.

Results

In a cohort of 1936 patients,148 (7.6%) were positive for antibodies. Of these, 87(58.8%) were females and 61(41.2%)were males .A single alloantibody was detected in 129 (87.2%) cases, while 19 (12.8%) had multiple alloantibodies. Alloimmunization occurred in 141 (95.3%) previously transfused patients ($p < 0.01$), and 66 (75.9%) of the 87 allo immunized women had a history of pregnancy ($p < 0.01$).Rh system antibodies were the most prevalent, detected in 118 (79.7%) cases ($p < 0.05$), with anti-D (68/148, 45.9%), anti-E (20/148, 13.5%), and anti-C (14/148, 9.5%) being the most frequent .MNS system antibodies were found in 16 (10.8%) cases, mainly anti-M (9/148, 6.1%).Other antibodies included Lewis (8/148, 5.4%), Kidd (3/148, 2%), and Kell (2/148, 1.4%).

Conclusion

Alloimmunization was strongly correlated with both transfusion history and previous pregnancies ($p < 0.01$). Antibodies from the Rh blood group system, particularly anti-D, were the most frequently identified, followed by antibodies from the MNS blood group system, predominantly anti-M.

ePO79

Immunohematology

Unusual presentation of Anti-C antibody along with Antigen-C

Dr. Jhalak Patel, Dr. Vishvas Amin, Ms. Palak Panchal, Ms. Jyoti Shetty, Mr. Emmanuel Christian, Mr. Bharat Parmar, Mr. Akib Mansuri

Background and Objectives:

The Rh blood group system is a complex blood group system. Rh antibodies are produced in Rh negative individuals following exposure to foreign RBCs post transfusion or pregnancy. Anti-C is a rare cause of hemolytic disease of fetus and newborn and is very scarcely reported in the literature.

The aim of this case report is to present the unusual findings of the "C" variant in Rh blood group system.

Material and Methods:

The blood grouping and antibody screening was performed on fully automatic immunohematology analyser “QWALYS-EVO” by Digast, France. The compatibility testing was done on fully automatic analyser “Automax-80” by Tulip diagnostics.

Results:

The patient’s phenotype was O positive and its Rh and Kell phenotype were D+C+c-E-e+K-. When crossmatched with the same phenotype, all the units were incompatible. Further, O negative having phenotype (D+C+c-E-e+K-) and D positive units with antigen C negative were compatible ruling out possibilities of anti-G. It was noted that Anti-C was present along with antigen C. The blood transfusion was avoided and the blood units was only kept for emergency as it would have caused alloimmunization to the patient against antigen-c.

Conclusion:

Rh and Kell Phenotyping facility is a boon to blood centres which ensures transfusion safety to patients.

ePO80

Immunohematology

Comparative Analysis of In-House vs. Commercial Anti-A1 Lectin: Insights from a Tertiary Care Blood Center in Southern India

Vijit Joon, Dr. Hariharan, Dr. Sureshkumar, Dr. Sriram, Dr. Sahayaraj

INTRODUCTION

Lectins are carbohydrate-binding proteins which are obtained from seeds of selected species of plants which plays a pivotal role in blood typing, especially in the detection of A sub groups and H antigen. Lectins have a nonimmune origin. Blood banks often rely on commercially available lectins for this purpose. They are used as tools to detect antigens on surface of Red blood cells. In-house preparation of lectins can be considered as an alternative approach to obtain the Anti-A1 lectin. Preparation of Lectin offers advantages like reduced costs and greater flexibility in titration of lectins.

AIMS AND OBJECTIVES

This study was done in order to

 Assess the efficiency between In house Lectin prepared lectin with Commercial available Anti-A1 lectins in terms of cost-effectiveness, reliability, specificity, and ease of implementation and storage.

MATERIALS AND METHODS

Seeds of Dolichus biflorus was locally obtained . Following which the seeds were soaked overnight in saline .The soaked seed were then crushed and grounded using mortar & pestle till coarse sand like . The grounded seeds were soaked in saline. The soaked seeds were incubated in room temperature for 12 hours. After the incubation the supernatant was centrifuged to get clear supernatant. The supernatant was then filtered and titres were checked. The solutions were stored in aliquots and taken when required.

RESULTS

The in house prepared Lectin showed specificity with 3+ to 4+ agglutination to A1 and A1B cells for which the results were comparable to commercially available lectins. The titres were adjusted to be reactive to A1 cells at titres 32 and A1B cells at 16. This solution was used for the analysis. Cost of In house prepared Anti-A1 lectin was significantly lower than commercial Anti-A1.The inhouse prepared lectin was stored at 4*c upto 7 days of storage.

CONCLUSION

The In- house prepared Anti-A1 lectin was found to be as effective as commercially available lectin, with substantial lower cost to prepare and store. This can be adopted in resource poor blood centres.

ePO81

Immunohematology

Retrospective study of Alloimmunization and spectrum of red serological findings in a tertiary care centre excluding non-obstetric and perinatal patients

DR B SHANTHI, DR CH VINAY KUMAR

Background & Objectives: Red cell alloimmunization occurs when a recipient's immune system forms antibodies against transfused Red blood cell antigens that are not present in the recipient. Challenges in managing alloimmunized patients include identification and provision of compatible RBC units. The alloimmunization process complicate future transfusions, leading to transfusion reactions, difficulties in finding compatible blood, increased transfusion-related morbidity. This study aims to investigate incidence and rates of alloimmunization, identify associated problems, and explore strategies for resolution and management of blood supply issues in such cases.

Methods: It was a retrospective study done in dept of Transfusion medicine, NIMS, Hyderabad from 2017 to August 2024. Data was taken from documented registers, HIS and previous test reports. All parameters of these patients (Age, sex, transfusion history, obstetric history, diagnosis, blood grouping, alloantibody identified and blood issues) were collected and analysed.

Results: In the study period total 1,24,743 samples came for blood grouping, antibody screening or cross matching. Alloimmunization was observed in 205 patients (0.16%). Most common alloantibody identified was anti-M in 48 patients followed by anti-c in 34 patients. Female predominance was seen in this study with male to female ratio of 2:1. Mean age of the patients was 34.7 years. Most of the patients (189) had a previous sensitization event either in the form of transfusion or pregnancy or both. Thalassemia was the most common diagnosis in the alloimmunized patients. Total 568 blood units were issued to 167 patients with alloantibodies. Blood grouping discrepancies were seen in 93 of 205 patients. Autoantibodies were present in 13 patients along with alloantibodies.

Conclusion: Red cell alloimmunization poses significant clinical and logistical challenges in transfusion medicine. Through preventive measures and strategic management of blood supplies, the impact of alloimmunization can be mitigated. Prophylactic antigen matching, particularly for Rh and Kell antigens, is recommended for patients requiring chronic transfusions

Key words: Alloimmunization, Thalassemia, RH blood group system and antibody identification

ePO82

Immunohematology

ESTIMATION OF ANTI-A IgM AGGLUTININ TITERS IN B-BLOOD GROUP INDIVIDUALS:

A CROSS-SECTIONAL STUDY

Dr.T.KINGSTON XAVIER, Dr.J.RAVISHANKAR

BACKGROUND & OBJECTIVES:

ABO blood group system has naturally occurring IgM agglutinins. Knowing the titers in general population can help in mitigating acute rejection during ABO incompatible transplantation and in transfusion of ABO incompatible plasma components(Fresh frozen plasma & platelets). The aim of this study was to estimate Anti-A IgM agglutinin titers in B blood group individuals.

METHODS:

This was a cross-sectional study performed at a tertiary care hospital-based blood centre from July to September 2024. Anti-A IgM titer was performed using hemagglutination principle by conventional test tube technique with in-house prepared pooled A red cells. While blood donor samples were used to assess titer in healthy individuals, samples received for blood transfusion were used to assess titer in patients. A titer > 64 was taken as high titer.

RESULTS:

Among 126 blood samples [donors(n=70) and patients(n=56)], Mean age was 35.26 ±15.34 years, 67.46% were males(n=85), Mean titer was 83.19 ±67.03,Mean titer in males was 87.62 ±67.12,Mean titer in females was 74 ±66.72 and 62.70% had low titer values(n=79). The mean IgM titer was higher in age less than 30 years(n=67) and was statistically significant ($p<0.05$).

Among 70 donor samples, Mean age was 28.24 ±7.17 years, 92.85% were males (n=65),Mean titer was 108.22 ± 65.5,Mean titer in males was 103.75 ±62.28, Mean titer in females was 166.4 ±85.86 and 54.28% had high titer values(n=38) .

Among 56 patient samples, Mean age was 44.03 ±18.16, 64.28% were females(n=36), Mean titer was 51.89 ±55.09, Mean titer in males was 35.2 ±55.38,Mean titer in females was 61.16 ±53.44 and 83.92 % had low titer values(n=47) .

CONCLUSION:

Agglutinin titration will be helpful in preventing transfusion reactions with ABO incompatible plasma components and in cases being planned for ABO incompatible transplantation.

ePO83

Immunohematology

Rare Blood, Rarer Genes: Mumbai's First Réunion Phenotype Blood Donor with a novel FUT2 Mutation

Dr. Elvis Alex, Dr. Lincy Jacob, Dr. Swati Kulkarni, Dr. Rati D, Harita M, Monali L, Sangeeta S, Amruta I.

Background & Objectives:

This case report details an expression of mutations in the FUT1 and FUT2 genes resulting in manifestation of rare Réunion phenotype in an Indian blood donor. These mutations led to the partial absence of the H antigen on RBCs with a non-secretor status, complicating the serological profile. We report the investigation of a 37-year-old male donor who presented with a blood grouping discrepancy which was ultimately identified as Ah (Réunion Phenotype). The objective of this report is to illuminate the nuances involved in recognizing and differentiating this rare phenotype from the Para-Bombay phenotype.

Methods:

Routine blood grouping revealed a discrepancy, prompting further investigation. Advanced serological tests were conducted to assess the expression of the A and H antigens on RBCs and in secretions. Mutations in ABO, FUT1, and FUT2 were analyzed by DNA sequencing.

Results:

To resolve the discrepancy, the donor's sample was tested with anti-H lectin and the Anti-A1 lectin. An atypical manifestation of a 4+ reaction was observed in the Anti-A (commercial) tube (Forward grouping) while the Anti-H lectin test showed a negative result. However, when polyclonal anti-A and anti-AB were used, a +2 reaction was detected, with no reaction to the commercial anti-H lectin. Antibody screening (commercial cells) by CAT was positive and negative with Bombay Phenotype RhD Positive Cells. Saliva testing revealed that the donor was a non-secretor for A, B and H substances, suggesting the possibility of the Réunion phenotype. Molecular analysis showed the genotype as: FUT1 gene: FUT1*01N.09/FUT1*01W.23 (weak H antigen on RBCs), FUT2 gene: se171,216,428/se171,216,428 (non-secretor) and ABO gene: ABO*A1.01/ ABO*A1.01 (A antigen on RBCs).

Conclusion:

This case unravels the diagnostic complexity in classifying and differentiating the Réunion phenotype from the Para-Bombay phenotype, and the indispensable role of molecular diagnostics in addressing blood group anomalies and safeguarding transfusion practices.

ePO84

Immunohematology

High Frequency antigen negative rare In(a+b-) phenotype in Indian patients producing anti-Inb: a case series

Swati Kulkarni, Swati Kulkarni, Pooja Kshirsagar, Sai Lalitha Challapilla, Shanthi Bonagiri, Soumee Banerjee, Ankit Mathur, Prasun Bhattacharya, Disha Parchure, Manisha Madkaikar

Background: Inb is a high frequency antigen (HFA) of Indian blood group system (ISBT 023) present on red blood cells (RBCs), present in >99% of the population. Antibody against this antigen is known to cause hemolytic transfusion reactions. The identification of alloantibodies to HFA and provision of blood in such cases is often challenging. Targeted-Next Generation Sequencing (tNGS) assay helps in predicting the antibody specificity once the full antigen profile of the patient is known. The aim of this study was to investigate the specificity of the antibody to the HFA.

Methods: This study included four complex serological cases (1 thalassaemic patient, 1 antenatal women and 2 patients requiring transfusion for surgery) where the specificity of the antibody could not be identified and were referred to ICMR-NIIH. After extensive immunohaematological workup, an antibody to HFA was suspected. Genomic analysis was carried out using tNGS assay for 51 genes of 41 blood group systems to provide a complete antigen profile. Specificity of antibody was predicted and further confirmed using antigen-positive cells. Family studies were also carried out for identifying more rare individuals.

Results: Blood grouping in all samples showed cell-serum discrepancy due to presence of an alloantibody showing panaggutination reaction at all phases by CTT. The antibody was suspected against a HFA. Genomic analysis revealed a rare HFA negative “In (a+b-)” phenotype due to homozygous mutation c.137G>C in exon 2 of CD44 gene. After knowing the full antigen profile, antibody was predicted as anti-Inb, which was further confirmed by using preserved rare Ina RBCs. All cases were found to be compatible with Inb negative donor. Twenty two family members of one index case were available for further screening, and two more rare blood donors with “In (a+b-)” phenotype were identified.

Conclusions: High-throughput genotyping is an effective tool for resolving transfusion-related serological challenges and identifying rare donors. The rare donors identified in this study will be registered in the Rare Donor Registry of India to facilitate the provision of rare blood units both nationally and internationally.

ePO85

Immunohematology

Invisible threats: Analyzing the prevalence of red cell alloimmunization in tertiary care centre

Dr. A.Khanitha Nuzhath, Dr. B.Latha M.D, Dr.G.Kavitha M.D, R.Vasanthraj

Background

Alloimmunization to red blood cell (RBC) antigens is caused by exposure to the red cell antigens either through transfusion or pregnancy. Clinically significant alloantibodies can lead to serious transfusion reactions or haemolytic disease of the newborn. Although Rh and kell blood group system antigens are most immunogenic but other minor blood group system antigens also contribute to alloimmunization. Naturally occurring antibodies are an exception in which the antibodies may be produced in the absence of exposure to the foreign RBCs.

Aims & Objectives

1) To estimate the prevalence of red cell alloantibodies in various patients.

2) To ensure safe transfusion and to optimize compatibility testing.

Methods

The prospective study conducted in department of Transfusion Medicine over a period of six months (January 2024 to June 2024). Antibody screening was carried out in patients with a commercially available three-cell panel by the column Agglutination technique. Antibody screening-positive samples were further tested for antibody identification.

Results

The overall prevalence of red cell alloimmunization in antenatal and multi transfused patients.Out of 185 samples tested, alloantibodies identified were 17.8%(n=33) with anti-D being the most common (48.4%), followed by anti D+C (15.1%), anti-Lea (9.09%), anti-Leb(9.09%), anti-c (6.06%), anti-E(6.06%),

anti-Fya (3.03%), anti-Jkb (3.03%) and

anti k+D(3.03%). The clinically insignificant alloantibodies were (15.1%).

Conclusion

Phenotypically matched antigen-negative crossmatch-compatible blood was transfused if the antibody was clinically significant, whereas for clinically insignificant antibodies, crossmatch-compatible blood at anti-human globulin phase was issued for transfusion.

ePO86

Immunohematology

Positives!!! Ain't No Good - A Quasi-Experimental Study to Determine the Efficacy of Crossmatch matched Platelets in Hemato-oncology Patients with suspected alloimmune platelet refractoriness

Daljit Kaur, Gita Negi, Vaidehi Prasanth, Ashish Jain, Dixa Kumari, Priyanka Rathod, OPS Negi, Gaurav Dhingra, Uttam Kumar Nath

Background: Platelet transfusion plays a vital role in the management of thrombocytopenic patients in hemato-oncology settings to prevent hemorrhagic complications. Immune causes of refractoriness involve alloimmunization against human leukocyte antigens (HLA)and human platelet antigens (HPA), post exposure through previous transfusions, pregnancy, or organ transplantation. This study aimed to determine the efficacy of crossmatched platelets in the patients suspected to have alloimmune platelet refractoriness.

Study Design / Methods: A prospective, quasi-experimental study was conducted in the Department of Transfusion Medicine over two years as an intramural research project after approval of the institutional research committee. Platelet crossmatching was performed on patients with haemato-oncological disorders, both adults and children, who were on platelet transfusion therapy and found refractory on two consecutive occasions post single donor apheresis platelets(SDP) transfusion ,with low corrected count increment(CCI)of < 5000-7000.Solid phase red cell adherence technology through an automated immunohematology analyzer was utilized. The quantitative data was analysed using mean, median, standard deviation t-test and chi-square tests.

Results :The study population consisted of 92(47 males and 45 females) patients with median age of 32.5 years (range 4-73 years). A total of 149 ABO compatible SDPs were transfused to 92 patients. The mean CCI and mean percentage platelet recovery(PPR) were observed as 13741.88 ±10255.08 and 34.6±26.5(mean ± SD) respectively. Of them, 94/149 (63.1%) tests resulted positive for 62% (n=57) of patients and 36.9% tests (55/149) were negative for 38%(n=35) of the total patients tested. Crossmatch compatible platelet transfusion events had a higher mean CCI than that of incompatible episodes (t-test; 17516.1 vs 11424.39; difference is statistically significant; p=005).The difference between adequate and inadequate CCI response for crossmatch compatible and incompatible SDP transfusions was observed to be statistically significant [Chi 2; p=0.0007 (p< 0.01)].

Conclusion: The transfusion of crossmatched platelets to refractory patients ensures better post transfusion platelet increment and platelet recovery. This will in turn benefit the patient from getting multiple donor exposures because of repeated transfusions in view of refractoriness.

ePO87

Immunohematology

Phenotypic Distribution and Clinical Relevance of Rh and Kell Antigens in Blood Donors: A Cross-Sectional Study

Dr. Sonal Sonu, Dr. Rajesh Kumar, Dr. Maryada

Background & Objectives:

The Rh and Kell blood group systems are essential in transfusion medicine due to their role in hemolytic transfusion reactions and hemolytic disease of the fetus and newborn. This study aimed to determine the phenotypic distribution of Rh (D, C, c, E, e) and Kell antigens in voluntary blood donors and explore its implications for improving transfusion safety and donor matching.

Methods:

A cross-sectional study was conducted on 5,754 voluntary blood donors over one year. Blood samples were phenotyped for Rh (D, C, c, E, e) and Kell antigens using the Neo Iris Immucor platform. Statistical analysis was performed using chi-square tests, and results were compared with global data to assess regional specificity.

Results:

Of the donors, 91.9% were RhD-positive and 8.1% RhD-negative. The e antigen was the most prevalent (98.5%), followed by C (83.8%), c (60.7%), and E (19.2%). The Kell antigen was present in 3.5% of donors. Significant correlations were found between RhD-negative status and blood group O (9.6%, $p = 0.009$) and the E antigen with blood group A ($p = 0.004$). The most common genotype was R1r (DCe/dce) at 38.8%, with rare genotypes like r'r (dCe/dce) observed in 0.14% of donors.

Conclusion:

These findings provide valuable insights into the phenotypic distribution of Rh and Kell antigens, highlighting the need for extended antigen phenotyping and specialized donor registries. Such measures can reduce alloimmunization risks, particularly in multi-transfused patients.

ePO88

Immunohematology

CLINICAL SIGNIFICANCE OF PHENOTYPE-MATCHED RBC TO PATIENT WITH THALASSEMIA

Rakhee Shah, Dr. Ripal J Shah, Dr. Tejal Chhabria, Mr. Harimoorthy

Introduction: Auto-immune Haemolytic Anaemia (AIHA) is a rare red blood cell disorder that occurs when antibodies directed against a person's red blood cells cause them to rupture, leading to increased hemolysis. Hemoglobinopathies are a group of inherited disorders because of abnormalities in Hb synthesis or Structure.

Case Report: A case of an 8-year-1-month-old male, with a known case of Thalassemia Intermedia was on/off on transfusion. At the age of 07 years patient was admitted with Hyper Hemolysis Syndrome and Hb of 2.4 gm/dl, transfusion on 2 units of PCV; his Hb reached to 6.1 gm/dl. After 1 year the patient presented with anemia (Hb 3.1 gm/dl), and samples were received for cross-match. At this time, his Blood Group showed discrepancy and the Cross-Match showed incompatibility. So we did DAT, IAT, and Auto, which were also positive. His Biochemical parameters showed Increased Bilirubin and LDH levels, Decreased Hb and Haptoglobulin levels, and reticulocytes present in peripheral blood which indicates a hemolysis picture. The patient also showed Hemoglobinuria and hemoglobinaemia. Due to decreasing Hb level and to find a compatible unit, further investigations like antibody screening and antigen phenotype was performed.

Result: On 11 cell panel, suspected antibodies were Anti-E, Anti-Kell, Anti-M & Anti-S.

On Phenotyping result M and S antigens were present. Voluntary donors with the same phenotype could not come for donation. To obtain a compatible RBC unit, we asked his parents' sample for cross-match and the cross-match showed compatibility with his father's sample. To verify this, we did father phenotyping and it has shown similar findings except for P antigen. His father came for blood donation. After all mandatory procedures, Leuco-reduced Irradiated blood was issued to this patient. After the transfusion, a compatible PRBC unit his Hb reached to 8.7 gm/dl and he was discharged.

Conclusion: Haemoglonipathies and Thalassemia are common disorders in our country. In Thalassemia, due to multiple transfusions, there are high chances of developing allo and autoantibodies. A phenotyped matched Few donors should be kept in reserve for each patient who is transfusion dependent.

Keywords: Thalassemia Intermedia, AIHA, Antigen phenotype

ePO89

Immunohematology

Approach to identification of antibodies to high frequency antigens (HFA)

Pragya Silwal, Sangeeta Pahuja Sindhwani

Background and Objectives:

Patients with antibodies against HFA (prevalence >90%) poses a challenge to the transfusion medicine specialists. Finding a corresponding antigen-negative compatible unit in such scenario becomes very difficult, particularly in emergency and resource-limited settings.

Methods:

We conducted a four years retrospective study to look at the cases wherein the plasma of patient showed pan-agglutination reaction with auto-control negativity. Evaluation(adsorption and elution studies, select cells) was done to segregate antibodies to HFA from multiple alloantibodies. Sample was further tested by enzyme and DTT to identify the specificity of HFA.

Results:

Anti Yta and anti-c : 29 year/Fe, G3A1P1 at 38 weeks POG was planned for elective CS.IAT showed pan-agglutination (2+ to 3+) and papain treatment showed enhanced reaction in most of the cells(suggestive of anti-c) and diminished in 2 cells(suggestive of additional antibody). DTT treatment of red cells showed no change in reaction strength. Reference lab found patient's cells to be Yt(a-) and confirmed presence of anti-Yta and anti-c in the patient's plasma.

D- -: 24 year/Fe,26 weeks POG with bad obstetric history(G6P4L0A1) and severe anemia. Her Rh profile showed presence of D and absence of C,c,E,e antigens. Strength of IAT didn't reduce with DTT and papain. Molecular study revealed patient to have D- -phenotype and presence of anti-Rh17 antibody.

In(b): An unbooked primigravida showed pan-reactivity in IAT(diminished by DTT and papain).Serology showed negative reaction of red cells with anti In(b) antisera and positive with In(a) antisera. Molecular analysis confirmed absence of In(b) on red cells, thus suggesting presence of anti-Inb in the patient's sera.

Family studies were done for all cases and help was sought from referral centres and rare donor registry for transfusion management.

Conclusion:

This study highlights the stepwise approach to identify antibodies to HFA and underlines the significance of national rare blood donor registry along with frozen red cell inventory.

ePO90

Immunohematology

Rh and Kell Phenotyping-A Closer Look

Dr.Jhalak Patel, Dr. Vishvas Amin, Ms. Palak Panchal, Ms. Jyoti Shetty, Mr. Emmanuel Christian, Mr. Bharat Parmar, Mr. Akib Mansuri

Background and Objectives:

There are currently 45 recognized blood group systems containing 362 red cell antigens. The 45 systems are genetically determined by 50 genes but only ABO and RhD blood group status of the recipient and blood donor are considered when red blood cells (RBCs) are transfused. Patients requiring chronic transfusion support are at high risk of alloimmunization because of disparity between donor and recipient antigenic profile. The chances of alloimmunization are higher if the donor and recipient are of different ethnic backgrounds with varied red cell antigenic profile. Immunogenicity of foreign antigens and number and frequency of transfusions also increase the risk of alloimmunization. The presence of RBC alloantibodies creates the potential for serologic incompatibility, makes the selection of appropriate units for future transfusion more difficult, delays blood transfusion, and presents the risk of haemolytic disease of the fetus and the newborn (HDFN).

This study tries to highlight the frequency of Rh and Kell antigens among the blood donors and patients from a period of April to June 2024.

Materials and Methods:

The antigen typing for Rh antigens (D, C, c, E, and e) and Kell (K) was performed on the collected EDTA samples from 16,922 voluntary donors and 5102 patient samples. The test was performed by Erythrocyte Magnetic Technique using a microplate (DuoLys) in a fully automated immunohematology system - Diagast Qwalys Evo by France.

Result:

A total of 22,024 samples were processed of which of the frequency of “D” antigen was 93.07% (n = 20,498), “C” was 87.31% (n = 19,231), “c” was 59.09% (n = 13,013), “E” was 16.94% (n = 3,731), “e” was 98.98% (n = 21,800), and “K” was 1.72% (n = 381).

Conclusion:

Since pre-transfusion phenotyping is not routinely practiced, transfusion of at least Rh and Kell phenotyped donor red cells can lead to a great decrease in the risk of alloimmunization and adverse events related to transfusion.

eP091

Immunohematology

Prevalence of Rhesus (C, c, E, e) and Kell (K) Antigens in blood donors: A Targeted RBC Antigen Typing Study from a Tertiary Care Centre in Eastern India

Mansi Sharma, Prof. Dr Somnath Mukherjee, Dr Satya Prakash, Dr Ansuman Sahu, Dr Debasish Mishra

Background and objectives:

The Rhesus (Rh) and Kell (K) blood group systems are pivotal in transfusion medicine due to their immunological implications and the potential of alloimmunisation due to corresponding antibodies. The primary objective was to assess the frequency of four key Rh antigens (C, c, E, e) and the Kell (K) antigen, as well as to determine the likelihood of obtaining c, E, and K antigen-negative red blood cell (RBC) units to mitigate the risk of alloimmunisation in patients requiring multiple transfusions. Additionally, the study sought to explore any association between ABO blood group and Rh antigen phenotyping.

Materials and Methods:

A retrospective analysis was conducted involving 2,799 blood donors recorded in a tertiary care centre's minor phenotyping donor register, from Jan 2021 to Sept 2024. Antigen typing for Rh (C, c, E, e) and Kell (K) was performed using tulip neutral gel cards and tube techniques with commercially available monoclonal antisera, as per manufacturer's guidelines, whenever corresponding antibodies were detected in patients (a targeted approach). Data analysis was performed using R software version 3.5.3. Fisher's exact test and chi-square test were employed to examine associations between individual Rh antigens and c, E, K antigen-negative units with ABO blood groups. Logistic regression modelling was subsequently applied to investigate these associations further.

Results:

Among 2,799 donors, 2,733 (97.64%) were D positive and 66 (2.36%) were D negative. Antigen frequencies were: e (98.97%), C (87.60%), c (39.15%), E (16.44%), and Kell (1.87%). Notably, 59.97% of RBC units were c, E, and K antigen-negative among 1,719 donors. The distribution of these antigen-negative units by ABO blood group was: A (61.86%), B (64.45%), O (57.25%), and AB (57.45%). Significant associations were found between c and C typing with ABO blood groups ($p = 0.006$ and $p = 0.048$, respectively), while no associations were observed for c, E, and K antigen-negative units. Logistic regression identified A, B, and O blood groups as significant predictors for 'c' positivity and A and B blood groups for 'C' positivity ($p < 0.05$).

Conclusion:

This study computes the prevalence of Rh and Kell (K) antigens in the local donor population, particularly emphasising the prevalence of c, E, and K antigen-negative RBC units (59.97%). Notably, c and C typing exhibited significant association with particular ABO blood groups. These insights are crucial for ensuring the timely availability of compatible or optimally matched RBC units, particularly in emergency transfusion scenarios.

ePI11

Quality Management

Return of unused blood components with its impact on inventory management- a retrospective study

Gaurav Kumar, Prasad P Kulkarni, Seema Gupta, Melvin Mathew, Mukta Jain, Masum Reza, Vaishali Thakare

One of the quality indicators for blood transfusion services is blood component wastage. Blood bags may get discarded for number of reasons, including after their expiration date, seropositive units, are not within QC limits, leakages, or are returned with unused component units.

The easily avoidable amongst these is the return of unused components. This typically occurs when requests for blood products are made without completing a patient investigation and pre transfusion preparedness. Therefore, blood is requested without assessment of its requirement.

This causes wastage of blood units, making it difficult to maintain blood inventory. We analysed returned blood components from different clinical departments retrospectively for a period of 18 months i.e. from January 2022 to June 2023. Total of 113 units were returned, out of which 53 (46.9%) were discarded as they didn't fulfil the criteria for reuse. The most common reason for return was change in plan of transfusion (28 out of 113, 24.77%) followed by fever prior transfusion (22 out of 113, 19.46%). Maximum no. of return blood units were received from surgical wards (38 out of 113, 33.62%) followed by ICU (35 out of 113, 30.97%). Maximum component units discarded from the total returned bags received were from Surgical departments (21 out of 53, 39.6%) followed by ICU (13 out of 53, 24.5%). The total discard rate due to return components were 0.53%.

ePI12

Quality Management
Instrumentation: Purchase, Installation,Calibration,Service and Maintenance……

Dr Yogini Patel, nil
Instrumentation in Transfusion Medicine-
Purchase, Installation, Calibration, Service and Maintenance…
Dr Yogini Patel: Vedantaa Institute of Medical Sciences -Dahanu .Maharashtra
Instrumentation has been elaborately discussed by many stalwarts in transfusion medicine.Protocols have been implemented by MHFW and NABH on criteria for proper equipment selection, Ordering, installation, calibration, validation and maintenance for types of blood centres.Importance of correlating the type of equipment requirement with the scope of the blood centre.

This presentation focuses on the intricate, simple work friendly DOs and DONTs on caring for equipment on daily basis. Technical in-house awareness of standard equipment performance, protocols for daily maintenance and monitoring with start-ups and relevant checklists. Responsibilities of every member of the blood centre from Director level to the housekeeping level.

ePI13

Quality Management

Comparative study of Quality parameters of Apheresis platelets stored in platelet additive solution and in plasma.

Dr. Amanpreet Kaur, Dr Rajesh Kumar, Dr Sonia Gupta ,Dr Deepika Aggarwal , Dr Sonal Sonu , Dr Gulinder Singh

Background: Platelet additive solutions (PAS) are crystalloid, isotonic buffered solution nutrient media used in place of plasma for platelet storage. They replace 60%–70% of plasma in platelet components, so the amount of storage plasma can be decreased.It contain substances that might be beneficial for preservation of platelet function during storage and might protect platelets from the storage lesions and can also be used to extend shelf life of platelet concentrates.Single donor apheresis platelets(SDAP) generally prepared and stored with 200-300ml of donor plasma with shelf life of 5 days.

Objectives: To study and compare in vitro changes in platelet indices – swirling, pH,platelet count,mean platelet volume(MPV) in PAS and plasma stored apheresis platelets on day 1, 5 and 7th day of collection.

Methods:A prospective study was conducted on 50 randomly selected apheresis platelet products,of which 25 were stored in PAS(study group) and 25 in plasma(control group. Eligible donor selection criteria was as per departmental standard operating procedure. Quality Parameters were compared in both groups on days 1,5 and 7.

Results: PAS stored platelets well maintained platelet counts and pH(>6.9),gradual decrease in bicarbonates from day1(16mmol/L) to day7(5mmol/L).On visual inspection swirling score indicated good viability at day1 and in some reduced at day7 indicating gradual fall in both groups.WBC counts in both groups were in normal range .Bacterial culture done on day 7 in both groups showed no growth.

Conclusions: PAS stored platelets maintained more platelet count in comparison with plasma stored platelets from day 1 to day 7.Gradual decrease in bicarbonates in PAS platelets,helped in maintaining pH till day 7.The addition of PAS maintains quality parameter of SDAP within acceptable limits till day 7 of storage. Additional benefit of PAS is to decrease TTI and allergic reactions in patients.

ePI14

Quality Management

STUDY OF THE PROCESS FOR ISSUE OF BLOOD UNITS WITH A VIEW TO REDUCE TURNAROUND TIME (TAT)

Dr.A.Yashovardhan, Dr. Divya Tejaswi

BACKGROUND:

• TAT is one of the quality indicator in blood centers and is calculated as the time taken from the time blood request and samples received to till the blood is crossmatched and available for issue. For PRBC crossmatch, blood centers must have appropriate time limits, for both routine and emergency scenarios.

AIMS

• Study of process for issue of blood units and blood center plan with a view to reduce TAT.

OBJECTIVES

• To determine the contribution of individual processes & plan within the blood center which contribute to TAT for issue of blood units.

• To minimize complaints against the blood center staff in the reception during busy hours and night time.

METHODS:

• TIME MOTION STUDY used to analyze various steps in the process and to know the motion of staff during the process.

RESULTS:

• The workflow with present plan shows, movement of staff across various sections and it took 40minutes 30 seconds to complete the crossmatch and issue of single unit. The nursing staff posted in the reception should take care of entire donor section and transfer of request to LAB -1 and issue of blood units. In night shift single staff is posted, if staff working in the LAB – 1 will not aware of staff came for blood units and they move through various sections to find the technical staff.

• The proposed plan was to merge Lab – I and reception which shows the reduced staff movement by removing 4 steps in the process and it took 36 minutes to complete crossmatch and issue of single unit & continuous availability of staff in reception during day and night.

CONCLUSION:

• The plan change by combining Reception and LAB-I, will minimize the cost of hiring new staff and complaints. The same was discussed with the management for further process.

ePI15

Quality Management

TURNAROUND TIME OF THE BLOOD DONATION PROCESS IN BLOOD CENTRE AT A TERTIARY CARE HOSPITAL -A PROSPECTIVE STUDY

GUNASEKARAN G, Dr. RAVISHANKAR J

BACKGROUND& OBJECTIVES:

Turnaround time (TAT) is one of the quality indicators of blood centre defined by National Accreditation Board for Hospitals and Healthcare providers (NABH). The workflow can sometimes have gaps or bottlenecks that prolong TAT of the blood donation process. This can result in a bad experience for the donor and may discourage the donor from donating. This study aimed to evaluate the turnaround time of the whole blood donation process.

MATERIALS AND METHODS:

This was a prospective cross-sectional study done at the Department of Immunohematology and Blood Transfusion from May to June 2024. Blood donation process includes registration, hemoglobin estimation, blood grouping & Rh typing, medical examination, blood collection and post-donation care. The time for each phase of the process was observed separately. Donations that completed the entire process were included in the study. Deferred donations were excluded. The data collected was entered in Microsoft Excel and analyzed.

RESULTS:

Out of 123 donors observed, mean TAT for donor to complete blood donation was 47.70±12.60 minutes, pre-donation phase was 25.09±11.42 minutes, donation phase was 6.47±1.84 minutes and post-donation phase was 16.13±5.30 minutes. Prolongation of pre-donation TAT was due to the donors' food intake more than 4 hours, many donors arriving simultaneously, and duty changeover time of phlebotomists at 1 pm. TAT of post-donation phase was prolonged when adverse donor reactions were encountered.

CONCLUSION:

The longest TAT was observed in the pre-donation phase. This can be reduced by assigning staff or residents exclusively to that donation area, and when many donors come for donations. Creating awareness among first-time donors may alleviate the problems with food intake. Donor adverse reactions can be avoided by skilled phlebotomists, communicating with the donors during blood donation, and continuous monitoring.

ePI17

Quality Management

ISO 9001:2015: Enhancing Quality in Blood Transfusion Services in Standalone Blood Centers of India"

Rakesh Kumar Luhar, Dr. Ripal J Shah,V. Harimoorthy

QA Coordinator, Medical Director, Quality Director

Prathama Blood Center-Ahmadabad.

Abstract

Background: The healthcare management system, particularly blood transfusion management, plays a vital role in modern medicine. Regular monitoring of quality objective in both medical and non-medical parameters in a blood center is essential to ensure effective blood transfusion services. Identifying and correcting deficiencies in a timely manner is crucial to maintaining high standards of care and patient and donor safety.

Aim and Objective: Current study was carried out to measure the impact of monitoring of quality objective and how it can be used as a tool for Continuous Quality Improvement (CQI).

Material and Methods: This retrospective analysis was conducted at one of the largest standalone blood centers in Western India. Blood centre is ISO certified since 2010 and we used to maintain data as per ISO standard since 2010. The data covering the period from April 2010 to March 2024 was analyzed to calculate 14 quality objective and quality objectives as defined by ISO 9001-2015 QMS.

Results: After data evaluation of these 14 years' data, it was observed that total Blood collection is 476,925 and an average of blood collection in six months is 17033, and the target average in six months of 1975 blood collection per Monthly – blood donation camp (BDC) only with Repeat BDC 68.60%, Number of donor awareness & motivation Programs 100%, Donor adverse reaction 0.6%, Low quantity 1.0%, whole blood damage 0.3%, expired Platelet 7.7%, Post transfusion reaction 0.04%, Donor feedback analysis 97.1%, Patient Feedback analysis 80.7%, NAT Invalid Batch 1 batch, Attrition rate 2.8%, virology batch Fail 1 batch, Material storage Incident 7 nos.

Conclusion: Quality objective are essential tools that stakeholders in Blood Transfusion Services must implement to enhance quality performance. By tracking and analyzing these objective, Blood centers can identify areas for improvement, optimize processes, and ultimately ensure the provision of high-quality blood components and services.

Keywords: Quality indicators (QI), Quality Objective (QB), Quality management system (QMS), Continuous Quality Improvement (CQI), Performance Indicator (PI).

ePI18

Quality Management

Implementation of internal quality control program for monitoring of HBsAg ELISA performance at a tertiary care hospital

Dr Thiruvenkatam, Dr J ravishankar

Background and Objectives:

Internal quality control samples may be incorporated in ELISA routinely for the detection of errors occurring due to change in environmental conditions, test system or operator performance. Aim of the study was to prepare HBsAg internal quality control samples, monitoring of results using Levey-Jennings (LJ) charts, their interpretation, identification of errors and corrections applied.

Materials and methods:

This was a prospective cross sectional study conducted at Department of Immuno Hematology and Blood Transfusion, Tirunelveli Medical College, Tirunelveli, Tamilnadu, India. Internal quality control samples for HBsAg ELISA were prepared 'in-house' by using positive pooled samples after 56ºC incubation for one hour. Sample with 1:256 dilution gave E ratio of 1.9 and was taken as internal quality control. After 20 runs, mean and SD was calculated. Inter aliquot variation was performed using Coefficient of variation and interpreted to detect errors. LJ chart demonstrating the performance of Internal quality control samples on 26 runs [07 July to 23 September] for HBsAg ELISA was drawn and analyzed.

Results: The Mean of first 20 runs was 3.66 ±1.44(Mean 1) and LJ chart was drawn. The first 7 runs, when plotted were within normal limits. But the next run showed a shift with value outside 3 SD. The next 6 runs were near the new results (Mean 2). This was followed by another 5 runs near Mean 1. The next 7 runs were near Mean 2. When these results were investigated and analysed, it was found that a new ELISA screening kit was supplied where the runs resulted in Mean 2. A new e ratio and thus a new mean need to be calculated for continuous check if quality.

Conclusion:

Inclusion of Internal quality control sample in HBsAg ELISA run is valuable to check the assay performance ensuring reliability and reproducibility of test results.

ePl26

Therapeutic Apheresis and cellular therapies

STUDY OF NINE CASES OF AUTOMATED RED CELL EXCHANGE IN TERTIARY CARE HOSPITAL

Dr. Bhavika Khunt, Dr Farzana Kothari (Professor & Head)

INTRODUCTION: Red cell exchange is very effective procedure but perhaps underutilized therapy for both acute condition and chronic complications of sickle cell disease. Red cell exchange is removal of patient's red cell, and it replaced by exogenous normal red cells. The exchange prevents the removed sickle cell from participating in new Vaso-occlusive events by decreasing the sickling percentage as high sickling percentage. Therefore, reduces hemolytic complications and provides added oxygen carrying capacity while decreasing the blood viscosity.

AIM: To study the better experience of the patient's clinical outcome, challenges, effectivity and complication by automated red cell exchange and to understand how thus procedure can be effectively utilized in the management of patients in Indian scenario.

MATERIALS & METHODS: This Retrospective study was conducted in tertiary care center in Baroda Medical College, Gujarat, India between 2022 to 2023. Here we shared our experience on analyzed 09 RCE procedure performed on patients of sickle cell disease on F. KABI Machine of apheresis system.

RESULTS & DISCUSSION: Out of 09 patients who underwent the RCE for sickle cell anemia, only one patient was admitted for hip joint replacement due to avascular necrosis of head of femur. The remaining patients were between 75% to 89% & post RCE was brought down to 24 to 35% and was achieved in a single sitting in all the cases. Ultimately the RCE helped to patients a lot by improving oxygen carrying capacity & patient showed significant improvement.

CONCLUSION: RCE is a very safe & clinically effective therapeutic procedure. RCE is helpful to reduce iron overload due to top up transfusion. This procedure is underutilized due to various reasons like inadequate awareness/technical expertise, lack of equipment's & facilities to identify the clinical conditions.

KEYWORDS: Abnormal red cell exchange (RCE), Sickle cell disease, Acute RCE, Apheresis machine

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ePP127

Therapeutic Apheresis and cellular therapies

Therapeutic Plasma Exchange: Gold standard treatment for atypical hemolytic uremic syndrome in children in India.

DR SHEETAL CHANDAK, DR HANSA GOSWAMI

Introduction: Atypical HUS (aHUS) is a serious disease caused by disorder of the complement system or due to genetic etiology. Therapeutic Plasma Exchange (TPE) is a preferred treatment for aHUS.

Material and methods: This was a retrospective study carried out over pediatric patients with aHUS between 2017 and 2018. One to 1.5 plasma volume was removed during every TPE and replaced with fresh frozen plasma. Clinical parameters were monitored pre and post TPE.

Results: 119 TPE were carried out in 15 patients. Average pre TPE and post TPE platelet count were 96.53 ± 75.33 x 109/L and 116.80 ± 80.30 x 109/L(p=0.34) Average pre TPE and post TPE hemoglobin was 6.76 ± 1.79 gm/dL and 8.13 ± 2.12 gm/dL (p=0.5) and pre TPE and post TPE serum creatinine was 1.43 ± 1.85 and 0.70 ± 0.63 mg/dl ($p<0.01$).

Conclusion: TPE is a safe procedure in the treatment of aHUS.

ePP128

Therapeutic Apheresis and cellular therapies

Role of therapeutic plasma exchange in oncology patients with acute liver failure at a tertiary care oncology centre

ABINASH PADHY, Priti Desai, Anisha Navkudkar, Abhaykumar Gupta

BACKGROUNDS & OBJECTIVES: Acute liver failure(ALF) in oncology patients is rare but a severe condition that poses significant challenge in patient management. Therapeutic plasma exchange(TPE) has emerged as a potential bridging intervention, but its effectiveness in this patient population remains under-explored. This study elucidates the outcomes of oncology patients with ALF, treated with TPE.

METHODS: This study is a single centre retrospective observational study, evaluated over 3 years (January 2021-December 2023). Data was collected from institutional Electronic medical and departmental records, that included patient demographics, procedure details, underlying malignancies, pre and post procedure liver function tests(LFT) and coagulation profile. TPE was initiated as per ASFA recommendation category III grade 2B for ALF.

RESULTS: During the study period, 12 TPE procedures performed on 6 oncology patients (3 males and 3 females) of mean age 39 years(9-66years), with mean of 2 (1-3) sessions each on alternate day basis. High volume plasma exchange couldn't be done on these patients, as patients were hemodynamically unstable. On an average 1.25 times the total plasma volume was exchanged per session with combination of Fresh Frozen Plasma, Normal Saline, Albumin as per patient's clinical requirement. Improvements in pre and post procedure values of PT (40 vs 17Sec, p=0.023), INR (3.4 vs 2.4, p=0.289), aPTT (80 vs 41Sec, p=0.136), Sr Bilirubin (24 vs 18mg/dL, p=0.060), ALT (1178 vs 464U/L, p=0.005), AST(2338 vs 1065U/L, p=0.005), and ALP(127 vs 99U/L, p=0.034) were observed. However, minor clinical improvements were noted. Post TPE >30 days survival was observed in 50% of the patients.

CONCLUSION: TPE was well tolerated and safe and can be considered as a bridging therapy in oncology patients with ALF as this data showed improvement in coagulation profile and LFT. This need to be evaluated with larger sample size to decide the utility of the procedure in oncology patients

ePP129

Therapeutic Apheresis and cellular therapies

Therapeutic plasmapheresis -A boon to low income group North Karnataka Patients with GBS

Kavitha Yevoor, Dr Purushottam Reddy, Dr Sunita Vernekar

NEED FOR STUDY:

The reported incidence rates for Guillain-Barre Syndrome are 1 to 2 per 100,000 population. The lifetime likelihood of any individual acquiring Guillain-Barre syndrome is 1:1000. Guillain-Barre Syndrome is an acute ascending paralyzing disorder that is caused by the inflammation of the peripheral nerves.4The primary focus of management is supportive care, and immunotherapy-intravenous immunoglobulin or Therapeutic Plasmapheresis. The Cochrane review published in 2017 summarized that the treatment with Therapeutic Plasmapheresis reduced time (a) on the ventilator, (b) to walk without assistance (c) recovery of full muscle strength.5 The present study is done to evaluate the outcome of Therapeutic Plasmapheresis as the first line treatment in Neurological Disorders

OBJECTIVES OF THE STUDY:

1. To determine the effectiveness of Therapeutic Plasmapheresis in the management of Neurological Disorders.

2. To determine the incidence of adverse reactions of Therapeutic Plasmapheresis in the treatment of Neurological Disorders.

3. To estimate the outcome of Neurological Disorders based on Medical Research Council Score.

MATERIALS AND METHODS:

SOURCE OF DATA:

This study is carried out jointly in Department of Pathology and Neurology, KMCRI, Hubballi. The study will include every case of Neurological Disorders treated with Therapeutic Plasmapheresis at KMCRI, Hubballi.

Retrospective review of Therapeutic plasmapheresis procedures done during a period of 36 months, from june 2022to May 2024 in a tertiary care teaching hospital in South India. Indications, clinical results and technical factors are discussed.

Results: The main indication for PE was GBS (50 patients) ,Age of patients ranged from 24-72 (mean = 48 years). The most common complications were hypotension (52%). There was no mortality.

Conclusion: The analysis of 56 cases done in our department shows that the procedure is safe, with only minimal procedure related complications and no mortality.

Keywords: Guillain-Barré syndrome; Therapeutic plasmapheresis; .

ePl30

Therapeutic Apheresis and cellular therapies

Revising the Role of Therapeutic Plasma Exchange in Pregnancy-Associated Thrombotic Microangiopathy: A Case Series

Dr Sathish S, Dr Saptarshi Mandal, Dr Muthukumaravel PJ, Dr Para K Trivedi, Dr Rahul, Dr Siddharth Mittal, Dr Archana Bajpayee, Dr Rajesh Jhorawat

Introduction:

Pregnancy and postpartum periods pose high-risk of developing thrombotic microangiopathies (TMA). However, the management of pregnancy-associated TMA remains ill-defined.

We present a post-partum TMA case series of 6 cases that highlights the importance of early recognition and prompt intervention for pregnancy-related TMA. All these cases presented mainly with isolated Acute Kidney Injury AKI, and underwent Therapeutic Plasma Exchange (TPE) which resulted in favourable maternal & fetal outcome in majority. Although therapeutic plasma exchange (TPE) has been successful in patients with TMA in the past, American Society for Apheresis guidelines 2023 lists this indication (TMA, Pregnancy Associated) under category III with grade 2C recommendation, which suggests that either the evidence is soft, i.e. likely to change with time, or an umbrella category likely to split up, as more evidence accrues. Our case series is likely to contribute evidence in favour of doing the procedure for such case/subtypes.

Aim and Objective:

To study the effect of TPE among postpartum TMA with Acute Kidney Injury

Method:

The Patients included in the series are Six patients admitted to our institute from September 2023 to September 2024 presenting with AKI and diagnosed with postpartum TMA, who underwent at least one cycle of therapeutic plasma exchange. These patients were assessed for laboratory parameters and clinical outcome.

Result:

Six postpartum patients with AKI are included in this case series. Indication for TPE in all the cases were thrombotic microangiopathy (TMA). All received 2 to 5 sessions of TPE with 1.3-1.5 plasma volume removed on an average per cycle. The endpoint of TPE was a reduction in lactate dehydrogenase and an increase in platelet count. Five patients responded well on follow-up while one had acute cortical necrosis and remained dialysis-dependent. It has been noted in the previous studies too that a pregnancy or postpartum induced TMA cases was getting converted to chronic kidney disease and becoming dialysis dependent in the long run.

Conclusion: These case series highlighted the successful management of pregnancy-related TMA involving acute kidney injury with therapeutic plasma exchange (TPE). TPE may be a valuable adjunctive therapy in severe cases of postpartum AKI, and its utilization should be considered early in a multidisciplinary approach to ensure favourable maternal outcomes. Early recognition of TMA and prompt intervention with TPE in managing postpartum AKI to prevent irreversible renal damage and improve patient outcomes.

ePI31

Therapeutic Apheresis and cellular therapies

Erythrocytapheresis(RBC Exchange) in a Sickle Cell Disease Patient with a Thalamic Space Occupying Lesion: A Case Report

DR PINJARI CHINIGI SAB, Soumya Das, Rounak Dubey, Sucheta Shrikant Meshram, Vishvdeep khushoo, Varidh Katiyar, Juilee Shalik Charmode, Aishwarya V

TITLE- Erythrocytapheresis (RBC Exchange) in a Sickle Cell Disease Patient with a Thalamic Space Occupying Lesion: A Case Report

BACKGROUND- A 52-year-old female was admitted to the neurosurgery ward with intermittent headaches persisting for one and a half years, associated with vomiting, slow responsiveness, and generalized weakness. CT head revealed right thalamic space-occupying lesion (SOL) with significant perilesional edema and mass effect which required urgent surgical intervention. She was also detected to have homozygous Sickle Cell Disease (SCD).

OBJECTIVES- The patient was started on intravenous analgesics Due to critical nature of the patient's condition and the immediate need for surgery, an urgent automated RBC exchange was scheduled to lower the hemoglobin S (HbS) levels to below 30%. During the procedure, the patient was intubated, and subsequently.

METHODS- The patient was transferred to surgical intensive care unit (SICU) for initiation of RBC exchange procedure, using Spectra Optia (TERUMO-BCT) cell separator machine through femoral line access. Based on the PRBC hematocrit (65%) and pre procedure HbS (72.6%), FCR concentration and post procedure hematocrit calculated by the system were 38% and 30% respectively. Prophylactic calcium gluconate infusion was given

ePP132

Therapeutic Apheresis and cellular therapies

Young onset valvular dysfunction as a presentation of familial hypercholesterolemia due to LDL receptor mutation and transient response to LDL apheresis

Divjot Singh Lamba, Jayaditya Ghosh, Liza Das, Rekha Hans, Ratti Ram Sharma, Sanjay Kumar Bhadada

Background and Objectives:

Familial hypercholesterolemia (FH) is an autosomal dominant disorder causing elevated LDL cholesterol, leading to a high risk of premature atherosclerotic cardiovascular disease (ASCVD). It exists in heterozygous (HeFH) and more severe homozygous (HoFH) forms, with HoFH often due to mutations in the LDL receptor gene. HoFH patients have significantly elevated LDL-C levels, resulting in early ASCVD and complications like aortic stenosis. Advances in treatments, such as statins and apheresis, have improved survival rates, extending life expectancy beyond 50 years.

Case report:

This case study presents a rare instance of homozygous familial hypercholesterolemia (HoFH) in a young female, highlighting early-onset severe aortic stenosis and moderate aortic regurgitation. HoFH, a more severe form of familial hypercholesterolemia, is caused by mutations in the LDL receptor (LDLR) gene, leading to extremely elevated low-density lipoprotein cholesterol (LDL-C) levels. The patient was diagnosed at the age of 7, presenting with multiple xanthomas and an LDL-C level of 392 mg/dL.

Despite undergoing several lipid-lowering treatments, including statins, ezetimibe, niacin, and PCSK9 inhibitors, the patient's LDL-C levels remained significantly high. Additionally, she developed myopathy as a side effect of high-dose statin therapy. Genetic testing confirmed the diagnosis of HoFH, with the mutation located in the LDL receptor gene.

Due to the failure of conventional therapies, the patient was treated with LDL apheresis, a procedure designed to lower LDL-C levels. While apheresis resulted in a temporary, substantial reduction in LDL levels, the effect was not sustained, necessitating repeated sessions to manage her condition. The challenges of managing HoFH in this patient, particularly in relation to her valvular dysfunction, underline the need for aggressive early intervention and advanced treatment strategies. LDL apheresis, though beneficial, may only provide transient improvements, emphasizing the need for novel therapies.

Conclusions:

The case also highlights the importance of multidisciplinary care and regular follow-up to optimize outcomes in patients with HoFH, especially in settings where access to advanced therapies may be limited. It stresses the ongoing need for research into more effective treatment strategies to improve long-term management and quality of life for patients suffering from this severe genetic disorder.

ePP133

Therapeutic Apheresis and cellular therapies

Clinical Efficacy of Granulocyte Apheresis Using Hydroxyethyl Starch in an AML Patient with neutropenia: A Case Report

Dr.Jayrajsinh Ajitsinh Rathod, Dr.Krina Mandora, Dr. Manthan Patel, Dr. Ashu Dogra, Dr.Milind Dighe, Dr. Suraj Goyanka

Background and Objective: Bacterial and fungal infections are significant causes of mortality and morbidity in neutropenic patients. Unrestricted antimicrobial use has further worsened the situation due to development of drug-resistant pathogens all over India. Granulocyte transfusion therapy has been shown to be beneficial in these patients by restoring neutrophil counts and aiding in the resolution of infections. This study aims to describe the observed clinical efficacy of granulocyte transfusion in a neutropenic sepsis patient.

Method: A retrospective observational analysis was conducted on patient receiving granulocyte transfusions at our hospital from voluntary blood donors, in accordance with DGHS guidelines. Granulocytes were mobilized using colony-stimulating growth factor (G-CSF) and dexamethasone, and collected using the Terumo BCT Spectra Optia Apheresis System with Medium Molecular Weight Hydroxyethyl Starch (MMW HES) as the red cell aggregating agent.

Results: A high dose of granulocytes (3.1 x 1010 neutrophils/bag) was achieved without any adverse donor reactions. The patient's neutrophil count increased, and fever subsided after two units of granulocyte concentrate transfusion, with no adverse reactions observed.

Conclusion: Granulocyte transfusion is a valuable adjunct to antimicrobials and growth factors in treating neutropenic sepsis that is refractory to conventional antimicrobial therapy.

ePI34

Therapeutic Apheresis and cellular therapies

Thrombocytapheresis in patient of Essential Thrombocytosis with acquired Von Willebrand Syndrome: A Case Report.

Dr.Krina Mandora, Dr.Jayrajsinh Rathod, Dr.Manthan Patel, Dr.Ashu Dogra, Dr.Milind Dighe, Dr. Suraj Goyanka

Background and Objective:

Essential Thrombocytosis (ET) is a clonal myeloproliferative neoplasm (MPN) characterized by the autonomous overproduction of platelets (≥450 x 109/L). Thrombocytosis in such cases is associated with thrombohemorrhagic events and bleeding due to acquired von Willebrand syndrome (AVWS) which can occur when platelet counts exceed 1000 x 109/L. Therapeutic apheresis offers rapid cytoreduction, ameliorating prothrombotic factors associated with dysfunctional platelets. The objective of this study is to describe the clinical efficacy of thrombocytapheresis in a patient with Essential Thrombocytosis.

Method:

A retrospective observational analysis was conducted on a patient undergoing thrombocytapheresis using the Terumo BCT Spectra Optia Apheresis System in the Bone Marrow Transplant (BMT) unit. Four units of cryoprecipitate were transfused before the apheresis procedure due to the presence of AVWD. Pre- and post-complete blood count (CBC) values were compared, and changes in clinical symptoms were noted to assess improvement in the patient's condition.

Results:

The thrombocytapheresis procedure was well tolerated by the patient with no adverse reactions. The platelet count decreased from 17.80 lakh/µL to 7 lakh/µL, representing a 58% reduction. Clinically, the patient showed resolution of the hematoma and bleeding episodes. The patient regained mobility, and was discharged four days after the apheresis procedure.

Conclusion:

Thrombocytapheresis is an effective treatment for acute uncontrolled thrombocytosis. This case report shows rapid improvement in symptoms and resolution of thrombotic/hemorrhagic complications following apheresis procedure in timely manner.

ePl35

Therapeutic Apheresis and cellular therapies

Light From The Grave: Therapeutic Plasma Exchange as a life-saving therapy in Postpartum Multiple Organ Dysfunction Syndrome.

Dr. Aditi Garud, Dr. Lincy Jacob, Prajakta Joshi, Samruddhi Salve

Background: A 32 year old Primigravida was referred post LSCS with Postpartum eclampsia, altered sensorium, severe sepsis and Multiple Organ Dysfunction Syndrome (MODS). She was put on mechanical ventilation, treated with antibiotics, hemodialysis and 5 cycles of Therapeutic Plasma Exchange (TPE).

Objective: Evaluate the effectiveness of TPE as a life-saving measure by reversal of post-partum MODS, altered sensorium and deranged blood parameters.

Methods: TPE was started immediately on the day of admission. And each procedure was performed on alternate days over 10 days.

Approximately 4.2 liters were extracted during each procedure and substituted with replacement fluids including Fresh frozen plasma. During this period the patient also received 3 units of PRBC

Results: Significant improvement was observed following the second procedure with improved sensorium, multi-organ function and blood parameters. By the second TPE she was alert and responsive, her serum Bilirubin decreased by 69% from 8.4 to 2.6 mg/dl and Serum LDH by 66.5% from 2884 to 966. She was weaned off the ventilator and CBC parameters stabilized to normal levels.

On 12th day of admission she was shifted to ward, discharged with HD catheter and weaned off dialysis within a month.

Conclusion: TPE procedure is safe and effective as a life-saving therapy for critically ill patients with Multiple Organ Dysfunction Syndrome.

Indication for therapeutic apheresis for sepsis with Multi Organ Failure is category III of ASFA guidelines 2023. However TPE used as the first line of treatment for our patient, was well tolerated, and proved to be lifesaving and effective to ensure a complete recovery.

ePP136

Therapeutic Apheresis and cellular therapies

Outcomes in thrombotic microangiopathies treated with therapeutic plasma exchange: 10 years experience from a southern tertiary care hospital

DR SHIVANAND HEMANT KUMATAGI, Dr Shamee Shastry, Dr Ganesh Mohan, Dr Deepika Chenna, Dr Deep M

Background & Objectives: In the 100 years since Eli Moschcowitz reported the first case of thrombotic thrombocytopenic purpura (TTP), there has been remarkable awareness and progress in the diagnosis and management of this rare blood disorder as well as other thrombotic microangiopathies (TMA). Currently there is less understanding of the incidence and pathophysiology of the long-term sequelae of TMA1. The aim of this study was to identify the long-term sequelae following discharge of TMAs treated with therapeutic plasma exchange.

Methods: It is a retrospective observation study conducted over a period of 10 years in a tertiary care hospital located in southern India. All patients who underwent therapeutic plasma exchange for TMA were identified from the register. Their discharge summaries and repeat admissions were analysed from HIS. The demographic details and other clinical details were entered in Microsoft Excel and analysed.

Results: A total of 36 patients underwent therapeutic plasma exchange for TMA in last 10 years. Females constituted 64% of them. The age distribution was 19-45 yrs (39%), <18yrs (33%), 46-60 yrs (20%), >60 yrs (8%). The conditions diagnosed included Thrombotic thrombocytopenic purpura (36%), Hemolytic uremic syndrome (50%), Undetermined (11%), glomerular type TMA (2%). The causes associated were sepsis – 33%, post partum -13%, Infection – 13% (viral, CMV, gastroenteritis, leptospirosis), accelerated HTN - 5%, renal transplantation -5%. The requirement of other treatment options was as follows: steroids (47.2%), hemodialysis (36.1%), rituximab (19.4%), IVIG (13.9%), MMF (5.5%), cyclophosphamide (5.5%). The mean difference days between admission and initiation of PLEX was higher (9.3+/-7.6) in expired group compared to non-expired group (6.2+/- 7.7) and it was statistically significant (p = 0.03).

The in-hospital mortality was 27.7%. The mean repeat admissions for remaining 26 patients was 3 (+/-8). The readmission for relapse was 8%. Other common reasons were gastroenteritis (11%) and graft dysfunction (11%). Other reasons were hypertensive emergency, AKI, medical termination of pregnancy, encephalitis, nephrotic syndrome, anxiety, Heavy menstrual bleeding, headache, tinea infection, vocal cord paresis.

Conclusion: In thrombotic microangiopathies, early initiation of plasma exchange reduces mortality. Most common long term complications are relapse, gastroenteritis and renal graft dysfunction. Other complications are varied but less studied.

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ePI37

Therapeutic Apheresis and cellular therapies

SIGNIFICANCE OF STEM CELL HARVEST IN PATIENTS OF HEMATOLOGICAL MALIGNANCY RECEIVING AUTOLOGOUS PERIPHERAL STEM CELL TRANSPLANT

Dr. Jyoti tiwari, Prof. Tulika Chandra, Dr. Ashutosh Singh, Dr. Archana Solanki, Dr. S.P. Verma

BACKGROUND:

Autologous stem cell transplantation (ASCT) is a common treatment modality in which the patient's own healthy stem cells are used to replace the diseased stem cells in the bone marrow. ASCT following intensive chemotherapy has been used in patients with hematological malignancies, such as multiple myeloma (MM), lymphoma, or solid tumors.

OBJECTIVES:

• Evaluation of CD34 counts with stem cell dose and volume.

• Correlation of recovery time of patients with stem cell dosage.

METHODOLOGY:

• A Pilot study of ASCT comprising of 16 patients, inclusive of 11 cases of Multiple myeloma (MM) and 5 of Hodgkin Lymphoma.

• Granulocyte colony stimulating factor (G-CSF) 10 mcg/kg daily in two divided doses was given till apheresis.

• Plerixafor 0.24 mg/kg stat dose was given 11 hours prior to transplant.

• This was followed by apheresis by COMTEC (Fresenius Kabi) via central venous access in the internal jugular vein.

• Stem cell dose was calculated using mid cycle CD34+ cells and the total blood volume processed.

RESULTS :

• All 16 participants were transfused with adequate amount of CD34+ cells

• Average time for harvesting procedure was 246 min (220-280 min)

• Death within 1 year occurred in 2 patients, out of which 1 showed relapse and was

subjected to multiple cycles of HSCT.

• Rest of the 14 recipients of HSCT were free of disease and did not show relapse till the time of follow up.

CONCLUSION :

Mid cycle CD34+ count can be used as a good indicator for the dose of stem cells in the product and the volume of the product can be adjusted accordingly

ePP169

Transplant Immunology

OUTCOME OF HAEMATOPOIETIC STEM CELL TRANSPLANTATION FOR PRIMARY IMMUNE DEFICIENCY DISORDERS IN A TERTIARY CARE HOSPITAL.

Dr. S. Sumathira, Dr. B. Latha, MD, Dr. Aruna Rajendiran, DM, Dr. G. Kavitha, MD

Background & Objectives:

Primary immunodeficiency disorders are inherited disorders with impaired and dysregulated immunity characterized by recurrent infections, failure to thrive. Hematopoietic stem cell transplantation (HSCT) is a curative option available for many primary immune deficiency disorders (PID). In the recent years increased awareness, availability of diagnostics based on flow cytometry, genetic testing, improved supportive care, use of reduced toxicity conditioning and alternate donor HSCT have improved access to HSCT for children with PID in India. We present results on children with PID who underwent HSCT in our Hospital and the factors that influenced outcome.

Methods:

This prospective observational study was conducted to know the outcome of HSCT for PID in a tertiary care hospital during the period from August 2023 to September 2024. We analyzed the impact of the type of PID, conditioning regimen, Type of HSCT, cause of Mortality and Overall survival.

Results:

A total of 5 children (3 female and 2 male) underwent HSCT for PID at a median age of 12 months (range 5 months to 156 months). HSCT was done for SCID, Gricelli syndrome and Chediak-Higashi syndrome. Matched family donor was available for 2 children. 1 child was transplanted with Haplo-identical donor HSCT and 2 children were transplanted with Matched Unrelated donor HSCT. Busulfan based conditioning regimen was used for 3 children and Treosulfan based conditioning regimen was used for 2 children. The graft source used was peripheral blood stem cells. The survival was superior in children receiving HSCT from Matched Unrelated donor (40%, n=2). Infection is the main cause of mortality in 2 children. The 1 year Overall survival rate was 60%.

Conclusion:

Matched Unrelated donor HSCT is now feasible and has made a therapeutic option accessible to all children with PID.

ePI70

Transplant Immunology

OUTCOME OF HAEMATOPOIETIC STEM CELL TRANSPLANTATION FOR PRIMARY IMMUNE DEFICIENCY DISORDERS IN A TERTIARY CARE HOSPITAL.

Dr. S. Sumathira, Dr. B. Latha, MD, Dr. Aruna Rajendiran, MD,DM, Dr. G. Kavitha, MD

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Conclusion:

Matched Unrelated donor HSCT is now feasible and has made a therapeutic option accessible to all children with PID.

ePI71

Transplant Immunology

" Bridging the Gap: How HLA Allele and Haplotype Frequency Analysis Can Expedite Donor Matching"

Dr Divya M, Mr Sam Arul Doss, Dr Gayathri KC, Dr Dolly Daniel

Background & Objectives:

In the era of cellular and targeted therapies, human pluripotent stem cells (hPSCs), CAR T-cells (Chimeric Antigen Receptor T-cells), and VSTs (Virus-Specific T-cells) are crucial in transplantation, particularly in managing post-transplant complications, and enhancing patient outcomes. These cells can be autologous or allogenic, with the latter being donor-derived, manufactured as patient-specific products and banked. The primary challenge of these cells stems from the inevitable mismatches in the highly polymorphic and immunogenic human leukocyte antigens (HLA), necessitating partially HLA-matched products for the recipients. In the light of this, our study aimed to analyse HLA allele and haplotype frequencies in a small population using custom-developed software.

Methods:

This retrospective analysis was conducted in the Department of Transfusion Medicine and Immunohematology. A cohort of patient and donor samples requested for High resolution HLA typing over a period of two years (2022-2024) were used. High-resolution HLA typing was done with MIA FORA kits on the Illumina MiniSeq platform. An in-house built software (Database-Driven HLA Matching Algorithm with Transaction-Safe CRUD Operations) designed by institutional IT team was used and the results were collated.

Results:

A total of 3050 patient-donor samples were analysed, revealing 61 observed alleles for HLA-A, 97 for HLA-B, 67 for HLA-C, and 67 for HLA-DRB1. Among the HLA class I alleles, the most frequently observed were A*24:02:01 (28%), A*11:01:01 (26%), and A*33:03:01 (25%) for HLA-A; B*40:06:01 (19%), B*52:01:01 (19%), and B*44:03:02 (14%) for HLA-B; and C*07:02:01 (26%), C*04:01:01 (22%), and C*15:02:01 (21%) for HLA-C. For HLA class II, the most frequently observed DRB1 alleles were DRB1*07:01:01 (31%) and DRB1*15:01:01 (28%).

With this high degree of polymorphisms, the study identified a total of 5,762 haplotype combinations, with five haplotypes standing out as the most frequent:

A*33:03:01B*44:03:02C*07:06:01(13%), A*01:01:01B*57:01:01C*06:02:01(10%), A*33:03:01B*58:01:01C*03:02:02(10%), A*02:11:01B*40:06:01C*15:02:01(7%), and A*11:01:01B*52:01:01C*12:02:02 (6%). These five haplotypes likely reflect the most frequent haplotypes in the general population as well and were distributed among 46% of the population studied.

Conclusion:

This study provides a comprehensive analysis of HLA allele and haplotype frequencies within a specific population, highlighting the possible haplotypes that should be targeted for engineering cellular therapy products. Notably, the five most frequent haplotypes are present in 46% of the studied population, offering significant opportunities for targeted allogenic interventions. The in-house software demonstrated its effectiveness in managing complex HLA data, facilitating the precise determination of allele and haplotype frequencies.

ePI72

Transplant Immunology

A Case Report of subgroup of A (Ax) in Renal Transplant Recipient and Donor - an unusual Mother-Son pair.

Dr Pooja Modi, Dr Amit Prajapati

Background & Objectives

A Case Report of subgroup of A (Ax) in Renal Transplant Recipient and Donor - an unusual Mother-Son pair.

ABO subgroups are phenotypes that differ in the amount of A and B antigen carried on red cells, in secretions and in solid organs of the body.

Method:

Two samples of a male and a female patient for Blood grouping were received from the outpatient department. Discrepant result was obtained in blood grouping in both the patients. The mother was impending kidney donor for his son, who was registered for renal transplant at our transplant institute.

On serological test using the Test Tube Method and Anti-A1 Lectin, both the recipient and donor were marked as Ax (Subgroup of A), in order to proceed with the pre-transplant evaluation.

Results:

In the present case, since the donor and recipient were of the same A Subgroup, transplant could be performed owing to ABO compatibility.

Conclusion:

A donor who is group A also has a non-A1 subgroup, then they could donate a solid organ to a recipient who is primary group B (or O) depending on other factors (Low Anti-A titer in the recipient).

• UNOS (United Network for organ sharing) in the United States of America in its new kidney allocation system (KAS) has implemented the allocation of kidneys from A2 and A2B deceased donors into blood group B candidates.

• UNOS showed that the outcomes of B group candidates, who receive A2 or A2B kidneys was not significantly different from the outcome of B group candidates transplanted with B kidneys.

when a subgroup of A is detected in solid organ transplant donors, provisions can be made for allocations to non-A organ recipients; leading to widening of donor pool for such recipients.

ePP176

Recent Advances (including molecular tests)

Evaluating the Efficacy and Safety of Autologous Growth Factor Concentrate for the Treatment of Androgenetic Alopecia

Dr.Rowena D.L. Robins, Dr. Hariharan, Dr. Suresh Kumar, Dr. Sriraman, Dr. Sahayaraj

Introduction: Androgenetic alopecia (AGA) is a prevalent form of hair loss affecting both men and women. This pilot study investigates the efficacy and safety of concentrated growth factor (GFC) therapy, a modified Platelet Rich Plasma (PRP) technique, in enhancing hair density and promoting hair growth in patients with AGA.

Methods: A prospective observational study was conducted from January 2024 to August 2024, involving 10 participants aged over 18 years. Patients were assessed using the Hamilton-Norwood classification. Exclusion criteria included uncontrolled diabetes, bleeding disorders, and active skin conditions. Each participant received 6 GFC injections at four-week intervals, with GFC prepared using the BIOPRO GROFACT Kit. Post-treatment, alopecia grades were re-evaluated, and statistical analysis was performed using the SPSS Software Version 21.

Results: Out of the 10 participants, one patient had a decrement of 3 grades, 5 patients had a decrement of 2 grades and 4 patients had decrement of 1 grade following the procedure. Wilcoxon Signed Rank Test was performed. The calculated p value (<0.05) indicated statistically significant improvement. None of the patients experienced any adverse effects.

Conclusion: GFC therapy demonstrates significant potential as a treatment option for AGA, promoting hair regrowth through the precise delivery of autologous growth factors. The findings support the efficacy and safety of GFC, highlighting its role in improving hair density and overall patient outcomes. Further studies with larger sample sizes are warranted to validate these results.

ePP177

Recent Advances (including molecular tests)

Standardization of SSP-PCR protocol for genotyping of HPA 1,2,3,4,5 &15 in North Indian blood donor population

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Background & Objective:

Human Platelet Antigens (HPAs) are polymorphic antigens, resulting from single base-pair substitutions, and play a key role in immune-mediated platelet disorders like neonatal alloimmune thrombocytopenia, post-transfusion purpura, and platelet refractoriness. There is scarcity of data on the prevalence of HPA alleles in India. The objective of this study was to develop SSP-PCR protocol for genotyping HPA 1, 2, 3, 4, 5, and 15 in our blood donor population.

Methods:

Primer designing was done on the basis of published papers and online bio-informatics tools. 25nM desalted primers were synthesized from commercial source. Gradient PCR (Thermal-cycler, Biometra GmbH, Germany) was done to determine annealing temperatures of individual HPA alleles. Protocol provided by NIBSC was used for standardizing PCR-SSP conditions. Genomic DNA extracted from left over buffy coat samples was used for assay standardization. The amplification products were visualized by agarose gel electrophoresis.

Results:

A total of 19 oligonucleotides primer sequences were prepared (04 primer sequences for HPA 1 and 03 each for HPA 2-5, 15). Annealing temperatures for different HPA genes were found to range from 57.5 (for HPA-4,5&15) to 62°C (for HPA-1). Final PCR conditions were standardized using DNA (conc 40 ng/µL) to a total of 21 amplification cycles and final 8 extension cycles.

PCR cocktail consisted of 0.4 µL of allele-specific HPA1-5 and -15 "a" and "b" primers (in 12 separate tubes) with 0.4 µL of common HPA primer, 0.4 µL of forward and reverse primers for Human Growth Hormone (HGH) as internal control, 2.9 µL of nuclease-free distilled water, 5µL of Taq DNA-polymerase and 0.5µL of DNA.

Conclusion:

SSP-PCR protocol for HPA 1, 2, 3, 4, 5, and 15 was successfully standardized. This will enable us determine frequency of different HPA alleles in our population and further develop HPA typed panels for development of platelet serology.

ePOO6

Blood Components

Influence of ABO Blood Groups on Fibrinogen Levels in Fresh Frozen Plasma: A Retrospective Study

Dr. GULINDER SINGH, Dr.Rajesh Kumar, Dr. Sonal Sonu

Background:

The ABO blood group system significantly affects various hemostatic factors, including fibrinogen, a critical protein in clot formation. Previous studies have indicated that non-O blood groups (A, B, AB) have higher fibrinogen levels compared to group O. This study aimed to assess the influence of ABO blood groups on fibrinogen levels in Fresh Frozen Plasma (FFP) and its potential clinical implications for transfusion practices.

Materials and Methods:

A retrospective analysis was conducted at Dayanand Medical College and Hospital between 2021 and 2023. FFP units from healthy donors were categorized based on ABO blood group (A, B, AB, O). Fibrinogen levels were measured using standardized coagulation assays, and data were extracted from transfusion records. Statistical analysis was performed using ANOVA to evaluate the differences in fibrinogen concentrations between ABO groups.

Results:

A comprehensive retrospective analysis encompassed 181 Fresh Frozen Plasma (FFP) units across different ABO blood groups. The distribution of mean fibrinogen concentrations for each group was as follows: A at 321.9 mg/dL, B at 324.0 mg/dL, O at 318.0 mg/dL, and AB at 267.2 mg/dL. The highest concentration was observed in the B group. Statistical evaluation using ANOVA revealed an F-statistic of 2.078 and a p-value of 0.058, which, while not reaching traditional levels of statistical significance ($p < 0.05$), indicates a trend towards elevated fibrinogen levels in non-O blood groups, most pronounced in the B group. This updated analysis underscores a pattern of higher fibrinogen levels in non-O blood groups.

Conclusion:

ABO blood groups have a marked influence on fibrinogen levels in FFP, with non-O groups displaying higher concentrations. This finding is clinically relevant, particularly in the selection of FFP for patients requiring optimal coagulation support, such as in massive transfusions or coagulopathy management. Tailoring FFP selection based on ABO blood group and fibrinogen levels may enhance transfusion efficacy.

ePOO7

Blood Components

Analysis of the unused returned blood components at a Tertiary care Oncology Centre from Western India

Meena Makwana, Sujata More, Priti Desai, Anisha Navkudkar, Abhaykumar Gupta

Background and Objectives:

Unused blood components should be returned to the Blood Centre immediately (within 30 minutes of issue), if a transfusion is not performed. Improper handling of returned components can lead to wastage and risk the safety of future recipients. This study aimed to evaluate the return of blood components across various hospital departments, identify reasons for returns, and propose preventive strategies.

Methods:

This retrospective observational study was conducted from August to September 2024 at the Department of Transfusion Medicine in a tertiary care oncology centre in Western India. Each returned occasion was analyzed for component type, number of units returned, site of return, duration outside controlled temperature, and reasons for return. Data were collected using departmental records and Blood Centre software.

Results:

During the study period, a total of 9989 blood components were issued, of which 121 units (1.2%) returned to the Blood Centre on 81 occasions. Of the 121 returned units, 44.6% (54/121) were packed red cells, 21.5 % (26/121) were random donor platelets, 14.0% (17/121) were fresh frozen plasma, 9.9 % (12/121) single donor platelets and 9.9 % (12/121) were cryoprecipitate. Total 17.4 % (21/121) units were discarded due to being returned after 30 minutes. The most common reason for return was patient related (patient having fever, breathlessness and chest pain), followed by patient not present at transfusion and transfusion not required any more. The primary site for returns was general day care, followed by Intensive Care Unit and pediatric ward.

Conclusion:

This study shows effective utilization of issued units (as only 1.2 % were returned) but also revealing areas for improvement. Majority of returned units were due to patient related factors. Implementing preventive strategies like staff education improved coordination can reduce the occurrence of unnecessary returns.

ePOO8

Blood Components

Analysis of blood ordering practices in elective onco-surgical cases at a tertiary care oncology hospital

SUJATA MORE, Priti Desai, Anisha Navkudkar, Abhaykumar Gupta

Background and Objectives:

Blood transfusion services have a crucial role in management of patients undergoing elective surgeries and are an integral part of the healthcare system. Crossmatch to Transfusion (CT) Ratio, Transfusion index (TI), Transfusion probability (TP) are an important quality indicator used to estimate the appropriate use of blood.

Objective:

To analyze the CT ratio, TI, TP at a tertiary care oncology hospital and to assess the efficacy of blood ordering practices.

Methods:

This was a retrospective study conducted over a span of two months from August to September 2024. Data was retrieved from the hospital information system and departmental records. This data was used to calculate the CT ratio, TI, TP.

Results:

A total of 894 patients(477 Males and 372 Females) undergoing elective onco-surgical procedures were included in the study. Out of the 2456 units of packed red blood cells (PRBC) ordered and cross matched, only11.97%(294/2456) were transfused; the CT ratio was 8.3. Out of 849 patients, only 154 patients required PRBC transfusion giving TP of 18.13% and TI of 0.3. Major departments requesting PRBCs were 25% (616/2456) from Head and Neck, 21% (517/2456) from Gastrointestinal (GI), 19% (461/2456) from Bone and Soft Tissue (BST). The maximum blood utilization was observed as 27.5% (81/294) in BST, 26% (77/294) in GI and 15.6% (46/294) in Head and Neck. The CT ratio ranged from 6-31 with neuro-oncology having the least (6) and Breast oncology having the maximum (31).

ePOO9

Blood Components

Restrict issue of female plasma to patient to decrease risk of TRALI

Dr Urmil Dhuria, Mr Karan Agarwal

yes

ePO10

Blood Components

A Retrospective case analysis of cryoprecipitate transfusion in a patient of chronic liver disease (CLD) with disseminated intravascular coagulation (DIC)

BHARAT NINGGO, Pratima Kh and Rachandra Singh K

Aim/Objective:

To assess the role of cryoprecipitate transfusion in managing DIC and Thromboelastrography (TEG) based monitoring of coagulation function

Background:

Cryoprecipitate is the plasma product which contains a concentrate of fibrinogen and factors viii, vWF, XIII. It is used to treat a bleeding condition associated with low or deficiency of coagulation factors. Patient with CLD have multiple coagulation abnormalities sometimes may presented with DIC. It is characterized by the simultaneous occurrence of widespread vascular clot deposition, compromising an adequate blood supply to various organs and thereby contributing to organ failure. Cornerstone of managing DIC is treating underlying cause. However, initial management includes replacement of factors with pre-available factors and plasma product such as cryoprecipitate. TEG comes as point of care and real-time diagnosis tool for de-arrange coagulation function and tracking of effect or changes from the replacement of factors deficiency

Case description:

Requisition of 10 units of cryoprecipitate was received at blood bank RIMS on 28/6/2023 for 55yrs male diagnosed with CLD and presented with manifestation of DIC, like bleeding episodes.

Outcome:

- Significant improvements in TEG tracing after cryoprecipitate transfusion are: -

I) K-value from 17.4 min to 4 min

II) Alpha angle from 23.8 degrees to 51.2 degrees

III) MA value from 21.8 mm to 36.4 mm

- Decrease in R value from 7.2 min to 1.6 min

Conclusion:

1-It was noted that significant improvement in coagulation profile or functions after the cryoprecipitate transfusion which was evident from the TEG recording chart

2-TEG rapidly provides a comprehensive assessment of the entire coagulation process and helpful as a guide for correcting coagulopathy

3- It is also helpful for rational use of blood and its components and reduce wastage

ePO27

Blood Donation and donor apheresis

RETROSPECTIVE ANALYSIS OF PATTERNS OF DEFERRAL AMONG BLOOD DONORS IN A TERTIARY BLOOD CENTRE

Kolahalam Venkata Sai Kiran, Dr. Nidhi Bhatnagar, Dr. Sangita Shah, Dr. Mamta Shah

INTRODUCTION:

Blood transfusion saves millions of lives. Proper donor selection is an important step to ensure safety of both donor and the recipient. Donors undergo strict selection criteria laid down by the Director General of Health Services and Drug Controller of India to ensure safety and quality of blood and blood products derived from their donation. Due to this, it is likely that donors may get deferred either temporarily or permanently. Rates and Reasons for deferral vary from region to region. All donors who are deferred must receive proper counselling and education regarding deferral reasons and adequate advice to rectify it.

AIM:

The aim of the study is to analyse the rates and reasons of donor deferral in our blood centre.

OBJECTIVES:

- To observe the rates of deferral among different sexes
- To observe the rates of temporary and permanent deferrals.
- To study the various reasons of temporary and permanent deferrals.

MATERIALS AND METHODS:

It is a retrospective observational study done over a period of 2 years from January 2020 to December 2021. Details of the donors who were deferred either temporarily or permanently during the study period was collected from the donor registry in the Blood Bank Data Management System in our Blood centre.

RESULTS:

Out of the 73215 donors who registered for blood donation during the study period, 3192 donors were deferred either temporarily or permanently due to various reasons. Total deferral rate was 4.35% in our Blood centre. The major reasons observed were Haemoglobin less than 12.5g% (30.6%), Hypertension (6.3%), Ongoing Medication (6%), Surgical Procedures (4.3%) and Prior Vaccination (2.7%).

CONCLUSION:

Knowledge about rates and reasons of donor deferral guides the medical personnel to focus on proper screening of donors. Proper follow up measures and donor motivation programmes can be carried out in case of temporarily deferred donors to bring them back to donor pool.

KEYWORDS: Blood Donation, Donor Selection Criteria, Donor Deferral.

eP028

Blood Donation and donor apheresis

Motivation of voluntary blood donation by introducing online blood E-Wallet

Mr Karan Agarwal, Mr Anand Agarwal, Dr Urmil Dhuria

Yes

eP029

Blood Donation and donor apheresis

Analysis of blood donor deferral and action taken in last three years

Jignesh J. Desai, Dr. Abhay G. Jhaveri, Dr. Rinku V. Shukla, Dr. Kruti Dumaswala

Background & Objectives:

Donor deferral can be categorized into temporary and permanent. Over the last few years, many blood donation organizations faced challenges of declining donor numbers. The aim of the study was to analyze the Temporary reasons of donor deferral due to three main common causes for the last three years (September 2021 to July 2024) and take proper action to reduce it.

Methods: We analysed the Temporary donor deferral data according to gender and reason (Low Hb, Low BP, Medication etc.). We counselled the donors to make lifestyle changes where appropriate like gave dietary advice and hematinics in case of Low Hb. We advised the donors to consult their doctors wherever needed.

Results: Total deferral rate during the study period (September 2021 to July 2024) was 16211 out of 88845 (i.e.18.35%).

In 2021 : 2183 donors (20.04%) from 10892 total donors

In 2022 : 5997 donors (19.32%) from 31069 total donors

In 2023 : 5521 donors (17.31%) from 31901 total donors

In 2024: 2510 donors (16.75%) from 14983 total donors

Overall The deferral rate is reducing every year.

Conclusion: If we analyse and counsel the deferred donors properly, we can reduce the donor deferral and reduce dissatisfaction about deferral. The deferral rate is reducing every year.

ePO30

Blood Donation and donor apheresis

Blood Donor Deferral Pattern at SMS BLOOD CENTRE

SMS Medical College And Attached Hospital, JAIPUR

Dr. Vinita Kumari Dotania, Dr. Parmendra Pachori

Background and Objective

Donor deferral is a significant challenge as it leads to the loss of motivated blood donors and reduces blood availability for patients in need. This study aims to analyze the frequency and reasons for blood donor deferral, including high hemoglobin deferral, which is often underreported. According to the World Health Organization (WHO), a nation's blood requirement is approximately 1% of its population. In India, during 2016-17, there was a shortfall of 1.9 million blood units against the target of 13 million units.

Method

This retrospective study reviewed the deferral records of whole blood donors at a tertiary care hospital from July 2023 to June 2024. The deferral process was categorized into four stages:

1. Stage A: Evaluation through the Donor History Questionnaire (DHQ)

2. Stage B: Medical examination

3. Stage C: Hemoglobin (Hb) check using the Hemocue Hb 301 Analyzer Hemoglobin System

4. Stage D: Pre-phlebotomy examination. The study followed national guidelines for blood donation screening.

Results

Out of 48956 pre-donation screenings, 9.8% of donors were deferred. The highest rate of deferral (56.04%) occurred at Stage C due to hemoglobin levels, with 53.40% attributed to low Hb and 2.64% to high Hb. High hemoglobin deferrals were seen only in male donors. The deferral rates at stages A, B, and D were 28.54%, 14.97%, and 0.45%, respectively. Female donors had a higher overall deferral rate (48.98%), while first-time donors and those aged 18 to 25 years were frequently deferred due to low hemoglobin, underweight status, or recent tattooing/ear piercing.

Conclusion

Understanding the reasons for donor deferral can inform proactive strategies for donor recruitment and retention. Educate potential donors, especially first-time and young donors, about maintaining healthy hemoglobin levels through diet and supplements.

ePO31

Blood Donation and donor apheresis

Impact on whole blood donor deferral criteria during pre and post covid pandemic: a retrospective analysis.

Dr Poonam Saini, Dr Poonam Saini , Dr. Saroj Rajput, Dr. Brig. Tathagata Chatterjee, Dr. Sumit Barik, Dr. Col. M.S. Bindra

Background & Objective

Healthy blood donors are crucial for maintaining safe and adequate blood transfusion services, which are vital for patients undergoing surgeries, trauma care, or managing chronic conditions like anemia and cancer. Understanding the reasons for donor deferral is essential for improving recruitment, retention, and ensuring blood safety.

This study aims to analyze the deferral patterns of whole blood (WB) donors and comparing the periods before and after the COVID-19 pandemic. By identifying the primary causes of deferrals and any significant shifts due to the pandemic, the study seeks to inform future strategies to optimize donor recruitment and ensure a stable and safe blood supply.

Methods

This retrospective comparative study analyzed WB donor deferral patterns at a tertiary care institute in northern India. Data were collected from donors who were deferred from donating blood during both the pre-COVID and post-COVID periods. The variables studied included the sex of the donor, donor type (voluntary or replacement), type of deferral (temporary or permanent), and reasons for deferral. All data were systematically recorded using a standardized proforma.

Results

A total of 13,457 donors donated blood during the study period, which was divided into two phases: pre-COVID and post-COVID. Of these, 2,026 donors were deferred, resulting in an overall deferral rate of 15.05%. Pre-COVID Deferrals Were 640 donor and the majority of deferrals were temporary, with anemia(24.21%) being the most common cause, followed by high haemoglobin. Post-COVID Deferrals Were 1386 donors were deferred after the pandemic. Similar to the pre-COVID period, anemia remained the primary cause of deferral. Across both periods, 87.79% of deferrals were temporary, allowing for the possibility of future donations and 12.21% were permanent deferrals.

Conclusion

COVID-related deferral criteria (recent illness, vaccinations, exposure) temporarily affected eligibility but did not significantly alter overall deferral patterns. Anemia remained the primary cause of deferral before and after the pandemic, highlighting its ongoing impact on donor eligibility. The study concludes that while pandemic-related challenges existed, medical deferral criteria remained stable.

of TMA and prompt intervention with TPE in managing postpartum AKI to prevent irreversible renal damage and improve patient outcomes.

ePO70

Hemovigilance

KAP Analysis of Heamovigilance Programme among Doctors in Tertiary Healthcare settings

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INTRODUCTION: The Heamovigilance Program of India, launched in December 2012, is a comprehensive and structured initiative aimed at monitoring and mitigating adverse reactions associated with blood transfusion. This program collects, collates, and analyzes data to identify and address transfusion-related risks, enabling corrective and preventive measures to minimize potential harm to patients. Despite the critical importance of Heamovigilance, under-reporting of transfusion reactions remains a concern among medical professionals. To bridge this knowledge gap, this study aimed to assess the Knowledge, Attitude, and Practice (KAP) of Heamovigilance among doctors.

METHOD: This was a cross-sectional questionnaire-based study conducted among 51 Doctors of a tertiary care hospital for a period of 1 month.

RESULTS:

Result obtained was analyzed, About 86.7% participants knows about the primary objective of HPvI program and 66.0% had knowledge who co-ordinate HPvI . The attitude was satisfactory regarding adverse events and near miss event reporting. Overall 60% had participated in HPvI training program.

CONCLUSIONS:

Increasing awareness of haemovigilance among doctors and training on reporting of transfusion reactions will improve spontaneous reporting and help to strengthen the blood transfusion system.

KEYWORDS:

Haemovigilance, Adverse Transfusion reaction

ePO71

Hemovigilance

Recipient Hemovigilance- A RIMS Perspective

Dr Nongmaithem Shivarjit Singh, Dr Pratima Khoyumthem and Dr. K. Rachandra Singh

Background and Objective:

Haemovigilance Programme of India (HvPI) was launched in December, 2012. It is an integral part of Pharmacovigilance Programme of India which scrutinizes, expedite remedial and preventive actions to be taken to improve blood safety. Department of Transfusion Medicine, RIMS also enrolled in 'HvPI' in July, 2014 and started reporting adverse transfusion reaction from 15th July, 2014 onwards. This study is aimed to determine the frequency and type of adverse transfusion reactions in blood recipients in RIMS hospital.

Materials and Methods:

A retrospective review of all transfusion reactions reported to Department of Transfusion Medicine, RIMS between July 2014 and May 2024 were done. All data were collected from the transfusion reaction register maintained in the department. All the transfusion reactions were evaluated and classified using standard definitions.

Results and Observation:

In our study, 168 transfusion reactions were observed in which 50% of the case (84 in number) was an allergic transfusion reaction, which makes it the commonest followed by Febrile Non-Hemolytic Transfusion reaction (FNHTR) with 75 cases. Females were more affected than males; (F=107, M=61). The age group of 31-40 years were the most affected with 45 cases. Packed red blood cells (PRBC) caused maximum transfusion reactions; 157 out of 168 (93.45%).

Conclusion:

Documentation of adverse transfusion event will help in improving transfusion safety. This study allowed for a good assessment of transfusion reactions in RIMS hospital. Proper education of health care team and active participation of all in reporting any adverse transfusion reaction will greatly increase safety of patients undergoing blood transfusion.

ePP160

Transfusion Transmitted Diseases (including NAT)

A study on response of sero- reactive blood donors to notification and counselling

DR. ANJU DUBEY, DR. ATUL SONKER

Post donation counselling is an ethical duty of blood centre toward the donors. It includes informing the reactive donors about their serological status, the risk of transmission of infection to other people in the family and society, providing emotional support, assistance in planning behaviour and lifestyle modifications, and then referral for health care follow-up. The study was conducted to analyse the response of sero-reactive blood donors towards notification and counselling. Transfusion transmitted infection(TTI) testing was done on 2460 blood donor samples using chemiluminescence assay (Vitros ECiQ, Ortho Clinic Diagnostics) for Anti-HIV 1&2, HBsAg and Anti-HCV. The donors whose samples were repeatedly reactive (n= 61, 2.48%) were notified and called to blood centre for counselling through postal communication. Those who did not respond were called telephonically and their reasons were recorded.

Table 1. Response of reactive donors

Marker	No. of repeat reactive donors (n= 61)			No. of donors responded (n= 35)		
	Voluntary	Replacement	Total	Voluntary	Replacement	Total
Anti-HIV	04	13	17(27.87%)	04	7	11(31.43%)
HBsAg	05	14	19(31.15%)	02	8	10(28.57%)
Anti-HCV	05	20	25(40.98%)	04	10	14(40%)
Total	14	47	61	10	25	35

Table 2. Reasons for non-response

Long distance	11(42.31%)
Busy schedule	07(26.92%)
Not willing to visit blood centre again	03(11.54%)
Will get treated by their preferred physician	03(11.54%)
Other personal reasons	02(7.69%)
Total	26

The responsive blood donors were counselled and referred to ICTC in case of anti-HIV sero-reactivity and gastroenterology department in case of HBsAg & anti-HCV reactivity. There were 26 (42.62%) sero-reactive blood donors who did not respond to notification. Voluntary donors showed a better response to notification. Distance of donor's residence from blood centre was a major cause of non-response. There is a need to create better awareness among blood donors regarding TTI through effective pre-donation counselling.

ePI61

Transfusion Transmitted Diseases (including NAT)

Descriptive analysis of HIV infections in blood donations for transfusion in 2022

HAKIZIMANA THEOGENE, Dr Hinda Ruton

Introduction

Transfusion of infected blood is one of the foremost causes of morbidity and mortality worldwide, particularly in sub-Saharan Africa, where it is responsible for 5–10% of new HIV infections. Today, there is an increased need to ensure the safety of all donor blood before transfusion. However, the magnitude of transfusion-associated HIV transmission in sub-Saharan African countries remains high due to reduced financial resources and poor HIV antibody screening programs. In 2021 the prevalence of HIV infections in blood donations in high-income countries was 0.002%; Upper middle-income countries 0.10%; Lower middle- income countries 0.19% compared to Low-income countries with 0.70%. In Rwanda there is a policy to reduce HIV prevalence in blood donations for transfusion from 0.07% of 2021 to 0.03% in 2022.

Methodology

This is a retrospective cross-sectional study conducted in Rwanda Biomedical Center/Blood Transfusion Division. The secondary data were extracted in Eprogesa (A blood computerized electronic system) dataset and analyzed using Ms Excel. The findings were presented using Frequencies, tables and graphs.

Results

According to data, among 35 HIV positives cases in 78738 blood donations; with the overall prevalence of 0.04%; new blood donors are more affected than regular and irregular blood donors with 20 (57.1%) to 6(17.1%) and 9(25.8%) respectively. The region center of Blood transfusion most affected is Butare and Rwamagana with 9 (25.8%) each.

Conclusion

Despite all efforts to reduce HIV prevalence in blood donations; there is still a slightly more number of HIV infections; a challenge of self-exclusion of persons with risk behaviors and ineffective blood donor recruitment and selection processes could be the cause. Providing pre-donation talk to everyone who comes to donate blood and emphasize on eligible criteria to enhance self-exclusion of those with risky behaviors. The further research is needed to find out the cause of this slight high number of HIV infection in blood donations.

eP162

Transfusion Transmitted Diseases (including NAT)

Ms. Palak Panchal, Dr. Jhalak Patel, Dr. Vishvas Amin

Abstract:

Transfusion-related illnesses (TTDs) may result from the transfer of infectious organisms during blood transfusion, despite the fact that this procedure is an essential life-saving measure. TTDs continue to be a worldwide public health problem even in the face of strict donor screening procedures and sophisticated testing techniques. Blood transfusions and infections including HIV, Hepatitis B, Hepatitis C, syphilis, and malaria have traditionally been connected. Advances in diagnostic technology, such as nucleic acid testing (NAT), have greatly increased the safety of blood transfusions. As standard serological tests may not be able to identify infected donors during the window period, NAT has become an essential tool for identifying viral infections. Through the direct detection of viral RNA or DNA, NAT reduces the risk of transmission by offering improved sensitivity and earlier identification of blood borne infections .This study investigates the frequency and prevalence of TTDs, looks at how NAT affects blood safety, and contrasts NAT's effectiveness with traditional serological testing. It also draws attention to the obstacles still standing in the way of accomplishing zero-risk blood transfusions, including new infections, implementation costs, and NAT accessibility in low-resource environments. In order to provide the safest transfusion procedures possible, the study highlights the need of ongoing observation, the use of cutting-edge technology, and the strengthening of blood transfusion services worldwide.

Keywords: Transfusion-transmitted diseases (TTDs), nucleic acid testing (NAT), blood safety, window period, viral infections, bloodborne pathogens

eP163

Transfusion Transmitted Diseases (including NAT)

Analysis of factors affecting bacterial contamination in apheresis platelet concentrates (APCs) and Leucodepleted Packed cells (LD-PRBC)

Kalpesh Chawan, Dr.Shashank Ojha, Dr.Suryatappa Saha, Amol Tirlotkar, Arunkumar, Hemali Kadu

Background & Objectives

Bacterial contamination of platelets has been a greater implication in safe transfusion practices compared to LD-PRBC. The primary source of contamination is skin bacterial microflora. Aim of this study is to analyze factors affecting bacterial contamination in APCs and LD-PRBC.

METHODS

Bacterial screening of APCs and LD-PRBC collected from January 2021 to December 2023 were analyzed by BacT/ALERT. 4-5 ml of sample from APCs and LD-PRBC were inoculated in culture bottle. Inoculated AP units were quarantined for 24hrs and LD-PRBCs for 48hrs. True positive units were sub-cultured for bacterial identification. Factors like collection method, cell separator, quality parameters (QC) and donor related factors were correlated with the positive sample.

Results

Total 4352 APCs and 3357 LD-PRBC underwent bacterial screening. Among APCs, 48(1.1%) tested positive, in which 18(0.41%) were confirmed as true positive.

The organisms identified were 7 Coagulase negative staph (CONS), 2 Staphylococcus aureus, 5 gram-positive bacilli (GPB), 4 gram-negative bacilli (1Acinetobacter,1 Kleb.Pneumonia, 1 E. coli, 1 Chryseobacterium).

Among 3756 single needle procedures, 15 (0.39%) tested positive and out of 596 double needle procedures, 03(0.50%) tested positive. 3254 procedures were performed on Amicus, in which 14(0.43%) came positive and 1098 procedures were performed on Comtec, in which 4(0.36%) came positive. By using Chi- square test, p- value was not statistically significant (>0.05) in both procedures. In positive APCs after day 3, the pH was less than 6 and swirling was absent.

Among 3357 LD-PRBC, 22 tested positive, out of which 11(0.32%) were confirmed as true positive. The organisms identified were 2, Enterobacter 5 CONS and 4GPB. No transfusion reaction were reported due to bacterial contamination.

Conclusion:

By adopting prevention and detection strategies, risks of bacterial contamination of platelets and packed cell can be significantly minimized. This in turn will help in reducing transfusion reaction.

ePI64

Transfusion Transmitted Diseases (including NAT)

Seroprevalence of Transfusion Transmissible Infections among Blood Donors at Sawai Man Singh Hospital,Jaipur

Dr Abhinav Jangir, Dr Sunita Bundas,Senior Professor

Background and Objectives:

The transfusion of blood carries a risk of transmission of infections known as Transfusion Transmissible Infections (TTIs), which include Hepatitis B virus (HBV), Hepatitis C virus (HCV), Human Immunodeficiency Virus (HIV), Syphilis and Malaria. The objective of this study was to evaluate the seroprevalence of TTIs among voluntary and replacement blood donors at Sawai Man Singh Hospital,Jaipur,Rajasthan.The study aimed to contribute to the ongoing efforts to prevent TTIs by identifying trends and emphasizing the need for robust donor screening procedures.

Method :

This retrospective, cross-sectional study was conducted over a period of one year, from July 2023 to June 2024, at Sawai Man Singh Hospital, Jaipur, Rajasthan. A total of 39458 blood donors were screened using serological tests, including ELISA for HBV, HCV and HIV, Rapid card test for Malaria, and VDRL test for Syphilis.Voluntary and replacement donors were both included. The aim was to identify the seroprevalence of these infections among donors and to analyze trends over the one year period.

Results:

Out of the total blood donors screened, voluntary donors were 72.1% and replacement donors were 27.9%. Males constituted 97.4% of the donors, while females made up only 2.6%. The overall seroprevalence of TTIs was 1.21 %. HBV was the most prevalent infection at 0.72%, followed by Syphilis 0.31%, HIV 0.07%,HCV 0.06%, and Malaria 0.05%.

Conclusion:

The study highlighted the continuing risk of TTIs despite the implementation of pre-donation counseling and screening. HBV was identified as the most prevalent TTI among donors, while Malaria had the lowest seroprevalence. Enhancing public awareness and improving donor screening methods, especially among replacement donors, could further reduce the risk of TTIs.

ePP165

Transfusion Transmitted Diseases (including NAT)

Seroprevalence of Australian antigen (HbsAg) among blood donors in the local population at standalone blood center

Hetal D. Patel, Dr Tejal P Chhabaria, Dr Ripal J Shah

Introduction: Hepatitis B virus (HBV) causes a silent killer disease of the liver with many carriers not aware of their clinical status; therefore, they act as a potential source of infection to others. HBV is highly infectious and can be transmitted by both percutaneous routes and by blood transfusion. Laboratory diagnosis of HBV infection is made by detecting Hepatitis B virus surface antigen (HBsAg), the earliest serological marker of active HBV infection (acute and chronic). Hepatitis B virus (HBV) Infection is one of the leading causes of death worldwide. The most important marker for HBV infection is HBsAg. In the case of the diagnosis of an infectious disease, discordant results may have serious consequences for the patients as it causes unnecessary mental stress and tension. For The proper diagnosis of infection, disease management, prevention, and as well as identification of appropriate Test kits, are necessary.

Objectives: To determine the seroprevalence of HBsAg among blood donors in a stand Alone Blood Center in Ahmedabad, Gujarat.

Method: The study was conducted on apparently healthy blood donors over 3 years from January 2021 to December 2023 at the Blood Centre to assess the prevalence of hepatitis B virus infection. A total of 90,754 blood donors were included In this study. In this study, For HBsAg ELISA test was used. For initial reactive donors, The second time, HBsAg Hepacard, a Rapid kit, was used to confirm true reactivity.

Result: Out of 90,754 donors, 85,959 (94.81%) were males and 4,795 (5.17%) were females. Out of these blood units, 526 (0.57%) were discarded, and among them, 276 (0.30%) were HBsAg reactive. The Seroprevalence of HBsAg was found to be 0.30%.

Conclusion: Blood Donors are often found to be reactive to hepatitis B surface antigen and others. To reduce this Seroprevalence, more sensitive screening assays and appropriate donor selection are must.

Keywords: Seroprevalence, Hepatitis B surface antigen, Blood donors

ePP166

Transfusion Transmitted Diseases (including NAT)

Nucleic acid amplification test: Bridging the gap in blood safety & re-evaluation of blood screening for transfusion-transmitted infection among Indian donors.

Disha N. Patel, Dr. Ripal J Shah, V. Harimoorthy

Prathama Blood Centre, Ahmedabad

Abstract

Background: A total of 30 million blood components are transfused each year in India. Blood safety thus becomes a top priority, especially with a population of around 1.23 billion and a high prevalence rate of human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) in general population. Nucleic acid amplification testing (NAT) in blood donor screening has been implemented in many developed countries to reduce the risk of transfusion-transmitted viral infections (TTIs). NAT takes care of the dynamics of window period of viruses and offers the safest blood pack for donation.

Aims: The aim of this study is to show the value of NAT testing for in blood screening.

Materials and Methods : Over a period of 2 year from May 2016 to May 2018, a total number of 63014 blood donor samples were subjected to tests for HIV, HBV, and HCV by enzyme-linked immunosorbent assay (ELISA) method and 60934 ELISA nonreactive samples were subjected for NAT using multiplex polymerase chain reaction technology.

Results: Of the 63,014 donors tested, 295 were seroreactive. In 60,934 ELISA negative blood samples subjected to NAT, 21 donor samples were reactive for HBV. The NAT yield was 1 in 2901.

Conclusions: The cryptic infections found in blood donors increase the risk of TTIs. Blood screening by both serology and NAT can reduce this threat.

Keywords: Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), Human Immunodeficiency Virus, Nucleic Acid Amplification Testing (NAAT), Transfusion-Transmitted Infection (TTI).

ePP167

Transfusion Transmitted Diseases (including NAT)

Gap Analysis of Screening for Hepatitis Risk Factors among Blood Donors

Dr Vilasini Patil, Dr Romesh Jain, Dr Pratul Sinha

Abstract:

Background:

Hepatitis remains a leading cause of transfusion-transmitted diseases (TTDs) worldwide. Common risk factors such as high-risk behaviors, family history of hepatitis, and previous history of jaundice, are frequently under reported by blood donors. The study aimed to assess the gaps in pre-donation screening by analyzing why these risk factors are often not disclosed by donors, focusing on post-notification counseling of those who tested reactive for hepatitis.

Methods:

A prospective study was conducted on blood donors who tested reactive for hepatitis B or C infection between January and August 2024. Post-notification counseling sessions were held to disclose the reactive results and offer referral services for further management. Donor's demographic details, educational background and employment status were collected during counselling session. Assessment of the donors' awareness regarding Hepatitis infections and reasons for nondisclosure of risk factors during pre-donation screening was done after obtaining informed consent from Reactive donors.

Results:

A total 197 donors tested reactive during the study period out of which 58.8% were reactive for Hepatitis B and 22.8% were found reactive for Hepatitis C infection. Prevalence was found to be 1.07% and 0.41% for Hepatitis B & C respectively. Among the reactive donors, 33.3% were uneducated and 41.6% had completed only primary schooling education. High-risk behavior, was revealed by 28.3% donors. 53.7% of donors had No awareness of Hepatitis infection & its modes of transmission. The primary reason for nondisclosure was a lack of understanding of the significance of disclosing risk factors found in 73% donors.

Conclusion:

The study identified substantial gaps in the pre-donation screening process for Hepatitis infection, driven primarily by donor unawareness. Despite rigorous screening protocols, these risks remain unidentified, largely due to a lack of donor education. To improve risk disclosure and reduce hepatitis transmission, there is an urgent need to enhance donor education programs, particularly for individuals with lower educational levels, and to provide more private and supportive environments for screening.

ePP168

Transfusion Transmitted Diseases (including NAT)

Nucleic Acid Testing: Experience at a Standalone South Indian Blood Centre

Prashanth R P, Dr. Ankith Mathur

Background: Addition of Nucleic Acid Testing (NAT) to the Transfusion Transmitted Infection (TTI) screening protocol for voluntary blood donors is being explored by various blood centres globally. Detection of TTIs in their window period is the major benefit of NAT. However, its feasibility depends on several factors and should be evaluated by every centre independently. We present our experience of introducing NAT to our standalone blood centre.

Methods: As per institutional protocol, all chemiluminescent (CLIA) negative samples were routinely tested by minipool NAT (Cobas 5800, Roche Diagnostics). Additionally, donors with CLIA S/Co value > institutional cut-off (IC) were also tested by NAT to streamline the counseling process. Samples are tested in pools of 6. If even 1 sample in the pool is reactive for 1 viral marker, the entire pool is designated as reactive. Each individual sample in the pool is then tested individually for the viral markers. The data provided is of 5 months (May-October 2024)

Results: Total donors tested during study period: 12228

CLIA non-reactive for TTIs:12077

NAT testing done for: 12112 (CLIA negative:12077 , S/Co> IC: 151)

Concordant: 12109

NAT yield: 3 (all HBV).

Conclusion: Addition of NAT to routine screening can be a valuable tool in ensuring blood safety and efficient donor counseling.

ePO92

Immunohematology

Serological, Hematological and Clinical Insights into Autoimmune Hemolytic Anemia: A Retrospective Study.

Dr. P. MOUNIKA, Dr. B. SHANTHI, PROFESSOR AND HOD, DEPARTMENT OF IHBT, NIMS

BACKGROUND AND OBJECTIVES: Autoimmune hemolytic anemias (AIHAs) are rare and heterogeneous disorders characterized by the destruction of red blood cells through autoantibodies leading to anemia that ranges from no symptoms to severe life-threatening hemolysis. AIHA is categorized based on temperature sensitivity into warm, cold, and mixed types. The autoantibodies involved can be immunoglobulin G (IgG), immunoglobulin M (IgM), immunoglobulin A (IgA), or complement proteins, and the hemolysis may occur either intravascularly or extra-vascularly. The present study was done to evaluate the serological characteristics and transfusion management in patients clinically suspected of autoimmune hemolytic anemia (AIHA).

MATERIALS AND METHODS: This retrospective study involved 154 patients with clinical suspicion of autoimmune hemolytic anemia (AIHA). Blood samples submitted to the blood bank underwent a comprehensive immunohematology evaluation, which included blood typing, direct and indirect Coombs tests (DCT and ICT), monospecific DAT, and alloantibody identification using column agglutination technique (CAT). Additionally, hematological and biochemical data for each patient, as well as the number of blood transfusions administered, were retrieved from the hospital information system for further analysis.

RESULTS:

The median age at presentation was 29 years with a female preponderance (73.3%). Majority of the patients belong to mixed AIHA (66%) followed by warm (18%) and cold (15%). Grouping discrepancy was seen in 88 (57%) cases. The mean pretransfusion Hemoglobin, Reticulocyte count, Serum Bilirubin and LDH were found to be 5.8 g/dL, 7.8%, 3.2 mg/dL and 820 IU/ml. A total of 510 Units of PRBCs were transfused to 75.9% of the AIHA patients.

CONCLUSION:

In our study, mixed autoimmune hemolytic anemia (AIHA) is the most prevalent form, followed by warm and cold types. A significant number of AIHA patients experienced blood group discrepancies, highlighting the importance of thorough immuno-hematological evaluations. Approximately one-third of patients endured severe anemia during their hospital stay, and transfusions even with least incompatible red blood cells were found to be both safe and effective.

KEYWORDS:

Autoimmune hemolytic anemia, direct antiglobulin test, hemolysis.

ePO93

Immunohematology

Evaluation of point of care test - “ABD ® PAD” for detection of weak A and Weak D groups

Anjali, Dr. Richa Gupta

Background: ABO/Rh discrepancy is one of the most important parameters that needs to be addressed while compatibility testing. In such cases, detailed blood grouping is cumbersome, time taking and requires additional reagents and manpower. This may not be possible in small blood centres or in an emergency. The ABD ® PAD cards have already been validated on a large group of donors by a few authors. The aim of the study was to evaluate the accuracy of these cards specifically for individuals with weak antigenic expression on the red cell surface including blood donors and newborns.

Objectives:

To compare the results between the ABD ® PAD & gel card technique and look for concordance.

To evaluate whether ABD ® PAD was able to detect weak A and weak D groups.

Methods: This study was conducted in UCMS & GTB Hospital Blood Bank in Delhi over a period of 6 months. 14,400 donors and 900 newborns were included. Subjects with antibody screen positive and newborns with history of Rh incompatibility were excluded. Manual whole blood-based ABD ® PADs were used for ABO and D grouping & results were compared with the standard gel card technique. Discrepancies were further resolved by using Anti-A1 lectin and antibody elution in weak A individuals and by indirect agglutination test in weak D individuals.

Results: The new ABD ® PAD technique detected the 18 weak A and 8 Weak D groups tested in 14,400 donors as revealed by faint color produced in the respective wells which were missed by gel-card technique. However, the remaining cases showed 100% concordance.

Conclusion: The new ABD ® PAD enabled the detection of weak A and weak D individuals which were missed by gel card. The study suggests that ABD ® PAD can be used as point of care test in emergencies and resource limited areas.

ePO94

Immunohematology

Seroprevalence of Transfusion transmitted infections in healthy blood donors attending a tertiary care hospital in Southern rajasthan

Dr Nikita Sanadhya, Dr Sanjay Prakash

Introduction:-

"Blood transfusions can transmit serious infections, posing a significant risk to recipient safety. To prevent the spread of these diseases, screening blood donations is a crucial step in ensuring blood safety."

Aim:-

This study aimed to investigate the prevalence of Transfusion-Transmitted Infections (TTIs) among healthy blood donors at a tertiary care blood bank.

Materials and Methods:

A cross-sectional retrospective study was conducted from January 2022 to December 2022(1-year period). Serum samples were tested for Hepatitis B surface antigen (HBsAg), HIV antibodies (Type 1 and 2), Hepatitis C virus (HCV) antibodies and Syphilis. Assay Methods include Enzyme-linked immunosorbent assays (ELISA) using third-generation kits for HBsAg, HIV, and HCV & Venereal Disease Research Laboratory (VDRL) test for syphilis.

Results:

A total of 25,184 healthy donors were included out of which the majority of donors were male. The overall seroprevalence of HBsAg, HIV, HCV, and syphilis were 0.26%, 0.87%, 0.15%, and 0.07%, respectively.

Conclusion:

To guarantee a safe blood supply, rigorous donor selection and advanced screening methods, including Nucleic Acid Testing, are crucial. Implementing these measures will minimize transfusion-related risks and protect public health.

Keywords: Seroprevalence, Transfusion transmitted disease,HBsAg, HIV, HCV, Syphilis

ePO95

Immunohematology

Red blood cell allo-immunization among pregnant women in India: A systematic review and meta-analysis

Sunil Golia, Samruddhi Panwar, Aseem Kumar Tiwari

RED BLOOD CELL ALLOIMMUNIZATION AMONG PREGNANT WOMEN IN INDIA: A SYSTEMATIC REVIEW AND META-ANALYSIS

Background and objectives: Red blood cell (RBC) alloantibodies in pregnancy may develop against the fetal antigens, that are of paternal origin. This phenomenon poses a substantial risk of Hemolytic disease of the fetus and newborn (HDFN) during pregnancy. HDFN, may contribute significantly to perinatal morbidity and mortality. Several studies conducted in India have assessed the alloimmunization to RBC antigens in pregnant women, but a comprehensive systematic review in this context is lacking in the published literature. Therefore, the authors undertook a systematic review and meta-analysis, to evaluate the current evidence on RBC alloantibodies among pregnant women in India, and suggest recommendations, if any.

Methods: Authors searched the MEDLINE, SCOPUS, CINAHL and Google Scholar bibliographic databases with no restriction in search dates to identify relevant studies. PRISMA flow diagram was used to select the relevant studies. Case reports, comments, letters, conference abstracts, editorials and review articles were excluded. The primary data of the relevant studies were extracted as raw numbers. An aggregate effect size, weighted by sample size, was computed to provide an overall effect size across the studies and 95% confidence intervals (CI) were calculated. The relative weighted contribution of each study was also assessed.

Results: Out of 933 potentially relevant articles, 16 studies with cumulative sample size of 36174 pregnant women were selected. A total of 647 alloantibodies were identified in pregnant women. The prevalence of RBC alloimmunization exhibited a wide variation ranging from 1% (95% CI; 0-4%) to 10.84% (95% CI; 7-16%) in different studies. The overall meta-analytical prevalence of alloimmunization was observed to be 1.78 per 100 pregnant women (95% CI; 1.6-1.9%) with zone-wise prevalence of 1.98%, 1.52%, 3.46%, 1.25% and 1.92% in the South, West, North, Central and East zone, respectively. 1.78% still seems to be highly significant, considering that India is the most populous country of the world. More than 85% of alloantibodies identified were associated with the Rh blood group system. Among clinically relevant alloantibodies, anti-D ranked as the most common, followed by anti-E, combination of anti-D+C, anti-c. After Rh alloantibodies, the next most common clinically significant alloantibodies belonged to the Kell blood group system. Asymmetry was noted in the funnel plot drawn to examine the publication bias in the results; observation being significant($p<0.001$).

Conclusion: The analysis of existing literature in India represented significant (1.78%) prevalence of RBC alloimmunization in pregnant women in India and highlighted that anti-D is the commonest allo-antibody found. Based on these results authors recommend adoption of RBC alloantibody screening as a standard of ante-natal care for all pregnant women across India, and striving for 100% access of anti-D immunization.

eP096

Immunohematology

Comparison of automated column agglutination technique (auto-CAT) with conventional test tube (CTT) technique for ABO antibody titration: Concept of clinically acceptable concordance rate (CACR)

DR GOWRI SURESH L, Dr. Aseem Kumar Tiwari, Dr. Gunjan Bhardwaj, Dr. Shubham Gupta

Background and Objectives: High titer of ABO (anti-A/anti-B) antibody can cause antibody-mediated rejection (ABMR) in ABO-incompatible living donor kidney transplantation (ABOi-LDKT). Desensitization therapy to achieve ABOi-LDKT involves repeated measurements of ABO antibody titers. Though the conventional test-tube technique (CTT) is considered gold standard test for ABO antibody titer measurement, it is cumbersome and subjective. This study aimed to evaluate automated column agglutination technique (auto-CAT) as an alternative to CTT for titration of anti-A/anti-B antibodies in ABOi -LDKT.

Methods: This was a prospective study, carried out in a large tertiary healthcare center between April-June 2024. Total (IgG and IgM) anti-A/anti-B antibody titers were performed using auto-CAT and CTT method in ABOi-LDKT recipients and was compared with CTT. Since variation of titer values is usually considered clinically acceptable if the variation is limited to one-tube dilution (higher or lower), we used a new concept; clinically acceptable concordance rate (CACR), a term published earlier in Japan1

Results: We examined 70 samples from 10 consecutive ABOi-LDKT recipients. As shown in table 1, the CACR was found to be very good at 84.3%. The correlation coefficient of the two methods was high at >0.9. Perioperative status did not influence the correlation coefficient value.

Conclusion: Auto-CAT is comparable with the CTT technique and is feasible for total (IgG and IgM) anti-A/B antibody titration in ABOi-LDKT.

Item Numbers Subtotal Percentage P value

Samples with completely

concordant titre value 30 59(CACR) 84.3% (CACR) <0.0001

Samples with one-tube variation 29

Samples with two-tube variation 11 11 15.7% -

Total number of samples 70 70 100% -

Table 1: Comparison of auto-CAT with the CTT, in context of CACR

1. Matsuura, Hideaki, et al. "Feasibility of the automated column agglutination technique for titration of anti-A/B antibodies in ABO-incompatible living kidney transplantation." Therapeutic Apheresis and Dialysis 26.4 (2022): 827-835.

eP097

Immunohematology

IDENTIFICTION OF RARE BOMBAY NEGATIVE PHENOTYPE THROUGH IMMUNOHAEMATOLOGY WORK UP

DR. NIHARIKA PILLAI, Dr. FARZANA KOTHARI

ABSTRACT

Introducion:

Bombay phenotype is a rare blood group reported first in Bombay, India by Bhende in 1952. This phenotype lacks, H, A and B antigen on RBCs and secretions and has anti-A, anti-B & anti-H in the serum. Genotypically, a person of the Bombay blood group inherits the recessive form of the allele for the H antigen from each parent and carries the homozygous recessive (h/h se/se)gene.

Methodology:

Forward and reverseblood grouping was done using semi-automatedCAT and test tube agglutination. This was followed by testing patient's RBCswith anti H antisera which showed no reaction. Further DAT, titre of anti-H antibody in the patient's serum , auto control and 3 and 11 cell panel tests were performed.

Result:

A 19yr old G1P0 female was referred to SSGH, Vadodara for routine blood grouping. The ABO grouping (forward and reverse) showed discordant results.On further workup,the reverse grouping showing agglutination with O pooled cells suspension and no reaction with anti H antisera confirming Bombay group of the patient. RH typing wasnegative . This was followed by DAT(negative), auto control(negative), titreand 3 cell and 11 Cell panels(panagglutination;+ 4).

Conclusion:

Bombay Blood group can be misinterpreted as O group unless reverse grouping is performed. As they can only receive same blood group transfusion, it is important to ensure proper grouping and crossmatchingto transfuse matched blood units for such cases.

KEY WORDS: Bombay group, reverse grouping, transfusion reaction.

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eP098

Immunohematology

Comprehensive Analysis of ABO Subgroups: Enhancing Blood Transfusion Safety- A Retrospective study

DR.KURUVA RAGHUNATH, DR. B. SHANTHI , PROFESSOR & HOD , DEPARTMENT OF IHBT

BACKGROUND-

The ABO blood group system is vital for safe transfusions and organ transplants, with subgroups like A1, A2, and weaker variants (A3, Ax, Am) influencing transfusion compatibility due to variations in antigen expression. A1 and A2 are distinguished by their reactivity to “Dolichos biflorus” lectin, while weaker subgroups show reduced agglutination with anti-A sera. Though B subgroups lack equivalents like B2, they remain essential for precise typing. Advanced techniques, such as glycosyltransferase studies and PCR, are crucial for identifying these subgroups, ensuring compatibility and preventing transfusion reactions, particularly in the presence of naturally occurring antibodies like anti-A and anti-B.

MATERIAL AND METHODS -

Present study included all the sample sent for routine blood grouping and antibody screening to department of transfusion medicine from October 2020 to September 2024. 3ml of sample sent in ethylene diamine tetra acetic acid (EDTA) vial is used for forward grouping and reverse grouping.

RESULTS -

In our study, a total of 21 cases of blood subgroups were identified. Among these, the distribution was as follows A subgroup: 10 cases (47.6%), B subgroup: 8 cases (38.1%),AB subgroup: 3 cases (14.3%).The age of patients ranged from 5 to 67 years, with a median age of 36 years. The gender distribution showed that 14 patients (66.7%) were male, and 7 patients (33.3%) were female. Notably, there were 3 cases in which anti-A1 antibodies were identified in individuals with the AB subgroup.

CONCLUSION-

The study suggests that, in addition to ABO and Rh blood typing, detailed subgroup analysis should be performed to accurately identify variants like A1, A2, and other weaker subgroups. This study highlights the importance of identifying subgroups to prevent potential transfusion reactions. Expanding research on the distribution of blood groups and subgroups across regions would help blood banks better estimate the demand and supply of specific types, ensuring safer transfusions.

ePO99

Immunohematology

ABO Blood Group Discrepancies: A Key Consideration in Inborn error of immunity

Dr. Minu Rose George, Gayathiri K C, Abirami K, Dolly Daniel

BACKGROUND & OBJECTIVES

Type I discrepancies in blood grouping can lead to unexpected reactions in reverse grouping due to weak or missing antibodies. One potential cause is Inborn error of immunity, which should be considered when encountering Type I discrepancies in newborns over 4 months and children. With this background, we aimed to determine the number of Type I discrepancies secondary to Inborn errors of immunity.

METHODS

A retrospective study was conducted in the Department of Transfusion Medicine and Immunohematology. Samples from newborns more than 4 months and children (<15 years) received from January 2022 to July 2024 that showed type I discrepancy were included in the study. Demographic details and immunohematological workup data were collected. Resolution of Grouping discrepancy was attempted using prolonged incubation, incubation at 4°C and double serum volume.

RESULTS

A total of 3,54,178 samples were tested during the study period, of which 194 (0.05%) showed discrepancies. Of the 194 samples, 52 (26.8%) showed Type I discrepancy. Of the 52 samples, 46 (88%) were from children under 15 years of age. Of the 46 samples, 7 (15%) were confirmed cases of Inborn error of immunity. The Inborn error of immunity states identified were Severe combined immunodeficiency, Chronic Granulomatous Disease, Ataxia Pancytopenia Syndrome, X-linked agammaglobulinemia, Wiskott-Aldrich Syndrome, and BTD gene mutation.

CONCLUSION

A significant percentage (15%) of samples from children under 15 years of age that tested positive for type I discrepancy were found to be linked to Inborn errors of immunity. This study highlights the criticality of clinically correlating atypical immunohematological results, particularly Type I discrepancy in children. And also considering the Inborn error of immunity if clinical pictures suggest the same.

ePP100

Immunohematology

Study of sickle cell cases by High Performance Liquid Chromatography (HPLC) Patterns in tertiary care hospital

Dr. Devanshi Gosai, Dr. Vidhi Jain

Abstract

Background

Genes for haemoglobin S are found in high frequencies in Gujarat. The clinical presentation of HbS- β thalassemia is enormously variable, ranging from an asymptomatic state to a severe disorder similar to homozygous sickle cell disease.

Materials and Methods

Haemoglobin A2 and HbF were determined in sickle cell anaemia patients attending Dhiraj general hospital, waghodia, Vadodara by high performance liquid chromatography (HPLC). Hematological parameters were estimated using Sysmex KX-21 and peripheral blood smear examination was assessed using Romanosky staining technique.

Results

A total of 596 cases were studied, out of these 380 (63.7%) cases were HbS positive on HPLC. From all 380 cases of HbS positive, 49(12.9 %) were HbSS , 184 (48.4 %) were Hb AS and 147 (38.7%) were double heterozygous for HbS-β thalassemia.

Conclusion

These findings confirm that the frequency of beta thalassaemia in sickle cell patients in Gujarat is higher. It is therefore important to consider the possibility of this variant in patients with sickle cell anaemia since their course may differ from that of patients with homozygous sickle cell anaemia.

Keywords

HPLC, thalassemia, Sickle cell disease

ePI01

Immunohematology

Yet another conservative approach in cross match test when blood sample is in short supply.

MANISHA MOHANBHAI RAJAPARA, Dr. Sanmukh Joshi

• 10 month old male patient with malaria(P.vivex),thrombocytopenia and anemia(Hb 5.0 gm/dl) was admitted to hospital for malaria treatment.

• His blood specimen was referred to our blood center with a request to provide 120ml RCC for transfusion.

• He was grouped as O, Rh D+; DAT-, auto control test all were was negative. Antibody screen test showed 4+ agglutination at 4°C

• cross-match test with random 12 blood units carried was incompatible (+4)

• As the antibody reacted in the saline phase, it was further tested using enzyme-treated cells and found to be non-reacting.

• We suspected the antibody to be directed to the antigen that was sensitive to an enzyme, e. g. antigen of the MNS, Duffy, Ina, etc. Of which those from the Fy system could be ruled out as antibodies in this system do not give direct agglutination (IAT reacting).

• As the patient was in the pediatric age group, it was not possible to collect a large sampling from him to test with more blood units, though we have tested some 10 units without any success. There was a dilemma in finding a compatible blood unit and we adopted a unique strategic approach as outlined below:

1. Since the antibody did not react with enzyme-treated RBCs, but reacted with untreated cells, and that too in the saline phase, we suspected its specificity to antibody to MN blood group system.

2. The patient's red cells were typed NN homozygote which has the potential to develop anti-M.

3. 10 random group O RBC units were tested with known anti-M and anti-N reagents from our stock out of which 3 units were found to lack M antigen.

4. The RBCs of these 3 units were tested with the patient <'s serum and all three units were found compatible.

5. One of these was issued as per the requirement of transfusion.

6. The patient did not show any clinical transfusion with the unit transfused.

Comments:

• A patient's serum in scarce supply needs to use some conservative approach .1. Saving the test supernatant (TS) and judicial use with appropriate positive control helps us in making use of a reasonably large number of blood units to find a compatible unit in the screening program. In the present case, we aspirated the TS from the reaction chamber from the gel card and tested it, which

showed strong reactivity. This approach has provided yet another unique approach to conserving the serum with antibodies when is in short supply.

• As the patient was positive for P. vivax parasites and was on an active anti-malarial regimen, we thought of testing the compatible blood units for the G6PD enzyme deficiency, should it coincidentally present and that would yield drug-induce iatrogenic hemolysis. We found the RBC of the unit with normal G6PD enzyme and the the blood was issued for transfusion.

ePP102

Immunohematology

ABO Blood Group Discrepancies

CHINTAN NITIN CHAMPANERIYA, • Dr. Kruti Dumaswala, Dr. Rinku Shukla, Keyuri Jariwala

Background & Objectives:

ABO discrepancy is any deviation from the expected pattern of red-cell antigen grouping with serum-grouping or when the forward-grouping results do not correlate with reverse-grouping results. This study was done to determine the incidence and causes of ABO-discrepancies and to identify the correct blood group for safe blood transfusions.

Methods:

In this study, there were 57950 samples collected between year of January 2020 to December 2023. All ABO typing was completed and records are maintained at the Suart Raktadan Kendra & Research Center. ABO typing was done which included forward cell grouping and reverse serum grouping by 2 methods.

(a) Tube method

• Forward-grouping

• Reverse-grouping

(b) Automation method (QWALYS®-3 in the E.M. Technology)

(c) If discrepancy was observed the tests were repeated with fresh sample to determine whether the discrepancy was in cell grouping or serum grouping. (techniques such as cell washing, using reagent serum, incubation under varying conditions). The discrepancy was then divided into four groups.

Results:

During the study period, 57950 blood grouping tests were performed. ABO discrepancies occurred in 68 (0.1%) of them. Majority Discrepancy in the Elder Age Patients (with history of Anemia) was 32 (47%) and in AIHA Patients was 12 (18%). The most common blood group involved was B with 23 (34 %) frequency. 65 (96%) Patients were reverse discrepancy type (Group-I, Group-III, Group-IV discrepancies).

Conclusion:

This study emphasizes the need of considering ABO discrepancies in blood banks for recipients (patients) for safe blood transfusion to avoid any fatal complications. This discrepancy ratio is 1: 852. Repeat testing and investigating for ABO subgroups and auto/allo antibodies is important.

eP104

Immunohematology

Impact of multiple alloantibodies beyond anti-D in pregnancy: A case report on newborn outcomes

Dr. Nishith Nayan, Dr. Bankim Das, Dr. Rakesh Kumar, Dr. Shweta Ranjan, Dr. Shanmathi Mani

Background: Alloimmunization to non-ABO red blood cell (RBC) antigens remains one of the most significant challenges faced by blood banking practitioners. In India, antenatal antibody screening primarily focuses on detecting anti-D in RhD-negative pregnancies. However, antibodies other than anti-D can also influence the outcome of hemolytic disease of the fetus and newborn (HDFN).

Aim and objectives:

Aim: To determine the significance of red cell alloantibodies other than anti-D during pregnancy and their effect on the newborn.

Objectives: 1. To identify the allo-antibodies present in the patient 2. To assess the effect of these maternal alloantibodies on the newborn.

Materials and Methods: We present a case of a one-day old newborn diagnosed with HDFN. His sample was sent to our blood centre for performing Direct Coomb's Test (DCT) and Indirect Coomb's Test (ICT). His mother's sample was requested for further work-up to find out the cause of positive DCT.

Result: Both the baby and mother had the same blood group (B positive). The baby's DCT was positive, while ICT was negative. The mother's antibody screen was positive (reactive in one out of three screening cells). Upon antibody identification, anti-E and anti-S alloantibodies were detected, reactive at the antihuman globulin phase. Acid elution of the baby's red cells was performed, and the eluate was subjected to antibody screening and identification, which revealed the presence of anti-E alloantibody. The mother's serum had a very low titre of anti S antibody (1+ reaction in homozygous cells and negative in heterozygous cells, possibly due to the dosage phenomenon), so the eluate did not come positive for anti-S.

Conclusion: As per Royal College of Obstetrics and Gynaecologists (RCOG), antibody screen should be mandatorily performed in all pregnant women along with blood grouping in order to prevent HDFN.

ePI05

Immunohematology

Evaluation of a point of care system for ABO grouping and Rh(D) typing

Ms. Sonal Kamath, Dr. Rajesh B. Sawant, Mr. Raees Ahmed, Ms. Vaishali Zende

Background: Manual blood grouping is performed in our blood centre in various scenario like in blood donation camps, inhouse donors and also in red cell serology lab during final blood group confirmation prior to issue by testing of sample from donor unit segment.

Objective: To evaluate the sensitivity, specificity, precision and accuracy of the ABD PAD system for blood group testing of donors and recipients.

Methods: Immucor Neo results and Ortho Vision results were considered as standard results for donor and recipient blood group testing respectively. Total 396 donor samples and 360 recipient samples were tested. 47 Rh (D) negative, five samples with weaker sub-groups and two with positive DAT were included in the evaluation exercise for donor samples. The recipient samples included 36 Rh (D) negative, two variants of D antigen, two DAT positive samples, two on Daratumumab therapy, 10 samples of ABO non-identical BMT patients, two samples of patients with multiple alloantibodies and two samples of patients with diagnosed AIHA. Five samples each with hemolysis and lipaemic appearance were included for evaluation exercise. All samples were tested within seven days of their collection and were stored at 2-6 degree Celsius.

Results: In the donor testing scenario, all the 396 results were concordant between the ABD PAD and Immucor Neo. In the patient testing scenario, one sample showed an additional reaction in the forward blood group. This was a patient of Multiple Myeloma with hyperproteinemia and visible roleaux formation. Lipaemia and hemolysis did not affect the test performance adversely. Precision of the test and accuracy of the results could be well established.

Conclusion: The ABD PAD point of care blood group testing system is easy, quick and robust system for both donor as well as recipient blood group testing. The results are dependable in even complex immunohematological scenarios.

ePP106

Immunohematology

Transfusion therapy for patients with auto immune hemolytic anemia:

Efficacy & safety of partial phenotype matched, blood transfusions

Mangesh Devram pawar, Dr. Rajesh B Sawant, Raees Ahmad , Minal Rane, Ujwala Demello

Background: Transfusion support may be urgently required for patients with auto immune haemolytic anaemia (AIHA) who present with fulminant haemolysis. Provision of clinically safe transfusion support within a short time remains a challenge in these cases.

Objectives : To evaluate the safety and efficacy of Best matched, Partially antigen matched blood transfusion in patient`s with AIHA.

Materials and Methods:

Retrospective analysis of data of 2 years and 6 months revealed 46 patients with AIHA. 25 patient's (54%) were transfused with best matched blood transfusion which was partial phenotype and K antigen matched . All cellular blood components were leukocyte depleted. The transfused and non-transfused patient group was compared for various clinical and laboratory parameters.

Results:

46 patients had established serologic diagnosis of warm AIHA and DAT was found to be positive in all but one case. 42/46 patients had a positive IAT. The autoantibody titre ranged from 128 to 2048. Reticulocyte count was done in 32 /46 patients and the mean reticulocyte count was 8%. Mean LDH level was 507 U/L. 517 units were cross-matched, of which 130 (25%) units were found to be best matched at a titre (2 to 64) below the autoantibody titre in the patient. 130 units were transfused in 25 patients and the mean post transfusion increase in haemoglobin was 1.8 gm/dl Delayed haemolytic transfusion reaction was reported in 1 case, (but the alloantibody specificity could not be identified) 13/46 patients expired, of which 6 were from the non-transfused group .On median follow up of 375 days, all patients in the transfused group maintained Hb > 10g/dl with transfusion support.

Conclusion:

The provision of partial phenotype matched blood for transfusion support in AIHA cases was clinically beneficial as well as safe at titres below 128. This practice has enhanced transfusion safety in urgent situations.

ePI07

Immunohematology

Analysis of Red cell Alloimmunization in Sickle Cell Disease.

Prabhat samadhiya, Dr. Vilasini patil, Dr. Pratul sinha, Dr. Romesh jain

Background

Red blood cell (RBC) transfusion is a vital therapeutic intervention for patients with sickle cell disease (SCD). Alloimmunization from repeated red blood cell transfusions makes it more difficult to find a compatible crossmatch unit and identify appropriate antigenic phenotype negative blood for transfusions. The study aimed to assess the prevalence of alloimmunization in patients with Sickle Cell disease and identify factors associated with it.

Materials and methods

A retrospective analysis of alloimmunization data from January 2024 to September 2024 was done on patients of Sickle cell disease of AIIMS Bhopal. Blood request forms received for these patients were analyzed for demographic and transfusion details. Immunohematology workup for antibody screening and Identification done on these forms was assessed.

RESULT

A total 81 request forms of patients with Sickle cell disease were assessed. The mean age was 19.17 years ranging from 1 to 61 years. 60.5% were male patients and 39.5% were female patients. RBC alloimmunization was found in 13 (16.04%) of SCD patients had a history of multiple transfusion. Multiple alloantibodies were identified in 53.8% patients. The most common alloantibodies identified were Anti-c in 53.8%, Anti-E in 30.7% and Anti-jkb in 15.3% patients.

CONCLUSION

High prevalence of alloimmunization in patients with Sickle cell disease thus emphasizes the need for prophylactic &/or Extended red cell antigen matching for patients with sickle cell disease receiving red cell transfusions.

ePP108

Immunohematology

RETROSPECTIVE ANALYSIS OF ABO BLOOD GROUP DISCREPANCIES IN A TERTIARY CARE CENTRE

Dr. Dhara Shah, Dr. Mamta Shah, Dr. Nidhi Bhatnagar, Dr. Sangita Shah, Dr.Kamini Gupta

Background: Ensuring the safety of blood transfusion is a fundamental responsibility of blood centres, necessitating the precise identification of ABO blood groups during pre-transfusion testing.

Objective: To analyse the reasons for commonly occurring ABO group discrepancies and their resolution by serological workup.

Methods: A retrospective observational study was done for a period of one year from April 2023 to March 2024.Blood group discrepancies encountered over the period were retrieved from blood grouping discrepancy register and analysed. Blood group was determined by conventional tube technique and further investigated with additional techniques and reagents. The data was compiled and plotted graphically and expressed in tables and charts.

Results: A total of 1,26,839 samples received for blood grouping; discrepancy was encountered in 325(0.26%) blood samples. Out of which 78 (24%) was group I, 92 (28.3%) was group II,11 (3.38%) was group III and 144 (44.32%) was group IV discrepancy. Group I discrepancy was resolved by enhancing the reaction by prolonged incubation at 4 ºC or by increasing serum: cell ratio. Group II discrepancy was noted due to subgroups, which was resolved most commonly by Anti-A1 lectin antisera. Group III discrepancy was resolved by washing the cells 3-4 times with normal saline. The causes for group IV discrepancies are unexpected alloantibodies, cold reactive autoantibodies, Bombay phenotype, Circulating RBCs of more than one ABO groups due to RBC transfusion or exchange transfusion. Cold autoantibodies were resolved by pre warming technique, Bombay phenotype was resolved by anti H lectin.

Conclusion: Resolving discrepancies before transfusion is essential. This study highlights the importance of both forward and reverse grouping. It is crucial to meticulously investigate all ABO discrepancies using available resources. Advanced investigative modalities, including molecular techniques, should be employed when serological methods are insufficient.

ePI09

Immunohematology

EVALUTION OF INCOMPATIBLE CROSSMATCH AT BLOOD CENTER

DR. RIYAAN FIROJ, Dr. Nidhi Bhatnagar, Dr. Mamta Shah, Dr. Sangeeta Shah, Dr. Kamini Gupta

INTRODUCTION:

Pre transfusion compatibility testing is one of the most important serological testing. Transfusion poses risk of adverse reaction, among one is immune mediated haemolytic transfusion reaction. The most common cause for immune mediated HTR is transfusion of incompatible donor's RBCs to recipient. Compatibility testing helps us to find best match (compatible units) for recipient and ensure the safety of transfusion. It is therefore important to detect incompatibility between patients plasma and donor cells and crossmatch should be performed following departmental SOP.

AIM & OBJECTIVES:

· To find out prevalence of incompatible crossmatch to formulate root analysis to help ensure safe transfusion.

· To serologically categorize the auto and allo antibodies with regard to different antibodies .

MATERIALS & METHODS:

A retrospective study was conducted in which total incompatible cases of 220 were reviewed out of total 174734 cross matches done by CAT(Column agglutination test) in polyspecific (IgG+c3d) gel cards(BIORAD) over a period 22 months i.e (1st January 2023 to 24th September 2024).

RESULTS :

Out of 174734 crossmatches reviewed only 220 were found to be incompatible of which 209 were incompatible due to presence of antibodies,40have autoantibody,97 have alloantibody,72 have both autoantibody with our without alloantibody,out of 40 patients(autoantibody) 22 are more prevalent in AIHA patients followed by 11 in thalassemia & 5 in sickle cell anemia, &2 in liver parenchymal disease which are associated with Immune haemolytic anemia.

Out of 97 patients of alloantibody 15 have multiple and 82 of them have single antibody of them AntiC: 9, Anti-c: 14, Anti-E: 7, Anti-e: 2, Anti-cw: 2, Anti-K: 2, Anti-k: 2,Anti-Fya: 6, Anti-Leb: 2, Anti-M: 22, Anti S: 6, Anti-s: 2, Anti-Jka: 4, Anti-N: 1, Anti-Jkb:1. 11 of them were due to technical/clerical errors.

CONCLUSION:

Presence of Antibody is most prevalent for incompatibility of which alloantibody are more prevalent and most of alloantibody identified have ANTI-M.

ePI10

Immunohematology

RED BLOOD CELL ALLOIMMUNIZATION IN MULTI-TRANSFUSED PATIENTS IN A TERTIARY CARE HOSPITAL

Dr. K. Sindhuja, Dr. Nidhi Bhatnagar, Dr. Mamta Shah, Dr. Sangita Shah, Dr. Rahul Rajvanshi.

BACKGROUND & OBJECTIVE:

Alloimmunization of red cells is a common and potentially serious consequence of blood transfusion. The risk of alloimmunization is especially high in patients who receive multiple transfusion, such as patients with thalassemia, sickle cell anemia and chronic renal failure. The frequency of alloimmunization is not uniform among all multi transfused patients and it depends on the age, sex, gender, genetic makeup of the patients as well as number and frequency of transfusion. The development of RBC alloantibodies complicates their long-term transfusion therapy. The incidence of ABO and Rh-D alloimmunization is reduced due to weak D testing and transfusing group "O" red blood cell in patients with ABO blood group discrepancy. Apart from these RBC antigens there are many other antigens which pose a risk for alloimmunization. To investigate the seroprevalence and specificity of RBC alloantibodies in multi-transfused patients, in the risk of alloimmunization is especially high.

METHOD:

A retrospective study was conducted for 6 months from February to July 2024 on blood specimens of 800 multi-transfused patients excluding alloimmunization caused via pregnancy, abortion and autoimmune hemolytic anemia. All specimens were evaluated for antibody screening & identification test via the erythrocyte magnetized technology and 3 and 11 cell panels by column agglutination technique.

RESULTS:

The overall prevalence of RBC alloantibodies was 5.4%. 10 specific types of alloantibodies were identified. The most common alloantibody was Rh blood group system(70.3%)especially E and c, followed by MNS (7.4%)and then KELL and Lewis blood group system(3.7% each).

CONCLUSION:

Most alloantibodies were of the Rh blood group specificity. To improve the quality of blood supplied, especially in multi-transfused patients, it is recommended that fresh, phonotype matched, crossmatch compatible and leukocyte reduced red blood cell should be issued to prevent blood transfusion reaction.

ePI19

Quality Management

EVALUATION OF QUALITY INDICATORS AT BLOOD CENTRE IN A TERTIARY CARE CENTRE IN KERALA

Dr Greeshma S, Dr Hadhiya Thahir, Dr Poornima A P, Dr Kala V L, Dr Sasikala N

BACKGROUND & OBJECTIVES

The therapeutic outcome in blood transfusion is directly related to the quality of blood transfusion services which can be achieved through the implementation of Quality management system(QMS).QMS can be monitored with the help of performance measures-Quality indicators.NABH has defined 10quality indicators,of which 5 are mandatory. This study is aimed to assess the 5mandatory quality indicators at the blood centre in a tertiary care centre in Kerala.

METHODS

Study Design:Prospective Observational Study

Study Setting:Department of Transfusion Medicine at a tertiary care centre in Kerala

Study Period:1Year(December 2022-November 2023)

Study Procedure:

The Five mandatory Quality Indicators as proposed by NABH were assessed.

1. PERCENTAGE OF TRANSFUSION TRANSMITTED INFECTION:

$(Combined\ TTI\ cases(HIV{+}HBV{+}HCV{+}Syphilis{+}Malaria)/Total\ number\ of\ donors)$X100

2. ADVERSE TRANSFUSION REACTION RATE:

$(Number\ of\ adverse\ transfusion\ reaction/Total\ number\ of\ blood\ components\ issued)x100$

3. WASTAGE RATE(Excluding discards due to TTI reactivity):

$(Number\ of\ blood\ components\ discarded/Total\ number\ of\ blood\ components)x100$

4. TURN AROUND TIME:

$Sum\ of\ Time\ taken\ for\ crossmatch/Total\ number\ of\ crossmatches$

5. COMPONENT Qc FAILURE(For each component):

$(Number\ of\ component\ Qc\ failures/Total\ number\ of\ components\ tested)$ x100

Samples were collected consecutively till the required sample size is met.The data was compiled,plotted graphically;expressed in tables and charts.

RESULTS

Percentage of TTI reactivity-1.81%(Meets the benchmark)

(HBV-0.52%,Syphilis–0.48%,HCV-0.45%,HIV-0.33%,Malaria-0.03%)

Adverse Transfusion reaction rate-0.45%

(Allergic transfusion reaction-0.20%,FNHTR-0.18% followed by TAD,TRALI, TACO.No case of hemolytic transfusion reaction were reported during the period)

Wastage Rate-6.17%(PRC-2.47%,PC-13.56%,FFP-2.47%)

Turn around time-For elective cases-80minutes,For emergency cases-35minutes

Component Qc failures:

PRC-All passed,PC-93.62% passed,FFP-92% passed Cryoprecipitate-60% passed(Does not meet the benchmark)

CONCLUSION

Quality indicators are important QMS tool for accomplishment of quality goals.This study helped us in assessing the quality and to identify the flaws in our blood centre.By using this data,one can analyze the root cause and can implement CAPA in order to sustain quality.

ePI20

Quality Management

Root Cause Analysis and CAPA for haemolysis during processing/Storage of blood bags

Sindhu P N, Dr. Amita R, Dr. Debasish Gupta

Introduction:

Hemolysis of red cells that occurs during component processing and storage of red cell units has serious clinical implications for the transfused patients. Timely detection of haemolysis is important to minimize adverse transfusion events

Aim: To do a Root cause analysis of red cell hemolysis encountered during processing/storage of blood bags

Material and methods:

The reasons for hemolysis were tabulated under 5M's – Man, Material, Method, Mother Earth and Measurements. An Ishikawa diagram was constructed based on this for each specific case of hemolysis.

This retrospective study was conducted in the blood centre as a comprehensive analysis of haemolysis in red cell units over a period of 15 months from July 2023 to September 2024

Results:

We encountered a total 39 hemolysis during this period , 6 during processing and 33 during storage. The frequency of encountering haemolysis in in-house and outdoor camps was almost similar at 0.5%

Duration of collection was less than recommended except for one which exceeded 11 minutes and the prevalence of haemolysis was seen more with 450 ml blood bags (Quadruple T &B & Triple bag with SAG-M)

Maximum time of return of blood unit was 11 hours

Cold chain was not maintained for one unit . Maximum repeated issue of units were 3.

Conclusion:

The study highlights the need for proper documentation of each step of donation, from vein to vein and to identify the reasons for hemolysis in blood bags using the Ishikawa diagram. Steps have been taken as corrective measure , such as numbering the BCMs and monitoring their performance, enhanced documentation practices,periodical temperature monitoring of blood collected from camps. And advanced hemolysis estimation methods .This will help in finding the root cause and initiating CAPA to prevent wastage of the precious resource called blood units.

ePI21

Quality Management

Optimizing Blood Component Utilization: A Study on Returned Bags

Dr.I.Saraswathi, Dr.N.Vivekanand, Dr.Puneeth Babu Anne, Dr.A.Sai Jahnavi, Dr.V.Harini

Background & Objective:

Return of issued blood component bags to blood centres compromises product integrity, poses logistical challenges, and raises biohazard concerns. The objective of this study is to identify the most common reason for return of the blood component bags and thereby improve the blood supply chain's efficiency and safety

Methods:

This is a prospective observational study carried out for a period of 6 months on the number of blood components issued and returned to the Blood Centre; examine reasons for return, component types, storage, transportation and handling.

Results:

A total of 2022 components were issued of which 1135 were PRBC (56.1%), 307 were FFP (15.1%), 166 SDP (8.2%) and 414 RDP (20.47%). The number of components returned were 22 PRBC (1.93%) and 2 FFP (0.65%) 4 RDP (0.96%), 1 SDP (0.60%). The main reasons for return were over ordering 8 (36.3%), high blood pressure 6(27.2%), fever 5(22.7%), cancelled or postponed procedures 2(9.0%) failure to secure a cannula for transfusion for PRBC 1 (4.5%), clots in the bag when the component issued was FFP 2(100%), miscommunication in case of RDP 4(100%) and SDP1(100%). Return rates varied significantly with PRBC being the most frequently returned component. The temperature of the components returned when checked was maintained in 21 PRBC (95.4%), 4RDP (100%)1SDP (100%); percentage hemolysis was calculated for returned PRBC which was 0.7% in 21 PRBC (95.45%). In case the component was returned due to high blood pressure or fever we made sure to find out that the vitals were checked before the component was issued from blood centre.

Conclusion:

Our study identifies areas for improvement in blood distribution and transfusion, including inventory management, storage, transport protocols and staff training. Addressing these issues can enhance patient safety, reduce waste and optimize the blood supply chain.

ePI22

Quality Management

A Prospective Study of Assessing Completeness and Accuracy of Blood Request Forms

Dr. V.Harini, Dr. N.Vivekanand, Dr. Puneeth Babu Anne, Dr. A.Sai Jahnavi, Dr. I.Saraswathi

Background and Objective

Incomplete forms can lead to delays, errors, and compromised patient care. Therefore, a quality improvement study to ensure completeness and accuracy of blood requests was carried out.

Methods

Blood request form is divided into 4 sections of which Section 1 contains patient demographic details, Section 2 clinical and lab parameters, Section 3 contains component requirements and Section 4 crossmatch and issue details

A prospective observational study was conducted at our blood centre from January to June 2024 during which request forms were evaluated for completeness and accuracy,

Results:

Of the 2727 blood request forms assessed, 1934 (70.9%) forms were found incomplete of which 1062 (54.91 %) forms were inadequately filled in Section 1 with date not being filled on 146 (13.7%) forms, gender on 53 (4.9%), patient location on 141 (13.2%), bed number on 436 (41%).

Section 2 was incomplete in 812 (41.98 %) forms of which indication for transfusion was not filled on 76 (9.35%) forms, haemoglobin on 27 (3.32%), platelet count on 86 (10.5%), previous transfusion history on 237 (29.1%), transfusion reactions on 219 (26.9%), pregnancy history on 98 (12%) and previous miscarriage history on 120 (14.7%) forms was not mentioned.

Section 3 was incomplete in 68 (3.51 %) forms of which type of request was not filled on 9 (13.2%) forms, date and time of requirement on 21 (30.8%), stamp and signature of in-charge on 7 (10.2%) forms was incomplete.

A total of 632 (23.1%) forms revealed inaccuracies with 292 (47%) bed numbers, 118 (19%) in patient location, 66 (10.6%) in indication for transfusion, 61 (9.8%) in platelet count, 56 (9%) in dates, 19 (3.05%) in haemoglobin, 9 (1.44%) in gender, wrong blood group in 11 (1.7%)

Conclusion:

The results highlight significant gaps in form accuracy and completeness for which corrective action is warranted.

ePP123

Quality Management

QUALITY INDICATORS AS PERFORMANCE TOOLS TOWARDS IMPROVEMENT OF BLOOD SAFETY & TRANSFUSION SERVICES –INSTITUTIONAL STUDY

Dr Nandini Raval, nandini raval

BACKGROUND & OBJECTIVES :

The Blood Transfusion Services is responsible for ensuring sufficiency,quality and safety of the blood and blood components . A well organized and efficient BTS would contribute toward better patient care and also towards the development of healthcare system in the country. The aim of this study is Evaluation of the all quality indicators as per NABH and assessing as a tool towards transfusion services and also check for the preparedness of our blood centre for NABH accreditation.

METHOD:

A retrospective study has been conducted for one year period from January-2023 to December-2023 in Blood Centre,Shalby Hospitals. Data were collected from software & registers .Detailed analysis was performed and all corrective actions have been taken .

RESULT :

Upon analyzing the quality indicators , out of 1638 donations over a period of one year, mean TTI% was 2.73% , ATTR was 0.001% with overall wastage rate 1.26% with highest wastage rate 2.68% in month of September due to higher no. of expired PRCs for which RCA and CAPA was done . overall TAT for routine issues were 132.43 mins and for emergency issues ,it was 29.51 mins.overall QC failure rate was 0.002% with highest and only QC failure was noted in month of Aug-2023.ADDR was found to be 0.0005% & DDR was 5.73% with C:T ratio of 1.20%

CONCLUSION :

A well-structured blood transfusion service contributes towards better healthcare in a hospital ,which is reflected by quality indicators.

ePP124

Quality Management

BLOOD DONOR TURN AROUND TIME (TAT): Quality Parameter For Transfusion Services

Dr Shaoli Ray, Dr Sanjay Prakash, Dr Suresh Kumar Lakhara

Background : Turn Around Time (TAT) is defined as time taken by blood donors for entire donation process i.e. from time of entry to time of exit. It indicates quality of blood donation complex.

Aims & objectives :

To calculate total time taken for blood donation by in house donors.

To evaluate reasons for increase in donation time.

To plan improvement strategies for donation process.

Methods : The study was conducted in Dept of Transfusion Medicine, R.N.T. Medical College, Udaipur with 3000 in-house blood donors randomly selected during January 24 to March 24 time period. Time of registration, Hb test, medical history, phlebotomy, donor exit time was recorded on donor card. If there was delay or donor reaction the details were documented which helped to assess the reason for delay.

Results : The TAT for in house donors was approximately 45 minutes. 94.5% donations were as par TAT. The factors causing increase in donation process are – time taken to understand the procedure, excessive rush of donors during peak hours and weekends, unexpected transient donor reactions and manpower shortage. Strategies to improve and prevent delay include appropriate staff presence at appointed counters, pre-donation counselling, prompt attention to donor reactions and effective management, team effort to overcome any challenges during donation process.

Conclusion : TATs helps to evaluate loopholes in chains of events. Once the shortcomings are detected, necessary measures need to be implemented. This is vital to improve all aspects of donor retention.

Keywords : TAT, donor reactions, counselling.

ePP125

Quality management

QUALITY ASSESSMENT OF PLATELET CONCENTRATES PREPARED BY PLATELET RICH PLASMA AND BUFFY COAT METHOD

Dr. Krupali Rajendrakumar Panchal, Dr. Sangita Shah, Dr. Nidhi Bhatnagar, Dr. Mamta Shah, Dr. Rahul Rajvanshi

BACKGROUND: Role of any transfusion services is to provide blood and blood components which are safe, pure, potent and effective. So quality control is the most important parameter to assess the efficacy of blood and its component. The present study was undertaken to assess the ex-vivo quality of platelet concentrates prepared by two different methods and compare the efficacies of both methods on various parameters.

AIM/OBJECTIVE: To evaluate quality control of platelets prepared by PRP method and buffy coat method.

METHOD: A total of 60 platelet concentrates (30 units of PRP-PC and 30 units of BC-PC) were selected randomly and tested for quality after collection. 2-3 ml of samples were collected from the selected platelet bags in plain test tubes using aseptic precautions and tested for the following parameters: 1. Platelet count per ml. 2. Platelet count per bag. 3. pH changes.

RESULTS: A total of 60 platelet concentrates (30 of PRP-PC, 30 of BC-PC) were enrolled in this study. The 95% of confidence interval (CI) of platelet per ml of PRP-PC and BC-PC was 915±2.87x10 3 and 1060.33±55.62x103 respectively. The 95% of CI of platelet count per bag of PRP-PC and BC-PC was 5.6±0.10x 1010 and 6.74±0.15x 1010 respectively. The 95% of CI of pH of PRP-PC and BC-PC was 6.8± 0.1and 6.5±0.1respectively.

CONCLUSION: In our study it was seen that even though PRP-PC and BC-PC fulfilled the desired quality parameters, platelets prepared by buffy coat method were at better yield in terms of platelet count.

ePI38

Therapeutic Apheresis and cellular therapies

Therapeutic Plasma Exchange in autoimmune disorders: A case series

Ambuja K, Dr Shivaram C, Dr Keerthi C

Background

Therapeutic Plasma Exchange(TPE or PLEX) is used in the treatment of various autoimmune haematological, renal and neurological diseases .The goal of TPE is to remove the antibodies found in the plasma. We share our experience of TPE with few autoimmune neurological and haematological disorders

Case description:

Case 1: A 38Y/F, with fever, severe joint and body pain since 1 month, NCS+EMG done suggestive of myokinetic discharges. Autoimmune encephalitis panel done was positive for antibodies to CASPR AND LGI-1. Diagnosed with ISAAC syndrome, 5 sessions of PLEX was done. On discharge she was symptomatically better, with only mild pain.

Case 2: A 29y/F with generalised myasthenia gravis; ACHR antibody positive with ocular and bulbar involvement in myasthenic crisis. 7 sessions of PLEX done outside and 3 sessions at our centre. At discharge she was independent of her ADL's with motor power 5/5 in all 4 limbs.

Case 3: A 29y/F with blurring of vision and weakness of right upper and lower limbs. MRI showed Optic Neuritis and Demyelinating lesions in thoracic and Cervical spine, diagnosed with Neuromyelitis optica. Following 5 sessions of PLEX, spasticity of right upper limb and gait improved

Case 4: A 2y/F child , with fever,cold,cough x7 days, vomiting, dark urine,ecchymatic patch over left lower limb with anemia,thrombocytopenia, renal dysfunction and normal coagulation s/o thrombotic microangiopathy. ADAMTS 13 deficiency noted. Underwent 4 sessions of PLEX. Renal parameters were normal at discharge

Case 5: A 60 year old lady with unexplained renal dysfunction underwent renal biopsy showed anti-GBM disease with anti-GBM titres more than 500, underwent 8 sessions of PLEX ,following which Anti-GBM titre was nil.

Conclusion: TPE is found to be an effective treatment modality for autoimmune diseases.

ePP139

Therapeutic Apheresis and cellular therapies

Collection efficiency in Peripheral blood stem cell collection using Spectra Optia – A retrospective study

Dr. J. Latha Fathima, Dr. Shanthala Devi AM

Background & Objectives:

Hematopoietic stem cell transplantation is a standard procedure for varied malignancies and for non-malignant diseases. It involves collection of peripheral blood stem cell (PBSC) by apheresis through automated cell separator. The objective of the study is to analyse the performance characteristics of the cell separator- SPECTRA-OPTIA

Methods:

A retrospective study from January 2021 to September 2024 was conducted. Laboratory parameters like Haemoglobin, Total leukocyte count, platelet count, CD 34 count prior to procedure, cell count and CD 34 of the product and procedural parameters like anticoagulant used, total blood volume processed, duration of run, product volume, total blood volume processed (in ratio), etc. were studied.

Results:

A total of 95 PBSC procedures were done. Of these, 51.5 % (49/95) were allogenic and 48.5 % (46/95) were autologous PBSC. Performance characteristics like apheresis yield (AY), apheresis yield per kg, collection efficiency (CE2), collection rate, predictive apheresis yield and performance ratio, etc were calculated. The results include Apheresis yield -440*106 cells, AY/kg -13.5 *106 cells /kg, CE2-71%, cell throughput-2 * 106cells /minute, collection rate- 5* 104 cells/ml, predictive apheresis yield -426.25 *106, and Performance ratio-103%

Pre CD 34+ count is the important factor in predicting the PBSC yield. Mean pre-CD 34 counts was 70 cells/ul and mean CE2 of Spectra Optia was 288.

Conclusion:

Collection efficiency assessment helps to understand the apheresis system, and the performance of cell separator. Primarily the collection efficiency depends on the CD 34 counts on the pre-procedure sample & CE 2 of Spectra Optia. CE2 can be prospectively used to predict the yield based on preCD34 counts

Key words: apheresis, collection efficiency, CD 34

ePI40

Therapeutic Apheresis and cellular therapies

Therapeutic Plasma Exchange in autoimmune disorders: A case series

Dr Ambuja K, Dr C Shivaram, Dr Keerthi C

Background

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Case 3: A 29y/F with blurring of vision and weakness of right upper and lower limbs. MRI showed Optic Neuritis and Demyelinating lesions in thoracic and Cervical spine, diagnosed with Neuromyelitis optica. Following 5 sessions of PLEX, spasticity of right upper limb and gait improved

Case 4: A 2y/F child , with fever,cold,cough x7 days, vomiting, dark urine,ecchymatic patch over left lower limb with anemia,thrombocytopenia, renal dysfunction and normal coagulation s/o thrombotic microangiopathy. ADAMTS 13 deficiency noted. Underwent 4 sessions of PLEX. Renal parameters were normal at discharge

Case 5: A 60 year old lady with unexplained renal dysfunction underwent renal biopsy showed anti-GBM disease with anti-GBM titres more than 500, underwent 8 sessions of PLEX ,following which Anti-GBM titre was nil.

Conclusion: TPE is found to be an effective treatment modality for autoimmune diseases.

ePI41

Therapeutic Apheresis and cellular therapies

“Single-center Experience of Therapeutic Plasma Exchange in Neurological Diseases :

Indications, Efficacy, and Safety

Dr Prerna Sachdeva, Dr Anil Khetarpal , Dr Divya Setya

Background & Objective

Neurological diseases with autoimmune or inflammatory etiology pose significant challenges in terms of treatment. Therapeutic plasma exchange (TPE) has emerged as an effective and promising treatment modality for managing these conditions by removing pathogenic

autoantibodies, immune complexes, toxins and proinflammatory mediators in conjunction with Immunosuppression. Removed plasma with toxins and autoantibodies is replaced by crystalloids, colloids, and/or normal saline.

The aim of the study was to describe the clinical profile and the experience with the usage of TPE in various neurological patients with emphasis on safety and efficacy of TPE.

Methods:

This retrospective study analyzed medical records of patients who underwent TPE for neurological diseases by centrifugal aphaeresis device between January 2017 and September 2024 at our institute. Patient Demographics, Clinical Diagnoses, Characteristics of TPE, such as number of cycles, type of replacement solution, and adverse events were collected and evaluated. Descriptive statistics were used to summarize the data.

Result:

A total of 73 patients underwent 343 TPE procedures during the study period. There was a slight predominance of male patients (54.8%),with an average age of 41.3 years. The most common diagnosis was Optic Neuritis followed by Guillain–Barré syndrome (GBS).

TPE protocols included exchanging 1-1.5 plasma volume every alternate day, with replacement solution being albumin, fresh frozen plasma or combination of both. Majority of patients showed positive clinical improvement indicating the efficacy of TPE in halting the disease progression and ameliorating symptoms. Adverse Events were reported in 20 procedures but were successfully managed.

Conclusion:

The study demonstrates the effectiveness and safety of TPE in the management of neurological diseases at our institute. It is a safe and cost effective treatment modality with minimal side effects or complications. These findings contribute to the growing acknowledgement of TPE as an upcoming therapeutic modality in the field of neurology.

ePl42

Therapeutic Apheresis and cellular therapies

Hump nosed pit viper snake bite induced VICC unresponsive to ASV treated successfully by therapeutic plasma exchange: A Case Report

SHIVANAND HEMANT KUMATAGI, Dr Shamee Shastry, Dr Ganesh Mohan, Dr Deepika Chenna, Dr Deep M

Introduction: Hump nosed pit viper (HNPV) snakes are common in western ghats region of India and Srilanka1. Their bites commonly cause local envenoming leading to local pain, swelling, and necrosis. Acute kidney injury is the most common systemic manifestation, and some patients may develop venom-induced consumption coagulopathy (VICC) which usually doesn't respond to ASV. Here we present a case report of a patient who developed VICC unresponsive to anti-snake venom, but was successfully treated with therapeutic plasma exchange (TPE).

Case summary: 48 year old male patient presented with alleged history of snake bite of hump nosed pit viper over his left ankle. The chief complaints on admission were pain and swelling till mid leg region which was progressive in nature and associated with redness. He received 20 vials of anti-snake venom in an outside hospital and was referred to our hospital. On examination, he was conscious and oriented, his vital signs were stable, peripheral pulses were palpable on his left foot. Localised rise of temperature, tenderness and swelling were noted. Small bite mark was noted near left achelles tendon. Lab reports showed deranged PT (> 120sec) and APTT (25 sec). Thromboelastography showed flat line and severe hypocoagulable state indicative of VICC unresponsive to ASV. Envenomation is a category III indication for TPE according to ASFA. We initiated TPE. Total plasma volume processed was 2842ml. A total of 4 normal saline, 2 albumin and 6 fresh frozen plasma units were used during the procedure. VICC improved on day 2 of plasma exchange as PT came down to 18 sec and TEG was normal. Patient tolerated the procedure well. Patient was put on supportive medication and antibiotics. The swelling gradually reduced and patient condition improved considerably. Patient PT INR improved and was discharged on day 4.

Discussion: Since the available ASV are not effective against HNPV, TPE is best option for treatment. It is also advantageous over FFP transfusion, which involves larger volume of blood products and takes many days to show effectiveness.

Conclusion: TPE may be considered in the management of snake bite envenomation unresponsive to ASV.

Reference:

1. Namal Rathnayaka RMMK, Ranathunga PEAN, Kularatne SAM. Venom-Induced Consumption Coagulopathy Following Hump-Nosed Pit Viper (Genus: Hypnale) Envenoming in Sri Lanka: Uncertain Efficacy of Fresh Frozen Plasma. Wilderness Environ Med. 2020 Jun;31(2):131-143. doi: 10.1016/j.wem.2019.12.006. Epub 2020 Apr 23.

ePI43

Therapeutic Apheresis and cellular therapies

Peripheral Blood Stem Cells Harvest from Paediatric Donors for Allogenic Transplantation – Our Apheresis Experience

Dr. Soma Agrawal, Dr. Rashmi Jain; Dr Ankita Sharma, Mr. Uday Thakur, Dr. Mohit Chowdhry

Background & Objectives: The aim of this retrospective study is to report our single centre successful experience in harvesting peripheral blood stem cells from paediatric aged group donors for allogenic haematopoietic stem cell transplantations (HSCTs).

Methods: We retrospectively collected data from our blood centre records of paediatric aged group allogenic donors who underwent PBSC harvest from January 2019 to September 2024 at our tertiary care centre. Demographic and clinical details of paediatric recipient and donor and PBSC harvest characteristics were recorded. Data was analysed using descriptive statistical tools and frequencies.

Results: A total of 98 PBSC harvesting procedures were done during January 2019 to September 2024 from 95 mobilized allogenic paediatric aged group donors on day-care basis. The mean age and weight of the donor noted at the time of apheresis were 8.47 years and 36.89kg respectively. Of this 46% were matched sibling and 54% were haploidentical allogenic paediatric donors. Femoral HD catheter was used as an access in 74% allogenic donors. Calcium gluconate at the dose of 10mg/kg or as per primary team's order was administered through out apheresis to counteract hypocalcaemia due to anticoagulant. The mean pre-CD34+ count and product CD34+ count was 240.7 cells/µL and 4349.1 x106 cells/µL. The minimum and maximum yield procured in 98 procedures were 5.2x106 kg/recipient's body weight and 86.1 x106 kg/recipient's body weight. All PBSCs procedures were concluded without any systemic adverse event with successful collection of target dose desired at primary physician's end.

Conclusion: Our single centre institutional experience corroborates for PBSC harvest from children as allogenic donors is a safer and effective apheresis procedure provided being optimised by an active participation of each clinical stakeholder to overcome physiological, anatomical, psychological, technical and ethical challenges.

ePP144

Therapeutic Apheresis and cellular therapies

A RARE CASE OF THERAPEUTIC PLASMA EXCHANGE (TPE) IN A STEROID-REFRACTORY PARANEOPLASTIC NEUROLOGICAL DISORDER IN SMALL CELL LUNG CARCINOMA PATIENT.

SOWMIYA BANU T, Dr MOHIT CHOWDRY

BACKGROUND:

Paraneoplastic neurologic syndromes (PNS) comprise of cancer-associated neurologic conditions triggered by onconeural antibodies against intracellular antigens shared by the tumor and nervous system (e.g., Hu,CV2/CRMP5,Yo,Tr,&amphiphysin). As per ASFA guidelines 2023, PNS gets category III Grade 2C with incidence of 0.1-1% (4-9 per 1,000,000) there are 2 controlled trials, 15 Case series and no Randomized controlled trials, Case report in TPE.

We present a Case of PNS in SCLC where the patient had antibody-mediated sensorimotor and cerebellar degeneration which was unresponsive to high-dose corticosteroids. TPE along with Intravenous Immunoglobulins (IVIG) manifested a good recovery and rehabilitation to the patient.

CASE REPORT:

A 63-year-old male, chronic smoker and known case of SCLC on chemotherapy, presented with abnormal behavior, sensorimotor neuropathy, and cerebellar signs. As nerve conduction studies suggested brain or spine-related etiology, CSF-autoimmune and serum-paraneoplastic panels were done, which revealed Anti-GABA-B and Anti-Hu, Anti-CV2 antibodies respectively. Patient was started on high-dose corticosteroids, however symptoms exaggerated and got bedridden.

Therapeutic Plasma Exchange was considered as the next option to revitalize the patient by removing antibodies and mediators of tumor in the circulation. Patient underwent three uneventful sessions of TPE daily with 1.5 Plasma Volume exchanged with fluid balance of 100% using 4% Albumin and two Fresh frozen plasma at the end as replacement fluid. Calcium gluconate infusions were given throughout the procedure. Followed by IVIG and chemotherapy were given. After 3 sessions, patient showed clinically significant improvement in the sensorimotor and cerebellar functions and was able to walk with support and maintain his muscle power and sensations at 3 months of follow up establishing the role of TPE in a steroid-refractory case of PNS.

CONCLUSION:

Early diagnosis of PNS and prompt initiation of TPE favors rapid resolution of PNS which rejuvenated the patient. Hence upgradation of PNS in ASFA categorization is pivotal.

ePl45

Therapeutic Apheresis and cellular therapies

An experience of therapeutic phlebotomy procedures as adjunct therapy in patient with their symptom in a tertiary care hospital

Dr.NEHASINGH, Dr Bankim Das, Dr,Rakesh Kumar,Dr Saurabh Lahare, Dr sweata Ranjan ,Dr Nishit Nayan

Background

Therapeutic phlebotomy is a medical procedure that involves removing blood, particularly red blood cells or serum iron, as a treatment for specific blood disorders. Historically known as bloodletting, this ancient practice had two primary methods: generalized techniques, such as venesection (vein cutting) and arteriotomy (artery cutting), and systemic techniques, including cupping and the use of leeches. The procedure was believed to stimulate the bone marrow to produce new red blood cells while simultaneously reducing serum iron levels. In modern medicine, therapeutic phlebotomy is used to manage conditions by decreasing red blood cell mass, lowering hematocrit (the proportion of red blood cells in the blood), reducing blood viscosity, or inducing iron deficiency. This approach helps alleviate symptoms and complications associated with various diseases.

Objectives

Therapeutic phlebotomy allows for a controlled and gradual decrease in red cell mass leading to improved blood flow and symptomatic relief in polycythaemia. The present study was aimed to determine the impact of serial fixed volume therapeutic phlebotomy protocol on the symptoms in patients of polycythemia.

Material and Method

This prospective longitudinal study was conducted over 37 months. The desired haematocrit for polycythemia vera and secondary polycythemia was 45% and 52% respectively. A fixed volume of 250 ml phlebotomy was performe. Presenting symptoms was evaluated before and after each procedure quesnarried based assement like mild ,moderate severe relif in symptoms

Volume to reduced= initial Hct-Desired Hct/79 X blood volume/kg X body weight/kg.

Results

From 2019 to 2024, a total of 151 therapeutic phlebotomy (TP) procedures were performed on 44 patients. Since the introduction of TP in 2019, the mean interval between procedures has been approximately 22 days. Polycythemia vera was the predominant indication for TP, followed by congenital heart disease. Platelet counts varied among patients, with some exhibiting levels exceeding 400,000/µL, while the average platelet count was 340,000/µL.Uncommon presentations for TP included polycythemia with optic neuritis, acute appendicitis, obesity with nasal obstruction, chronic obstructive pulmonary disease (COPD), sarcoidosis, and coronary artery disease with hypertension. Pre-procedure and post procedure symptoms of patient compared with

paired T test and chi squared test (The two-tailed P value equals 0.6657) with mild and moderate symptoms group.

Conclusion

Our protocol yielded rapid and marked improvement in patients of primary and secondary polycythemia with minimal adverse events and significant amelioration of clinical parameters.

ePl46

Therapeutic Apheresis and cellular therapies

Efficacy of Dump Freezing for Cryopreservation of PBSC for Autologous Stem Cell Transplant

Mr. Jayesh Rohit, Shailesh Lavana, Arpit Patel, Bhawna Chaudhary, Yogesh Mistry, Santhosh Vandanasetti, Sahil Gupta, Ameya Korane, Niraj Bhatt

Background & Objective:

This retrospective analysis aims to assess the efficacy and outcomes of dump freezing (uncontrolled rate freezing) at -80°C using a mechanical freezer for the cryopreservation of peripheral blood stem cells(PBSC) intended for autologous stem cell transplant

Methods:

The study involved 20 patients with haematological cancers who underwent autologous stem cell transplant between May 2019 - July 2023. Cryopreservation was achieved using a cryoprotectant mixture of 10% DMSO and 5% albumin. PBSCs were subjected to dump freezing and stored at -80°C until infusion. The viability of stem cells was evaluated at 24 hours post-cryopreservation, at the time of stem cell infusion, and during clinical follow-up to monitor engraftment.

Results:

The study cohort comprised 15 male and 5 female patients with a median age of 33 years(range:17-60 years). Two patients were co-infected with HIV. The median storage duration of cryopreserved products was 9.5(6-13) days. The mean viability of stem cells after 24 hours of cryopreservation was 78.5% (range 65-95%), and at the day of stem cell infusion was 75.05%(range:55-90%). All patients achieved neutrophil engraftment, median time to engraftment of 9.5(range:7-14) days. Most patients (except one) achieved platelet engraftment, median time to platelet recovery of 13.5 (range:9-60) days. The patient who did not achieve platelet engraftment experienced thrombocytopenia, likely due to a sudden surge in HIV and veno-occlusive disease. Out of the 4 deaths, 3 were attributed to relapse, one was related to the transplant. The remaining patients were alive with a median follow-up of 621(range:43-1554) days, all maintaining sustained neutrophil and platelet engraftment.

Conclusion:

This study demonstrates that dump freezing is an effective and clinically successful cryopreservation method for autologous stem cell transplant, particularly in resource-constrained settings. It provides a straightforward and cost-effective alternative to controlled rate freezing, yielding positive outcomes and ensuring the viability and engraftment potential of cryopreserved stem cells.

ePP147

Therapeutic Apheresis and cellular therapies

"Role of therapeutic plasma exchange in treatment of transplant associated thrombotic microangiopathy following renal transplantation: A Case Report"

Dr. Anshu Mahajan, Naveen Akhtar, Meena Sidhu, Abdul Majeed

Thrombotic microangiopathy (TMA) in renal transplant recipients is commonly associated with various causes such as drug – induced TMA mainly due to administration of calcineurin inhibitors (CNIs), TMA due to ischemia reperfusion injury, Antibody-mediated rejection (ABMR) and viral infections. We report a case of transplant associated thrombotic microangiopathy (TA-TMA) diagnosed in the kidney allograft of a 49 -year-old male who was successfully treated with plasma exchange. He was diagnosed with end-stage renal disease of unknown etiology. Patient present with Thrombocytopenia, hemolytic anemia, elevated lactate dehydrogenase and graft dysfunction three days after kidney transplantation. We diagnosed TA-TMA and administered plasma-exchange (Plex) sessions, steroid pulse and intravenous immunoglobulin. The patient's laboratory test results show increase in hemoglobin, platelet count and decrease in creatinine level and was discharged on day 12. Plasma exchange is indicated as category-III treatment for transplant associated TMA and as category-I in certain drug induced TMA and antibody-mediated rejection. In recent studies, plasma exchange has resulted in allograft salvage rate of 80% in cases with Post-transplant TMA. In the present case study, TPE resulted in allograft salvage in the patient.

ePP148

Therapeutic Apheresis and cellular therapies

Rare presentation of Smooth Muscle involvement in a known case of Myasthenia Gravis

Dr. Madhan Kumar B K, Dr.Pramanya

38 year old presented with obstipation and abdominal pain for 25 to 30 days and was diagnosed as Adult Hirschsprung disease in Delhi. Biopsy done in Apollo, Chennai showed presence of Ganglionic cells in sero-muscular layers of rectum and sigmoid colon. His Anti-Ach R Ab were high(> 8) and was diagnosed with Myasthenia Gravis presenting with rare smooth muscle involovement. He was also diagnosed to have Thymoma operated on 24/9/24. He also underwent 5 to 6 cycles of PLEX which improved his symptoms.

ePP149

Therapeutic Apheresis and Cellular Therapies

ROLE OF THERAPEUTIC PLASMA EXCHANGE IN DIFFERENT CLINICAL CONDITION IN TERTIARY CENTER

Dr. Hirenkumar V Makwana AKA Darji, Dr. Mamta Shah, Dr. Nidhi Bhatnagar, Dr. Sangita Shah, Dr. Kamini Gupta.

Introduction: Therapeutic plasma exchange (TPE) is a procedure that removes plasma from the blood and replace with a replacement fluid such as a fresh frozen plasma or albumin. It removes auto-antibodies, pathogenic substance, lipoproteins, Cryoglobulins from the plasma and key role in management of various diseases. Early diagnosis of diseases and starting of therapeutic plasma exchange may enhance fast recovery. A typical goal is to exchange 1-1.5 times estimated plasma volume as per ASFA guidelines.

Aim/objective: The aim of the study is to determine effects of the therapeutic plasma exchange on the patients with the different diagnosis.

Methods: A retrospective observational study was conducted of all the TPE procedures done in a period of 1 year (March 2023 to February 2024) in tertiary care center. Therapeutic plasma exchange procedure were performed using automated Cell Separator like Spectra Optia and COM-TEC, F.kabi and Amicus. The data was analyzed for the various indications in which TPE was advised.

Results: During the study period procedure of TPE performed on 121 patients out of which The most common indication for TPE was Guillan-barre syndrome (41.32%), followed by Acute Transverse myelitis(18.18%),Myasthenia gravis (13.2%), Liver Parenchyma diseases (8.26%), Neuromyelitis optia (5.78%), Auto-immune Encephalitis (4.95%), multiple sclerosis (2.47%), Hemoglobinopathy (1.65%), Organophosphate poisons (1.65%), TTP (1.65%).

Conclusion: Therapeutic plasma exchange is considered as an effective immune-modulatory treatment.TPE hold strong evidence in improvement of neurological disorders, For the better outcome the clinicians should advice plasmapheresis at an earlier stage before irreversible damage of the diseases as per ASFA guidelines.

ePI73

Transplant Immunology

Navigating transfusion needs in Heart transplantation surgery in tertiary cardiac care Hospital

Dr Dhara Darshan Patel, Dr Shital Soni, Dr Brijesh Patel, Dr Nirali Patel, Dr Parul Prajapati, Dr Truptee Thakkar, Dr Ajay Taviyad

Abstract

Background and Objectives: Since few years, there is an increase in number of heart transplant being performed in India, and for that increase in demands for blood and blood products. Transplantations may require massive transfusion of blood products. Therefore, blood centres need to predict, prepare and supply the required amount of blood products.

Methods: In this retrospective observational study, we analysed the amount of reserved and transfused blood components as Red blood cells, Fresh frozen plasma, Platelets, and Cryoprecipitates in 37 patients who was planned for heart transplantation surgery in our hospital between September 2022 and September 2024. Data was gathered from blood centre records.

Results: Platelets were the most frequently transfused blood component. Transfusion of blood components during and after heart transplantation surgeries are: Red blood cells (Leucodepleted and irradiated) 3.16 units; Fresh frozen plasma 0.56 units; Platelet concentrates (irradiated) 7.05 units; and Cryoprecipitate 0.29 units and Single donor platelet (SDP) 0.10 respectively. The average transfusion volume of transplants would be optimized every year. To control the emergency situations during surgery, our blood centre has made policy to reserve 5 units of each components ready for transfusion. To prevent this reserve and wastage of blood components it is recommended to implement patient blood management for such patients.

Conclusion: Periodic evaluation of transfusion requirements will facilitate the efficient management of blood products at the time of transplantation and help blood centres predict changes in blood requirements.

Keywords: Blood transfusion; Heart transplantation, Blood management

ePP174

Transplant Immunology

The key to Immunologic compatibility in the highly sensitized -The combined role of understanding Anti HLA antibody and HLA allelic prevalences.

Sam Arul Doss.R, Divya M, Gayathiri KC, Dolly D

Background: Donor availability for the highly sensitized is a challenge despite high quality HLA typing and Anti HLA antibody detection techniques. A deeper understanding of prevalences of these two entities might help to crack the code.

Aim & Objectives: To evaluate the frequency of allele-specific anti-HLA antibodies and the prevalence of the corresponding HLA alleles to assess the clinical probability of finding an antigen negative donor.

Methods: This retrospective study analysed the frequency of antibody specificities present in 15 highly sensitized patients. Antibody testing was performed using the Luminex Single Bead Antigen Assay (SAB), with an MFI (Mean Fluorescence Intensity) > 1500 considered positive. High-resolution HLA typing was done with MIA FORA kits on the Illumina MiniSeq platform. An in-house built software (Database-Driven HLA Matching Algorithm with Transaction-Safe CRUD Operations) designed by institutional IT team was used to determine the HLA allele frequency and the results were collated.

Results: Amongst 15 patients, the most frequent antibodies were listed in decreasing order and corresponding allele frequency of the Antigen in question is collated. In Class I : Anti HLA-B*57:01 (80%) / HLA-B*57:01 (10%), Anti HLA-B*58:01 (73.33%) / HLA-B*58:01 (10%), Anti HLA-B*15:12 (66.67%) / HLA-B*15:12 (0.29%), Anti HLA-A*24:02 (53.33%) / HLA-A*24:02 (29%), Anti HLA-A*02:01 (53.33%) / HLA-A*02:01 (8%), Anti HLA-B*27:05 (46.67%) / HLA-B*27:05 (2.5%), Anti HLA-A*24:03 (40%) / HLA-A*24:03 (0.1%) Anti HLA-A*01:01 (33.33%) / HLA-A*01:01 (23%), Anti HLA-A*11:01(20%) / HLA-A*11:01(26%), and Anti HLA-A*33:03 (25%) / HLA-A*33:03 (13.33%).

Whereas in Class II : Anti HLA-DRB1*07:01 (46.67%)/ HLA-DRB1*07:01 (31%); Anti HLA-DRB1*09:01 (46.67%) / HLA-DRB1*09:01(1%); Anti HLA-DRB1*12:01 (40%) / HLA-DRB1*12:01 (1%); Anti HLA-DRB1*14:04 (33.33%) / HLA-DRB1*14:04(17%); Anti HLA-DRB1*04:03 (33.33%) / HLA-DRB1*04:03(12%); Anti HLA-DRB1*08:02 (33.33%)/ HLA-DRB1*08:02 (1%); Anti HLA-DRB1*10:01 (26.67%) / HLA-DRB1*10:01 (13%), Anti HLA-DRB1*15:01 (20%) / HLA-DRB1*15:01 (28%) and finally Anti HLA-DRB1*15:02 (6.67%) / HLA-DRB1*15:02 (24.3%).

Discussion and Conclusion: Our results highlight the various combinations of antibody frequency and allelic prevalence such as HLA-A*24:02 which shows high prevalence (29%) and moderate frequency (53.33%), suggesting strong immune engagement. Conversely, HLA-B*15:12, despite its high frequency (66.67%), has limited clinical relevance due to its very low prevalence (0.29%). In Class II, HLA-DRB1*07:01 plays a significant role in immune recognition with both high frequency (46.67%) and prevalence (31%). On the other hand, HLA-DRB1*09:01 and HLA-DRB1*12:01, despite their high frequencies, have low prevalence (1%), indicating minimal immune significance. Understanding these various combinations in our population is essential for predicting the chances of finding a suitable donor in highly sensitized individuals.

eP175

Transplant Immunology

Non-HLA antibodies and their role in solid organ transplants

Nithya S, Dr. Ankith Mathur

Background: Non-HLA antibodies have recently begun to be suspected of playing a role in antibody-mediated rejection and graft survival. In the absence of any donor specific HLA antibodies (DSA) in the recipient, antibody mediated rejection (ABMR) may be caused by non-HLA antibodies like Angiotensin II Type 1 receptor (AT1R), Endothelial-1 Type A receptors (ETARs) etc. We report 7 such cases where the clinical suspicion was targeted towards non-HLA antibodies and the immunological findings thereof.

Methods: On suspecting ABMR, the physicians requested non-HLA antibody testing. The test was done on the patient's serum using the luminex bead based assay by Lifecodes for non-HLA antibodies. It covers 60 antigens and detects IgG antibodies against them. Results, expressed as mean fluorescence intensity (MFI) were analysed using the accompanying Match It! Software. The cases were encountered over 2 years (October 2022- September 2024).

Results: Of the 7 cases, M:F ratio was 4:3. The ages ranged between 30 and 48 years. Relationship of Donors with recipient- cadaver:3 , mother:2, husband:1 and father-in- law:1. H/O previous transplant was present in 1 case.

Pre-transplant testing was unremarkable in all cases. However, post- transplant, all cases presented with features S/O graft rejection and in view of absence of donor specific antibodies, non-HLA antibody screening was requested.

It was negative in 2 cases (no H/O transplant, Pre-transplant cross-match[CXM] and single antigen bead [SAB] assay for HLA antibodies- negative in both cases).

Case 3: first transplant, pre-transplant CXM and antibody screening (LMX)- negative. Symptoms started 2 months after transplant and non-HLA antibodies were positive (4 antibodies with MFIs between 3000 and 6000).

Case 4: first transplant, pre-transplant CXM- negative. Symptoms started 1 week after transplant and non-HLA antibodies were positive (1 antibody with MFI of 1005).

Case 5: second transplant, pre-transplant CXM- negative. Despite positive SAB, the antibodies were not donor specific. So the transplant was performed. Symptoms started 2 months after transplant and SAB was positive, non-HLA antibodies were also positive (>20 antibodies with MFIs between 1000 and 13000).

Case 6: first transplant, pre-transplant CXM- negative. Symptoms started 1 week after transplant and SAB and non-HLA antibodies were positive (>15 antibodies with MFIs between 1000 and 3000).

Case 7: first transplant, pre-transplant CXM- negative. Symptoms started 4 months after transplant and non-HLA antibodies were positive (10 antibodies with MFIs between 1000 and 5000).

Conclusion: In the absence of DSA-HLA antibodies, clinical features of graft rejection should raise suspicion of non-HLA antibodies being the possible cause. However their clinical significance needs more evaluation.

ePP178

Recent Advances (including molecular tests)

Standardization of SSP-PCR protocol for genotyping of HPA 1,2,3,4,5 &15 in North Indian blood donor population

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Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

Background & Objective:

Human Platelet Antigens (HPAs) are polymorphic antigens, resulting from single base-pair substitutions, and play a key role in immune-mediated platelet disorders like neonatal alloimmune thrombocytopenia, post-transfusion purpura, and platelet refractoriness. There is scarcity of data on the prevalence of HPA alleles in India. The objective of this study was to develop SSP-PCR protocol for genotyping HPA 1, 2, 3, 4, 5, and 15 in our blood donor population.

Methods:

Primer designing was done on the basis of published papers and online bio-informatics tools. 25nM desalted primers were synthesized from commercial source. Gradient PCR (Thermal-cycler, Biometra GmbH, Germany) was done to determine annealing temperatures of individual HPA alleles. Protocol provided by NIBSC was used for standardizing PCR-SSP conditions. Genomic DNA extracted from left over buffy coat samples was used for assay standardization. The amplification products were visualized by agarose gel electrophoresis.

Results:

A total of 19 oligonucleotides primer sequences were prepared (04 primer sequences for HPA 1 and 03 each for HPA 2-5, 15). Annealing temperatures for different HPA genes were found to range from 57.5 (for HPA-4,5&15) to 62°C (for HPA-1). Final PCR conditions were standardized using DNA (conc 40 ng/µL) to a total of 21 amplification cycles and final 8 extension cycles.

PCR cocktail consisted of 0.4 µL of allele-specific HPA1-5 and -15 "a" and "b" primers (in 12 separate tubes) with 0.4 µL of common HPA primer, 0.4 µL of forward and reverse primers for Human Growth Hormone (HGH) as internal control, 2.9 µL of nuclease-free distilled water, 5µL of Taq DNA-polymerase and 0.5µL of DNA.

Conclusion:

SSP-PCR protocol for HPA 1, 2, 3, 4, 5, and 15 was successfully standardized. This will enable us determine frequency of different HPA alleles in our population and further develop HPA typed panels for development of platelet serology.

ePP179

Recent Advances (including molecular tests)

HLA-B*57:01: The Genetic Spoilsport in Abacavir Therapy

VIJAY ANAND V, DR.DOLLY DANIEL , DR GAYATHRI

Background & Objectives

Abacavir (ABC) is an effective treatment for HIV/AIDS, but it carries a risk of mild to severe hypersensitivity reactions, particularly in patients with the HLA-B*57:01 allele. Approximately 3-8% of patients with this allele may experience adverse effects. There are currently no guidelines for screening for HLA-B57:01 in the Indian population prior to start of therapy. With this background, the study aimed to determine the prevalence of HLA-B*57:01 in our population and to assess if the frequency warranted the screening of the patient population in question.

Methods

This retrospective analysis was conducted in the Department of Transfusion Medicine and Immunohematology. We analyzed a cohort of samples requested for high-resolution HLA typing over two years (2022-2024). High-resolution HLA typing was performed using MIA FORA kits on the Illumina MiniSeq platform. An in-house software, designed by the IT team, was used to determine the HLA allele frequency of HLA-B*57:01. In another cohort of People living with AIDS/HIV(PLHA), we also collected data on HLA-B*57:01 testing using the SSO platform.

Results

The study comprised 3050 samples, all of which underwent high-resolution HLA typing. Within this cohort, it was determined that the prevalence of HLA-B*57:01 was approximately 10%. In another cohort of 146 individuals with PLHA who underwent HLA-B*57:01 locus typing using SSO, 24 patients (16%) tested positive for HLA-B*57:01.

Conclusion

With a population prevalence of 10%, HLA-B*57:01 is likely to occur at a high frequency demonstrated by the data derived from individuals with PLHA in our study. Therefore, it is crucial to screen for HLA-B*57:01 prior to starting Abacavir, in view of it being implicated in the development of a severe drug hypersensitivity reaction.

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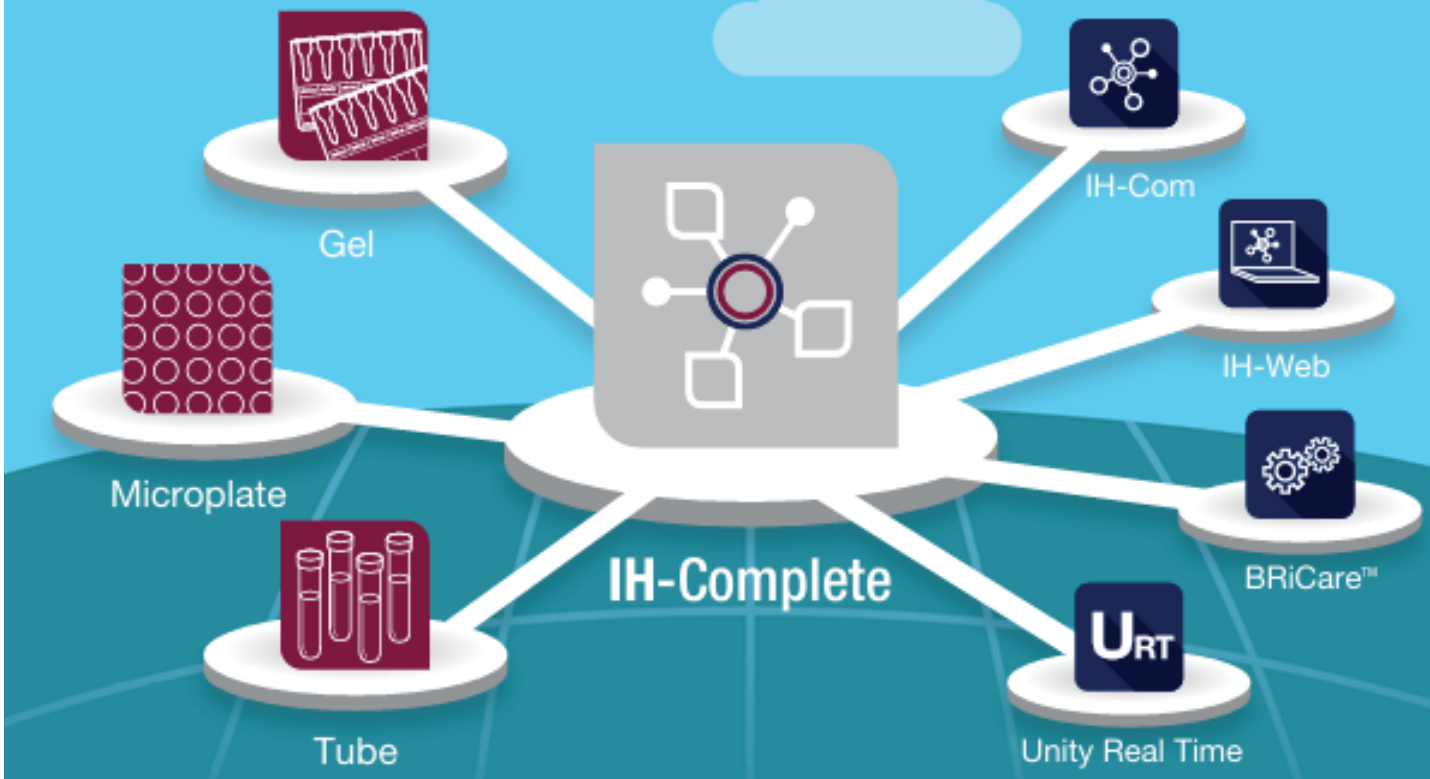

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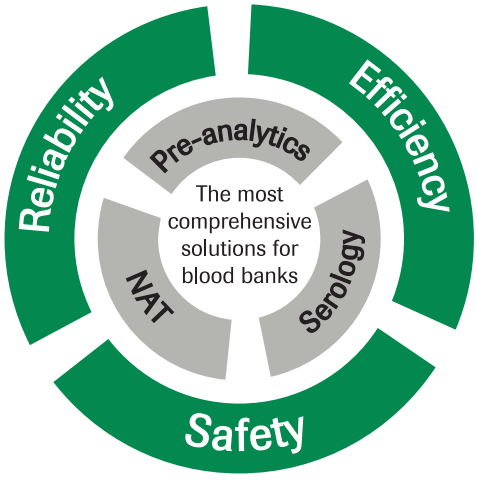

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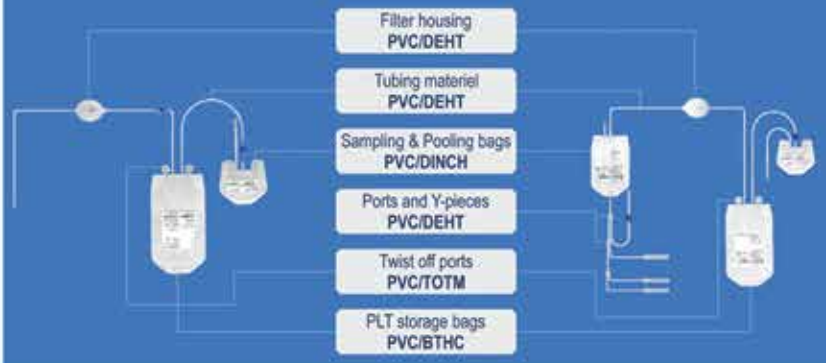

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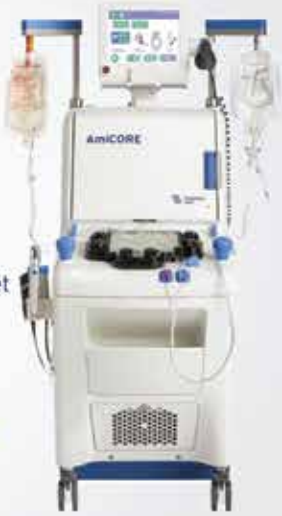

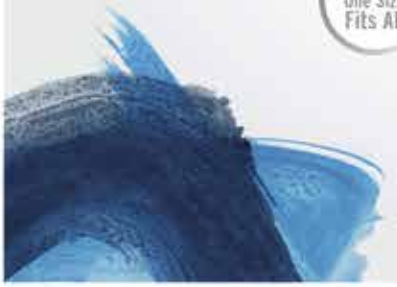

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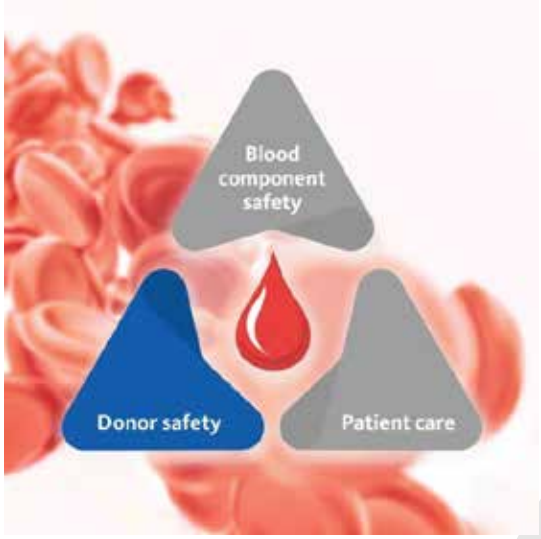

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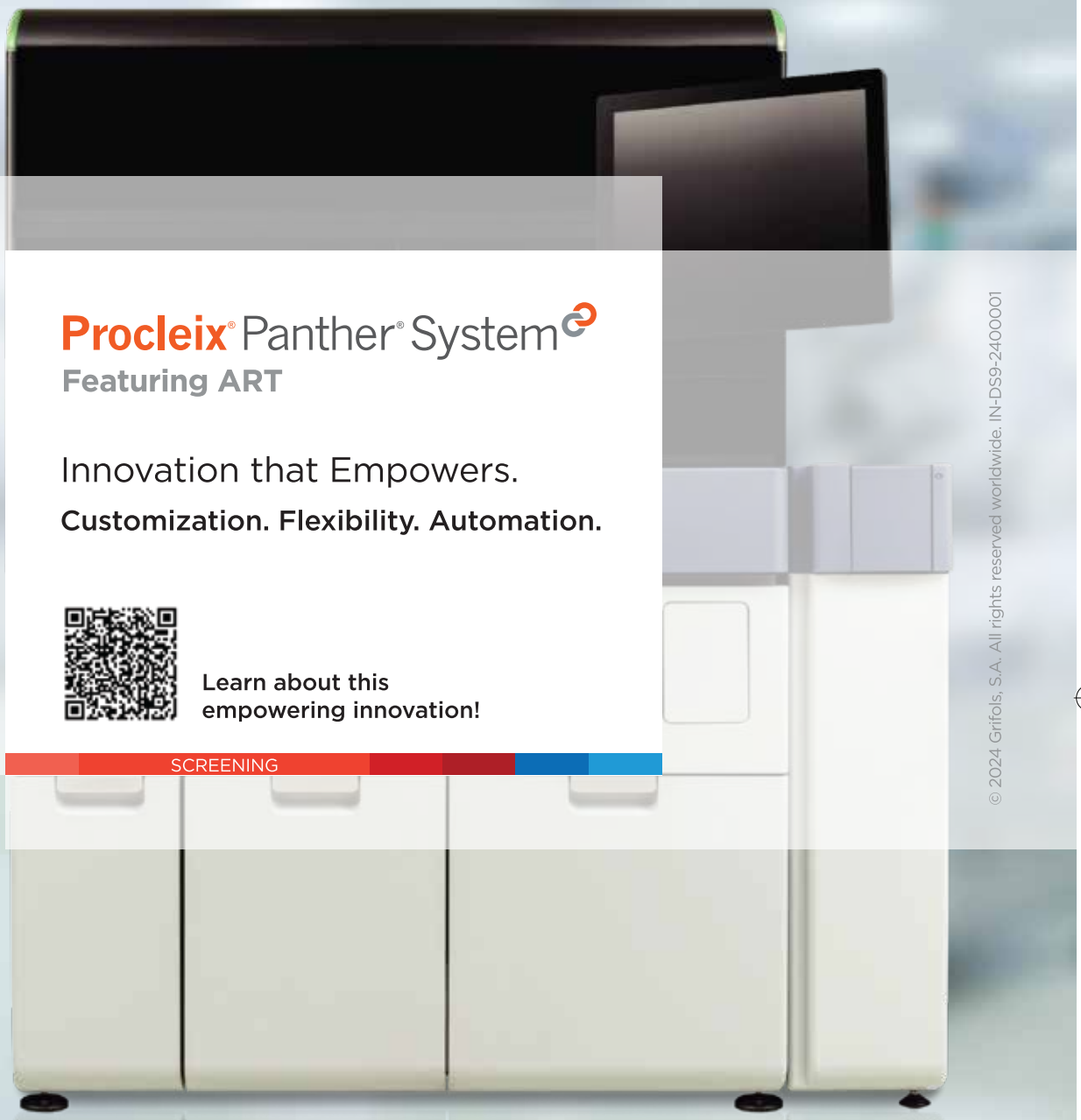

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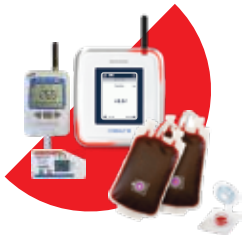

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We at Imperial Biotech have state of art facilites to cater the both domestic and international markets. Imperial Biotech has been established with an objective of serving mankind by way of providing good quality and user-friendly products along with exceptional customer supportive services.

Imperial Biotech operates through a robust network of 8 branch offices, various dealers and business associates spread across the country. We are known for the quality of our technology, the exceptional standards of cutomer care and our sustainability intiatives.

Our manufacturing facility follows national & international relevants norms as we are certified with GMP/ISO that allows us for high standards designing, quality manufacturing and approved by USFDA, we are also certified by 4 digit CE European certificate, ISO 13485:2016 (Latest regulation for medical device), ISO 9001-2015, IEC, MSME and NSIC, also listed in GEM Portal of Indian Government.

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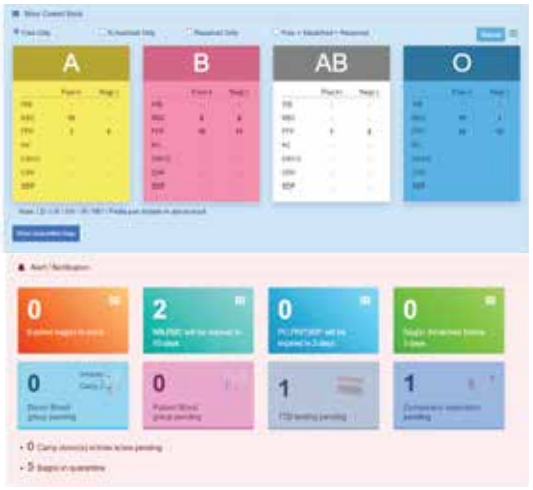

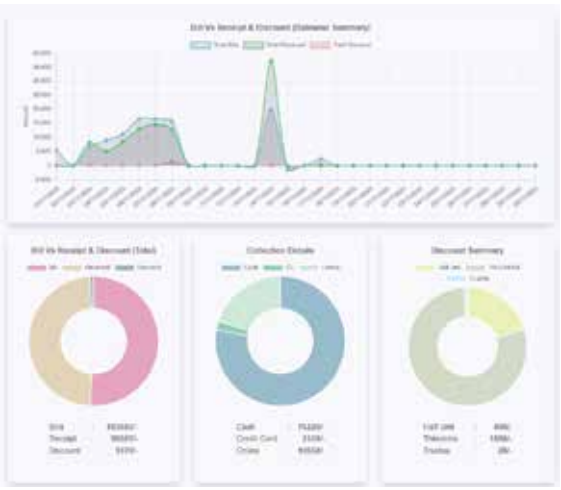

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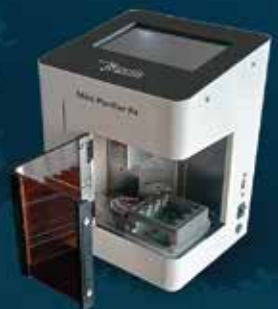

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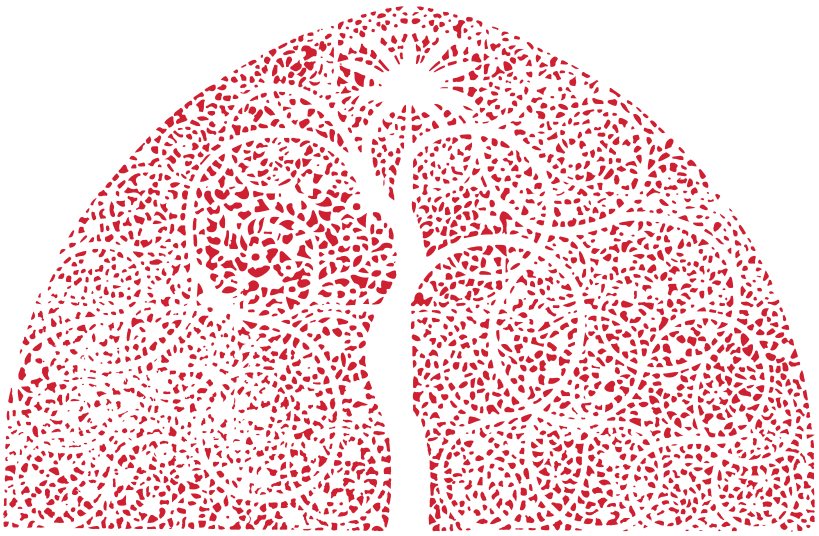

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