11-12th July

ISTM CME 2024

Unlocking the Future of Transfusion Medicine

First National CME of Indian Society of Transfusion Medicine

SOUVENIR

istmcme2024@gmail.com www.istmcme2024.com 95676 04381| 94478 62554 | 90201 20101

First National CME of Indian Society of Transfusion Medicine

ISTM CME 2024

11- 12th July, 2024
Trivandrum

ISTM

Kiddo and Kelly
Our official mascots

Let's deep dive in to the Ocean of Knowledge of Blood !!!

चलो, रक्त के ज्ञान महासागर में डूबकी लगाएं ! ! !

Organizing Committee

Patron
Dr. Sanjay Behari,
Director, SCTIMST

Organizing Chairperson
Dr. Debasish Gupta,
Professor & Head,
Dept. of Transfusion Medicine,
SCTIMST

Scientific Committee Chairperson
Dr. Amita R,
Associate Professor,
Dept. of Transfusion Medicine,
SCTIMST

Organizing Secretary
Dr. Vinu Rajendran,
Assistant Professor,
Dept. of Transfusion Medicine,
SCTIMST

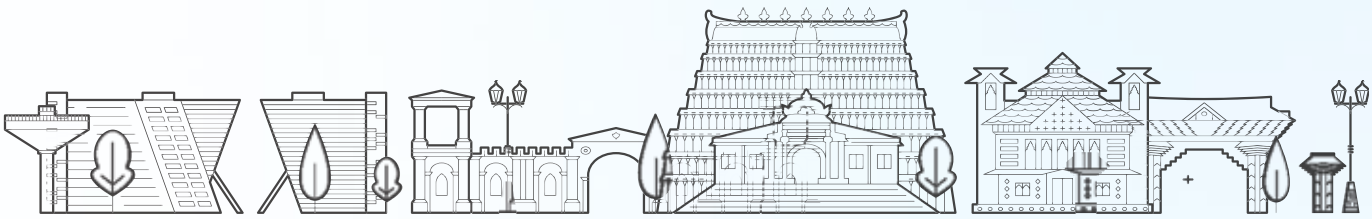
Treasurer
Ms. Sindhu PN,
Scientific Officer,
Dept. of Transfusion Medicine,
SCTIMST

National Advisory Committee

Dr. Neelam Marwaha
Dr. R.N. Makroo
Dr. Rajendra Chaudhary
Dr. Susheela Innah
Dr. Ratti Ram Sharma
Dr. Jayashree Sharma
Dr. Sitalakshmi Subramanian
Dr. Ravneet Kaur
Dr. Prasun Bhattacharya
Dr. Aseem Tiwari

Scientific Committee

Dr. Vijayalekshmi K
Dr. Shaiji PS
Dr. Veena Shenoy
Dr. Mohandoss M
Dr. AM Rafi



Scientific Presentation Co-ordinator

Dr. Sanooja Pinki
Dr. Anila Mani
Dr. Arif Vaheed
Dr. Linda John

Registration Committee

Dr. Poornima AP
Dr. Shiffi Fazal
Dr. Sreelekshmi S
Dr. Lekshmi Sudev

Reception Committee

Dr. Angel Mary Sam
Dr. Bhuvaneshwari
Ms. Manju Nair K
Ms. Sindhu MS
Ms. Anu MP
Ms. Noora Fathima R
Ms. Akshaya MP

Transport Committee

Dr. Arun VJ
Dr. Shouvik Basu
Mr. George Paul Thaliath
Mr. Sivakumar S
Mr. Sunil KP
Mr. Shammy S

Audio-Visual Committee

Dr. Shanavas A
Dr. Jess Elizabeth Rasalam
Ms. Jyothi M
Dr. Don Davis

Entertainment Committee

Dr. Akshaya R
Dr. Meethu Muraleedharan
Ms. Subimol AS
Ms. Amritha VS
Ms. Aiswarya AS

Food & Beverage

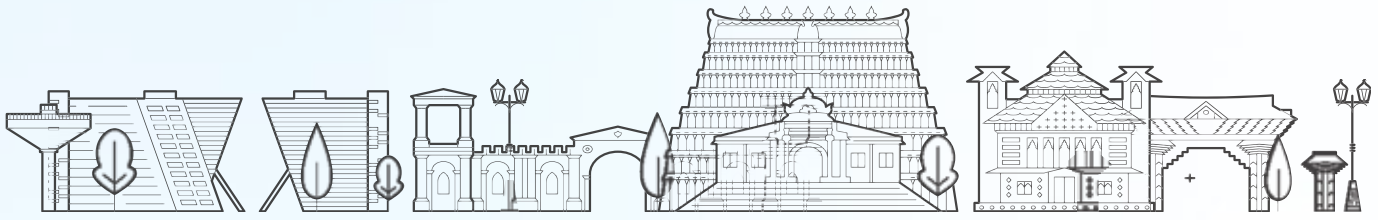
Dr. Kala VL
Dr. Shivanand K
Ms. Baby Saritha G
Ms. Saju S
Ms. Preethi Prakash

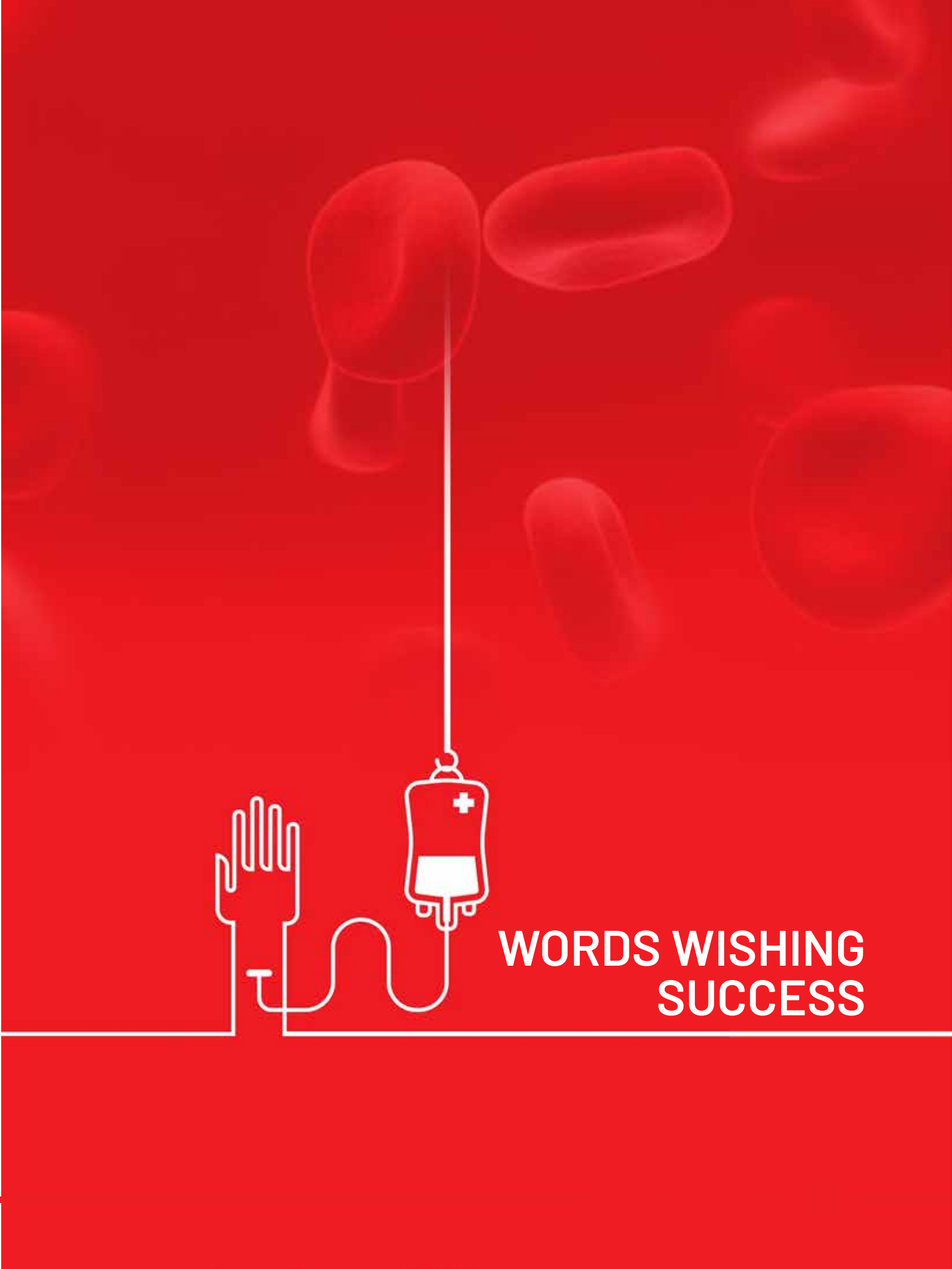
Accommodation Committee

Dr. Ancy Ninan
Dr. Dilna Edison
Mr. Ans AM
Ms. Parvathy Padmakumar PS
Ms. Priyanka SH

Souvenir Committee

Dr. Davood Bava
Dr. Jasmin Gafoor
Dr. Punkesh Patel
Ms. Renjini P




WORDS WISHING
SUCCESS

MESSAGE FROM CHIEF MINISTER OF KERALA

GOVERNMENT OF KERALA
Pinarayi Vijayan
CHIEF MINISTER

No. 512/Press/CMO/24 14 June, 2024.

MESSAGE

I am happy to note that the Department of Transfusion Medicine, SCTIMST, is planning to publish a souvenir as part of the first National CME of Indian Society of Transfusion Medicine.

The role that transfusion medicine plays in healthcare delivery and patient outcomes is undeniable. I hope that this program will function as a medium for sharing knowledge and innovation in order to improve patient care and safety.

My best wishes.

Pinarayi Vijayan

141, 3rd Floor, North Block, Government Secretariat, Thiruvananthapuram Pin 695001 T 0471 2333241, 2333812, 2333610 F 0471 2333489
E chiefminister@kerala.gov.in facebook.com/cmokerala twitter.com/cmokerala
Residence Cliff House T 0471 2318406, 2314853
www.keralacm.gov.in

MESSAGE FROM HEALTH MINISTER OF KERALA

VEENA GEORGE
MINISTER FOR HEALTH
WOMAN AND CHILD DEVELOPMENT
GOVERNMENT OF KERALA

Date. 19.06.2024

MESSAGE

I am happy to know that the Indian Society of Transfusion Medicine is bringing out a souvenir in connection with the First National CME, Organized by the Department of Transfusion Medicine, Sree Chitra Tirunal Institute for Medical Sciences & Technology. This academic event brings together esteemed professionals in Transfusion Medicine from across India. The scientific program covers key topics relevant to Transfusion Medicine practice, fostering collaboration, idea exchange, and meaningful connections within the community. I wish this endeavour all the success.

Veena George

Office: Secretariat Annexe-2, 7th Floor, Room No. 701
Government Secretariat, Thiruvananthapuram-695 001
Phone-Office: 0471-2327876, 2327976 Fax: 0471-2327016
Mobile: 9400066111 E-mail: min.hlth@kerala.gov.in

MESSAGE FROM PATRON

डॉ. संजय बिहारी
(एमएस, एमसीएच, डीएनबी, आईएफएएएनएस, एफएएमएस)
निदेशक

DR. SANJAY BEHARI
(MS, MCh, DNB, IFAANS, FAMS)
DIRECTOR

श्री चित्रा तिरुनाल आयुर्विज्ञान
और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम-695011, केरल, इंडिया
(एक राष्ट्रीय महत्व का संस्थान, विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार)
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL
SCIENCES AND TECHNOLOGY, TRIVANDRUM
THIRUVANANTHAPURAM-695011. KERALA. INDIA
(An Institute of National Importance, Department of Science and Technology, Govt. of India)

Dated 24th June, 2024

MESSAGE

It gives me immense pleasure to note that the First National CME of Indian Society of Transfusion Medicine (ISTM CME 2024) is going to be organised by the Department of Transfusion Medicine of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram on 11th and 12th of July 2024.

Sree Chitra Tirunal Institute for Medical Sciences and Technology is an Institute of National Importance, which pioneered the first successful technology for Indigenous Blood bag manufacturing in the country.

This conference with its befitting scientific programmes, interactions and exposures and the presence of the distinguished faculty members and researchers would go a long way in benefiting the participants and the speciality.

We are very proud of our Department of Transfusion Medicine that has ensured that majority of surgeries are carried out by voluntary blood donation. Their efforts in this direction are inspirational.

I express my best wishes to the organising committee and the participating delegates in this conference and wish it a grand success.

Sanjay Behari

Dr. Sanjay Behari
प्रो. संजय बिहारी
(एमएस, एमसीएच, डीएनबी, आईएफएएएनएस, एफएएमएस)
Dr. Sanjay Behari (MS, MCh, DNB, IFAANS, FAMS)
निदेशक / DIRECTOR
श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान
Sree Chitra Tirunal Institute for
Medical Sciences and Technology
त्रिवेन्द्रम / Trivandrum-695011

दूरभाष Phone : 0471-2443152, 2443085
फाक्स Fax : (91) 471-2446433, 25507728
ई-मेल/E-mail : director@sctimst.ac.in
वेबसाइट/Website : http:/www.sctimst.ac.in

MESSAGE FROM ORGANIZING CHAIRPERSON

Dr. Debasish Gupta
President, I.S.T.M
Professor and Head
Department of Transfusion Medicine
Sree Chitra Titunal Institute for Medical Sciences and Technology
(An Institution of National Importance, Department of Science and Technology, Govt. of India)
Thiruvananthapuram, Kerala - 695011

MESSAGE

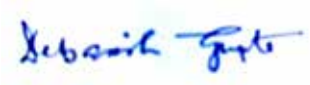
We are delighted to extend a warm invitation to the Delegates of the First National CME of the Indian Society of Transfusion Medicine (ISTM) in Trivandrum, the capital city of "God's Own Country."

Gathering the finest professionals in Transfusion Medicine from across India, this two-day academic extravaganza promises a deep dive into the latest advancements in the field. Our meticulously curated scientific program encompasses a wide range of topics vital to Transfusion Medicine practice, creating a platform for collaboration, knowledge exchange, and the establishment of valuable connections within the community.

Delegates can look forward to a plethora of scientific presentations and engaging panel discussions led by distinguished experts in Transfusion Medicine. Junior Residents, and Senior Residents will be highly benefitted and gain knowledge on the various recent trends in the subject. They will get an opportunity to interact with their peers from all across the country and exchange their views and recent innovative developments that are taking place in this specialty.

Join us in immersing yourself in the serene ambience, tranquil surroundings, and delectable cuisines of God's Own Country while benefiting from unparalleled scientific experiences.

Let's embark on a journey together to explore fresh perspectives, foster collaboration, and ignite innovation in the realm of Transfusion Medicine.



(Dr. DEBASISH GUPTA)

MESSAGE FROM SECRETARY

Dr R R Sharma
Secretary, Indian
Society of Transfusion Medicine
Prof. &Head,
Department of Transfusion Medicine,
PGIMER, Chandigarh

MESSAGE

As a Secretary of Indian Society of Transfusion Medicine, It gives me immense pleasure to extend a warm welcome to the eminent faculty and distinguished guests and delegates who have come to participate in the 1st National CME of Indian Society of Transfusion Medicine- from 11th – 13th July 2024 organized by the Department of Transfusion Medicine, SCIMST Trivandrum. The theme of the CME is "Lets deep dive into the Ocean of Knowledge of Blood" which is quite relevant in the present context, as the specialty of transfusion medicine has witnessed a multifaced growth over last few decades and the Transfusion Medicine professionals are now playing a vital role in clinical transfusion practice by involving in decision making by providing therapeutic apheresis consultations and guiding various complex clinical situations, such as , Transfusion support in massively bleeding Obstetrics and trauma patients, Bone marrow & Solid Organ transplantation and multiply transfused alloimmunized patients.

Safety and adequate availability of blood and blood components is an essential pre-requisite for delivering good healthcare services hence, developing a quality system and understanding the need to comply with good manufacturing practices is vital to strengthen the safe blood programme in the country. The present CME programme has been very carefully designed under the able guidance of Prof. Debasish Gupta, President ISTM and organizing chairperson of this event, and covers various key areas in Transfusion Medicine, which has attracted the attention of people from all walks of life in last two decades. These deliberations will certainly motivate young minds to explore new avenues of research in this field. I do hope that meaningful interactions will take place between the faculty and delegates and that each one of us will have an academically enriching experience. Hope you all will enjoy the CME and take back some good memories from Kerala.

Best wishes and regards

Dr Ratti Ram Sharma

MESSAGE FROM COMMITTEE CHAIRPERSON

Dr. Amita R
Scientific Committee Chairperson- ISTM CME 2024
Associate Professor
Department of Transfusion Medicine
Sree Chitra Tirunal Institute for Medical Sciences & Technology,
Trivandrum

Dear Esteemed Colleagues,

It is with great pleasure that I extend a warm welcome to each one of you for the inaugural session of the Indian Society of Transfusion Medicine National Continuing Medical Education (ISTMCME 2024). This prestigious event, which brings together experts, researchers, and practitioners in the field of Transfusion Medicine, is hosted by the Department of Transfusion Medicine, Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST). The event is scheduled for 11th and 12th July 2024 at the Hyatt Regency, Thiruvananthapuram.

As the Chairperson of the Scientific Committee, I am honoured to be part of this significant scientific endeavour. Our chosen theme, "Unlocking the Future of Transfusion Medicine," reflects our commitment to exploring cutting-edge research, innovations, and best practices that directly impact patient care and safety.

Allow me to highlight three key aspects of ISTMCME 2024:

Keynote Speakers: We are privileged to have distinguished experts who will share their insights during the conference. These speakers will address critical topics, inspire us, and shape the discourse on future of Transfusion Medicine.

Mascots Kiddo and Kelly: These delightful companions will guide our delegates as they take a deep dive into the ocean of knowledge of Transfusion Medicine.

Facility Visits: Thiruvananthapuram boasts two major facilities for blood bag manufacturing. We have thoughtfully arranged pre- and post-conference visits to these facilities, providing firsthand insights into state-of-the-art technology for making blood bags—a technology that was developed and transferred by the Biomedical Technology Wing of SCTIMST.

I encourage lively discussions, knowledge sharing, and collaborative learning. Let us seize this opportunity to elevate the standards of Transfusion Medicine across India.

Together, we can shape the future of transfusion medicine and contribute to better patient outcomes. I eagerly anticipate an enriching and memorable ISTMCME 2024.

Warm regards,

Dr. Amita Radhakrishnan Nair

MESSAGE FROM ORGANIZING SECRETARY

Dr Vinu Rajendran
Organizing Secretary -ISTM CME 2024
Assistant Professor
Dept. of Transfusion Medicine
Sree Chitra Tirunal Institute for Medical Sciences & Technology,
Trivandrum

MESSAGE

Dear Esteemed Colleagues and Delegates,

On behalf of the Department of Transfusion Medicine, Sree Chitra Tirunal Institute for Medical Sciences and Technology, it is my great pleasure to welcome you to the First National CME of Indian Society of Transfusion Medicine, taking place on the 11th and 12th of July 2024 at Hyatt Regency in Trivandrum, Kerala.

This landmark event brings together a diverse group of professionals dedicated to the field of transfusion medicine. Our goal is to foster an environment of learning, collaboration, and innovation. Over these two days, we have curated a program that features eminent speakers, cutting-edge research, and interactive sessions designed to enhance our knowledge and practice in the field of Transfusion Medicine.

Trivandrum, with its rich cultural heritage and serene landscapes, provides the perfect backdrop for our conference. We hope you take the opportunity to not only engage with the academic content but also to explore and enjoy the unique beauty of Kerala.

I extend my heartfelt thanks to our sponsors, organizing committee, and all participants for their unwavering support and enthusiasm. Your participation is what makes this CME a success.

Welcome to Trivandrum, and I wish you a fruitful and enriching experience at the First National CME of the Indian Society of Transfusion Medicine.

Warm regards,

Dr. Vinu Rajendran
Organizing Secretary
ISTM CME 2024

SYMPOSIUM

IS NEAR ZERO RISK BLOOD POSSIBLE?

R.N.Makroo
Managing Director
Transfusion & Transplantation Consultancy
Ex, Director Professor Department of Transfusion Medicine,
Molecular biology & Transplant immunology
Apollo Group of Hospitals New Delhi

Introduction

A blood transfusion service has become an integral part of modern medical practice. Most transfusion save lives, but they can also put a patient at risk if blood is contaminated by an infectious agent. Safe blood may generally be described as having no traces of viruses, parasites, drugs or any chemical substances that may cause harm to the recipient. A crucial element in ensuring safety is to know as much as possible about the source of donated blood.

Blood Safety especially in respect of viral infections HIV, HBV & HCV has improved drastically in the developed world because of voluntary non-remunerated regular blood donors, serological testing for infectious markers and incorporation of Nucleic acid testing to narrow window period donation. The overall blood supply has also improved thanks to sensitive viral screening methods, compatibility testing, leucoreduction and bacterial detection of blood components in the developed world. Recently Pathogen Inactivation of blood/ blood components by agents like psoralens and ultra-violet irradiation has been incorporated in some of the developed countries.

While no Blood Transfusion is completely safe, countries with a well-managed blood transfusion service, such as Japan, USA and Western Europe have achieved commendable levels of blood safety, yet make no claims to providing 100% Zero risk blood. The frequency of viral transmission, per unit of blood transfused in the USA, is estimated as 1 in 1.5 million for HCV, 1 in 4 lakhs for HBV and 1 in 1.8 million for HIV. Reliable nationwide figures for viral transmission are not available in India. Those getting repeated transfusions, such as patients of thalassemia or patients on renal dialysis are distinctly worse off and show high evidence of infection with HBV and HCV.

Blood Safety Scenario in developing countries including India

Up to 2-3 % of HIV infections in the developing world, may still be due to transfusion of contaminated blood. Maintaining a safe blood supply, therefore, is in the interest of every public health official. There are approximately 2.4 million HIV infected cases in India. As per NACO (National Aids Control Organization) report 2010, 1.8 % of the HIV infection is attributed to blood transfusions. Since most blood donors are first time donors, the HIV prevalence in blood donors matches that in general population. India now ranks second only to South Africa for the largest number of people living with HIV/ AIDS.

There are 30 million carriers of HBV and 10 million carriers of HCV in India. The prevalence of HBsAg positivity in blood donor population in USA and UK is about 0.1%, which is very low compared to its incidence in Indian blood donors. The Incidence of HIV, HBsAg and HCV in blood donors in India varies in different states of the country and ranges from 0.1-0.2%, 0.86-2% and 0.28-0.53% respectively. Even after the most sensitive screening tests for the detection of HBsAg in blood from blood donors. HBsAg negative units have been found to transmit the Hepatitis B virus infection.

Accordingly there is a need to frame strategies to ensure safe blood for the patient.

Strategies for Blood Safety

Blood safety revolves around three things:

- Safe blood donors
- Safe blood transfusion Practices
- Appropriate / Rational use of blood

Safe blood donors

Voluntary non- remunerated repeats blood donor is a pivot for safe blood supply. A carefully screened voluntary donor, who answers the questions of medical history questionnaire honestly and is non- reactive to the available screening tests, is the best defense against TAI (Transfusion Associated Infections). A system of voluntary, regular non-remunerated blood donation is widely recognized as critical factor in quality blood service delivery. Blood donation coming from family, or replacement donors and especially paid donors is known to have a higher incidence and prevalence of transfusion- transmissible infections. Experience shows that paid donors present a higher risk of acquiring infections that can be transmitted by transfusion than those who give for purely altruistic reasons.

Accordingly it is important that from target population of young people, the potential low risk blood donors need to be motivated and encouraged right from schools, universities and workplace to become regular blood donors. Blood coming from a voluntary system is, in general, less likely to contain the HIV, Hepatitis B, Hepatitis C or any other harmful substances. Not only is the blood likely to be safer from voluntary donors but also such a system has another advantage; it cuts down on the amount of blood that has to be discarded because of evidence of infectious disease markers in that way reducing the cost of blood transfusion services. In spite of a big human resource of over 1.4 billion of population there is still shortage of voluntary blood donors in India. Although the national average of voluntary blood donation is about 75 % (NACO statistics) but there is very little concept of regular repeat blood donation, which is the hallmark of blood safety.

Safe Blood Transfusion Practices

Safe blood transfusion practices have to be followed from vein to vein i.e blood donor – patient. To achieve this, there is need to have right blood donor selection, blood collection, preparation of blood components, storage of blood components, screening for the infectious markers by highly sensitive and specific tests, blood grouping, screening for immune antibodies, cross matching, issue of blood/ blood component and transfusion of the blood / blood component.

Infectious Markers Screening has been the most highlighted aspect of blood banking in respect of safety and accordingly each and every unit of blood need to be tested for infectious markers by highly sensitive and specific tests. However in-spite of all the tests for infectious markers there is no zero risk blood as none of the test available to date have been able to completely eliminate the risk of infection during the window period. The window period is the time between infection and development of antibodies / antigens. Thus, there is risk of transfusion-transmitted infection despite serological testing due to such false negative results. Some possible reasons for false negative reports are donation of blood during the window period, atypical genetic variant of viruses, immunosilent cases, laboratory error due to equipment malfunction, and technical errors.

Impact of Nucleic Acid Testing (NAT) to Blood Safety

Nucleic Acid Testing (NAT) has considerably improved the blood safety in the developed countries. It has now been established that Individual Donor Nucleic Acid Testing (ID-NAT) detect infections earlier than serological testing by reducing the window period for HIV to 3-5 days, HCV to 2.5 days and HBV to 15 days. Given the high rate of sero-positivity of HIV, HCV and HBV in India and keeping in mind the high percentage of first time and replacement donors, it is likely that adding NAT to the current screening tests will have a

significant impact on blood safety by reduction in Transfusion Transmitted Infections. Screening for malaria by very sensitive methods like malarial antigen helps in the prevention of transmission of malaria in endemic countries like India. Accordingly the malarial antigen testing needs to be implemented uniformly in all the blood banks.

Bacterial Contamination of Blood Components

There is a growing awareness that bacterial contamination plays a key part of acute post-transfusion microbial adverse events identified by Haemovigilance program in the developed countries. Most of the bacterial transmissions are associated with platelets as these are stored at 22 °C followed by red blood cells. The most common source being the donor skin contamination followed by the infection present in blood. Interventions to reduce bacterial risks of transfusion include enhanced cleansing of the venepuncture site, diversion of the first 15-20 ml donation to flush out skin bacteria entering the venepuncture needle, screening blood components for bacterial contamination and in the future we will have the option to use pathogen inactivation/reduction technologies to disable contaminant bacteria, especially in platelet preparations.

Leucoreduction.

The use of leucodepleted blood products is gaining importance because of the scientific evidence that filtered blood products especially prestorage leucoreduction prevent or reduce the incidence and severity of a number of adverse transfusion effects like Febrile Non Haemolytic Transfusion Reaction, sensitization to blood products (HLA alloimmunization), refractiveness to platelet therapy and prevention against lymphotropic viruses including CMV. Leucoreduction is very advantageous in neonates; transplant patients and patients of leukemia and aplastic anemia. Blood Safety can further be improved by decreasing the donor exposure to the patient by providing blood components from single donors i.e. platelets, plasma on cell separator or two units of red blood cells on Alyx Component System or Haemonetics MCS+. The ultimate goal of every member of the blood center team is to provide blood components of the highest available quality to patients in need. For this the blood centers have to invest extra time and money as they try to meet demand. The ALYX System produces 2 units of red cells that consistently meet both US and European compliance standards. Transfusing 2 units of red cells from the same donor helps reduce patient exposure.

Blood safety in Neonates has improved with the use of multiple paediatric blood collection bags and Sterile Connecting Device. Sterile Connecting Device (SCD) has made it possible for blood components to be issued in small aliquots and thus allowing the same unit to be further issued to the same child if needed.

Even today, gaps exist in our defenses against the risks of blood transfusion. Pathogen Inactivation (P I) Systems like INTERCEPT Blood System or Mirasol or Theraflex system have been developed to answer the need for a comprehensive solution to the gaps that remain with current blood safety strategy. The INTERCEPT Blood System offers the potential to inactivate new and emerging pathogens even before we realize they could be a threat to the blood supply and before tests can be developed to screen for them. It is effective against susceptible viruses, bacteria and parasites because it targets the genetic material (DNA and RNA) that is essential for their reproduction. Since all known viruses, bacteria, and parasites rely on DNA or RNA for reproduction, pathogen inactivation technology offers the potential to inactivate even those pathogens that have not yet been identified. The pathogen inactivation technology built into the INTERCEPT Blood System provides a comprehensive approach to blood safety.

Appropriate/ Rational Use of Blood

Appropriate / rational use of blood / blood components is an important strategy for safety of blood / blood components. Blood is not to be considered as a tonic and accordingly the clinician are supposed to give due thought & know the transfusion triggers for various blood components before prescribing any transfusion of blood / blood components to the patients, keeping in mind the hazards and benefits

associated with it. It is also essential that every clinicians should take an informed consent from the patient before transfusion of blood / blood components storage.

Patient blood management (PBM) is an important strategy for blood safety.

Conclusion

Safe blood begins with safe donors. Evidence from around the world shows that voluntary, unpaid donors are the foundation of a safe blood supply because they are the least likely to transmit potentially life-threatening infections, such as HIV and hepatitis.

To place the issue of safe blood on political agendas and highlight the role of voluntary, unpaid donors as the foundation of a safe supply, several major health organizations set 14 June as the date of the annual World Blood Donor Day. The World Health Assembly endorsed the establishment of the Day. The celebration is an important part of the strategy to promote voluntary blood donation and to reduce transfusion-transmitted infections Since blood is a biologic product, it is unlikely that the risk for transfusion-transmitted infection will ever be reduced to zero. The approach to emerging infections associated with transfusion of blood and blood products includes assessing the transmissibility of the agent by this route; developing effective prevention strategies, including screening tests and donor deferral policies; improving viral and bacterial inactivation procedures; and surveillance for known, as well as emerging and poorly characterized, transfusion-transmitted agents. Vigilance is needed to help ensure proper balance between safety and the availability of blood.

Blood is a priceless gift but the final product costs. The yardsticks of Good Manufacturing Practices (GMPs) and Good Laboratory Practices (GLPs) in blood transfusion services keep on changing with the newer technologies and the tests introduced to ensure blood safety. Accordingly the service charges will vary depending upon the service and consumables used which invariably would keep on escalating to meet the international standards. Thus public policies about the issues of blood safety cannot be based on pure consideration of cost effectiveness but should take into account the ethical aspects and public perception of the risks and also the constraints from regulatory authorities. The Drugs and Cosmetics Act, which govern the blood transfusion services in India, needs to be amended on regular basis in line with the International standards.

PRACTITIONERS OF TRANSFUSION MEDICINE BEYOND THE BLOOD CENTRE AND LABORATORY

Dr. Prasun Bhattacharya
Professor and Head
Dept. of Immunohematology and Blood Transfusion, Medical College Kolkata, 700073

Blood transfusion is an essential part of any health care delivery. In the last two decades our country has progressed immensely in terms of blood component preparation and its applications. Incorporation of new technologies and creation of transfusion medicine (TM) departments adhered to the objectives of National Blood Policy improved the blood transfusion services of 21st century.

To monitor and generate evidence-based recommendations to minimize the adverse events of blood transfusion, the National Haemovigilance program was established on December 10, 2012.1 The nomenclature of blood banks was now replaced to blood centre by the Central Drugs Standard Control organization (CDSCO), the national regulatory authority. 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.2

As per the National Medical Commission (NMC), there are over 74 medical institutions which are providing the MD teaching to an aspiring doctor in transfusion medicine. An approximately 4000 blood centres in country processing almost 1.4 million whole blood. Only a few lakhs of apheresis (platelet, stem cells and therapeutic) procedures are performed annually by a few hundreds of these centres. The present MD curriculum form clearly demand the adequate clinical exposure for the TM residents. 3

Allogenic blood transfusion is an intervention, which is a key to the management of hemoglobinopathies, cancer and other critically ill patients.

The immunomodulatory effects of blood transfusion remain unexplored. There is a limited awareness of the other specialties for managing recurrent transfusion reactions, alloimmunization and rare blood group patient management where consultative transfusion medicine services may not be adequate.

The so called 'healthy' persons attending as blood donors deferred by the blood centres have limited access to the general health care. Only counselling and referral has several limitations to guide TTI seropositive blood donors to health.

In India TM is a separate broad specialty, unlikely to most of the countries where TM exist as a subspecialty. 4 Considering the bench strength of TM

specialists in India, it is essential for TM doctors in direct patient care to exist as a utility discipline not a blood centre specialist only.

In the present preview, I am going to share our experience of direct patient care, from the department of Immunohematology and Blood transfusion (IHBT) was established on July 26, 2010, at Calcutta Medical College Hospital blood bank (now blood centre) in West Bengal. Our teamwork of medical doctors during the Covid19 pandemic had been recognized by many premier scientific body/institutions across the world, for its multidisciplinary trial on the application of convalescent plasma.5,6,7 This background of patient treatment enabled us to design a protocol for the direct patient care by the TM specialists.

To a practical approach to the patient care delivery the Dept. IHBT, Medical College Kolkata started its first OPD services as Transfusion Medicine Clinic on 06.04.2022 and on every Wednesday 9.00 am - 2.00 pm. We started our indoor admission within two months of onset of the outdoor clinic. Our scope of services included:

1. Post-transfusion follow-up 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 screening and allied services related to blood component support.
4. Hemoglobinopathy and allied diseases
5. Patient having poor tolerance to blood component therapy (viz. alloimmunization, recurrent transfusion reactions, platelet refractoriness etc.)
6. Blood donor related services (deferred blood donors, donor adverse events and post donation counselling)
7. Specialised blood component support in critically ill patients
8. Undiagnosed abnormality in bleeding or coagulation

In a broad sense TM is a broad specialty with multidisciplinary approach, involving blood and its components used in almost essentially in all the specialties of medical and surgical treatment. It is a distinct from its allied super specialty (Haematology). However, some of the patients do not have any point of contact to present their complaints, whenever there are critical issues related to blood transfusion or its outcome. Neither their primary treating physicians have the access to manage these complications/issues, where blood transfusion or rectification of a blood component deficiency may not be the right approach.

Presently, we are running both the outdoor an indoor of 10 beds, with an monthly average of 250 and 50 patients at outdoor and in-patient admissions (Fig I)

OPD AND IPD INFORMATION 2023

Annual OPD patients	3235
Old OPD patients	919
New OPD patients	2316
Total bed	10
Admission and OPD day	Wednesday
Total IPD admission	617
Male	337
Female	280

Fig. I

India, bears a huge burden of haemoglobinopathy, involving almost 30% of its total red cell requirements. The scenario of under treated hemoglobinopathy (thalassemia and other allied diseases) are a major patient load in our outdoor and inpatient admissions. We believe the approach to patient care by the TM specialists may be a futuristic goal to control the huge burden of hemoglobinopathy and coagulation disorders in the resource constraint health care system.

References

1. Bisht A, Singh S, Marwaha N. Haemovigilance Program – India. Asian J transfu Sci; 7(1): 73 -74.
2. cdsco.gov.in (accessed on 04.07.2022)

3. Standard Assessment form Immunohaematology and Blood Transfusion. www.nmc.org.in (accessed 26.05.2024)
4. Panzer S, Engelbrecht S, Cole-Sinclair MF, Wood EM, Wendel S, Biagini S et al. Education in transfusion medicine for medical students and doctors. Vox San 2013 (104): 250-272
5. Biswas D, Maiti C, Talukder B, Azharuddin M, Saha S, Pandey S et al. A prospective study on COVID-19 convalescent plasma donor (CCP) recruitment strategies in a resource constrained blood centre. ISBT Sci Ser. 2021 Jun 1:10.1111/voxs.12639. doi: 10.1111/voxs.12639. Epub ahead of print. PMID: 34226835; PMCID: PMC8242402.
6. Bandopadhyay P, D'Rozario R, Lahiri A, Sarif J, Ray Y, Paul SR, et al. Nature and Dimensions of Systemic Hyperinflammation and its Attenuation by Convalescent Plasma in Severe COVID-19. J Infect Dis. 2021 Aug 16;224(4):565-574. doi: 10.1093/infdis/jiab010. PMID: 34398242; PMCID: PMC7928875.
7. Ray Y, Paul SR, Bandopadhyay P, D'Rozario R, Sarif J, Raychaudhuri D, Bhowmik D et al. A phase 2 single center open label randomised control trial for convalescent plasma therapy in patients with severe COVID-19. Nat Commun. 2022 Jan 19;13(1):383. doi: 10.1038/s41467-022-28064-7. PMID: 35046397; PMCID: PMC8770561.

INNOVATIVE STRATEGIES TO MITIGATE DONOR ADVERSE EVENTS

Dr Abhishekh B
Additional Professor and Head Department of Transfusion Medicine
Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry

The vast majority of blood donations are uncomplicated, with no side effects or discomfort. However, a small number of donors experience bruising and/or bleeding at the venipuncture site, mild nausea, or changes in consciousness, including dizziness, prefainting, fainting, or syncope, leading to collapse or convulsions. Several factors influence the risk of complications after blood donation: inherent donor characteristics and predisposition toward reactions, blood collection staff skill and experience, blood drive set-up and environmental site features, donor education before and after donation, young age, first-time donation status, low weight, low blood volume, female gender, and Caucasian ethnicity.

Given these predisposing factors, many field practices and literature reports on measures to reduce reactions have emerged, including the following. The history of fainting episodes is to be collected and analyzed for the suitability of the donors. Donor selection is to be stringent so as to defer those who may be at higher risk for donor reactions. The hospital/donor data may go a long way in reviewing them. Artificial intelligence (AI) can be of assistance in highlighting, identifying, and alerting the same. Reporting the reactions helps to seek causes and modify the modifiable ones. Predonation education helps to alleviate anxiety and, hence, reduce reactions.

The Blood Drive environment and set-up are of huge importance in negating or reducing reactions. Chaotic environments, hot and humid, are predisposing. A quiet and calm, encouraging setup with cordial staff and a support group is beneficial. Soothing music in the background or distractions by television live shows are helpful.

Staff supervision and phlebotomist skills are very important and always need fine-tuning.

Interventions:

Donor Size/Age Criteria may be modified based on local demography.

Hydration is of utmost importance, with up to 500 ml of water given immediately before donation.

Salt intake, coffee, soda water, and iced tea have been used.

Nutrition. sandwich/crispbread, bananas, sweet biscuits, and sometimes salty crackers, cookies, and sometimes also donuts. Salted snacks are considered superior.

Applied Muscle Tension (AMT) by making the donor engage in light physical activity during donation has been shown to be beneficial by increasing blood return as well as a distractor. Automated Collection Procedures can be beneficial as they can control the speed of withdrawal, which is an important factor in determining faints.

Postreaction Instructions are to be given verbally as handouts or delivered to their mobiles, and videos will also reduce reactions.

DOUBLE UNIT RED CELL APHERESIS

Col Alok D Sen
Sr Advisor (Path & Micro), Trained in Transfusion Medicine
Head, Dept of Lab Sciences AICTS Pune

Introduction

Modern apheresis technologies make it possible to collect 2 units of RBCs from one donor at a single donation. This procedure, widely used in autologous donations in preoperative settings, is also increasing in value and use for allogeneic donations because of its many advantages for donors and blood banks.

Procedure

Advanced automated component systems that collect red cell by apheresis are now available. These systems are designed to improve component collection and make it easier for such collections to be in compliance with good manufacturing practices. They also provide standardized products despite variations in donor parameters. Separation of blood into components takes place within the instrument and eliminates the need for a separate laboratory blood component processing area as is required with manually collected whole blood.

For a double RBC collection, whole blood is withdrawn via a single 18-gauge needle into both the centrifuge and an in-process container after mixing with ACD-A. The in-process container acts as a temporary reservoir for whole blood during processing. This allows the instrument to continue separating whole blood at the same time components are returned to the donor. With centrifugation, the blood is separated into its components. The RBCs are pumped into the RBC container and plasma into the plasma container. After drawing 300 ml of whole blood, the separated plasma is returned to the donor with a measured amount of saline through the venous access line. The system continues to transfer whole blood into the separation chamber from the processing bag during the return cycle. These cycles are repeated until the programmed volume of 360 ml of RBCs is collected. The collection system automatically mixes the ACD-A RBCs with ADSOL before pumping it through the leukoreduction filter and into the two RBC storage containers. Units are refrigerated at 1 to 6°C as soon as possible after processing, but left at room temperature for no longer than 8 hours after the procedure.

Advantages

(a) RBC apheresis has been proven to be a safe procedure with very low risk of serious side effects and high donor acceptance.

(b) RBC units collected by apheresis are similar in storage and quality measures to RBC units prepared from conventionally collected whole blood.

(c) The ability to collect a specified absolute RBC volume represents a great advantage of RBC apheresis over traditional whole-blood collection.

(d) Furthermore, 2-unit RBC apheresis offers the potential to adapt component collection to inventory needs, by facilitating the collection of a sufficient number of phenotypically matched RBC units to meet specific requirements, while reducing the number of random donors from whom blood is collected.

(e) Regular blood donation is well known to involve the risk of iron deficiency by continually depleting iron stores in a frequency-dependent manner.

Requirements

(a) FDA donor recruitment criteria are more stringent for Hct, Hb, and the weight and height of donors. But, as for whole-blood donors, recruitment criteria do not include actual storage iron values. FDA donor criteria for double unit red cell apheresis are as given in Table 1 below: -

Table 1 FDA Approved Nomogram For Donor Selection

Weight	Height	Hematocrit	Haemoglobin	Max RBC Vol
Male				
60 – 67 Kgs	> 5'1"	> 40 %	> 13.3 g/dl	360 ml
68 – 79 Kgs	> 5'1"	> 40 %	> 13.3 g/dl	400 ml
> 79 Kgs	> 5'1"	> 40 %	> 13.3 g/dl	420 ml
Female				
68 – 79 Kgs	> 5'5"	> 40 %	> 13.3 g/dl	360 ml
> 79 Kgs	> 5'5"	> 40 %	> 13.3 g/dl	400 ml

(b) As double-dose RBC donation removes approximately twice the amount of RBCs as does whole-blood donation, recommendations for the donation interval double the minimum time span to 4 months.

Discussion

The use of a multiple blood component production system that is capable of collecting 2 units of RBCs would not only help blood centres increase the availability of collected blood products but also decrease recipient exposure to viruses and alloantigens. Furthermore, 2-unit RBC apheresis offers the potential to adapt component collection to inventory needs, by facilitating the collection of a sufficient number of phenotypically matched RBC units to meet specific requirements, while reducing the number of random donors from whom blood is collected.

The time has come for new strategies to help alleviate and potentially end the chronic shortage of RBCs. The use of automated RBC collection technology has the potential to increase the total number as well as the specific blood types of RBCs collected, without significantly increasing the number of donors or their frequency of donation. Moreover, the RBCs collected meet the established standards and expectations for blood components and the collection is fully automated and provides consistent products with predictable yields. This consistency minimizes variability associated with manual whole blood processing. Double red cell collection can be extremely useful for pre-deposit autologous blood donation, in disaster management, rare blood groups and in the management of thalassemia.

RED CELL CRYOPRESERVATION

Col Alok D Sen
Sr Advisor (Path & Micro), Trained in Transfusion Medicine
HoD, Dept of Lab Sciences AICTS Pune

Introduction

As per latest estimates annual requirement of blood in India is about 14.6 million units against an annual collection of approximately 13 – 13.5 million units resulting in a discrepancy between supply and demand. Strategic blood reserves are an important component in meeting blood needs and this can be accomplished through the establishment of a frozen blood program. The concept of a frozen blood reserve is twofold: to freeze excess units of blood during times of surplus for use during a time of shortage and to freeze units of rare blood types for use later by patients with special transfusion needs.

Frozen red cells are FDA approved for storage at – 80° C or below for 10 years. Post deglycerolization the RBCs can be stored at 4° C for no more than 24 hrs if open system for deglycerolization is used due to the potential for bacterial contamination. However, the use of an automated closed system extends the shelf life of the thawed blood to 14 days. The pilot project in India for assessing the efficacy of automated cryopreservation of red cells was carried out in AFTC Delhi Cantt from 2007 to 2010. The aim of this project was to standardize and evaluate an automated system of Cryopreservation of red cells using an automated cell processor, the Haemonetics ACP 215, to glycerolize and deglycerolize red cells producing cryopreserved red cells having a 14 day post-thaw life and to assess the quality of the packed red cells prior to glycerolization, immediate post deglycerolization and at the middle and end of the 14 day post-thaw period. The final objective was to assess the feasibility of development of a frozen blood bank at this centre for availability of blood of rare blood groups for unexpected high demands as a back up to liquid blood.

Procedure

1. **Glycerolization** - One hundred healthy male voluntary donors who met the requirements for acceptable blood donors donated one unit of whole blood comprising of 450 ml. The CPDA-1 whole blood was centrifuged and the plasma removed to produce a hematocrit of 75 ± 5%. The volume of RBCs collected was between 180 - 220 ml per unit. The RBCs were stored at 4 ° C before being taken up for glycerolization and freezing within 5 days of blood collection. On the 4th/ 5th day the red cell bag was removed from the blood bank refrigerator, brought to a temperature range of 20 °C (68 °F) to 30 °C (86 °F) and the red cell concentrate was transferred into a 1000 ml bag appropriate for freezing using a sterile connecting device. The disposable glycerolization set was then connected to the 1000 ml freezing bag using the sterile connecting device and glycerol (57%) W/V) solution was pumped through the disposable glycerolization set into the bag using the Haemonetics Automated Cell Processor (ACP 215) to achieve a final glycerol concentration of 40% W/V glycerol. Glycerolized red cell bags were then centrifuged and all the visible supernatant was then expressed to remove supernatant glycerol and prepare a glycerolized red blood cell concentrate with a hematocrit value of 60 + 5 %. The glycerolized red cells were resuspended and mixed thoroughly by manual agitation. The product weight, product hematocrit, product RBC count, WBC count and the product haemoglobin were estimated and from these the product volume, absolute RBC volume and the total RBC count of the bag were calculated. One sample from the bag was sent for aerobic, anaerobic and fungal culture. This bag was then placed in rigid card board boxes and stored in a – 86 oC deep freezer. As per FDA approved protocol no more than 4 hours were allowed to lapse between the time the red cells were removed from the 4 °C refrigerator and the time they were placed in the – 86 °C deep freezer.

2. **Deglycerolization** - Twenty five bags were thawed and deglycerolized after every three months using the ACP 215 system starting at one year from the date of first glycerolization i.e. at one year, one year three

months, one year six months and one year nine months post glycerolization.

(a) **Thawing** - The units of glycerolized frozen red cells were first thawed by placement into one of the pouches of a plasma thawer at 36 ºC for 35 minutes and checked for any breaks by gently compressing the unit.

(b) **Deglycerolization** - After thawing, the plastic freezing bag was secured to the Haemonetics ACP215. The ACP215 first evaluated the integrity of the sterile connection weld by holding and monitoring a negative pressure and then automatically started the deglycerolization procedure. During the deglycerolization procedure the machine first added 50 ml of 12% sodium chloride (hypertonic) solution to the red cell bag. The hypertonic saline shocked the red cells causing the glycerol to come out of the cells. Next the machine added the first dilution of 340 ml 0.9% sodium chloride-0.2 gm% glucose solution to the thawed red blood cells and then stopped for an equilibration delay of 60 seconds. The 0.9% sodium chloride-0.2 gm% glucose solution has two roles – it washes away the glycerol and at the same time rehydrates the red cells. A total of five dilutions/ washes were done by the machine. At the end of the fifth cycle the ACP215 transferred 240 ml of AS-3 additive solution into the bowl. AS-3 was the additive preservative solution which gave the red cells a 14 day post thaw life. The colour of the effluent fluid in the effluent line was then compared to the colour of the Haemonetics plastic colour comparator. If the colour was less than 5, the haemoglobin level was acceptable the procedure was complete. In addition to all the earlier parameters (product weight, product hematocrit, product RBC count, WBC count and product haemoglobin), certain additional tests were carried out on the deglycerolized bags like supernatant osmolality, pH, supernatant haemoglobin, ATP levels and supernatant potassium and from these the red cell recovery, percentage hemolysis, supernatant glycerol and red cell viability were estimated. All tests were repeated on the post thaw samples at the end of 7 days and 14 days in order to assess the quality of red cells during and at the end of the 14 day post thaw period. Samples from the bags were sent for culture on Day 0 and Day 14 to assess the sterility.

Results

A total of 99 units of glycerolized red cells were successfully prepared. One unit was discarded due to the blood bag leakage during centrifugation. All 99 bags were successfully deglycerolized. The product quality details of the glycerolized and deglycerolized red cells are summarized in Table 1 below.

All the bags were sterile on aerobic, anaerobic and fungal culture and negative for red cell alloantibodies and infectious markers screening in the samples collected post glycerolization, on Day 0 post deglycerolization & on Day 14 after storage for 14 days at 4 ºC.. The mean product volume of the deglycerolized bags on Day 0 of deglycerolization was 317.69 ml with a mean hematocrit of 47.13% resulting in a mean absolute red cell volume of 149.73 ml.

Table 1: Product Details of Glycerolized and Deglycerolized Red Cells

Glyc	Unitage	Net Product Wt (gms)	Product-Vol (ml)	Product Hct (%)	Absolute RBC Vol(ml)	RBC Count ($x10^6$)	Total RBC-Count	WBC Count (/ µl)
Deglyc								
Glyc		235.96	222.60	75.49	168.04	8.17	1818642.00	9743.67
Deglyc	Day0	336.75	317.69	47.13	149.73	4.93	1566211.70	196.23
Deglyc	Day7	318.85	300.80	47.09	141.65	4.83	1452864.00	32.71
Deglyc	Day14	312.49	294.80	46.29	136.46	4.82	1420936.00	32.54

Glyc	Unitage	Supernatant Vol (ml)	Product Hb(g/dl)	Supernatant Osmolality (mosm/Kg)	ProductpH (37°C)	Supernatant Hb(g/dl)	Hemolysis(%)	Pre-Glyc-Total RBCCount
Deglyc								
Glyc		54.56	24.42					
Deglyc	Day 0	167.96	14.71	323.27	6.65	0.05	0.18	1818642
Deglyc	Day 7	159.15	14.70	326.07	6.67	0.14	0.50	1818642
Deglyc	Day 14	158.34	14.68	331.61	6.63	0.24	0.88	1818642

Glyc	Unitage	RBC Recovery (%)	ATP (mmol/g Hb)	SupernatantK+ (mmol/L)	Sterility	Antibody-Screen	Infectious Markers
Deglyc							
Glyc					Sterile	Negative	Negative
Deglyc	Day0	86.12	3.93	2.52	Sterile		
Deglyc	Day7	79.89	3.98	25.55			
Deglyc	Day14	78.13	2.71	34.06	Sterile		

Discussion

This study represented the first Red Cell Automated glycerolization project conducted in India using the Haemonetics ACP 215 system. This was a milestone for the frozen blood program in India. The data in this study showed that the red cells which were glycerolized using the automated platform ACP 215, frozen at – 80 °C for more than a year and deglycerolized again using the ACP 215 had excellent viability while being stored at 4°C during the 14 days of post-thaw storage. This conclusion was based on the various parameters discussed above in comparison to the results of previous studies where similar data produced good viabilities. Thus the study was successful in carrying out it two aims viz. standardizing and evaluating the automated system of cryopreservation of red cells using the ACP215 automated cell processor to glycerolize and deglycerolize red cells capable of producing red cells having a 14 day post-thaw life; and assessing the quality of the packed red cells prior to glycerolization, immediate post deglycerolization and at the middle and end of the 14 day post-thaw period. Based on the findings of this study AFTC Delhi Cantt has established the first Licensed Frozen Blood Bank in the country which is now fully functional.

ACCREDITATION PROGRAM FOR BLOOD CENTERS: BEYOND INDIA

Dr. Ankit Mathur
Additional Medical Director
Transfusion Medicine & Transplant Immunology at Rotary TTK Blood Center,
Bangalore Medical Services Trust

Healthcare Organizations should be places of safety not only for patients but also for staff and other stakeholders. Quality and patient safety at Blood banks / Centre is of great interest to government bodies, NGOs, insurance agencies, professional organizations representing healthcare workers and patients. Accreditation focuses on establishing quality and safety in relation to predetermined standards. Accreditation encourages healthcare organization to pursue continual excellence.

In India, The blood bank accreditation program was started in the year 2007, at that time very few countries had this program. The special significance of this program includes quality standards in all areas including collections, processing, testing, compatibility, transfusions, hemovigilance and quality assurance, which includes enforcement of complete regulatory processes and national guidelines thus ensuring high quality of patient care with supply of safe blood to the right patient in right time and right quantities which boosts confidence among the patients at national and international level under medical tourism initiatives.

Outside India, especially in North America AABB Accreditation program is considered highly reputed & many centres have been accredited. The AABB's Quality System Essentials (QSE) are based on ISO specifications and provide additional guidance in implementing practices that assure quality and compliance with cGMP.

The AABB's 10 QSEs are rooted in the 20 clauses of ISO 9000 series and compatible with their standards.

Among Asian countries, most of the countries do not have their own Bllod Bank Accreditation program. Therefore, AABB, in partnership with the Asian Association of Transfusion Medicine (AATM), is offering to take part in AABB's new Quality Certificate Program– adistinction of quality based on AABB's Fundamental Standards for Blood Collection and Transfusion. This program offers facilities the opportunity to validate their safety and quality measures against AABB's standards and gain international recognition for their efforts with a two-year certificate issued by AABB and AATM.

The program offers a high value and is a cost-effective way to advance their facility's operations, validate safety and quality measures, and demonstrate commitment to donors and patients. The process of obtaining an AABB Quality Certificate is a rich educational experience for the staff, facilitated by an AABB specialist who guide the facility through the process utilizing a thorough self-assessment guide based on AABB's world-renowned standards program. Obtaining the AABB Quality Certificate is streamlined through a self-assessment guide that includes documents that provide the quality framework for an organization's success and help advance safety and quality in all processes performed.

AABB's fundamental standards for blood collection and transfusion provides a first step toward the implementation of a quality-systems-based approach for blood banks and transfusion services. They are based on the quality system essentials that form the framework of all AABB Standards and contain many of the core concepts found in all other AABB Standards. This includes requirements focused on leadership qualifications, ensuring documented policies are in place, and processes and procedures for all activities performed by the facility. This also contain requirements centered on the use, qualification and calibration of all equipment in use in the facility, and that staff are trained and competent on their use and for the job functions they perform. In addition, it contain requirements for donor qualification, blood collection, processing, storage and transfusion, including pre transfusion testing of patient blood, serologic cross match, and medical record documentation.

Our Blood centre first got accreditation by NABH in 2012 & later in year 2022 we went for AABB Quality certificate program achieved the same. We found both the accreditation program very helpful in improving patient care & Quality of blood component.

PRODUCTION OF VIRUS SPECIFIC T CELLS TO TREAT REFRACTORY VIRAL INFECTIONS POST ALLOGENIC STEM CELL TRANSPLANTATION

Dr Mohandoss M

Malabar Cancer Centre- Postgraduate Institute of Oncology Sciences and Research, Thalassery, Kerala.

Allogeneic hematopoietic stem cell transplantation (HSCT) has become the standard care for many hematologic malignancies and non-malignant disorders. However, chronic and refractory viral infections remain a leading cause of morbidity and mortality during the immunodeficient period following transplantation, highlighting the weakened host immune system's inability to control pathogen replication and spread. Viral reactivations primarily occur within the first six months post-HSCT and the most common viruses emerging after HSCT include cytomegalovirus (CMV), Epstein-Barr virus (EBV), BK virus (BKV), adenovirus (AdV), and human herpes virus 6 (HHV-6). Current prophylactic and preemptive antiviral therapies are often inadequate due to toxicity, ineffectiveness, drug resistance, and lack of long-term protection and immunologic memory. Effective infection control post-HSCT relies heavily on T cell reconstitution, given the crucial role of pathogen-specific T cells in monitoring infections. Thus, strategies to enhance pathogen-specific immunity and T cell recovery could complement the existing drug treatments. Antigen-specific adoptive immunotherapy can target and eliminate host cells by recognizing specific antigens. Virus-specific T cells (VSTs) are targeted therapies designed for specific viral antigens. These products are derived from virus-naive or virus-experienced (seropositive) allogeneic donors (e.g., CMV seropositive individuals). Antigens identified as immune targets are presented by antigen-presenting cells (APCs) to T cells, along with other molecules that stimulate their growth and activation. The method is to stimulate peripheral blood mononuclear cell with viral peptides and isolate virus-reactive T cells using an interferon gamma (IFNγ) capture assay. The resultant T cell is enriched via magnetic selection or fluorescence cell sorting in the product and infused into the HSCT recipient to restore antiviral immunity. VSTs have shown significant promise in combating refractory viral infections in post-HSCT patients, both for treatment and prevention. Due to their robust and durable response rates and tolerable side effect profile, VSTs have the potential to become a valuable clinical addition to existing treatments for viral reactivation and disease.

INTRAUTERINE TRANSFUSIONS: TRANSFUSION MEDICINE PERSPECTIVE

Dr. Ashish Jain
Professor, Department of Transfusion Medicine, PGIMER, Chandigarh

Intrauterine transfusion (IUT) treatment is considered most successful for fetal anemia due to red cell (RBC) alloimmunization.1 In the early 1960s, IUT by percutaneous intraperitoneal transfusion was introduced by Liley for management of fetal anemia due to RBC alloimmunization.1 The currently used technique, intravascular intrauterine transfusion into the umbilical cord, was first described by Rodeck et al. in 1981 using guidance of the needle by fetoscopy.1 Immunogenicity of RBC antigens play a key role since anti-D is one of the most potent immunogenic antigens and globally the most common cause of hemolytic disease of the fetus and newborn (HDFN) with a 15.0% risk of Rh alloimmunization in pregnant women without prophylaxis.2

Indications for IUT:1,2

i) HDFN: it is the most common indication for IUT, where the transfused product consists of plasma-reduced packed red blood cells (PRBC),
ii) human parvovirus B19 infection
iii) fetomaternal hemorrhage (FMH)
iv) twin-twin transfusion syndrome
v) placental/fetal tumors
vi) α- and β-thalassemia
vii) other rare disorders: elliptocytosis, Blackfan-Diamond anemia, hemochromatosis and cytomegalovirus infection

Fetal alloimmune thrombocytopenia is the most common indication for a platelet IUT.2 In very rare circumstances, fetal blood sampling may be performed to measure the platelet count and if it is found to be less than 50,000/μL then an IUT platelet transfusion could be performed.

Assessment of fetal anemia:

i) Middle cerebral artery-peak systolic velocity (MCA-PSV)
ii) Fetal blood sampling
iii) Amniotic fluid spectral analysis (Liley's curve)

The sensitivity of an increased MCA-PSV for the prediction of moderate or severe anemia was 100% either in the presence or in the absence of hydrops (95% CI: 86-100% for the 23 fetuses without hydrops), with a false positive rate of 12 %. In comparison with amniocentesis, Doppler ultrasonography was more accurate by 9 percentage points (95% CI: 11–159).3

PRBC selection: 4, 5

The PRBC unit characteristics should include:

i) Group O RhD-negative units; type specific RhD-positive units may be used if anti-D is not causative and/or if the fetus is known to be RhD positive

ii) Crossmatch compatible with maternal plasma
iii) Irradiated: to prevent transfusion-associated graft-vs-host disease (TA-GVHD)
iv) Cytomegalovirus (CMV) reduced-risk (leukocyte reduced or from a CMV seronegative donor)
v) Lack hemoglobin S: to prevent sickling under low oxygen tension
vi) Collected within 5 to 7 days
vii) May be washed or concentrated to a hematocrit of 70% to 85% (usually 75–80%).
viii) PRBC suspended in SAGM or Adsol should not be used.
ix) Not to be transfused straight from 4°C storage: risk of fetal bradycardia
x) 24-h shelf-life following irradiation

Initiation of IUT may done when the amniotic fluid ΔOD 450 nm results in high zone II or zone III, in presence of fetal hydrops noted on ultrasound, when cordocentesis blood sample shows fetal hemoglobin (Hb) < 10 g/dL or Hb < 2 SD below the mean for gestational age (GA), when MCA-PSV Doppler exceeds 1.5 multiples of the median (MoM) (figure 1). Since the prediction using the MCA Doppler is highly reliable, fetal blood sampling is preferably directly followed by IUT and not performed as a diagnostic tool without blood available for immediate transfusion.6

Pre-transfusion testing on Maternal sample:

i) ABO and RhD
ii) Extended Rh (C, E, c, e) and K
iii) Typing for other blood group system antigens
iv) Antibody screening and identification
v) Antibody titration (Anti-D)
vi) Compatibility testing

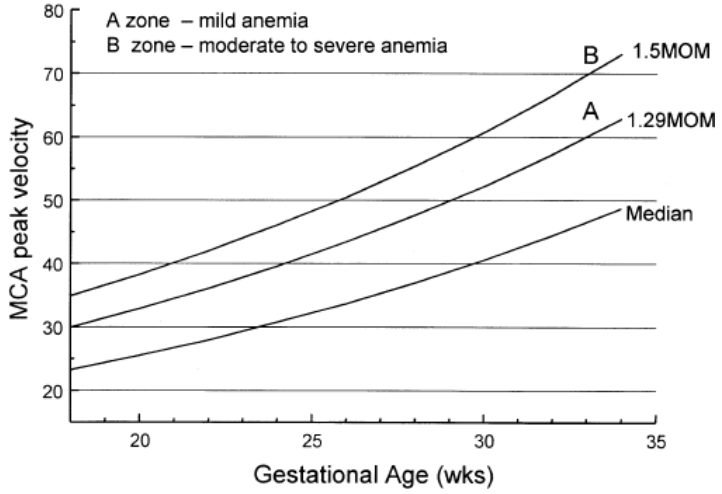


Figure 1. Middle cerebral artery (MCA) Doppler peak velocities based on gestational age.6

IUT Volume Calculation of PRBC unit:[2]

Volume to be transfused (mL)

$$= \frac{\text{USG estimated fetal weight (g) x 0.14 ml/g x (Cdesired – Cpretransfuion)}}{\text{CPRBC}}$$

where, C: Hematocrit

A final target hematocrit of 40–50% is used; a decline of approximately 1% per day can be anticipated between transfusions. In the extremely anemic fetus, the initial hematocrit should not be increased by more than four-fold to allow the fetal cardiovascular system to compensate for the acute change in viscosity.

Tests on the First Pre-IUT Sample:

i) Hb/ hematocrit (Hct)
ii) ABO and RhD
iii) Direct antiglobulin test (DAT)
iv) Extended phenotyping

Complications of IUT:1

Nowadays, IUT is considered a safe method to correct severe fetal anemia. However, procedural complications sometimes occur and may affect outcome.

Acute Procedure-Related Complications:

i) Fetal distress: fetal death (0.9 to 4.9%)
ii) Risk of prematurity, neonatal asphyxia or death.
iii) Local cord accidents: rupture, spasm, tamponade from hematoma/excessive bleeding
iv) Volume overload
v) Chorioamnionitis
vi) Preterm rupture of membranes or preterm labor
vii) Emergency delivery

Long-Term Complications:

i) Requirement of more top-up PRBC transfusions during the first 6 months of life, due to suppression of fetal erythropoiesis
ii) Formation of new alloantibodies (19–26%):
   - may complicate present and subsequent pregnancies and future transfusions
   - delayed hemolytic transfusion reactions
iii) Risk of transfusion reactions such as TTI

Neonatal outcomes and management:[6]

Perinatal survival after IUT varies by center and the experience of the operator. In one review series, overall survival was noted to be 84%. Survival of nonhydropic fetuses (92%) was markedly improved over those with hydrops (70%). Suppression of erythropoiesis is not uncommon after several intravascular transfusions. Because exchange transfusion is rarely required, passively acquired maternal antibodies remain in the neonatal circulation for weeks. This results in a 1–3 month period in which the infant may need several top-up red cell transfusions. Weekly neonatal Hct and reticulocyte counts should be assessed. Threshold Hct values of less than 30% in the symptomatic infant or less than 20% in the asymptomatic infant have been suggested for transfusion.

Experience from our centre (PGIMER, Chandigarh):[7]

In a retrospective study (between January 2006 and December 2014) from our centre 7, a total, 363 Rh D alloimmunized women attended antenatal clinic or obstetric emergency between January 2006 and December 2014. MCA-PSV was the screening method for detection of fetal anemia. IUT was given when MCA-PSV was > 1.5 MOM. Totally, 162 women (164 fetuses) received 492 transfusions. Forty-eight women had fetal hydrops at presentation. Five women (three received IUT) were lost to follow-up. Approximately 74% of women who received IUT had anti-D titer ≥ 64 as compared to who did not (38%) [p=0.0001]. The lowest gestation at first IUT was 19.5 weeks, and the highest gestation was 35 weeks. Median number of IUT was 3, and the number of IUTs ranged from 1 to 7. Thirty patients had received single IUT. The mean Hct at first IUT was 13.37 ± 7.28%

in hydropic fetuses and 21.71 ± 7.38% in non- hydropic fetuses. IUT-related serious complications were seen in approximately 3.8% of procedures.

Summary:

IUT can nowadays be considered a safe and successful method to treat severe fetal anemia for different indications.6 A close coordination is required between the transfusion services and the Obstetric team for ensuring timely availability of specially prepared PRBCs, which are also appropriately tested as per the recommended standards. Non-invasive techniques to identify the fetus at risk for HDFN are quite promising.

References:

1. Lindenburg IT, van Kamp IL, Oepkes D. Intrauterine blood transfusion: current indications and associated risks. Fetal Diagn Ther. 2014;36(4):263-71.
2. Delores Mo Y, Bahar B, Jacquot C. Intrauterine, neonatal and pediatric transfusion therapy. Ann Blood 2022;7:13 (https://dx.doi.org/10.21037/aob-21-59).
3. Mari G, Deter RL, Carpenter RL, Rahman F, Zimmerman R, Moise KJ Jr, Dorman KF, Ludomirsky A, Gonzalez R, Gomez R, Oz U, Detti L, Copel JA, Bahado-Singh R, Berry S, Martinez-Poyer J, Blackwell SC. Noninvasive diagnosis by Doppler ultrasonography of fetal anemia due to maternal red-cell alloimmunization. Collaborative Group for Doppler Assessment of the Blood Velocity in Anemic Fetuses. N Engl J Med. 2000 Jan 6;342(1):9- 14.
4. Cohn CS, et al editors. Technical manual. 20th ed. Bethesda, MD: American Association of Blood Banks (AABB) Press; 2020.
5. New HV, Berryman J, Bolton-Maggs PH, Cantwell C, Chalmers EA, Davies T, Gottstein R, Kelleher A, Kumar S, Morley SL, Stanworth SJ; British Committee for Standards in Haematology. Guidelines on transfusion for fetuses, neonates and older children. Br J Haematol. 2016 Dec;175(5):784-828.
6. Moise KJ Jr. Management of rhesus alloimmunization in pregnancy. Obstet Gynecol. 2002 Sep;100(3):600-11.
7. Saha SC, Rai R, Bagga R, Jain A, Mukhopadhyay K, Kumar P. Pregnancy outcome of Rh D alloimmunized pregnancies: a tertiary care institute experience of a developing country. J Obstet Gynecol India 2021;71(6):583–90.

TELE-SERVICES IN TRANSFUSION MEDICINE

Dr. Ashish Munjal MD and CEO
TISQ Health Pvt Ltd

Like any speciality, to build transfusion medicine, and make a much wider impact on its establishment as discipline, TeleServices plays significant role for better patient handling and management, donor management, seeking cross functional support from other specialties while keeping every information in digital format for better patient outcome, second opinions, remote validations of laboratory tests, blood units, electronic blood requests, bed-side identification of patients, process control , legal issues and risk management.

QUALITY INDICATORS IN MASSIVE TRANSFUSION – DEVELOPING KEY PERFORMANCE INDICATORS

Dr. Ganesh Mohan
Associate Professor – Department of Immunohaematology and Blood Transfusion,
Kasturba Medical College Manipal, Manipal Academy of Higher Education, Karnataka, India.

Implementing institution-specific massive transfusion protocols (MTP)/Major haemorrhage protocol (MHP) to support resuscitation of class III and IV of haemorrhagic shock have benefits. Conditions like trauma, rupture of arterial aneurysm, massive obstetric haemorrhage (MOH) or upper gastro-intestinal bleeding (UGI bleeding) may present with massive haemorrhage and shock needing massive transfusion support.

Benefits of MTP:

Streamline a multidisciplinary approach: MTPs/MHPs facilitate a coordinated response among healthcare professionals and the pre-defined responsibilities of the stakeholders help to reduce the confusion.

Improve patient care: coordinated protocols help to reduce the turnaround time, preventing complications like acidosis, and coagulopathy that are seen often in massive transfusion, improves tissue oxygen delivery and maintains adequate intravascular volume.

Standardized blood component delivery to patient side: MTPs/MHPs that are designed according to the need of the patients, can either be a 1:1:1 formula-based protocol or a goal- directed massive transfusion (GDMT). Even though they have their advantages and disadvantages, it is ideal to implement either one of the protocols.

Implementing an institution- MTP tailor-made for the institutions as per the need is only the first step towards process improvement.

To ensure optimal performance, it is imperative to regularly assess all implemented processes against established standards. This continuous evaluation allows for the identification of areas for improvement and ultimately leads to enhanced patient outcomes.

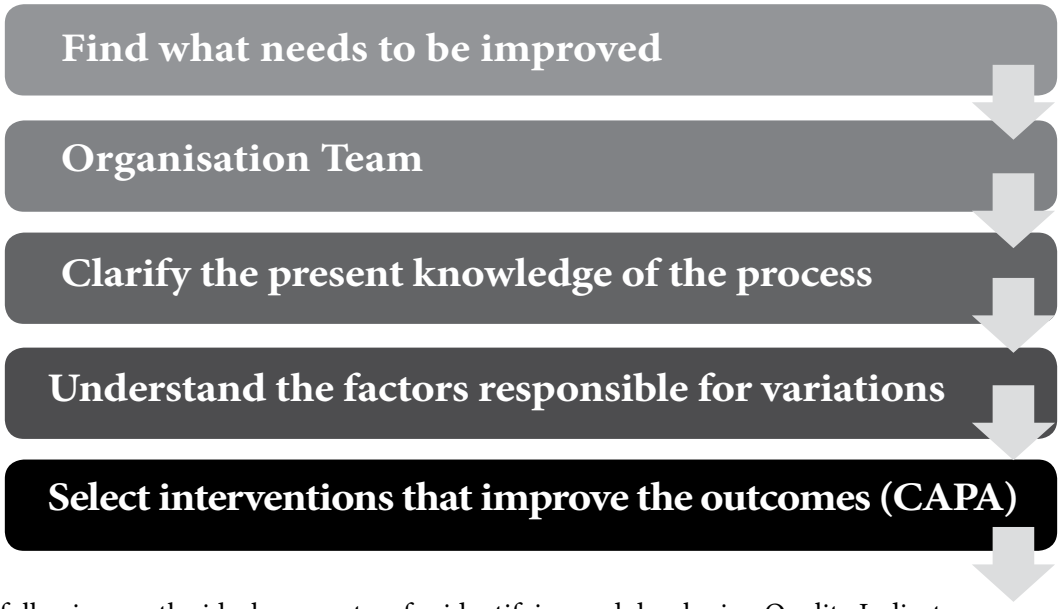
Several well-established tools can be effectively utilized within the transfusion service for continuous improvement.

a) Lean & Lean-Sigma – Identifying the value, Identifying the waste, Continuous flow.
b) Six Sigma – Define, Measure, Analyse, Improve, Control
c) FOCUS-PDCA:

A step-by-step process flow on Continuous quality improvement:

Quality indicators:

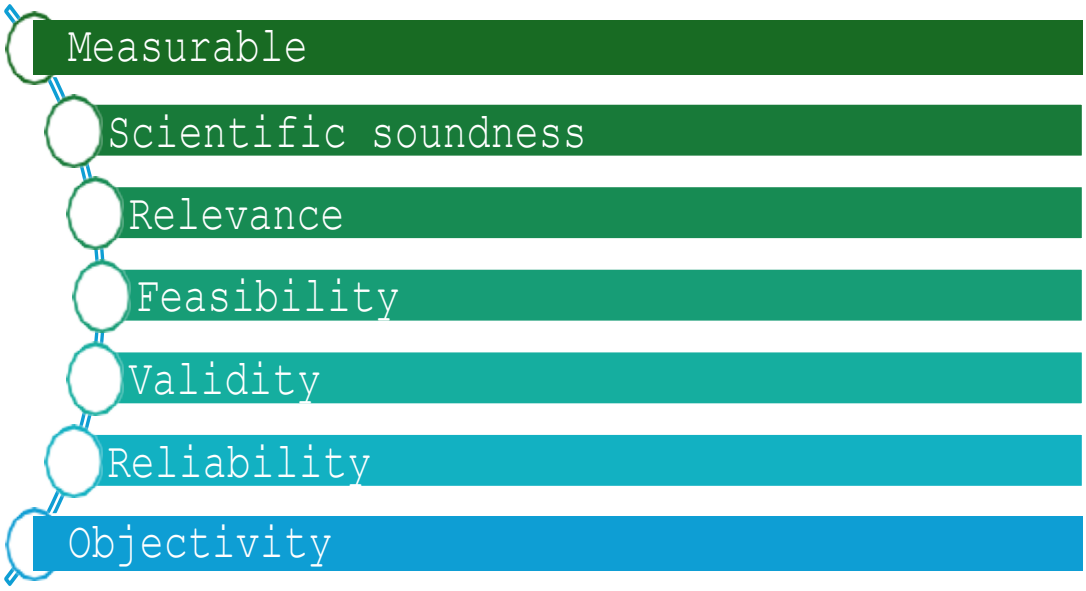
They are an integral part of the quality management system because QIs provide data-driven feedback about how the implemented process adheres to their desired parameters. Developing "Benchmarks" from the quality indicators provides an opportunity for continuous monitoring and improvement.



The following are the ideal parameters for identifying and developing Quality Indicators:

Quality indicators in Massive transfusion:

One of the most critical aspects of transfusion service that is overlooked in terms of process control is an established Massive transfusion protocol. After the first step of implementing MTPs, the next is to develop certain key performance indicators that will tell you how good is your MTP actually is. The Qis that need to be developed should have all the necessary features as mentioned before, and it should be easy to capture and interpret. Unfortunately, we lack data on this aspect. The quality management system should emphasise on the



importance of process mapping and control through quality policy. Once the policy of massive transfusion has been established in a centre, the next step is to develop a protocol/process (massive transfusion protocol).

Three important aspects in MTP are – 1) massive transfusion-related performance indicators, 2) clinical indicators that will provide data about patient care and safety and 3) indicators that provide data about lab performance.

The Quality Indicators that can be adopted into an existing MTP.

Administration related	Process related	Outcome related
Capturing patient details	Turnaround time 1 – From activation to receiving components bedside	Patient outcome within 24 hours
Diagnosis documentation	Turnaround time 2 – From time of receiving samples in blood centre to time of components issue.	Patient outcome after 24 hours
Informing all stakeholders	Appropriateness of MT	ABO switchover
Mode of activation of MTP	Number of components transfused –	Adverse transfusion reactions
	a) Before MTP	
	b) During MTP	
	c) After MTP	
Communication and Documentation	Duration of MTP activation	Length of hospital stay
Patient monitoring	Wastage of blood components	Acidosis / Hypothermia / Coagulopathy
Door to Bed time	Laboratory tests performed as per protocol	Un crossmatched blood transfused or not
	Viscoelastic tests performed	
	Haemostatic agents	
	Audits of MTP	

References:

1) Sanderson B, Coiera E, Asrianti L, Field J, Estcourt LJ, Wood EM. How well does your massive transfusion protocol perform? A scoping review of quality indicators. Blood Transfus. 2020; 18: 423–33.
2) Adkins BD, Libby TA, Mayberry MM, Brady TW, Halls JB, Corbett SM, et al. How did we reform our out of control massive transfusion protocol program? Transfusion. 2021;61:3066–74.
3) Hess JR, Ramos PJ, Sen NE, Cruz-Cody VG, Tuott EE, Louzon MJ, et al. Quality management of a massive transfusion protocol. Transfusion. 2018;58:480–4.
4) ACS TQIP MASSIVE TRANSFUSION IN TRAUMA GUIDELINES. 2014. Available from: https://www.facs.org/quality-programs/trauma/quality/best-practices- guidelines/. Last accessed on 20 Mar 2024.

"Quality improvement is a journey, not a destination"

DESIGN THINKING IN TRANSFUSION MEDICINE

Prof. Gita Negi
Head of the Department Transfusion Medicine AIIMS Rishikesh

Design thinking is a new process of thinking and planning used to create innovative solutions by challenging assumptions and redefining problems.

It encompasses five phases:

- **Empathize :** Understanding the patients, healthcare providers, blood donors and other stakeholders involved in the transfusion medicine process by gathering insights into their experiences through feedback to identify areas for improvement.
- **Define :** Based on the gathered insights, the core problem is defined e.g. challenges in getting negative blood group donors
- **Ideate :** Includes encouraging a free flow of ideas from team members by brainstorming, mind mapping etc to generate innovative and feasible solutions for the defined problem
- **Prototype :** Creating a basic prototypes of the top ideas and testing their feasibility and effectiveness
- **Test :** Continuous evaluation and testing to ensure they meet the needs of all stakeholders

Finally the last step is to institutionalize the improvements like education and training programs or proficiency testing etc and scaling and sustaining of outcomes.

RECIPIENT HAEMOVIGILANCE: PULMONARY COMPLICATIONS

Dr Gopal K Patidar
Additional Professor, Department of Transfusion Medicine, AIIMS, New Delhi

Blood transfusions, come with potential risks and complications. Among these, pulmonary complications are particularly concerning due to their potential severity and impact on patient outcomes.

The major pulmonary complications following blood transfusion include:

A. Transfusion-Related Acute Lung Injury (TRALI): The new consensus document1 effectively subdivides TRALI into Type I and Type II, based on the presence or absence of acute respiratory distress syndrome (ARDS) risk factors.

   i. TRALI Type I occurs in patients without risk factors for ARDS. These patients experience an acute onset (within 6 hours) of hypoxemia (P/F ≤ 300* or SpO2 < 90% on room air) and exhibit clear evidence of bilateral pulmonary edema on imaging (e.g., chest radiograph, chest CT, or ultrasound). Additionally, there should be no temporal relationship to an alternative risk factor for ARDS.

   ii. TRALI Type II occurs in patients with risk factors for ARDS or those who have existing mild ARDS (P/F of 200-300) but whose respiratory status deteriorates. These patients display findings similar to TRALI Type I, except for the association with ARDS, and have a stable respiratory status in the 12 hours before transfusion.

The pathophysiology of TRALI involves the "two-hit" hypothesis. The first "hit" is a predisposing condition in the patient that causes pulmonary endothelial activation or primes neutrophils. The second "hit" involves transfusion-related factors, such as donor antibodies against recipient leukocytes, bioactive lipids, or soluble mediators.

B. Transfusion-Associated Circulatory Overload (TACO): Patients classified with TACO should exhibit at least one required criterion with onset during or up to 12 hours after transfusion, along with these criteria (required and additional)2.

   i. Acute or Worsening Respiratory Compromise: This can include pulmonary edema identified through clinical physical examination, radiographic chest imaging, other non-invasive assessments of cardiac function, or a combination of these methods.

   ii. Cardiovascular System Changes: These changes must not be explained by the patient's underlying medical condition and can include the development of tachycardia, hypertension, jugular venous distension, an enlarged cardiac silhouette, peripheral edema, or a combination of these signs.

   iii. Evidence of Fluid Overload: This includes a positive fluid balance or clinical improvement following diuresis. Supportive evidence may include a relevant biomarker result, such as an increase in B-type natriuretic peptide concentrations (brain natriuretic peptide or N-terminal pro-brain natriuretic peptide) above the age group-specific reference range and greater than 1.5 times the pretransfusion value.

TACO results from excessive blood volume leading to acute pulmonary edema. It is particularly common in patients with compromised cardiac or renal function, the elderly, and pediatric patients.

C. Transfusion-Associated Dyspnea (TAD): TAD is an under-recognized complication characterized by respiratory distress occurring within 24 hours of transfusion without clear evidence of TRALI, TACO, or other specific causes.1 The exact pathophysiology remains unclear but may involve immune or volume-related factors.

Conclusion

Pulmonary complications after blood transfusion represent a significant clinical concern, with various underlying mechanisms and presentations. TRALI and TACO are the most common and severe complications, requiring careful differential diagnosis and prompt management.

References:

1. Vlaar, A.P.J., Toy, P., Fung, M., Looney, M.R., Juffermans, N.P., Bux, J., Bolton- Maggs, P., Peters, A.L., Silliman, C.C., Kor, D.J. and Kleinman, S. (2019), A consensus redefinition of transfusion-related acute lung injury. Transfusion, 59: 2465-2476.
2. Wiersum-Osselton JC, Whitaker B, Grey S, Land K, Perez G, Rajbhandary S, Andrzejewski C Jr, Bolton-Maggs P, Lucero H, Renaudier P, Robillard P, Santos M, Schipperus M. Revised international surveillance case definition of transfusion- associated circulatory overload: a classification agreement validation study. Lancet Haematol. 2019 Jul;6(7):e350-e358.

CAR T CELL THERAPY

Dr. Priti Desai
Professor and Head
Department of Transfusion Medicine Tata Memorial Hospital
Tata Memorial Centre, HBNI, Mumbai, India

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, 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

Advantages and disadvantages of CAR T cell therapy [6]

Advantages:

- High antigen affinity, specificity
- HLA independent antigenic recognition
- Recognises proteins, carbohydrates, and glycolipids
- Repetitive, serial killing of tumor cells
- Living drug and the benefits may last for years

Disadvantages:

- Off target CAR T cell activation in presence of antigen cross reactivity
- On target CAR T cell activation in presence of soluble antigens (it may block the ability to recognise cell surface antigen)
- poor trafficking and tumor infiltration
- immunosuppressive microenvironment
- limited efficacy against solid tumors
- antigen escape
- inhibition and resistance in B cell malignancies,
- limited persistence

Applications of CAR T is in:

Acute lymphoblastic leukemia Chronic lymphoblastic leukemia Lymphoma

Multiple myeloma

In solid tumors: limited role

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.

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.

Given the current success of CAR-T cell therapy and the potential for development of CAR-natural killer cells, researchers have paid great interest in developing CAR- macrophages (CAR-M) for tumor immunotherapy. (9)

CAR-Macrophages (CAR-M)

The emergence of CAR-M opens up a new possibility for treating solid tumors: modifying human macrophages with specific CARs to improve phagocytic activity and antigen presentation of macrophages against tumors.However, innate immune cells, such as macrophages, have not been widely studied in cancer treatment. Taking into account their capabilities of phagocytosis, antigen presentation and penetration in the tumor microenvironment, macrophages should be considered in the treatment of solid cancers. Macrophages are innate immune cells that are intrinsically equipped with broad therapeutic effector functions, including active trafficking to tumor sites, direct tumor phagocytosis, activation of the tumor microenvironment, professional antigen presentation. Unlike lymphocyte-based therapies, macrophages readily localize to and persist within the tumor microenvironment. Recent advances in synthetic biology and the increasing understanding of the cluster of differentiation 47/signal regulatory protein alpha (CD47/SIRPα) axis may provide new opportunities for the clinical application of engineered macrophages. The CD47/SIRPα axis is a major known pathway, repressing phagocytosis and activation of macrophages.(10)

Until November 2020, two clinical trials based on the CAR-M strategy have been approved by the FDA. The first is a drug candidate from CARISMA Therapeutics, CT- 0508, which treats tumor patients with relapsed/refractory HER2 over-expression with anti-HER2 CAR macrophages (Phase I clinical trial). The study recruited 18 patients with HER2 overexpressed solid tumors for the first time to study the effects of adenovirus transduction CAR-M in humans.The other is MaxCyte's MCY-M11, which uses mRNA-targeted PBMCs(including CAR-M) to express mesothelin-CAR, treating patients with relapsed/refractory ovarian cancer and peritoneal mesothelioma. Volunteers were recruited for Phase I clinical trial.(9)

CAR- NK

NK cells are a group of cytotoxic lymphocytes of the innate immune system that can mount a rapid response to non-self cells. Unlike engagement and activation of CAR T cells which can release inflammatory cytokine and lead to cytokine release syndrome and neurotoxicity, NK cells have different cytokine profiles. Hence, NK cells are currently being actively explored as an alternative approach for adoptive cell therapy. One major advantage of CAR NK therapy is that an "of-the-shelf" ready-to-use CAR NK cells can be manufactured through mass production and infused to patients at any time. NK cells have multiple mechanisms to target and eliminate cancer cells in addition to the CAR pathway. All the limitations associated with CAR T therapy also apply to CAR NK cells, from target antigen selection, antigen heterogeneity, CAR design, manufacturing to post-infusion challenges, such as NK cell migration into tumor sites, hostile tumor microenvironment. Active research is currently ongoing to improve CAR NK manufacturing and storage, especially for "of-the-shelf" CAR NK cell. At least 24 clinical trials with CAR NK cells have been planned or are ongoing. (11)

Conclusion:

CARs are modular synthetic receptors and CAR-T cells have transformed the treatment of certain hematological malignancies however, as outlined obstacles persist. To meet the demands of this complex and progressing field, innovative curriculum development and trained workforce is required.

References:

1. Abbas AK, Lichtman AH, Pillai S. Properties and Overview of Immune Responses. In: Cellular and Molecular Immunology, 9th edition. Amsterdam: Elsevier; 2017.1–11.
2. Edwin A. Burgstalerand Jeffrey L.Winters. Apheresis: Principles and technology of hemapheresis. In, Toby L. Simon (ed).Rossi's principles on Transfusion Medicine, 5th edition. U. K. Wiley Blackwell. 2016;373-380.
3. Trong H N, Hung L V M, Dang V T, Nguyen N H, Thanh Vu B, Pham P V. Current strategies for adoptive immunotherapy for cancer: "Off-the-shelf" immune cells. Biomed. Res. Ther; 7. 2012:4170-4189.
4. Feins S, Kong W, Williams EF, Milone MC, Fraietta JA. An introduction to chimeric antigen receptor (CAR) T-cell immunotherapy for human cancer. AmJ Hematol. 2019;94.
5. Ramalingam SS, Yang JC, Lee CK, Kurata T, Kim DW, John T, et al. Osimertinib as first-line treatment of EGFR mutation–positive advanced non–small-cell lung cancer. J Clin Oncol. 2018. 36:841– 9
6. Maude SL, Laetsch TW, Buechner J, Rives S, Boyer M, Bittencourt H, et al. Tisagenlecleucel in children and young adults with B-cell lymphoblastic leukemia. New Engl J Med. 2018. 378:439–45.
7. Neelapu SS, Locke FL, Bartlett NL, Lekakis LJ, Miklos DB, Jacobson CA, et al. Axicabtagene ciloleucel CAR T-cell therapy in refractory large B-cell lymphoma. N Engl J Med. 2017. 377:2531–44.
8. Mullard A. FDA approves first CAR T therapy. Nat Rev Drug Discov. 2017. 16:669.
9. Chen Y, Yu Z, Tan X, Jiang H, Xu Z, Fang Y, Han D, Hong W, Wei W, Tu J. CAR- macrophage: A new immunotherapy candidate against solid tumors. Biomed Pharmacother. 2021 Jul;139:111605. doi: 10.1016/j.biopha.2021.111605. Epub 2021 Apr 23. PMID: 33901872.
10. Sloas C, Gill S and Klichinsky M (2021) Engineered CAR Macrophages as Adoptive Immunotherapies for Solid Tumors. Front. Immunol. 12:783305. doi: 10.3389/fimmu.2021.783305
11. Pan K., Farrukh, H., Chittepu, V.C.S.R. et al. CAR race to cancer immunotherapy: from CAR T, CAR NK to CAR macrophage therapy. J Exp Clin Cancer Res 41, 119 (2022). https://doi.org/10.1186/s13046-022-02327-z

RESOLUTION OF MULTIPLE ANTIBODIES FOLLOWING INCOMPATIBLE CROSSMATCH

Dr. R. Raj Bharath
Professor and Head
Department Of Transfusion Medicine
S.R.M Medical College Hospital And Research Centre, Tamil Nadu

When a patient serum contains multiple antibodies, it is difficult to interpret the results of testing using a single panel of reagent red cells. The test result will show a pattern of reactive and nonreactive red cells which does not fit a single antibody and reactivity occurs at different test phases (immediate spin and AHG). The autologous control that is tested with antibody identification is the preliminary step for complex antibody problem resolution.

Patient with negative autocontrol where antibodies react in different strengths and different phases, an extended phenotype of the patient red cells needs to be performed when there is no history of blood transfusion for the last three months. Selected red cells which matches the patient phenotype are first tested with the sample. If phenotyped matched red cells are non-reactive, then test selected antigen red cells to rule out other alloantibodies. If it is reactive, then consider antibody to high prevalence antigen. When initial antibody identification shows some weakly reactive cells, then consider dosage effect and test selected reagent red cells that shows double dosage expression of the antigen that the patients lacks. Enhancement techniques such as Enzymes and Dithiothreitol (DTT) treatment of red cells will also help in identifying specific antibodies. Enzymes such as papain and ficin destroy antigens of Duffy and MNS blood group system. DTT on red cells denatures Kell antigens that are sensitive to it, destroy CD38 on red cells which causes interference during anti-CD38 immunotherapy and denatures IgM antibodies in plasma by cleaving their disulphide bonds.

In patients with positive DAT, it is important to differentiate if it is caused by an autoantibody or an alloantibody. Elution procedures are helpful in dissociating the red cell bound antibody in the eluate, which can then be screened for a defined specificity. Similarly, antibody can be removed from a serum sample by adsorption onto red cells that express the corresponding antigens. Patient with no history of previous transfusion for 3 months, red cells should be extended phenotyped for doing autologous adsorptions. If all red cells react with the eluate or serum of the patient, suspect autoimmune haemolytic anaemia (AIHA) and if all red cells are nonreactive with eluate or serum consider drug antibody. If there is transfusion history and all red cells are reactive with eluate, do allogenic adsorptions with selected cells to rule out AIHA and antibody to high prevalence antigens. It becomes important to identify any alloantibodies masked by autoantibodies so that compatible blood unit may be provided for them. Allo-adsorption studies help to separate the autoantibodies from the patient's serum by adsorbing them onto selected red cells. The remaining plasma can then be tested for the presence of allo-antibodies. There are also antibodies against variety of drugs and chemicals in testing reagents which can cause all red cells to be reactive during antibody identification. Cold autoantibodies may also complicate antigen typing because of the immunoglobulins coating the patient's red cells and warm (370C) saline washes with red cells removes these cold autoantibodies.

The phases in which an antibody is identified and its specificity are the defining features used to predict an unexpected antibody's potential clinical significance. RBC units selected for transfusion to a patient with potentially clinically significant antibodies should be negative for the corresponding antigens. For patients requiring chronic transfusion therapy for sickle cell disease or thalassemia, phenotype matched specifically for C, E and K antigens is done to prevent allo- immunization. Red cell genotyping is a better alternative to extended phenotyping in patients with warm AIHA and multiple transfusions to guide transfusion therapy.

CLINICAL AUDITS IN TRANSFUSION MEDICINE: A STEP TOWARDS CONTINUOUS QUALITY IMPROVEMENT

Rajendra Chaudhary,
MD, FRCPath, SGPGIMS, Lucknow

The clinical transfusion audit is a quality improvement process that aims to improve patient care and outcomes, through the systematic review of the use of blood components meeting current transfusion guidelines. The audit is a systematic, critical analysis of the quality of care which will include the procedures used for the diagnosis and treatment of the patient, the use of available resources, as well as the outcome and change in the quality of life of the recipients. The aim of this process is to create a culture of delivering a quality service to patients whereby medical care will be improved on a continuous basis.

Auditing transfusion practices is therefore a cyclical process. Within the cycle, there are stages that follow a systematic process of establishing best practice taking into account local circumstances and limitations, measuring care against established criteria, taking action to improve care given and monitoring to sustain improvement.

There are many reasons to undertake clinical audit:

- Clinical audit offers a way to assess and improve patient care, to uphold professional standards and 'do the right thing'.
- Through clinical audit, healthcare staff may identify and measure areas of risk within their service.
- Regular audit activity helps to create a culture of quality improvement in the clinical setting.
- Clinical audit is educational for the participants. It involves being up to date with evidence based good practice.
- It offers an opportunity for increased job satisfaction.
- It is increasingly seen as an essential component of professional practice.
- It can improve the quality and effectiveness of healthcare.

Fig 1: Audit Cycle

Audit Process

Table 1: Stages of conducting audit

Stage 1	**Planning the audit**
	• Involving stakeholders
	• Determining the audit topic
	• Planning the delivery of audit fieldwork
Stage 2	**Standard and criteria selection**
	• Identification of standard and audit criteria
	• Selecting appropriate performance level
	• Inclusion / exclusion criteria
Stage 3	**Measuring performance**
	• Data collection
	• Data analysis – measure actual performance against standards
	• Drawing conclusions
	• Presentation of results
Stage 4	**Making improvements**
	• Develop Quality Improvement Plan (QIP)
Stage 5	**Sustaining improvements**
	• Monitoring the quality improvement plan
	• Develop performance indicators
	• Dissemination and celebrating the success
	• Remember -close the audit loop - reaudit

Auditing Strategies:

1] Retrospective audit:

In this type of audit, information regarding transfusions given to patients is gathered and reviewed sometime after the transfusion episode and subsequent discharge of the patient. The review is therefore retrospective by necessity and the information is used in an attempt to alter clinicians' behavior in the future. It does not have any impact on the treatment of the patients that were included in the audit.

Retrospective audits do have limitations, mostly owing to the fact that appropriate recording of all the necessary information is very often lacking. The advantage of this type of audit is that it does not need many resources to be implemented and maintained. It can also be managed on a manual system. This type of audit strategy is capable of yielding some information on what current practices consist of and will give guidance regarding strategies for clinicians' education. It also serves as a tool to establish whether current transfusion practices are acceptable in terms of the agreed guidelines and whether the guidelines are at an acceptable standard.

2] Prospective audit:

This entails reviewing and validating the decision to transfuse at the time when it is made against the agreed clinical guidelines. It therefore implies the review of orders for blood prior to the transfusion episode. This approach needs considerably more resources than a retrospective audit approach. Somebody with transfusion knowledge and experience must be available constantly to monitor transfusion practices and must also have access to laboratory results on a continuous basis. The advantage of this approach is that it gives the patient the benefit of receiving the appropriate transfusion therapy

3] Concurrent audit:

It entails gathering information on a transfusion episode and giving feedback within the time scale of a patient's stay in the hospital. The advantage of this approach is that the data are likely to be accurate and the outcome can be provided to the clinicians making the decisions regarding the transfusion episode while the specific incident can still be recalled. The disadvantage is, as is the case with retrospective audits, that this type of audit will not influence the transfusion decision for the current patient.

Clinical audit in Transfusion Medicine

Studies have shown that concurrent audits of requests for blood components and pretransfusion approval reduce the number of components used and increase the appropriate use of components. Predetermined transfusion guidelines, pretransfusion approval, and transfusion audits are useful tools in education and reduction of inappropriate use of blood components. An audit of mislabelled and mis collected samples should be carried out to identify the causes of errors, and the conclusions should be reported to the institution staffs for the prevention of similar errors.

Areas for audit:

- The transfusion rate (the number of units transfused per hospital bed per year).
- The percentage transfused per user or user department for each indication.
- Crossmatch/transfusion ratio per user or user department for type of surgery and/or indication.
- The transfusion failure rate (% of transfusions that did not achieve the expected outcome)
- The incidence of non-compliance with transfusion guidelines.
- Bed-side transfusion practices
- Transfusion triggers
    - Red cells: pre transfusion Hb level

- Platelet: platelet count, presence or absence of bleeding
- FFP: results of coagulation tests, presence or absence of bleeding

Conclusion

Quality control, and consequently the right allocation of resources, is becoming a central issue in the management of Health Care Systems. Several tools are deployed to provide a monitoring of the levels of care and improve its quality. Among them, clinical audit is one of the most popular and widespread. In the specific field of Transfusion Medicine, this method has proven its effectiveness in facing different problems, such as appropriateness of use of blood components, bedside transfusion practices, triggers for blood components etc. However, it still seems necessary to spread the understanding of clinical audit and promote its systematic application both nationally and locally, so that it can be part of the expertise of each health care provider, together with other quality improvement techniques.

TECHNOLOGICAL ADVANCES IN MANUFACTURING OF PLASMA DERIVED MEDICINAL PRODUCTS (PDMPs)

Dr. Ranjeet S Ajmani
CEO – Asia, Aegros ranjeetajmani@gmail.com

Plasma-derived medicinal products (PDMPs) are life-saving medicines derived from human plasma, which is separated from blood or donated directly. Plasma is a powerhouse of many therapeutic proteins—albumin, immunoglobulins, Factor VIII, Factor IX, fibrinogen, etc. The therapeutic properties of the proteins present in the plasma can be utilised to make up for the deficiencies of proteins in the human body, either due to genetically defective machinery, rare diseases, infection, or a or a clinical condition of injury. These PDMPs are manufactured by a very complex process called plasma fractionation. PDMPs were used for the first time during the Second World War. These products were manufactured using Cohn technology. This technology has been refined over a period of time to improve the yield, increase the safety profile of the products, and improve their quality. With more technological advances in separation technology, chromatographical steps were included in basic Cohn technology, which is named hybrid technology. Today, there are plants that function purely on chromatography. A new technology is under clinical evaluation, where the products will be manufactured using charge-based separation. It is proposed that this technology will have many advantages as compared to traditional ones: higher yields, smaller sustainable plants, suitability for smaller countries, etc. In the last eight decades, many technological advancements have happened in the plasma fractionation industry, and this has improved to access to the treatment across the globe. But most of the patients living in developing and underdeveloped countries who need PDMPs for their survival do not have easy access to treatment.

The need of the hour is to create a model of plasma fractionation that is technically and financially viable to ensure PDMPs can be made available, accessible, and affordable in different parts of the world.

USE OF WHOLE BLOOD IN PAEDIATRICS

Dr Satyam Arora
Additional Professor, Department of Transfusion Medicine
Post Graduate Institute of Child Health (PGICH), Noida, UP

Background: Whole blood was one of the initial hemostatic resuscitation products commonly used for traumatic hemorrhagic shock and immediate life- threatening injuries. Presently whole blood is not routinely available since there is a wide availability of blood components. In recent times there is a resurgence of whole-blood use in both military and civilian life-threatening bleeds. Recent data have shown that there is also a growing interest in using low-titer cold- stored type O whole blood (LTOWB) in paediatrics.

Aims: The aim of this presentation is to evaluate the recent renewed interest and indications of whole-blood use in paediatrics.

Methods: The presentation discusses the published data on the use of whole blood (LTOWB) in paediatrics and neonates. There is a detailed discussion on the concept of LTOWB, indications of use and possible future focus areas for future research.

Results: A recent survey of 36 USA children's hospitals showed that there is a willingness to participate in a study to determine the use of LTOWB in paediatrics. Another retrospective study showed the use of LTOWB in 56 injured children showed better outcomes when compared to the component therapy. A recent observational study also showed improved outcomes for 80 children receiving LTOWB post-trauma (AOR 0.23) as compared to component therapy (AOR 0.41). One recent case report also showed a positive outcome of transfusing cold-stored LTOWB re-warmed (via fluid warmer) to a preterm neonate.

Summary/ Conclusion: There is a growing interest in using LTOWB as compared to component therapy, in paediatric and neonatal patients with life-threatening bleeds but there is limited data on efficacy, utility and overall benefit. In our presentation, we will review the present data on the topic and highlight the gaps requiring more work.

MONOCYTE MONOLAYER ASSAY (MMA) - SOLUTION FOR SAFE TRANSFUSIONS IN COMPLEX IMMUNOHEMATOLOGICAL CASES

Dr Shamee Shastry
Professor and Head, Dept.IHBT, Kasturba Medical College, Manipal

The monocyte monolayer assay is an in vitro assay performed to predict blood transfusion outcomes in patients with auto- or alloantibodies to red blood cells or to determine the clinical significance of antibodies. Basically it assesses the effect of anti-RBC antibodies in mediating Fcγ receptor (FcγR)-mediated phagocytosis.

The basic principle of the test is Monocytes, the immune cells that destroy red blood cells during an adverse transfusion reaction, are isolated and placed in a single layer on a plate in the laboratory. The donor red blood cells are mixed with the patient's antibodies and added to the monocytes. The number of monocytes with one or more red blood cells adhered/engulfed at the end of the assay is counted and this is used to calculate a "monocyte index". If the monocyte index is less than 5 percent, this indicates that the red blood cells won't be rapidly destroyed and that the patient won't have a serious reaction to the blood. Several variables such as anticoagulant used for whole blood samples, temperature and duration of storage, and optimal pH for assessing the response of monocytes to antibody-bound can influence the results and Tong et al have discussed the optimal conditions for performing the MMA.

MMA serves as an alternative cross-match test when antigen-negative blood units aren't accessible for selection. However, The MMA assay is a time-consuming process, demanding 6–8 hours for execution, with an additional 8–10 hours for manual quantification post-slide drying. Consequently, the total turnaround time for results spans a lengthy 24 hours from assay initiation. Enhancing its efficacy for both academic and clinical applications necessitates further streamlining and automation of the procedure.

DONOR LYMPHOCYTE INFUSIONS AFTER HAPLOIDENTICAL STEM CELL TRANSPLANTATION

Dr Shashank Ojha,
Professor & Head, Department of Transfusion Medicine, Tata Memorial Centre,
Advanced Centre for Treatment, Research and Education in Cancer, Kharghar, Navi Mumbai.

Introduction

Donor lymphocyte infusion (DLI) has been used in the management of relapsed hematologic malignancies after allogeneic hematopoietic stem cell transplantation (HSCT). It can eradicate minimal residual disease or be used to rescue a hematologic relapse, being able to induce durable remissions in a subset of patients. With the increased use of haploidentical HSCT, there is renewed interest in the use of donor lymphocytes to either treat or prevent disease relapse post-transplant.

Haplo identical HSCT as viable option

Allo-HSCT from an HLA-haploidentical related donor (haplo-HSCT) has emerged as a suitable alternative for those patients who need an allograft but who lack an HLA-matched related or unrelated donor. Several T cell depleted and T-cell replete haploidentical transplant strategies are utilized today.

Brief history

The first report on DLI was published in 1990 by HJ Kolb. In this report, 3 patients with chronic myeloid leukemia (CML), relapsed after allo-HSCT, were treated with DLI and interferon alpha, obtaining a complete cytogenetic response.

After these promising results, DLI was extensively used in other hematological malignancies such as acute leukemia, lymphomas, and myeloma.

Modalities of administration

DLI has been used in three clinical settings: therapeutic (for proven relapsed/progression), pre-emptive / prophylactic in patients considered to be at high risk of relapse, and in case of mixed chimerism.

Therapeutic haplo-DLI: hematologic relapse

Published retrospective studies have suggested that outcomes of haplo-DLI in patients with hematologic relapse are comparable to standard DLI from an HLA-matched donor. The incidence of DLI-associated GvHD also appears to be similar regardless of donor type.

Therapeutic DLI in T-cell replete haplo-HSCT

Haplo-DLI after chemotherapy successfully resulted in complete remission (CR) in approximately 30% of the patients with a subset of long-term survivors. The cell dose in most DLI was 1x106 CD3+ cells/kg and the majority of patients received cytoreductive chemotherapy before DLI. The incidence of grade 2-4 acute GvHD was approximately 30%, and only 5% of patients developed grade 3-4 acute GvHD. No patient (0%) developed extensive chronic GvHD.

Pre-emptive haplo-DLI: minimal residual disease, mixed-donor Chimerism

The presence of MRD before or after allo-HCT is associated with significantly increased risk of relapse and reduced survival in both acute lymphoblastic leukemia (ALL) and acute myeloid leukemia (AML). Low donor T-cell chimerism [mixed-chimerism (MC)] after an allo-HCT is also associated with poor donor-derived immune reconstitution and increased risk of disease relapse, especially after myeloablative conditioning. Pre-emptive DLI from a full matched donor for MRD and MC appears to be safe and effective in improving disease-specific outcomes.

DLI should not be used in patients who have converted to host chimerism due to increased risk of marrow aplasia. An alternative strategy for such patients would be to undergo a second allo-HCT from the same or from a different donor. It is important to weigh the risk of GvHD and marrow aplasia versus the potential benefit of reducing the disease relapse when considering pre-emptive DLI for MRD or MC.

Prophylactic haplo-DLI

Prophylactic DLI from a matched donor has been studied in patients with high-risk myeloid malignancies and was associated with improved disease-specific outcomes and low non relapse mortality. It can contribute to immune reconstitution and reduce the risk of infection, which is a major challenge after a T-cell depleted haplo-HCT.

The timing of prophylactic-DLI

The timing of prophylactic-DLI is also important as decreasing the interval between allo-HCT and DLI will likely increase the risk of aGvHD. It may be reasonable to administer prophylactic haplo-DLI before d+90 given that median time to relapse after allo-HCT is approximately three months.

Proposed treatment algorithm

A Proposed treatment algorithm outlines the use of therapeutic, pre-emptive and prophylactic donor-lymphocyte infusion (DLI) following T-cell replete HSCT

HLA: human leukocyte antigen; MRD: minimal residual disease; GvHD: graft-versus-host disease; TKI: tyrosine kinase inhibitor.

Practical aspects of haplo-donor-lymphocyte infusion

Cell dose

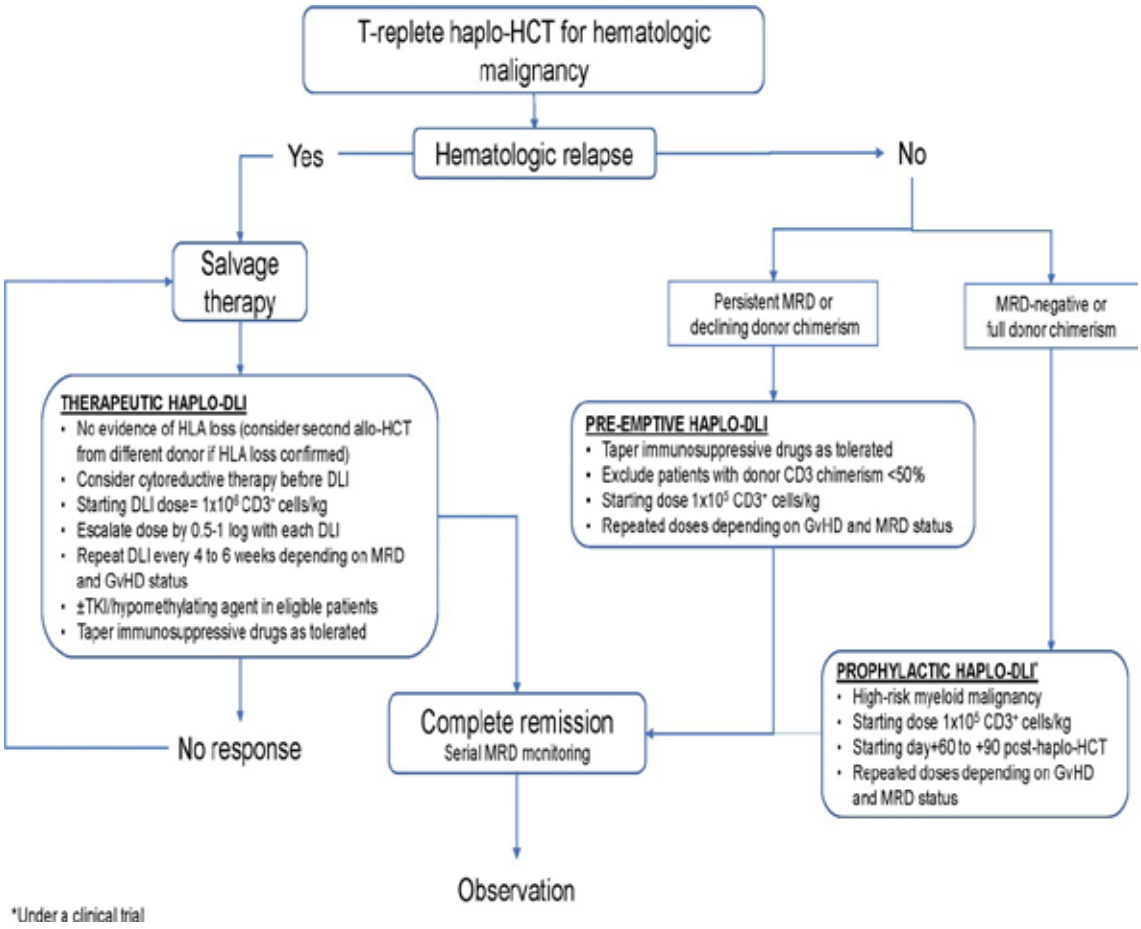
Available data suggest that 1x106 CD3+cells/kg is a reasonable starting dose with appropriate repeated dose escalation every 4-6 weeks based on disease response and GvHD for therapeutic haplo-DLI in T- replete haplo-HCT.

Clinical trials are needed to establish the optimal timing and cell dose in prophylactic and T-cell depleted haplo-HCT settings. Published studies have used wide-ranging repeated non-escalating cell doses for pre-emptive or prophylactic DLI.

Technical tips for DLI procurement

DLI may be harvested through normal or large-volume leukapheresis, with immunomagnetic selection procedures are to be performed to obtain selected T-cells population. In other clinical settings, such as haplo-identical transplantation when G-CSF–stimulated peripheral blood stem cells are harvested, DLI may be collected from the negative fraction of the CD34+-hematopoietic stem cell selection.

From a technical point of view, recently released cell separators (Cobe Spectra, Amicus, Fresenius Com. Tec and more recently, Optia) allow for very satisfactory lymphocyte-enriched yields.



Furthermore, it should be taken into account that when performing lymphocyte collection in a low-weight donor, devices with a low extracorporeal blood volume should be of choice. The lymphocyte- enriched harvest in turn is subdivided in aliquots which contain increasing doses of DLI, according to the different clinical protocols. These aliquots are therefore kept frozen until thawing and infusion.

The end point of DLI therapy

Patients with DLI-responsive relapse usually respond within 2-3 months. Repeated infusions of escalating doses of therapeutic DLI can be administered until CR is achieved (ideally an MRD-negative status) or the patient develops clinically significant GvHD. Patients should be evaluated for GvHD, donor chimerism and disease response after each DLI.

Major references

1. Clinical applications of donor lymphocyte infusion from an HLA-haploidentical donor: consensus recommendations from the Acute Leukemia Working Party of the EBMT.B. Dholaria et al. Haematologica 2020; 105(1):47-58.
2. Donor lymphocyte infusion after allogeneic stem cell transplantation. L. Castagna et al. Transfusion and Apheresis Science; 54 (2016) 345–355.

QUALITY ASSURANCE IN A HEMOSTASIS LABORATORY

Dr Sitalakshmi Subramanian
Associate Medical Superintendent – Lab Services Professor,
Department of Transfusion Medicine and Immunohematology
St John's Medical College Hospital, Bangalore

Quality Assurance in the Clinical haemostasis laboratory ensures that the result a laboratory generates, and reports is accurate and precise. External quality assurance (EQA) is an important component of the total quality assurance program. Internal Quality Control [IQC] and EQA should be a fundamental part of any test that a laboratory offers. Coagulation tests are biological tests performed on blood samples contributing to significant variation. Haemostasis testing is particularly sensitive to pre-analytical issues including sample collection, handling, transportation, processing, and storage, but most quality assurance measures are specific for the analytical phase of haemostasis testing.

The two components to QA are:

Internal Quality Control- 'Are my results today the same as yesterday?'

External Quality Assurance - 'Are my results the same as other labs performing the same test?'

Internal QC is the monitoring of any haemostatic test performed in the laboratory to ensure that there is no day-to-day or within the day variation. It includes a statistical analysis of the tests that have been performed and the use of control materials with an assigned value. It is designed to ensure that there is continual evaluation of the reliability of any test that the lab generates.

External QA involves the evaluation of the performance of the laboratory in a particular test or tests by an external agency. Such schemes are usually organised on a national or international basis and the analysis is retrospective with a comparison of performance of labs using similar methodology against each other.

Laboratory Standards and Controls:

International Standards for use in the laboratory undergo calibration in extensive multicentre international collaborations and using multiple methodologies. International Standards are usually limited in quantity and therefore used to calibrate National, Regional or Local Standards.

Definition of units:

'IU' unit used for an FVIII assay. It involves the use of a reference plasma that has been calibrated against an International Standard with an assigned value in e.g. 100 International Units [IU] /dL or 1 IU/ml.

'U' refers to an assay e.g. a FX assay - involves the use of a reference plasma but this is not an international standard but it does have an assigned value e.g. Units [U] per ml - U/mL '%' implies that the assay has involved a reference plasma that has been derived from a normal plasma pool and which has been arbitrarily assigned a value of 100%.

Internal quality control (IQC) procedures are crucial for ensuring accurate patient test results. Laboratories that design and implement good quality assurance (QA) practices, which includes an optimal quality control (QC) program, can minimize analytical errors and ensure accurate patient results and the quality of test performance. It provides documented evidence that the laboratory's results are accurate and acceptable.

There are many challenges facing laboratories, such as increased workload and scope of testing. In addition, implementation of automated platforms for higher throughput and increasing use of auto-verification requires close monitoring of systems to ensure accurate results are reported.

The interpretation of IQC data has evolved from manual plotting of data and visual inspection of Levey–Jennings graphs to the use of multiple-rule IQC computer software. The use of integrated software programs rapidly alert users to potential IQC changes thereby ensuring better reliability of results. The advent of advanced software, within or interfaced to the laboratory information system (LIS), has greatly accelerated the ability of laboratories to deploy more advanced IQC practices. Ongoing education is required to ensure appropriate understanding and use of IQC when developing and implementing advanced software programs.

The post-analytical component which includesresult reporting, reference interval comparison and result interpretation or an interpretative report for a battery of tests or a multi-component test.

The session will focus on case studies to illustrate the importance of Quality control in a haemostasis laboratory.

MASSIVE TRANSFUSION PROTOCOLS IN OBSTETRIC BLEEDING

Dr. Ravindra Singh
Associate Director Department of Transfusion Medicine
Aditya Birla Memorial Hospital, Pune, Maharashtra

Massive postpartum hemorrhage (PPH) is the most common cause of maternal death worldwide [1]. Life-threatening massive PPH occurs in one out of every 300 cases, and its onset is difficult to predict before delivery. Once it occurs, it can result in nonstandard requests for blood products without any protocol guiding the administration of a large amount of blood in a short period.

Hallmark signs of massive hemorrhage, such as tachycardia and hypotension, may not be readily apparent in healthy postpartum women until blood loss approaches 25% of total blood volume (1.5 L in a term, pregnant female).[2] Once hemorrhage is recognized, determining the etiology is of primary importance as treatment strategies vary tremendously.

Massive Obstetric Hemorrhage is variably defined as:

- Blood loss >1500 ml
- Decrease in Hb > 4 gm/dl
- or acute transfusion requirement of > 4 units.

Obstetric Hemorrhage is classified as:

- Antepartum (APH)
  - Bleeding occurs after 24 weeks of gestation and before delivery.
- Postpartum (PPH)
  - Primary: Within 24 hours of delivery
  - Secondary: 24 hours to 6 weeks

Causes of Hemorrhage

- Early Pregnancy:
  - Abortion
  - Ruptured Ectopic
- Ante Partum Hemorrhage (APH):
  - Placenta Previa
  - Placenta Abruption
  - Uterine Rupture
  - Trauma
- Post Partum Hemorrhage (PPH)-Primary
  - Uterine atony
  - Retained products of conception
  - Genital tract trauma
  - Abnormal adherent placenta
  - Clotting defects
  - Acute uterine inversion
- Post Partum Hemorrhage (PPH)- Secondary
  - Puerperal sepsis
  - Retained products of conception

Postpartum hemorrhage: Massive transfusion

Massive transfusion in obstetrics requires extensive collaboration between the obstetrics, anesthesiology, and transfusion team.

Management: When postpartum hemorrhage is encountered, care should be taken to accurately diagnose the source of bleeding as treatment strategies vary. Close inspection of the placenta to ensure that it is intact and completely extracted, as well as appropriate visualization of the cervix and birth canal to rule out laceration is integral. Once the source of the bleeding has been identified, appropriate steps to swiftly address the etiology should ensue.

The leading cause of postpartum hemorrhage is uterine atony, which accounts for 80% the incidence of postpartum hemorrhage. The mainstay of therapy is uterotonics and active management of the third stage of labor with bimanual massage, uterine compression, and Pitocin.[3]

If acute hemorrhage persists, the most important next clinical step is a rapid and appropriate response to the hemorrhage, as recommended by National Maternal Health initiative postpartum hemorrhage bundles, which calls for unit standard obstetric hemorrhage protocols in addition to several other components discussed below. Other components of the postpartum hemorrhage bundle include hospital wide massive transfusion protocols (MTP), hemorrhage carts, and assessment of blood loss. [4]

Blood products: Transfusion of blood products is a critical component of resuscitation in response to postpartum hemorrhage. Transfusion medicine was altered tremendously when it was discovered that blood can be divided into individual components and transfused separately, which is crucial given that blood is a limited resource.

Massive transfusion protocols (MTP): In certain circumstances, when maternal blood loss is drastic, or the rate of bleeding is rapid, several units of blood products will not suffice to insure avoidance of maternal morbidity or even mortality. In these circumstances, massive transfusion protocols were developed. Massive transfusion is defined as greater than 10 units of packed red blood cells (pRBCs) in a 24-h period, and has resulted in a reduction in mortality from hemorrhage. [5]

Exsanguinating hemorrhage results in acidosis, hypothermia, and coagulopathy, commonly referred to in the trauma literature as "the lethal triad" [6] and aggressive correction of coagulopathy improves outcomes and increases survivorship. Therefore, reduction in mortality is achieved with decreased fresh frozen plasma to packed red blood cell ratios, with most MTP protocols prescribing a 1:1 or 1:1.5 ratio [7]

Most institutions that had an initiation standard used a cut-off of 1500 mL with uncontrolled bleeding. Although institutions develop their own MTP protocols; many have adopted a 1:1:1 strategy (1 unit pRBCs, 1 unit of fresh frozen plasma [FFP], and 1 U of platelets). Once MTP is activated, the blood products are typically provided in a "cooler" or "container", which contains the multiple blood products in the prescribed ratio to be transfused, with a typical cooler consisting of 6 units pRBCs, 6 units FFP, and one unit of pooled (6 packs) platelet

Table 1: Example of Massive Transfusion Protocol [4]

Container	pRBC	Thawed Plasma	Plateletpheresis	Cryoprecipitate
(Pool X 10)				
Initial	6	5	1	-
2	6	5	1	-
3	6	5	1	1
4	6	5	1	-
5	6	5	1	-
6	6	5	1	1
7	6	5	1	-
8	6	5	1	-
9	6	5	1	1
Adopted from the Johns Hopkins Massive Transfusion Protocol				

Adjuncts to massive transfusion: Maternal death from hemorrhage can occur within hours of onset especially in settings without robust blood cnter or the ability to initiate or collaborate with a nearby blood center.

Medications recently described such as Tranexamic acid (TXA), fibrinogen concentrate, and plasma concentrate may aid in both high and low blood bank/centre resource settings as adjuncts to massive transfusion protocols.

1. Tranexamic acid: TXA is an antifibrinolytic drug that serves as a lysine analogue and inhibits the breakdown of fibrinogen and fibrin by plasmin. In traumatic injury, TXA reduced death secondary to hemorrhage without increase in thrombotic events.

   The WOMAN trial [8] has generated more interest in the utilization of TXA for postpartum hemorrhage. The WOMAN trial showed similarly that women given TXA within 3 h of birth (or hemorrhage) had significantly reduced mortality from bleeding when compared to controls. After 30 min the TXA, it can be re-dosed until surgical or procedural control is achieved.
2. Fibrinogen Concentrate: Disseminated intravascular coagulopathy (DIC) can occur soon after hemorrhage especially in trauma or surgical injury. Augmentation of the fibrinogen, a plasma glycoprotein, allows clot formation through its conversion to fibrin and is an independent predictor of mortality. It also decreases the risk of a viral transmission as well as delay in administration
3. Prothrombin Complex Concentrate (PCC): PCCs contain vitamin K dependent clotting factors (Factors II, VII, IX, and X) as well as Protein C and Protein S. PCCs could be of benefit in women with severe liver disease (i.e., cirrhosis, HELLP syndrome, etc.) or with acquired, factor-deficient bleeding disorders.
4. Recombinant-Activated Factor VIIa: Given its controversial nature, the use of this agent in trauma patients at many institutions remains restricted and is not incorporated into their MT protocols.

Conclusions: Massive hemorrhage is a form of shock which is unavoidable for most obstetric providers. In extremis, blood product transfusion is often lifesaving.

Obstetric providers should become familiar with MTP protocols in their institutions and understand adjuncts to resuscitation for these patients to reduce the risk for severe morbidity and mortality. In the settings without access to MTP and large quantities of blood products, hemostatic adjuncts may play a vital role in decreasing the risk for life-threatening hemorrhage.

References:

1. Thurn, L.; Wikman, A.; Westgren, M.; Lindqvist, P.G. Massive blood transfusion in relation to delivery: Incidence, trends and risk factors: A population-based cohort study. BJOG 2019, 126, 1577–1586. [CrossRef]
2. Bonner J Massive obstetric hemorrhage. Baillieries Best Pract Res Clin Obstet Gynaecol. 2000;14:1–18.
3. Main EK, et al. National partnership for maternal safety: consensus bundle on obstetric hemorrhage. Obstet Gynecol. 2015;126:155–162. [PubMed: 26241269]
4. Benjamin K. Kogutta, Arthur J. Vaught, Postpartum hemorrhage: Blood product management and massive transfusion, Semin Perinatol. 2019 February ; 43(1): 44–50. doi:10.1053/j.semperi.2018.11.008.
5. Cinat ME, et al. Improved survival following massive transfusion in patients who have undergone trauma. Arch Surg. 1999;134:964–968: discussion 968-70. [PubMed: 10487591]
6. Moore EE. Staged laparotomy for the hypothermia, acidosis, and coagulopathy syndrome. Am J Surg. 1996;172:405–410. [PubMed: 8942535]
7. Riskin DJ, et al. Massive transfusion protocols: the role of aggressive resuscitation versus product ratio in mortality reduction. J Am Coll Surg. 2009;209:198–205. [PubMed: 19632596]
8. Shakur H, et al. The WOMAN Trial (World Maternal Antifibrinolytic Trial): tranexamic acid for the treatment of postpartum haemorrhage: an international randomised, double blind placebo controlled trial. Trials. 2010;11:40. [PubMed: 20398351]

THERAPEUTIC APHERESIS IN SICKLE CELL DISEASE

Dr. Girijanandini Kanungo
Professor & Head
Department of Transfusion Medicine
IMS & SUM Hospital, Bhubaneswar, Odisha

Today, SCD is the most common severe monogenic disorder in the world, with a high prevalence in sub-Saharan Africa, parts of Mediterranean, India and in the Middle East. In South Asia, the highest prevalence of the disease is in India, where over 20 million patients with SCD live. The highest frequency of the βs allele is found across Central India (up to 10%), from South-Eastern Gujarat to South-Western Odisha4. Altogether, India has been ranked the country with the second highest numbers of predicted SCD births

Blood transfusion is established as an important treatment in some acute situations, such as severe anaemia and acute chest syndrome, and also to prevent some chronic complications, such as cerebrovascular disease. India is estimated to have the biggest unmet need for blood units in the world, with important implications for the treatment of SCD. Making reliable blood transfusion services available would improve the standard of care for patients with SCD and facilitate the development of curative treatments, including gene therapy and bone marrow transplantation.

Hydroxyurea (HU) was the first licensed disease-modifying therapy for SCD

a-RCE is a safe intervention with very low alloimmunisation rates and no risk of iron loading. We have seen some very good responses from patients with recurrent painful crises, but it is clear that these responses build over time. We have also seen very good clinical responses from most patients with stroke, sickle cell crisis, leg ulcers and stuttering priapism along with other complications.

We consider the provision of a-RCE an essential component of any specialist service looking after patients with sickle cell disease. Setting up an apheresis service requires investment in equipment and appropriate staff. However, a-RCE is a cost-effective intervention as it reduces the need for iron chelation drugs , while also reducing the number of episodes of emergency hospital attendance.

Regular monitoring and documentation of indications, targets, adverse events and responses is required at a multidisciplinary level. Additionally, careful planning is essential when attempting to match capacity to demand. Our policy is to run the service at 80–85% capacity to allow for staff absences, equipment maintenance, emergency procedures and the ability to enter new patients without delay when there is an urgent clinical need.

SCD is an emerging public health challenge not only in India but also globally. In 2006, WHO recognized it global public health problem. In INDIA, 5200 livebirths have SCD every year. By ICMR study, 20% children with SCD expired by 2 yrs of age, 30% die before they reach adulthood.

Honourable PM of India launches National Sickle Cell Anaemia Elimination Mission (NSCEM) from Shahdol, Madhya Pradesh, 1st july,2023.

National Sickle Cell Anaemia Elimination Mission aims to eliminate Sickle Cell Anaemia before India celebrates it's Amritkal Mohatsav by 2047 .

PM Distributes sickle cell genetic status cards to beneficiaries

National Sickle Cell Anaemia Elimination Mission prioritizes the health of tribal communities in India: Prime Minister

Mission achieved a milestone of screening one crore for SCD and targets screening approximately 7.0 crore people under 40 years of age in the next 3 years.

Sickle Cell Genetic Status Cards before marriage, to ensure that the disease is not transferred to the next generation: aRBCx/ Erythrocytapheresis s an effective therapeutic mode in SCD complications but challenges exist…..

Underutilization of the Procedure…. Educational and Awareness Programs… Research and Publications….

Collaboration with Healthcare Institutions: Collaborating with hospitals and healthcare institutions to integrate therapeutic red cell exchange into treatment protocols and ensure that medical staffs are well-informed….

Experience in IMS & SUM Hospital, S'O'A Deemed to be university, Bhubaneswar

Total Erythrocytapheresis procedure till date(16 04.2024)– 34

Manual exchange procedures - 15

FOR COMPARISON

Manual RBC Exchange		Automated RBC Exchange
Avg.	Pre HbS: 64.4	Pre HbS: 70.7%
Avg.	Post HbS: 47.5	Post HbS: 28.7%

Except one patient who developed alloimmunisation at the time of procedure, not a single patient out of followed of, developed any alloantibody formation post 1 year follow up.

Except two patients (one patient with SCD with RAO, one patient with SCD with crisis), erythrocytapheresis procedure done for all patients preoperatively achieving a target of post procedure HbS value less than 30%.

BACTERIAL CONTAMINATION IN PLATELET CONCENTRATES

Dr R B Sawant
Consultant-Transfusion Medicine, Histocompatibility and Immunogenetics Kokilaben Dhirubhai Ambani Hospital, Mumbai
Email: sawantrb72@rediffmail.com, rbshil@gmail.com Mobile : 9223448570

Despite improvements in transfusion safety during the last two decades, bacterial contamination of platelets remains a significant cause of transfusion-associated morbidity and mortality (1,2,3). Bacteria very rarely survive in whole blood stored at 4°C. Post-transfusion Yersinia enterocolitica toxemia has been reported after transfusion of red cells. In contrast, platelets are stored at room temperature on an agitator and are a potential source of bacterial contamination, which can result in transfusion-related sepsis. Bacterial contamination of platelets has been estimated to occur with a frequency of 1:2,000 – 1:3,000 platelet units with clinical sepsis occurring in 5-10% of patients receiving a bacterially contaminated platelet unit (4,5).

Gram-positive bacteria (e.g., Staphylococcus spp.) found on skin are the most frequent contaminants of platelet units. Although less commonly recognized as contaminants, gram- negative bacteria (e.g., Serratia, Enterobacter, or Salmonella spp.) account for more severe and often fatal infections and are attributed to donor bacteremia or contamination during product processing (6). Although the concentration of bacteria required to cause clinically significant reactions varies depending on the microorganism, endotoxin production, clinical condition of the recipient, and other factors, it is known that as few as 102 to 103 CFU/mL have been associated with fever and positive blood cultures.

Bacterial contamination of the blood component often is not considered in the differential diagnosis at the time of transfusion reaction because signs and symptoms (e.g., fever, rigors, or change in blood pressure) are similar to those expected from sepsis due to other causes (7).

Platelets are essential for management of thrombocytopenia in patients and their availability is limited by their short shelf life which is predominantly due to the potential possibility of bacterial contamination.

In an oncology setup many of the patients are immunosuppressed as well as thrombocytopenic, the number of platelet transfusion received per patient are almost 5-6 time greater than those received by other non oncology-patients & transfusion of contaminated platelet units may prove fatal to these patients.

Based on recognition of this issue, the blood industry has taken steps to improve control of bacterial contamination at multiple steps during blood collection and processing. Dealing effectively with this problem will involve continued and enhanced education of phlebotomy, technical, nursing, and medical staff with regard to sources of contamination and the importance of the problem. Using approved products and procedures, blood collection centers can implement practices that may decrease bacterial contamination, including better skin disinfection, collection of blood with a diversion pouch set, testing for bacteria, and, potentially, the use of safe and effective pathogen reduction technologies if and when available. Promising technologies for bacterial detection like the Pall e BDS and the Bact T alert system appear to be offering a significant potential to screen out contaminated units.

Culturing individual platelet units derived from whole blood imposes serious additional difficulties. The volume needed for the culture to capture contaminating bacteria will remove a significant portion of the small volume in a unit of platelets from whole blood, thereby reducing its clinical efficacy. Furthermore, the sheer number of cultures to be performed may overwhelm the technical capabilities and financial resources of the transfusion system. We need to address this issue, and also need a practical way of doing so. Finally, the addition of bacterial detection systems will necessitate some delay in release of platelets, which may ultimately result in a higher frequency of outdates and wastage. Given that platelets are already in short supply in some areas of our country, a further decrease will worsen these shortages unless the storage period is increased to at least seven days.

Currently there is no uniform approach to deal with bacterial contamination of platelet units in

our country. The only check performed on every platelet unit prior to its issue is visual inspection for any abnormal appearance and swirling phenomenon. Also health-care providers need to be made aware of bacterial contamination as a potential cause of transfusion reaction so that they can diagnose this adverse reaction, treat patients appropriately, and evaluate interventions that might prevent additional transmissions. If bacterial contamination of a component is suspected, the transfusion should be stopped immediately, the unit should be saved for further testing, and blood cultures should be obtained from the recipient. Bacterial isolates from cultures of the recipient and unit should be saved for further investigation.

Challenges for the future:

- To standardize the approach for ensuring bacterial safety of platelet transfusions for our thrombocytopenic patients.
- Whether a simpler approach like pH measurement can serve as a sensitive marker for bacterial contamination of platelets, also needs to be evaluated. This may not only ensure safety of the transfused product but also save cost of the bacterial culture.
- A further study for the feasibility of extension of platelet shelf life to 7 days needs to be done in the future. This shall have far reaching implications in terms of availability of this ever in-demand component for an extended period and thus benefit the society as well.

References:

1) Blajchman MA. Reducing the risk of bacterial contamination of cellular blood components. Dev Biol Stand. 2000;102:183-93.
2) AuBuchon JP, Birkmeyer JD, Busch MP. Safety of the blood supply in the United States: opportunities and controversies. Ann Intern Med. 1997 Nov 15;127(10):904-9.
3) Zaza S, Tokars JI, Yomtovian R, Hirschler NV, Jacobs MR, Lazarus HM, Goodnough LT, Bland LA, Arduino MJ, Jarvis WR. Bacterial contamination of platelets at a university hospital: increased identification due to intensified surveillance. Infect Control Hosp Epidemiol. 1994 Feb;15(2):82-7.
4) Illert WE, Sanger W, Weise W. Bacterial contamination of single-donor blood components. Transfus Med. 1995 Mar;5(1):57-61.
5) Kuchnert MJ et al. Transfusion-transmitted bacterial infection in the United States, 1998 through 2000. Transfusion 2001;41:1493-9.
6) Ness P et al. Single-donor platelets reduce the risk of septic platelet transfusion reactions. Transfusion 2001;41:857-61.
7) Kleinman S et al. Risks associated with transfusion of cellular blood components in Canada. Transfus Med Rev 2003;17:120-62.

THERAPEUTIC APHERESIS IN PAEDIATRIC PATIENTS

Dr. Rekha Hans
Additional Professor Transfusion Medicine, PGIMER,Chandigarh

Therapeutic plasma exchange (TPE) in pediatric age group is technically demanding because of low blood volume, difficult venous access, and poor cooperation of the patient during the procedure.

Special considerations in the application of the therapeutic procedure to pediatric patients [1]

To ensure the safe and effective treatment of pediatric patients, careful attention should be paid to four areas: technical/procedural, vascular access, anticoagulation, and psychosocial aspects.

Technical or procedural consideration

The technical principles of apheresis are the same in children as in adults; however, available apheresis equipments are generally designed for adults rather than infants and young children. To perform pediatric procedures safely, one must be familiar with the physical characteristics of apheresis instruments including Extracorporeal blood volume (ECV), patient's clinical condition, and Total blood volume (TBV). ECV varies depending on the type of equipment and even with the same equipment, may depend on the type of procedure. For example, intermittent-flow cell instruments have significantly large ECV than continuous-flow cell instruments for therapeutic plasma exchange.

Regardless of the type of instrument, the ECV will represent a larger fraction of TBV in a child than an adult, thus resulting in a greater blood volume shift in children [2]. To estimate the degree of volume shift, the TBV of the child should also be estimated. TBV varies with body composition and with other clinical factors. TBV can be calculated by multiplying an age- based estimate of blood volume in mL/kg by the patient's weight in kg. Estimated TBVs for different age groups are as follows: the TBV of a child more than 3 months old is 65-75 mL/kg; the TBV is larger in infants younger than 3 months old, ranging from approximately 80 to 100 mL/kg; and in adult males it may be estimated as 75 to 80 mL/kg [2].

Simple formulae for estimation of plasma volume (PV) and Red Cell Volume (RCV) are shown below, with haematocrit (Hct) expressed as a decimal fraction:

$$PV = TBV \times (1\text{-}Hct) \text{ or } TBV\text{-}RCV$$

$$RCV = TBV \times Hct \text{ or } TBV - PV$$

Extracorporeal blood volume

Extracorporeal volume (ECV) is the amount of cells and plasma that is required to displace the saline used for priming the lines. The manufacturers usually provide this and are fixed for the cell separator. This is quite critical in pediatric patients, especially those weighing less than 25 kg as their capacity to tolerate, volume shifts due to extra-corporeal volume deficit is very less [2]. Thus, automated apheresis equipment with low ECV is always preferred. The RBC extracorporeal volume is the RBC volume required to fill the bowl or channel and all the tubings and is directly related to the patient's hematocrit. It varies depending on the system (continuous or intermittent flow), type of procedure, and ancillary equipment such as a blood warmer or single needle device. Before planning therapeutic apheresis in children, ECV of cell separator should be considered as it represents a larger fraction of TBV of children and is responsible for major volume shifts. In children ECV should not exceed 15% of TBV, if so, priming saline may be infused into the patient without diverting. The children who have low hematocrit levels (less than 20%), red cell priming may be considered to prevent a sudden hypoxic state due to a decline in intravascular hematocrit [2].

Management of extracorporeal volume

ECV and Red cell extracorporeal volume should not exceed 15% and preferably not more than 10% in children.

If ECV is 15 to 20% but extracorporeal RBC volume is less than 15%, a saline bolus or colloid prime may be sufficient to prevent hypotension due to intravascular hypovolemia. However, if ECV is less than 15% and the expected extracorporeal RBC volume is more than 15%, or the patient with an underlying cardiac or pulmonary problem, priming of the extracorporeal circuit with RBCs should be considered and the patient should be monitored for a sign of hypoxia.

Intraprocedural hematocrit can be calculated as:

(Initial RBC volume - Extracorporeal RBC volume) x100

Total blood volume

It should be ≥ 24% in an asymptomatic patient [2].

Replacement fluid [3]

In the therapeutic plasmapheresis (plasma exchange) procedure, a large volume of the patient's plasma is retained, and it has to be replaced with fluids to maintain adequate intravascular volume and oncotic pressure during and post-procedure. Albumin (5%) with normal saline is generally preferred as a replacement fluid. Five percent albumin is slightly hyper-oncotic and can be diluted with saline to a concentration of 4.0-4.5% for plasma exchange. Fresh Frozen Plasma (FFP) contains all the constituents of the removed plasma and is an optimal replacement fluid. FFP has the disadvantage that it may transmit transfusion-transmitted diseases and can cause allergic reactions, ABO incompatibility, or sensitization to plasma proteins. It is the fluid of choice only when it is desired to replace clotting factors or to give some specific plasma protein. FFP is recommended in plasma exchange in patients with thrombotic thrombocytopenia (TTP) or hemolytic urinary syndrome (HUS) [4].

Calcium supplementation can reduce the chances of hypocalcemia. So, the addition of 10% calcium gluconate (10 ml per liter of return fluid i.e., 1% infusion) should be considered in TPE [5,6].

Vascular access

Apheresis procedures require high blood flow rates which can be achieved by peripheral venous access using one or two large bore needles (16 to 18 gauge) in adults. However, in children, central catheters are needed. A central venous catheter (CVC) should be inserted in subclavian, internal jugular or femoral vein [7]. Internal jugular and subclavian catheter insertions carry increased risk of pneumothorax, haemothorax and air embolism whereas femoral catheterization require less specialized skills and is relatively safe. However, there is increased risk of infection and thrombosis with femoral catheters. Central catheters should be rigid so that they should not collapse under negative pressure exerted by cell separators during withdrawal or during inspiration. These catheters need proper care and maintenance in the form of regular dressing, inspection of catheter site for redness, swelling and other signs of sepsis. Thrombosis in CVC is an issue that must be addressed as many times as possible therapeutic procedure get delayed due to CVC occlusion. A CVC should be flushed with heparinised saline having heparin in concentration of 100 units/ml to 5000 units/ml or with heplock flush having heparin in the concentration of 10 units/ ml however if the heparin concentration in the flush increases to 1000 units/ ml before use, heparin should be removed from the catheter. Alteplase was proven safe and effective in adults as well as children, with catheter clearance rates of 85- 95% and no major haemorrhagic complications [8,9,10].

Anticoagulants

Citrate, heparin, or combination of both is used during apheresis to prevent coagulation in the extracorporeal circuit. Citrate prevents coagulation by binding ionised calcium which is required in coagulation cascade. Citrate is metabolised by liver, if liver functions are deranged or if citrate infusion exceeds its metabolic rate, transient hypocalcaemia may occur which may present as mild parasthesias (perioral, distal extremities), gastrointestinal symptoms, hypotension or in most extreme cases, cardiac dysrhythmias can occur. Risk of citrate toxicity is more in patients where FFP is used as replacement fluid as it has four times more citrate than in 5% albumin. Citrate is available in three forms- ACD-A with concentration of citrate as 113 mmol/l, ACD-B with citrate concentration of sixty-eight mmol/l and concentrate of Trisodium citrate having citrate as 136 mmol/l. ACD-A is commonly used [11].

Heparin results in systemic anticoagulation. When used alone, can cause platelet aggregation during cytapheresis procedures. Heparin is required less, when used in combination with citrate as in LDL apheresis and large volume procedures like peripheral blood stem collection.

Psychosocial Aspects

Child needs to be made comfortable during the procedure. This needs use of distraction, involvement of child life specialists-Familiar home objects from home, Parental/familial involvement-Lower parental anxiety. Also, teach the child signs of possible reaction and when to call the nurse (i.e., "I feel funny", "I feel cold", etc.).

To summarise, TPE is well tolerated in paediatric patients with current generation of equipments but require meticulous volume calculations prior to procedure and close observation during the apheresis procedure due to rapid shifts in their small intravascular volumes.

References

1. Kim HC. Therapeutic apheresis in pediatric patients. In: McLeod BC,Weinstein R, Winters JL, Szczepiorkowski ZM, editors. Apheresis principles and practice. third ed. AABB press; 2010. p. 446-57.
2. Vishesh Chhibber MD, King Karen E. MD. Management of the therapeutic apheresis patient. In: McLeod BC, Weinstein R, Winters JL, Szczepiorkowski ZM, editors. Apheresis principles and practice. third ed. AABB press; 2010. P229-49.
3. Chopek M, McCullough J. Protein and biochemical changes during plasma exchange. In: Berkman EM, Umlas J, editors. Therapeutic hemapheresis. Washington, DC: AABB; 1980. p. 13-52.
4. Scott EA, Puca KE, Pietz BC, Duchateau BK, Friedman KD. Comparison and stability of ADAMTS13 activity in therapeutic plasma products. Transfusion 2007;47:120-5.
5. Weinstein R. Prevention of citrate reactions during TPE by constant infusion of calcium gluconate with the return fluid. J Clin Apher 1996;11:204-10.
6. Couriel D, Weinstein R. Complications of therapeutic plasma exchange: a recent assessment. J Clin Apher 1994;9:1-5.
7. Bambauer R, Latza R. Complications in largebore catheters for extracorporeal detoxification methods. Artif Organs 2004;28:629-33.
8. Chesler L, Feusner JH. Use of tissue plasminogen activator (rt-PA) in young children with cancer and dysfunctional central venous catheters. J Pediatr Hematol Oncol 2002;24:653-6.
9. Jacobs BR, Haygood M, Hingl J. Recombinant tissue plasminogen activator in the treatment of central venous catheter occlusion in children. J Pediatr 2001;139:593-6.
10. Shen V, Li X, Murdock M, Resnansky L, McCluskey ER, Semba CP. Recombinant tissue plasminogen activator (alteplase) for restoration of function to occluded central venous catheters in pediatric patients. J Pediatr Hematol Oncol 2003;25:38-45.
11. Brecher ME, Jones HG, Randels MJ, Bandarenko NA. Practical and technical issues and adverse reactions in therapeutic apheresis. In: Hillyer, Silberstein, Ness, Anderson, editor. Blood banking and transfusion medicine Basic principle and practice. 1sted. Churchill Livingstone; 2003. p509-17.

PATHOGEN REDUCTION IN BLOOD TRANSFUSION SERVICES

Dr Tulika Chandra
Professor and Head, Department of Transfusion medicine
King George Medical University, Lucknow, Uttar Pradesh

The safety of blood transfusion is still evolving and threatened by infections with various pathogens like virus, bacteria, parasite etc.There are numerous variety of known pathogens and emerging pathogens which are not feasible to test for each and every organism. A novel pathogen reduction technique known as Mirasol pathogen reduction inactivates all these infections. 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. The advantages are

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

The Mirasol PRT system inactivates pathogens by altering their nucleic acids in two primary ways

1. UV light only: reversible inactivation
    - UV light alone breaks chemical bonds in the nucleic acids of pathogens.
2. 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 alteration to nucleic acids, making pathogens unable to replicate.

Platelets have a high risk of bacterial contamination. The strategies to protect platelet products from bacteria

- Special care in arm disinfection prior to collection
- Blood diversion during collection
- Bacterial detection
- Pathogen reduction

Bacterial contamination of platelet products is one of the largest threats to blood safety and estimated to be around 1:3,000. The initial bacteria contamination titer in blood product is very low, less than 62 cfu/unit which represents 1.7 log. Therefore there is only a need to protect the blood supply from low bacteria titer. The AABB has recognized PRT as the most definitive mitigation approach to protect the blood supply from bacteria contamination.

Bacteria contamination in Switzerland that caused the death of one child led to nationwide PRT implementation. Bacterial culture is the current standard to protect platelet products from bacteria. However, the effectiveness of such technology is not comprehensive. The Mirasol system offers a much higher protection level than bacterial culture (98 percent versus 66 percent effectiveness). It is important not to talk about log reduction for bacteria

Testing is particularly effective at detecting high titer viruses during the viremia. PRT offers further protection for the lower titer, therefore reducing the window period. Despite implementation of NAT, transmission of pathogens still occurs due to the window period.

Blood centers are already very well protected for the top three viruses (HIV, HBV, HCV). The residual risk comes from the window period that the Mirasol system further closes. More than 70 percent of the investigated emerging/untested pathogens are reduced at the limit of detection (LOD). Unlike other PRTs, the Mirasol system is also effective at reducing the load of non-enveloped viruses (HEV, HAV, Human B19 model).

Global travel and climate change threaten the blood supply for emerging and untested pathogens.There are 4 times more travelers transiting through Oslo Airport than there are inhabitants in Norway (22 million versus 5 million).In Switzerland (8 million inhabitants) there are 44 million people transiting through Swiss airports (5.5 times more than the number of inhabitants).A single person from India who traveled to Italy was able to trigger the infection of >200 people in a geography than was untouched by that particular pathogen.

The first safety layers discussed on the slide are selective measures that were put in place to protect the blood supply from known threats and, as such, were more reactive measures. PRT is a more comprehensive measure that targets unknown as well as current and existing threats.

Riboflavin is present in a lot of food nutrients in concentration similar to the one present in a Mirasol-treated blood product. The daily recommended intake of riboflavin is in the same order of magnitude as one Mirasol-treated blood product. Riboflavin is water-soluble and rapidly excreted in urine; consequently, a minimal amount is stored in the body. Riboflavin and its photoproducts are naturally present in normal blood. Phototherapy supplemented with riboflavin helps to treat neonates for jaundice. The photochemistry taking place during this treatment is similar to the one used in the Mirasol technology. A retrospective study showed no increase incidence of cancer for more than 55,000 patients up to 14 years of age who received this treatment.

The Mirasol system in combination with leukoreduction can be used as an alternative to leukoreduction. The Mirasol system can be used as an alternative to bacterial detection, further closes the window period for tested pathogens and offers a wide protection against emerging/untested pathogens as it reduces the pathogen load to the limit of detection for more than 70 percent of the investigated agents. Following stimulation with LPS or anti- CD3/CD28, only Mirasol-treated WBCs are unable to produce cytokines. Even gamma irradiated cells do produce cytokines. Mirasol system treatment prevents the production of cytokines by WBCs, which might be beneficial for the patient and may prevent FNHTR. We do not have any evidence in humans yet to show that Mirasol system treatment prevents FNHTR. Mirasol system treatment offers better performances than the current standards to protect from residual WBCs. Indeed, it inactivates WBCs, prevents the production of cytokines, prevents TA-GVHD and alloimmunization in animal studies.

Department of Transfusion medicine , King George Medical university is the first to start pathogen reduction technology in Asia and have performed the procedure on more than 400 platelets and plasma.

MASSIVE TRANSFUSION PROTOCOL IN LIVER TRANSPLANTATION

Dr Chitra James,
Assistant Professor , Transfusion Medicine , GMC Kottayam

Massive Hemorrhage and Transfusion are associated with increased morbidity and mortality in liver transplantation setting. Understanding the unique epidemiology of hemorrhage during liver transplant is crucial in management of the same. There is an interplay of portal hypertension, coagulopathy of liver disease and phases of the transplantation which causes hemorrhage in Liver transplantation.

Though observational studies have demonstrated association between blood loss, transfusion requirements and mortality and morbidity outcomes, causality of the same is not established. Various prediction models for the cases requiring massive transfusion have been proposed. Preoperative risk factors, Hemoglobin , Platelet count, INR , fibrinogen levels, ascites, Child Turcot Pugh (CTP) score, MELD score etc have been integrated into various prediction models for massive blood transfusion like

Mc Clusky risk index, risk prediction model by Cywinski et al etc .Surgical factors like veno -venous bypass has been found to be an independent predictor of increased blood loss.

Management of massive hemorrhage during transplant needs to be customized as per the epidemiological factors contributing to the same for each patient. In the event of uncontrolled bleeding ratio based transfusion packages are initiated and converting to viscoelastic test guided goal based resuscitation once the bleeding is slowed down. Intraoperative fluid management is crucial and maintenance of a low Central venous Pressure (CVP) is to be balanced against adequate tissue perfusion. Use of vasopressins, restrictive transfusion thresholds, coagulation monitoring using viscoelastic assays and cell salvage play a crucial role in management of bleeding.

A concerted effort in identification of patients at risk for massive blood loss, point of care evaluation of hemorrhage and cost effective blood conservation strategies tailor made for each patient is the need of the hour.

INNOVATIONS FOR SUSTAINABLE MODEL OF BLOOD TRANSFUSION SERVICE

Dr Nittin Henry ACTM, MD (IH&BT)
Sr Consultant, Head; MVR Blood Centre; MVR Blood Transfusion Service Network; Department of Transfusion Medicine and Cellular Therapy; MVR Cancer Centre and Research Institute, Kozhikode, Kerala-673601

Sustainability is the ability to maintain or support a process continuously over time. The 3 core concepts are economic, environmental and social. Investing world calls it ESG; environmental, social and governance. There are major gaps in the existing state of Blood Transfusion Services. Though India and China evolved similarly, the last 20 years saw them taking diverse path with respect to BTS. In India, Kerala being the state topping in NITI Ayog Health Index 19-20, was shown to be wanting with respect to BTS in a 2018 WHO funded analysis of the Blood Transfusion Services. MVR Blood Transfusion Service Network attempts to address these issues, focusing on the core concepts of sustainability.

To aim for a holistic sustainability model, believing that the efforts to perfect the Hospital focussed Blood Transfusion Services stays challenged, if we disregard the less endowed health facilities around us. Blood Collection by non-licensed hospitals are a common practice in the hinterlands. An attempt to meet this objective through Centralisation of Blood Transfusion Services, currently spread over the districts of Malappuram and Kozhikode. Considering global warming, 1 PRBC unit is equivalent 7.2 kg CO2e, same as driving 38km in a petrol passenger car. Environmental impact can be addressed by supply chain management, planned logistics, lean management of blood centre operation, energy efficient equipments, reduced wastage, reusability and alternative waste management (discontinuing incineration). Economic efficiency can be attained by rational pricing policies, operational leverage, inventory management, working capital management and value addition. Social responsibility can be fulfilled by addressing the requirements of smaller centres in the vicinity, making it easier for them to onboard with you and stay attached, address the staff requirements for additional efforts, provision of additional services to the hospitals who cannot afford to post trained TM specialists and handhold them in quality journey. Governance can be improved by dispersion of decision making, empowerment of staff, risk management and opportunity assessment.

A price rationalisation can help us to onboard the facilities of data mining, Internet Of Things, machine learning and Artificial Intelligence in all the above-mentioned practices. Changes like permission for issuing of blood from storage centres to other health care centres, separate existence of permanent blood collection areas from processing ad testing facilities and removal of ownership and association restrictions can help us in taking this service a step further. This is a journey where perfection is a few feet away, when we reach each milestone.

NEWER PROSPECTS OF VISCOELASTIC TESTING FOR CLINICAL APPLICATIONS

Dr Aboobacker Mohamed Rafi
Associate Professor, Immunohematology & Blood Transfusion
Jubilee Mission Medical College & Research Institute, Thrissur, Kerala

Viscoelastic testing, including thromboelastography (TEG) and rotational thromboelastometry (ROTEM), significantly advances hemostasis assessment in diverse clinical settings. This abstract highlight recent developments and applications of viscoelastic testing, emphasizing its transformative potential in perioperative care, trauma management, and monitoring coagulopathies, including hemophilia.

Viscoelastic tests offer a dynamic and comprehensive evaluation of clot formation and dissolution, surpassing traditional coagulation assays. Innovations include enhanced assay sensitivity, platelet function analysis, and real-time data integration into clinical decision-making, facilitating precise interventions and improving patient outcomes.

In perioperative care, viscoelastic testing guides transfusion strategies, minimizes blood product use, and reduces bleeding and thrombosis complications. In trauma care, rapid assessment identifies coagulopathies early, enabling targeted interventions. For congenital and acquired bleeding disorders, viscoelastic testing tailors' treatment by identifying specific hemostatic defects.

Emerging applications in critical care include managing sepsis-induced coagulopathy and monitoring anticoagulant therapy. Its expanding role in personalized medicine optimizes anticoagulant and antiplatelet therapies based on individual profiles. Viscoelastic testing is also valuable in managing obstetric hemorrhage, assessing hypercoagulable states, diagnosing coagulopathies associated with direct oral anticoagulants (DOACs), and monitoring anticoagulation in patients on extracorporeal membrane oxygenation (ECMO) and ventricular assist devices (VADs).

TEG is used to monitor the hemostatic effects of platelet transfusion and assess the quality of blood components, although its integration into blood banking will require time.

In conclusion, viscoelastic testing leads hemostatic assessment, with ongoing research and advancements enhancing its clinical utility, promising improved patient care across medical disciplines.

References

1. Hartmann J, Hermelin D, Levy JH. Viscoelastic testing: an illustrated review of technology and clinical applications. Research and practice in thrombosis and haemostasis. 2023 Jan 1;7(1):100031.
2. Ramiz S, Hartmann J, Young G, Escobar MA, Chitlur M. Clinical utility of viscoelastic testing (TEG and ROTEM analyzers) in the management of old and new therapies for hemophilia. American Journal of Hematology. 2019 Feb;94(2):249-56.
3. Shen L, Tabaie S, Ivascu N. Viscoelastic testing inside and beyond the operating room. Journal of thoracic disease. 2017 Apr;9(Suppl 4):S299.
4. Verma A. Thromboelastography as a novel viscoelastic method for hemostasis monitoring: its methodology, applications, and constraints. Global Journal of Transfusion Medicine. 2017 Jan 1;2(1):8-18.

ABSTRACTS

EFFECT OF ANTI-D TITRE ON IUT INTERVAL AND HDFN SEVERITY IN ALLOIMMUNISED PREGNANT WOMEN

Topic: Immuno-haematology
Author: Ajay Joseph, Co-authors: Vasundhara Singh, Aparupa Sengupta, Prashant Agarwal, Dheeraj Khetan, Institution: Sanjay Gandhi Post Graduate Institute, Lucknow

Introduction:

Anti-D alloimmunisation is the leading cause of fetal anemia and Hemolytic Disease of Fetus and Newborn (HDFN). Intra-Uterine Transfusions (IUT) is often required for the management of such pregnancies. Anti-D titre is a useful indicator in determining the need for serial ultrasounds forfurther monitoring as well as HDFN severity. Its association with IUT intervals has not been widely studied.

Aims:

Assessing the effect of Anti-D titre values on IUT intervals and HDFN severity.

Methods:

This was a single centre retrospective observational study including pregnant women undergoing IUT secondary to Anti-D alloimmunisation over the course of 4 years (2016 2019). Cases with in complete data or where delivery was not done at our institute were excluded. Anti-D titres were performed in doubling dilution by conventional tube technique (CTT) and a titre of ?16 was considered critical for Middle Cerebral Artery Peak Systolic Velocity (MCA-PSV). Based on their clinical severity at first visit, fetuses were classified into two categories - fetus with anemia only (Hematocrit <30%) and fetus with hydrops (sonographic presence of 2 or more abnormal fluid collections in the fetus). IUTs were done with fetal MCA-PSV >1.5 MoM (Multiples of Median). IUT intervals were assessed as mean inter-IUT intervals (in days) and interval between 1st IUT and delivery. Qualitative analysis was done using SPSS.

Results:

Out of 139 pregnant women who underwent IUTs, 33 were excluded due to missing data. 106 patients with 337 IUTs were included in the study. Higher Anti-D titres (16-32 and ?64) were foundto be associated more severe HDFN (presence of hydrops in the fetuses) as compared to a titre of ?8 (*p value*<0.0001). High titres were also found to be associated with a longer interval between 1st IUT and delivery (Mean 44.44 ± 30.1 days in group with titres of 16-32 and 57.31 ± 29.4 days in ?64 titres group compared to 26.08 ± 12.7 days in group with titre ?8, *p value* 0.002). However Anti-D titres were not having any significant effects on the inter-IUT interval (Mean 17.91 ± 7.8 days in group with titres 16-32 and 16.78 ± 8.8 days in 64 titre groups compared to 16.39 ± 2.8 days in group with titre 8, *p value* 0.885).

Conclusion:

Higher Anti-D titres were found to be associated with higher morbidity and increased interval from 1st IUT to delivery. This indicates that IUT need to be started earlier in pregnancies in cases with a higher anti-D titre as it affects fetus at a younger age.

ANALYSIS OF ABO BLOOD GROUP DISCREPANCIES IN DONORS

Topic: Immuno-haematology
Author: Angad Gill
Co-authors: Paramjit Kaur, Ravneet Kaur, Kshitija Mittal, Gagandeep Kaur
Institution: Government Medical College And Hospital, Chandigarh

TITLE: Analysis of ABO Blood Group Discrepancies in Donors

INTRODUCTION: ABO discrepancies arise due to mismatch between cell grouping and serum grouping results. Accurate ABO and Rh typing in blood donors and patients is essential for the safe and timely issue of blood components to patients.

AIM: To determine the frequency and causes of ABO discrepancies in whole blood donors.

MATERIALS AND METHODS: This retrospective study was conducted over a period of eight months (September 2023- April 2024). As per protocol, blood grouping of all donor samples is performed on fully automated immunohematology analyzer. All samples showing discordant results between the cell and serum grouping are further tested using conventional tube technique and detailed history of the donor is also elicited. Adsorption elution and saliva studies are performed wherever appropriate and results are documented.

Records of all ABO discrepancies in whole blood donors were retrieved from blood group discrepancy register and analyzed.

RESULTS: During the study period, 15016 donor samples were tested of which 20 (0.13%) samples showed discordant results. The mean age of donors was 32+/- 10 years which included 19 (95%) males and 1 (5%) female donor. The majority of discrepancies were seen in red cell grouping. The most common blood group involved was A (n=12; 60%). The discrepancies were further classified. Type II discrepancy due to weak or missing antigen was most common (n=11; 55%) which included weak subgroups of A (n=8; 40%) and B (n=3; 15%). In one such regular whole blood donor previously known to have O Rh D Positive blood group, serum grouping showed negative results with B cells at room temperature and 1+ reaction at 4 degree C. Direct and Indirect antiglobulin test (DAT and IAT) were negative. Subsequently, adsorption elution studies were conducted in which polyclonal anti B antiserum was adsorbed on donor's red cells. The eluate along with supernatant was tested on plain gel cards and on tube with A1, B and O cells. The eluate revealed a 2+reaction with B cells signifying a weak subgroup of B. The donor was contacted and secretor studies were conducted on his saliva sample. The donor was found to be a secretor of B substance. A special immune-hematology card was issued to the donor labelling him as B Rh D Positive as a donor and counselled to receive O Rh D Positive PRBC and AB plasma / platelets as recipient. Type IV discrepancy due to irregular antibodies was seen in two donors. The antibodies identified in these samples were Anti-D in one female donor and Anti-P1 in one male donor. The female donor had Ab Rh D negative as her blood group and had previous history of receiving Anti-D in her last pregnancy.

CONCLUSION: All cases of blood group discrepancies should be carefully investigated to determine the cause and to ensure that the blood donor is accurately typed. Blood donor should be informed of the results of the investigation and of any implications for their future donation of blood.

HARNESSING THE POTENTIAL OF C AND e ANTIGEN NEGATIVE BLOOD DONORS:- A DATABASE INITIATIVE FOR THALASSEMIA CARE

Topic: Immuno-haematology
Author: Akarshan Gupta
Co-authors: Pandeep Kaur, Davood Bava, Amit Kumar Chatterjee, Amit Kumar
Institution: NIMS Jaipur, Rajasthan

Introduction:- Thalassemia major affects the largest number of children in the Indian population (1-1.5 lakhs). Increasing life expectancy and prevalence of thalassemia have led to a greater need for safe blood, yet the current supply from voluntary donors is insufficient to meet this demand. Thalassemic recipients face a significant risk of alloimmunization because of repeated exposure to foreign red cell antigens. Among Rh antigens, prevalence of the C-antigen (81-87%) and e-antigen (98-100%) is higher among the Indian population, thereby creating a significant challenge in identifying donors for patients who have developed antibodies against these antigens.

Aim & Objectives:-

- To calculate the prevalence of C and e-antigen negative donors in study population
- To determine what percentage of these donors are willing to become dedicated voluntary donors for thalassemia patients
- To examine factors influencing their willingness and challenges in mobilizing dedicated donors

Method:- 700 whole blood donors, following screening for inclusion & exclusion criteria as per DCA 2020 amendment guidelines & were seronegative for transfusion transmitted infections were enrolled for the study. Red cell phenotyping was performed using Conventional Tube Technique (CTT) for "D", "C", "E", "c", "e" and "K" antigen using known antisera. Donors that were "C" & "e" antigen negative were contacted telephonically and were counseled and motivated for becoming voluntary blood donors. Factors determining the willingness to become dedicated voluntary donors were analysed.

Result:- Among 700 donors, 96.6% (n=676) were males and 3.4% (n=24) were females. The most predominant blood group was B > O > A > AB. Rh(D) antigen was present in 91.44% (n = 640) and absent in 8.6% (n=60). Prevalence of other Rh antigens is as follows: "e" (98.9%) > "C" (85.3%) > "c" (59.1%) > "E" (18.0%). Only 0.6% had "K" antigen positive. The commonest Rh phenotype R1R1 (DCe/DCe) was expressed by 40.4% (n=283), and the least common r"r (cE/ce) and r'r' (Ce/Ce) was found in 0.14% (n=1), respectively. C and e-antigen negative donors constituted 14.8% (n = 104) with 92.3% (n=96) C-antigen negative, 1.92% (n=2) e-antigen negative and 5.76% (n=6) both "C" and "e" antigen negative donors. The commonest phenotypes among C-antigen and e-antigen negative donors were ccee (48.5%) and DCcEE respectively. Likewise, the most common phenotype amongst both C- and e-antigens negative donors was DccEE(66.6%) > ccEE(33.3%). 61.5% of the donors agreed to enroll for voluntary blood donation following telephonic invitation, while 5.7% of them refused permanently. Approximately, 4.8% of the blood donors were willing to donate blood only when neededand 27.8% of them could not be contacted.

Conclusion:- Creating a database of voluntary donors with known phenotype, especially who lack very common antigens like "C" and "e" and are willing to become dedicated, regular voluntary donors for thalassemic patients can ensure timely administration of safe blood. One of the major challenges for this noble initiative was lack of awareness which can be circumvent effectively with proper counseling efforts.

ANTENATAL MATERNAL INDIRECT ANTIGLOBULIN TITERS(IAT) TITRE AND FETAL OUTCOME IN RH NEGATIVE PREGNANCIES

Topic: Immuno-haematology
Author: Ananya C Y
Institution: St. Johns Medical College and Hospital,Bangalore

INTRODUCTION: Rh isoimmunisation poses a significant concern in obstetrics, particularly in Rh-negative pregnancies, where maternal alloimmunisation against fetal Rh-positive antigens can lead to adverse outcomes. This study investigates the correlation between antenatal maternal serum IAT titres and fetal well-being in Rh-negative pregnancies.

AIMS & OBJECTIVES: To assess the incidence of Hemolytic disease of new born (HDN) in Rh negative pregnancies.To correlate maternal IAT Titres with neonatal outcome.

METHODS: This was a retrospective study conducted at our institute between 01/01/2023 to 31/12/2023. The study included all pregnant women with Rh-negative blood type who came for antenatal management during thestudy period and delivered. The data collected included; Maternal details from antenatal records, including maternal demographics, blood type, Rh status, IAT titres, obstetric history, and any relevant medical comorbidities.

Neonatal details including gestational age, birth weight, presence of neonatal jaundice, neonatal bilirubin levels, ABO and Rh blood type, Direct Coombs test results, need for phototherapy / exchange transfusion.

Cases with Total bilirubin >3.1mg/dL and Hb <11 g/dL were considered as HDN.

RESULTS: During the study period, IAT was done in 129 mothers with Rh negative blood group. Among them 15 were IAT positive. 1 case was lost to follow up. IAT Titre was done in 10 cases. Of these, 3(30%) cases had titres of Direct (undiluted serum), 1(10%) case had titre of 2, 3(30%) cases had titre of 4,in 1(30%) case each with titres of 8, 64 and 128. All cases received Anti D (During Antenatal period).

Neonates of these 14 IAT Positive mothers were followed up. 13 neonates were born with term gestation and 1died at 23 weeks of gestation because of Abruptio placenta. Most common blood group of neonates was O positive (n=7, 50%) 1 with O negative group with elder O positive sibling was also observed.

Among them Total bilirubin (TB) level of 7 neonates were normal and did not require phototherapy (Mean TB was 2.49 mg/dl).

Incidence of HDN in Rh negative mothers was 4.6%. In these cases, TB levels was increased (n=6) with mean TB: 4.6 mg/dl (Range 1.58mg/dl -11.58 mg/dl).This amounted to 42.8% of neonates, among the IATpositive pregnancies.

4 cases required phototherapy, of these cases the mean TB was 6.19mg/dL, corresponding maternal IAT titres were direct, 4, 8, 64. 2 underwent exchange transfusion, in whom the mean TB 6.35mg/dL , the maternal IAT titres was 128 , assessed 1 case.

CONCLUSION:

- HDN in Rh negative mothers is well known consequence though occurrence was 4.6% in the present study, probably attributed effective antenatal management.
- The titre of IAT varied from Direct to 128 in neonates with HDN. A case of neonatal HDN which required exchange transfusion had high IAT titre.

KEY WORDS : Rh negative pregnancy, IAT, Titre ,Neonatal outcome.

SEROLOGICAL CHARACTERIZATION OF DIRECT ANTIGLOBULIN TEST POSITIVE CASES IN ASSESSING THE SEVERITY OF IN VIVO HEMOLYSIS AT A TERTIARY CARE CENTRE IN SOUTH INDIA

Topic: Immuno-haematology
Author: Shaniba A B, Co-authors: Ramesh Bhaskaran, Aboobacker Mohamed Rafi, Nithya M Baiju, Susheela J Innah
Institution: Jubilee Mission Medical College and Research Institute

Introduction: The direct antiglobulin test (DAT) is a laboratory test that detects immunoglobulin and/or complement on the surface of red blood cells. The use of the DAT is to differentiate hemolysis into immune or nonimmune. DAT results must be viewed along with other clinical and laboratory data. The different reagents that may be used: polyspecific reagents that can detect IgG and/or C3 and monospecific reagents to detect either IgG or C3.

Materials and Methods Aim: To evaluate the role of serological characterization of DAT positive cases in assessing the severity of in vivo hemolysis.

Objectives: To study the association between strength of DAT and severity of in vivo hemolysis.

Study Design: Cross sectional study

Methodology : The study is performed on samples sent by clinicians to the Department of IHBT for DAT and are testedpositive. A positive DAT is further performed using monospecific antisera with antibodies to IgG and C3b,C3d. The grades of positivity (1+ to 4+) with polyspecific and monospecific antisera are recorded.

The presence or absence of hemolysis is assessed in all DAT positive cases.

Hemolysis is documented when three or more than three of the following are abnormal:

1. Hemoglobin(<9g/dl)
2. Total serum bilirubin(>2mg/dl)
3. Reticulocyte count(>2%)
4. Lactate dehydrogenase(>500U/L)

The in vivo haemolysis is classified into moderate and severe based on whether three, or all four parameters, respectively, are abnormal. The presence or absence of hemolysis is further assessed for each grade of positivity with polyspecific and monospecific reagents.

Results: Total 104 DAT positive cases were studied. The strength of polyspecific DAT was 1+ in 29 cases, 2+ in 37,3+ in 24 and 4+ in 14. Out of total cases, 95(91.3%) were positive for IgG alone, 7(6.8%) were positive for both IgG and C3b,C3d and 2(1.9%) were positive for only C3b,C3d.

Out of 104, 29(27.9%) had in vivo hemolysis and 75(72.1%) did not have in vivo hemolysis. Among 29, 18(62%) had moderate hemolysis and 11(38%) had severe hemolysis. Cases having both IgG and C3b,C3dand those having C3b,C3d alone showed severe hemolysis. Cases having IgG alone showed moderate to severe hemolysis. The grades of positivity with antiglobulin reagents were correlated with the severity of hemolysis. It was found that there was significant increase in hemolysis with increasing grades of DAT positivity. All severe hemolysis cases had DAT strength of 4+. Moderate hemolysis cases had a DAT strengthvarying from 2+ to 3+.

Conclusion

DAT can be positive in different clinical conditions with or without hemolysis. Majority of DAT positive cases do not show hemolysis. A positive DAT does not always indicate the presence of hemolysis. A combination of clinical and laboratory evidences of hemolysis is necessary for the diagnosis of autoimmunehemolysis. The strength of polyspecific and monospecific DAT and serological characterization of DAT is useful in assessing the severity of in vivo hemolysis.

ALLOIMMUNIZATION RISK AND MANAGEMENT IN BETA-THALASSEMIA: INSIGHTS FROM EXTENDED ANTIGEN- MATCHED TRANSFUSIONS.

Topic: Immuno-haematology
Author: Vijaysri T S
Institution: Wenlock District Hospital
Alloimmunization Risk and Management in Beta-Thalassemia: Insights from Extended Antigen-Matched Transfusions.

INTRODUCTION : RBC alloimmunization stands as a significant complication of chronic transfusions in β-thalassemia patients. This study aims to determine the prevalence of alloimmunization among thalassemia patients receiving regulartriple saline-washed red cell transfusions.

MATERIALS AND METHOD: A cross-sectional study was conducted over seven months in the Department of Transfusion Medicine, involving 125 participants aged over 6 months diagnosed with beta-thalassemia major including thalassemia variants. Informed consent was obtained from the patients or their parents. Plasma samples were used for antibody screening and identification using the column agglutination technique. Extended red blood cell (RBC) phenotyping for donor blood, including C, E, c, e, and K antigens, was performed for alloimmunizedpatients.

RESULTS: In a screening of 125 patients, 4 individuals were found to have developed alloantibodies against Kell and Rhantigens. Specifically, 3 patients developed antibodies against the Rh system (C,c,E), while 1 patient developed antibodies against the Kell antigen (K). The overall alloimmunization rate was found to be 3.2% in the study.

Conclusion : Employing extended antigen-matched donor blood has proven effective in lowering alloimmunization rates. Washing the donor product removes plasma proteins targeted by recipient antibodies. Our study found a lower prevalence of alloantibodies than others, and we noted fewer transfusion reactions in this group of patients.

This may be attributed to the triple saline washing method of leucodepletion.

ROOT CAUSE ANALYSIS AND CAPA OF INCOMPATIBLE CROSSMATCHES FOR PRBC TRANSFUSION IN PATIENTS ATTENDING TO A TERTIARY CARE HOSPITAL IN EASTERN INDIA: A RETROSPECTIVE STUDY OF ONE YEAR DATA

Topic: Immuno-haematology
Author: Trishaala Jaiswal
Co-authors: Girija Nandini Kanungo
Institution: Institute of Medical Sciences and SUM Hospital Bhubaneswar

INTRODUCTION: One of the major responsibilities of a transfusion medicine specialist is to provide right blood at the right time. Crossmatching forms the pillar of pretransfusion testing. It is of paramount importance in a blood center for ensuring compatibility, preventing transfusion reaction, enhancing transfusion safety, optimising patient care and complying with regulatory requirements. Problems faced during crossmatching should be resolved expeditiously. Resolving problems should be carried out following departmental guidelines so that time is utilised in a judicious manner and blood is not held unnecessarily.

AIMS AND OBJECTIVES: The aim of the study was to find causes and prevalence of incompatible crossmatches.

The objective of the study was to analyse the root cause and take simultaneous corrective and preventive steps for safe and timely transfusion.

METHOD: A prospective study(n=28,580) was conducted in tertiary care hospital in Eastern India from February,2023 to January,2024. Requisition of PRBC was received along with 2ml of EDTA and plain vial. Crossmatching was done by column agglutination technique in polyspecific (IgG+C3d) BIORAD COOMBS CARD. Any incompatibility encountered during crossmatching was resolved as per the departmental standard operating procedure(SOP). Patients's clinical history, transfusion history, medication history, obstetrics history were recorded.

RESULTS: During the study period, total 99 incompatibilities were observed out of 28,580 crossmatching(0.34%). Out of which 40 were males(40.40%) and 59 were females(59.6%). Incompatibility observed were:

- A Rh D Positive: 27.27%
- B Rh D Positive: 32.32%
- Rh D Positive: 27.27%
- AB Rh D Positive: 7.07%
- Rh D Negative: 6.07%

Of the total incompatibilities encountered, DAT/ICT/DAT+ICT positive in patients's sample were 3.03%,27.27% and 58.59% respectively. From donor units, DAT/pool cell positive/hemolysed RBC/clot in the bagwere 5, 1, 5 and 2 respectively. From clerical errors, WBIT/wrong groups in requisition were 2 and 13respectively. Among patients with cold autoantibodies(8.08%), crossmatch compatible units were given afterperforming tests at 37?C and with warm autoantibodies(1.01%) patients were transfused with least incompatible units along with steroids. In patients with ICT positive, antibody identification was done. Singlealloantibody was found in 33.33% patients and multiple alloantibodies in 16.16% patients for which corresponding antigen negative PRBC was issued. Most common alloantibody identified was Anti E(17.17%). In patients with both autoantibodies and allobodies(39.39%) partial phenomatched least incompatible unit lessthan the autocontrol were issued. In patients with antibody against enhancement media[1.02%(LISS)], crossmatching with normal saline was done and compatible unit was issued. For patient with A subgroup with Anti A1 antibody(1.01%) O Rh D Positive PRBC was issued. In patients with Weak D antigen(2.02%), patient was transfused with O Rh D Negative PRBC prophylactically. In minor incompatible transplantpatients[(1.01%) (Donor: O Rh D Positive, Recipient: A Rh D Positive)], O Rh D Positive PRBC wastransfused.

CONCLUSION: Incompatible crossmatch poses a challenge in the field of transfusion medicine the resolution of whichrequires a thorough evaluation of patient's clinical history and underlying pathology.

A STUDY OF ABO BLOOD GROUPING DISCREPANCIES: EXPERIENCE OF A TERTIARY CARE HOSPITAL, NAVI MUMBAI

Topic: Immuno-haematology
Author: Prabhakaran P
Institution: Mahatma Gandhi Mission Medical College And Hospital, Kamothe, Navi Mumbai

INTRODUCTION: The ABO system plays a vital role in transfusion therapy and organ transplantation. ABO typing and compatibility tests are essential components of pre-transfusion procedures. ABO typing involves both cell andserum grouping, and discrepancies may occur in either category. Resolving these discrepancies is crucial for accurately determining the ABO and Rh groups of blood donors and patients. Failure to do so can result in ABO-incompatible transfusions, which may have fatal consequences. These discrepancies pose a serious threat to transfusion safety as the patient's blood group remains unknown, increasing the risk of acute hemolytic transfusion reactions, which are far more prevalent than transfusion-transmitted pathogens. To prevent transfusion errors in these cases, quarantine the affected units and temporarily use group O red cells for patient transfusions until the issue resolves. These discrepancies can arise from technical errors, protein abnormalities, or the presence of rare blood phenotypes, necessitating meticulous attention to detail and adherence to standard protocols.

AIM: The aim of this study is to analyze the incidence and underlying causes of ABO typing discrepancies in bloodtransfusion services, with a focus on resolving these discrepancies to ensure transfusion safety.

OBJECTIVES:

- To determine the incidence of ABO typing discrepancies in patient and donor samples.
- To identify causes of discrepancies: technical errors, protein abnormalities, rare blood phenotypes. To analyze the age and gender distributions of cases with ABO typing discrepancies.
- To determine whether standard protocols and communication are effective in resolving discrepancies.

METHODOLOGY: A prospective study was conducted in the Department of IHBT, MGM Medical College and Hospital, Navi Mumbai, Maharashtra, analyzing 10,588 blood samples over 12 months from March 1, 2023, to February 29,2024. With the approval letter number DHR-EC/2023/03/05, the Institutional Ethics Committee accepted thestudy.

The study included 5493 blood samples from patients requiring blood transfusions and 5095 blood donors. Ofthese, 3422 (67.16%) donated at blood donation drive camps, while 1673 (32.84%) made in-house donations. We included both patient and donor samples, utilizing standard blood grouping techniques. Exclusion criteria were applied to ensure sample integrity.

RESULT: The study revealed an overall discrepancy rate of 0.17%, with Type IV discrepancies being most prevalent (39%), followed by Type II (33%) and Type I (17%). Underlying causes included autoimmune hemolytic anemia, cold antibodies, and a rare blood group like the Bombay phenotype. We examined the age and genderdistributions of cases, emphasizing the importance of effective communication and adherence to standard protocols in promptly resolving discrepancies to ensure transfusion safety.

CONCLUSION: The first and foremost priority is to provide patients with safe blood transfusions and resolve ABO blood grouping discrepancies in order to prevent any fatal complications. If there is a delay in resolving discrepancy, the clinician and transfusion medicine specialist must effectively communicate and coordinate to discuss the clinical history, laboratory values, diagnosis, ongoing treatment, and selecting the appropriate blood components for transfusion.

EXPLORING ERYTHROCYTE ALLOIMMUNIZATION AND AUTOIMMUNIZATION IN TRANSFUSION-DEPENDENT THALASSEMIA (TDT) PATIENTS OF PREDOMINANTLY NORTHINDIAN DESCENT FROM UTTARAKHAND

Topic: Immuno-haematology
Author: Dr Tushar Bhardwaj, Co-authors: Manish Raturi, Yashaswi Dhiman, Dushyant Singh Gaur
Institution: Himalayan Institute of Medical sciences

Introduction: Regular transfusions of packed red blood cells (PRBC) every 3-4 weeks seem to be the only viable method to maintain the haemoglobin (Hb) levels of β-thalassemia major patients. Nevertheless, this therapeutic approach of regular PRBC transfusions is linked with several long-term challenges, including potential consequences like auto/alloimmunization, organ damage due to iron overload, and the probable transmission of transfusion-transmitted infections. Further, the factors involved in auto/alloimmunization are complicated and rely on the antigenic disparities between the blood donor and the recipient, the immune status of the recipient, and the immunomodulatory impact of allo-antigens on the innate immune system of the recipient. Aim and objectives: We aimed to explore the prevalence of auto/alloimmunization in transfusion-dependent beta (β) thalassemia major patients belonging to Uttarakhand.

Methods: This cross-sectional study included 24 transfusion-dependent thalassemia (TDT) patients for a duration of four years (Jan 2020 through Dec 2023). We took around 3-5 mL of their blood sample and determined their ABO and Rh (D) blood types, as well as performed the Direct Antiglobulin Test (DAT), Indirect Antiglobulin Test (IAT), Auto Control (AC) and detected the presence of either auto and/or alloimmunization. The process of screening and identifying erythrocyte antibodies was carried out utilizing commercially available 3-red cell screening and 11-red cell extended identification panels (Ortho Clinical Diagnostics Pvt Ltd). The number of PRBC issued was noted and categorized for two cohorts namely, auto/alloimmunized vs non-sensitized. The data so obtained was expressed as numbers and proportions for categorical variables. A p-value < 0.05 was considered as statistically significant.

Results: Out of 138 events of PRBC transfusions among 24 patients (M: F = 4.75:1), 8.32% (n=2/24) had developed erythrocyte antibodies. One patient was allo-immunized having the concurrent presence of (Allo-anti- c, anti-E and anti-K) and another patient had developed autoantibody presenting with a positive DAT (Grade 3+), a pan-reactive IAT and a positive AC. The ABO profiles of thalassemia patients were B-9, A-4, O-4, and AB-7, with 18 Rh-D positives and 6 Rh-D negatives. Age-wise (in years) the auto/allo-immunized patients (n=2) were significantly in a higher mean age group at their transfusions [24.6±8.30 (10-27)] than the non-sensitized (n=22/24) ones [8.9±8.0 (1-24); two-tailed p-value equals 0.0145 which by conventional criteria, was statistically significant]. The alloantibody identified was directed against the K and Rh blood groups, respectively. The titers found were, anti-c=1024; anti-E = 256; and anti-K-128, respectively. The cohort having "auto/allo-immunized" patients received more units per year [1.8±0.38 (1-2)] than the "non-sensitized" cohort of patients [1.0 ±0.35 (1-2)]. The two-tailed p-value equals 0.0054 which by conventional criteria, was statistically significant]. One mild allergic reaction was observed in 4.16% (n=1/24) of the patients who was advised to use saline-washed cellular blood components for future use.

Conclusion: A low alloimmunization rate implies that there is homogeneity of red cell antigens amongst the blood donors and the TDT recipients. RBC auto/alloimmunization was not influenced by gender, unlike age where it was significantly associated.

COMPARATIVE ANALYSIS OF AUTOIMMUNE HEMOLYTIC ANEMIA PREVALENCE PRE AND POST-COVID-19 ERA : A RETROSPECTIVE COHORT STUDY.

Topic: Immuno-haematology

Author: Shashank Damodar NaikCo-authors: Jayashree Sharma
Institution: King Edward Memorial Hospital and Seth GS Medical College, Mumbai

Introduction: Autoimmune hemolytic anemia (AIHA) is an uncommon condition where the body's immune system mistakenly attacks its own red blood cells, leading to hemolysis and anemia. The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has had widespread effects on healthcare systems and patient health outcomes globally. Emerging evidence suggests that COVID-19 might trigger or exacerbate autoimmune conditions, including AIHA, due to its profound impact on the immune system. This study seeks to investigate whether there has been a significant change in the prevalence of AIHA before and after the onset of the COVID-19 pandemic.

Aim: This study aims to compare the prevalence of autoimmune hemolytic anemia (AIHA) in patients diagnosed before and after the COVID-19 pandemic to identify any significant differences and explorepotential contributing factors.

Methods: A retrospective cohort study design was employed, utilizing patient data from a tertiary care hospital. The dataset included patient demographics (name, age, gender), clinical data (ward, diagnosis, blood group, ICT, DCT, AUTO status), and the year of diagnosis. Patients diagnosed with anemia and for whom autoimmune status (AUTO) data were available were included in the study. Patients were categorized into two groups based on the year of diagnosis: pre-COVID-19 (before 2020 ie from March 2017-March 2019) and post-COVID-19 (from April 2020 to April 2023 onwards). The prevalence of AIHA was calculated for each group. Statistical analysis, including chi-square tests, was conducted to compare the prevalence of AIHA between the two groups. Additionally, subgroup analyses were performed to explore differences based on age,gender, and blood group. Ethical considerations, including patient confidentiality and data protection, were strictly adhered to throughout the study.

Results: The study included a total of patients of 688 (258+430)(Total samples recieved in our centre as suspected case of antibody), with 8 patient diagnosed in the pre-COVID-19 group and 35 patients diagnosed inthe post-COVID-19 group. In the pre-COVID-19 group, the prevalence of AIHA was 3.1 % (258 patients). In contrast, the post-COVID-19 group showed a prevalence of 8.1% (430). The chi-square test indicated a statistically significant difference in AIHA prevalence between the two groups (p-value = 0.01). Subgroup analyses revealed that the increase in AIHA prevalence was particularly pronounced in patients aged 12-30 years.The prevalence of female cases was also seen to be significantly higher in the post-COVID 19 era (p value =0.005).

Conclusion: The prevalence of AIHA has significantly increased in the post-COVID-19 era compared to the pre-COVID-19 period. The significant rise in AIHA cases, particularly among younger patients suggests potential triggersor exacerbating factors associated with the COVID-19 pandemic. These findings underscore the need for heightened clinical awareness and further research to explore the underlying mechanisms linking COVID-19to autoimmune conditions like AIHA. Understanding these factors could enhance the management and treatment of AIHA in the context of COVID-19.

A CASE OF DELAYED HEMOLYTIC TRANSFUSION REACTION WITH CONJUGATED HYPERBILIRUBINEMIA, AN INTERESTING CASE REPORT.

Topic: Immuno-haematology
Author: Anandeeswari B
Co-authors: Rajeswari S, Sintha M
Institution: Madurai Medical College

INTRODUCTION: Incidence of Delayed Hemolytic transfusion reaction is 7.3 per 1,00,000 transfused RBCs. It is one of the unsuspected and under reported adverse blood transfusion reaction which must be given significance for a Good transfusion practice.

AIMS AND OBJECTIVES: Our aim is to unmask the pathophysiology behind conjugated hyperbilirubinemia which mislead into the diagnosis of Liver pathology in a case of Delayed Hemolytic Transfusion Reaction.

MATERIALS AND METHODS: A 21 year old primi with gestational age 14 weeks, diagnosed as Anemia complicating pregnancy with Hemoglobin-5.9grams/dL who had Packed red cell transfusion 2 days back and presented with features suggestive of Delayed Hemolytic Transfusion Reaction after 2 days of transfusion.

Transfusion reaction workup done. Regrouping and typing of Blood bag sample , pre and post transfusion patient sample done by Conventional Tube Technique. Major Crossmatching, Direct Antiglobulin Test and Indirect Antiglobulin Test done by Conventional Tube Technique.

Antibody screening and Identification done by Column Agglutination Technology. Complete Blood Count done in Sysmex Hematology Analyser. Liver Function Test done in Erba Mannheim XL540 Automated Analyser by Enzyme method.

RESULTS: Blood grouping and typing found to be O Rh D positive with no discrepancy in forward and reverse grouping in Blood bag sample, pre and post transfusion patient sample .Major crossmatch found incompatible at Saline phase and AHG phase. DAT and AutoControl found negative. IAT positive at Immediate Spin, 37?c and AHG phasewith grading 3+,3+ and 4+ respectively. Antibody Screening and Identification proceeded and Probable allo antibody interpreted as anti- $Duffy^{a}$. And presence of anti-E couldnot be ruled out.

Complete Blood Count revealed Neutrophilic Leukocytosis and drop in Hemoglobin level to 4.8grams/dL. Peripheral smear showed evidence of haemolytic picture. Renal parameters elevated. Liver Function test showed Total bilirubin – 5.4mg/dL, Conjugated bilirubin -3.4mg/dL and unconjugated bilirubin – 2.0mg/dL. Liver enzymes found normal.

In Hemolytic transfusion reactions, unconjugated hyperbilirubinemia is the usual presentation. Elevated conjugated bilirubin levels in this case arouse suspicion of underlying undiagnosed Liver pathology.

UltraSonoGraphy- Abdomen and Pelvis found normal. Repeat LFT after5 days revealed sustained elevation of total and conjugated bilirubin levels.

Inspite of normal Hepatobiliary system as evidenced by USG report and normal Liver enzymes, conjugated hyperbilirubinemia in this case can be explained by the concept of Delta bilirubin, which is an "Albumin bound bilirubin subfraction synthesised non- enzymatically in vivo from albumin and conjugated bilirubin". Sustained elevation of total and unconjugated bilirubin levels is due to long half life of Delta bilirubin when compared to conjugated bilirubin. 45 Packed red cells were crossmatched. Only 4 units found to be compatible and reserved for this patient. Antibody status of the patient mentioned in discharge summary and well informed to the patient.

CONCLUSION: An awareness of this fact of Delta bilirubin will prevent erroneous diagnosis of Liver pathology being made in patients who demonstrate conjugated hyperbilirubinemia in conditions like Hemolytic transfusion reactions.

QUALITY INDICATORS IN BLOOD DONATION AREA AT A TERTIARY CARE INSTITUTE IN NORTHERN INDIA

Topic: Blood donor and blood donation
Author: Braja Sundar Hajira
Co-authors: Brijesh Kumar Yadav, Niharika Yadav, Rajendra Chaudhary
Institution: Sanjay Gandhi Post Graduate Institute Of Medical Sciences, Lucknow

Introduction: Quality management system (QMS) in healthcare organisation rely on various tools including quality indicators (QIs) to enhance performance. The goal of quality checks is to inform the operational team about the status of an ongoing procedure. It is one type of internal audit that helps to raise the standards of quality for our transfusion practise.

Aims and objectives: To establish acceptable limits of various quality indicators in blood donation area of our institute and to study the trends in these quality indicators for proposing interventions to improve the quality ofpractices in blood donation area.

Materials and methods: After getting approval and consent waiver from Institute Ethics Committee, we retrospectively analysed 10 years (January 2013 - December 2022) data from blood donation and apheresis section of our department. Quality indicators studied were percentage of voluntary donation, percentage of female donors, donor deferral rate, phlebotomy failure rate, rate of adverse donor reaction.

Results: Out of 2,85,495 donors registered a total of 2,43,587 donors (2,35,177 whole blood and 8401 SDP) donated blood (85.42 %), and 41,917 donors (14.68 %) deferred over the study period. Of the total donors donated blood 2,26,787 donors (96.56 %) were male and 16,791 were female donors (3.44 %). 51,707 donors (18.11%) were deferred, and deferral range was 17.8% - 19.3% due to various reasons. the proportion of adverse reactions among donors was 1.0%-1.9%. Whole blood collection failure resulting from phlebotomy was between 0.46% and 0.90%. A total of 22169 donor (9.1 %) donated blood as voluntary donor.

Conclusion: Tracking performance indicator is essential for ongoing quality improvement in transfusion medicine. Our study underscores the significance of monitoring donor demographics, deferral rates, minimising adverse donor reaction to ensure a safe and adequate blood supply. We need to increase the community's level of health awareness in order to increase the voluntary replacement donor ratio. Efforts should focus on increasing voluntary non remunerated donation and addressing barriers to female donation to meet transfusion needs effectively.

KNOWLEDGE, ATTITUDE AND PRACTICES ABOUT BLOOD DONATION AMONG INTERNS IN TERTIARY CARE CENTER

Topic: Blood donor and blood donation
Author: Sharon Joy
Institution: Government Medical College, Thiruvananthapuram

Introduction:- Blood donation is a necessary process that can save lives. Voluntary blood donation is encouraged over other types of blood donation. In accordance with this a study was conducted to understand the awareness about blood donation among interns in a tertiary care center.

Aim:- To determine the knowledge, attitude and practices about blood donation among internsStudy design:- Cross sectional study done among 50 interns.

Materials and methods:- All interns who gave consent for study was included .A pretested questionnaire was given. After getting a baseline information a brief awareness session was given and willingness to donate blood was asked again.

Result:- 50 residents participated in the study. Out of which 28 were females (56.25%) and 22 males (43.75%).

Knowledge about blood donation:-All 50 (100%) know their own blood group. 6 (12%) residents knew the frequency for blood donation in both men and women. When asked about universal donor for PRC 19 (38%) said O Rh D negative,22 (44%) said O Rh D positive and 9 (18%) didn't know which blood group was universal donor. Residents were not familiar with the criteria for blood donation. When asked about the transfusion transmitted diseases for which tests are done in blood center, only 16 (32%) knew all the 5 diseases for which tests are done, 31 (62%) knew all 4 diseases except Malaria (15 didn't know about testing of malaria),38 (76%) knew about testing of Hepatitis B,C and HIV and all 50 residents knew HIV (100%) wastested in the donated blood in a blood center.

Attitude towards donation:- 100% agreed that blood donation is necessary.

Practice towards blood donation:- Out of 50 interns 22 (43.75%) have donated before and 28 (56.25%) have not donated before. Out of 22 donated 16 (32%) have donated multiple times and 6 (12%) of them donated once. Out of 28 not donated 12 have attempted to donate but got rejected and 16 have not even attempted to donate blood. Reasons for rejection include low Hb, recent history of vaccination, fear etc.

A brief class about necessity and procedure of blood donation was given and wiliness to donate blood wasasked again 48 (96%) agreed to donate blood in future and 2 (4%) were still reluctant to donate blood due to fear and family restrictions.

Conclusion:- The awareness about blood donation increased and more interns agreed to donate blood in future.

DECIPHERING DONOR SATISFACTION AND FUTURE DONATION INTENTIONS: POST-DONATION FEEDBACK ANALYSIS FROM AN EASTERN INDIAN ONCOLOGY SETTING

Topic: Blood donor and blood donation
Author: Najla Haneefa Basheela
Co-authors: Suvro Sankha Datta, Soumitra Shankar Datta, Somnath Roy
Institution: Tata Medical Center, Kolkata

Objective: The escalating demand for blood places immense pressure on blood centers, particularly challenging in oncology settings where securing an adequate blood supply is crucial. Recognizing the paramount importance of donor recruitment and retention, this study aims to :

1. To understand and evaluate blood donor satisfaction and motivation concurrently at the time of donation.
2. To find correlation between donor satisfaction and likelihood for future donation.

Material and Methods: Donors were approached by a blood-center counselor in the refreshment area to complete a brief, anonymous,self-administered feedback survey and rate their satisfaction with the donation process over a period of 42 months(2019-2022).Questions included basic demographics, satisfaction at each step, motivation for the current donation and intent to return for future donation. Responses were recorded on 10-point Likert-type scales. Univariate analysis explored variables related to donor satisfaction, current donation motivation, and future donation intent. Bivariate associations between demographic/blood donation

variables and donor motivation, and intent were assessed using Chi-squared tests and Fisher's exact tests. Multivariate logistic regression identified confounders, with significance set at $p < 0.05$.

Results: Out of the 2,197 donors studied, 78.8% were males, with a mean age of 40 (± SD 22.457). Over 95% of donors rated the overall donation process as a 9 or 10 on a scale of 10, with no observed differences among gender and age groups. Of the donors, 63.9% were repeat donors, with the majority (77.5%) having graduated or obtained a higher degree. Regression analysis revealed that feeling good about oneself and believing blood donation is good for health were associated motivational factors for repeat donation, with the former observed in multigallon donors. Additionally, intent to return was influenced by altruism and satisfaction levels from current and previous donations. The blood center's affiliation with a cancer hospital influenced 62% of donations. Future donation intention positively correlated with donor satisfaction ($p < 0.005$).

Conclusion: This study underscores the pivotal role of donor satisfaction and motivating factors for repeat donations, guided by the Theory of Planned Behavior. It also acknowledges the substantial influence of the blood center'sassociation with a cancer hospital. These findings highlights the ongoing imperative to enhance donor experiences and sustain engagement, ultimately advancing blood donation in healthcare.

THERAPEUTIC PHLEBOTOMY: IMPACT ON HEMATOLOGICAL PARAMETERS AND CLINICAL OUTCOMES IN POLYCYTHEMIA PATIENTS

Topic: Blood donor and blood donation
Author: P. Mounika
Co-authors: V. SUDHIR KUMAR, B. Shanthi, K. Mahesh Kumar, B. Murali Krishna
Institution: NIMS Hyderabad

INTRODUCTION: Polycythemia, characterized by an elevated red blood cell count, poses significant risks of thrombosis and vascular complications. Therapeutic phlebotomy (TP) allows for a controlled and gradual decrease in red cell mass which acts as a cornerstone in the management of patients with either primary or secondary polycythemia. Its aim is to reduce blood viscosity and mitigating associated risks. This study investigates the efficacy and therapeutic potential of therapeutic phlebotomy in managing polycythemia.

AIMS AND OBJECTIVES: The aim of this study is to investigate the effects of therapeutic phlebotomy on hematological parameters and clinical outcomes in patients diagnosed with polycythemia. The main objective of this study is to analyze the relationship between the frequency and volume of phlebotomy sessions and changes in hematological parameters and clinical outcomes, such as symptom severity, in polycythemia patients.

MATERIALS AND METHODS: This was a prospective study on patients with polycythemia who underwent therapeutic phlebotomy from January 2024 to May 2024. The TP procedures in 171 patients undergoing 325 episodes were studied. Patient demographic and clinical details were recorded to assess the improvement in symptoms after phlebotomy procedure. The changes in hematological parameters like hemoglobin (Hb), hematocrit (Hct), plasma volume (PV), were assessed and compared with the pre-phlebotomy values. Furthermore, the influence of frequency and volume of phlebotomy sessions on various parameters were analysed.

RESULTS: Mean pre-procedure hemoglobin was 17.5± 1.7 g/dl and mean post-procedure hemoglobin was 16.6± 2.1g/gl. Drop in Hb was 0.9±1.5 g/gl. Mean pre-procedure hematocrit was 52.8± 5.7% and post-Hct was 48.8±6.5%. Drop in Hct was 4.0±5.2%. It was observed that there was a progressive reduction in hemoglobin andhematocrit in relation to the volume removed and frequency of procedures. Calculated mean pre-procedure plasma volume was 1917 ml and the post-procedure plasma volume was 2121 ml. There was a progressive increase in plasma volume in relation to the frequency of therapeutic phlebotomy. The results were found tobe statistically significant ($P<0.0001$).

CONCLUSION: The reduction in the level of hematological parameters like Hb and Hct was observed after every procedure. Additionally there was an expansion of plasma volume indicating the overall tissue oxygenation with efficient perfusion. The symptomatic improvements following the procedure were noted in 68% of patients affirming the therapeutic efficacy of therapeutic phlebotomy in enhancing patient well-being. Furthermore, the analysis of TP session frequency and volume highlights opportunities for optimizing treatment protocols. Overall, these findings support therapeutic phlebotomy as a valuable intervention in the management of polycythemia, offering insights for tailored patient care and improved clinical outcomes.

KEYWORDS: Therapeutic phlebotomy, polycythemia, hematocrit, plasma volume.

SHOULD PRE-DONATION SICKLE CELL CARRIER TESTING BE MADE MANDATORY IN HIGH - PREVALENCE AREAS?

Topic: Blood donor and blood donation
Author: Namrata Datta
Co-authors: Somnath Mukherjee, Satya Prakash, Ansuman Sahu, Debasish Mishra, Gaurav Chabbra, NayanaV.K.
Institution: AIIMS Bhubaneswar

INTRODUCTION: Sickle cell disease is a hereditary hemoglobinopathy affecting the African population and the groupsgenetically linked to the African population. In India, the tribal populations of eastern states like Odisha and Chattisgarh and some pockets in Gujrat and Maharastra are affected by this disease.

Blood donations from sickle cell trait/disease are not allowed because the hypoxic condition during storage will lead to sickling of stored PRBC which will not be effective after transfusion. However, mass screening of blood donors in vulnerable populations before donation is difficult to implement due to increasing cost and convenience to perform the screening test. Sickle cell testing after donation leads to more discard of blood which should not have been collected in the first place.

AIMS AND OBJECTIVES

1) To report one such case of blood collected from a sickle cell carrier that underwent sickling during storage, the follow-up test and counseling of the donor done.
2) **To advocate for point-of-care, rapid testing methods to screen blood donors for Sickle trait in high-**prevalence areas.

METHODS: In our center, we transfuse RH extended phenotype matched (D,C,E,c,e) and Kell (K) negative leukofiltered red cells to all Thalassemia and Sickle cell disease patients. Because of inventory constraints, leukofiltration is done both pre-storage or post-storage, just before issue of the PRBCunit. During one such labside leukofiltration, one PRBC unit was found to be not filtered by gravityeven after one hour of hanging at 4^{O}C. Suspecting this donor unit to be drawn from a sickle patient, we sent the PRBC from the bag for microscopy and HPLC testing to our pathology department.

RESULTS: Sickled RBCs were visible under 100X oil immersion lens and HPLC showed that donor is a carrier (HbA 53%, HbA_2 3% and HbS 36.7%, HbF <0.8%). The donor history was reviewed and he was contacted telephonically to communicate the findings and advised to not donate blood in the future.

He was a 25-year-old unmarried young male with no siblings, so he was also advised for pre-maritaltesting of spouse for sickle cell and other hemoglobinopathy especially thalassemia status. He reported that he had donated once before, eight months back in his local district hospital, and was not diagnosed as a sickle carrier at that time so he was unaware of this finding.

CONCLUSION: Point of care sickle testing is required in our population both for blood donors and for mass

screening of young population to update them about their carrier status. These tests should be low cost and be able to be performed with quickly with minimum sample volume and minimum biomedical waste generation. Screening of blood donors in high prevalence areas like our center should be done because many a times pre-donation screening is the first time a person becomes aware of some underlying health problems. A sickle cell screening test done before donation can also make the youth aware of this disease and help in preventing the propagation of this disease to the next generation.

PREDICTING VASOVAGAL REACTIONS IN WHOLE BLOOD DONORS. IT'S TIME TO BE CAUTIOUS.

Topic: Blood donor and blood donation
Author: Juhi Bhatia
Co-authors: Ashish Jain, Gita Negi, Daljit Kaur
Institution: AIIMS Rishikesh

Introduction: The risk factors leading to adverse donor reactions are long known. It is important to identify the subset of the population who should be followed cautiously before, during, and after donation in addition to the routine care and counseling for blood donation. This data can help predict vasovagalreactions in high-risk blood donors and help in better donor management and possible prevention ofadverse reactions.

Aim and Objectives: To predict the probability of occurrence of a vasovagal reaction in the whole blood donors visitingour blood center.

Methodology: A retrospective study was done from April 2023 to April 2024 with a sample size of 309 (VVR) and205 (non-VVR) donors. The data analysis was done in MS Excel with three independent variables,age, weight, and donation frequency. A VVR probability prediction calculator was thus devised based on the analysis.

Results: The total number of whole blood donations from April 2023 to April 2024 was 23482. Out of these, 22942 (97.7%) were male donors and 544 (2.31%) were female donors. The number of vasovagal reactions during this period was 309 (1.31%).

Of the donors who had a vasovagal reaction, 285 were male (92.2%) and 24 were female donors (7.7%). The percentage of adverse reactions in male donors is 1.2% while in female donors, 4.4%. The percentage of overall female donors is less, hence there was a gender bias in donor adverse reactions towards male donors and this parameter could not be included in predicting the vasovagalreactions.

A multiple regression was run to predict a VVR from age, weight, and donation frequency. resulted in a significant model, $F=23.01$, $p < .01$, $R^2 = .119$. The individual predictors were examined This donation ($t = -4.63$, $p < .001$) are statistically significant.

Using single variate regression, it was seen that age<30 years and weight<70 kg give an further and indicated that age ($t = -3.31$, $p < .001$), weight *(*$t = -4.26$, $p < .001$*),* and frequency of independent probability of 60% of having a VVR.

A total of 249 donors (80.5%), who had a VVR, had a probability of more than 50% according to the predictive model used in the study. Seven donors who experienced a VVR had a predicted probability of more than 90%. A total of 129 donors (62.9%) who did not have a VVR, had apredicted probability of more than 50%. This difference is statistically significant ($p<0.05$). None of the donors who did not have a VVR had more than 90% predicted probability.

Conclusion: A decrease in the probability of occurrence of a vasovagal reaction was noted with increasing age and weight of the donor. A higher chance of reaction was also predicted in first-time donors than repeat donors. This VVR prediction tool can be used during donor registration and help the doctorsand nursing staff take better measures to prevent a vasovagal reaction in such donors keeping in consideration other factors such as blood pressure, heart rate, gender, as well as psychological factors at play.

COMPARATIVE ANALYSIS OF HEMATOLOGICAL PARAMETERS IN FIRST TIME AND REPEAT DONORS IN A TERTIARY CARE HOSPITAL

Topic: Blood donor and blood donation
Author: Bhavani T
Institution: Saveetha Medical College, Chennai, Tamil Nadu

INTRODUCTION: The safety of a blood transfusion practice is anchored on safe blood from a healthy donor, while further protecting the donor from future harm. Changes associated with repeat blood donation is important in maintaining a healthy donor pool. This study will aid in assessing the safety threshold in terms of donationfrequency.

AIMS AND OBJECTIVES:

1. To identify the risk of donation induced iron deficiency anemia
2. To identify the relation between the number of donations and the risk of anemia

METHOD: This was a prospective cross-sectional study conducted on blood donors at Saveetha Medical College And Hospital Chennai , for a period of 4 months from January 2024 to April 2024. The blood samples were collected from the donors. Complete blood count and serum ferritin levels were checked. The comparison of CBC values and serum ferritin levels with donation frequency and time since the last donation was carried out.The statistical analysis was performed using SPSS software.

RESULTS: A total of 100 blood donors were recruited for this pilot study and all donors were male. Out of all donors, 22.5% are first-time donors,50.3% have donated 1 to 5 times,14.6% donated 6-10 times and 7.9% are frequentdonors with more than 15 donations. The average hematological parameters were comparable between donorscategorized based on number of donations. On further analysis on changes in hematological parameters with number of donations ,the MCH,MPV and WBC count had a negative correlation(-0.594, -0.162 and -0.184 respectively, $p<0.05$) and RDW had a significant positive correlation (0.426,$p<0.001$). RDW had a significant difference among first time and repeat donors, WBC and MCH had significant difference among first time andrepeat donors. The Ferritin levels showed a statistically significant negative correlation with the number of donations, the correlation coefficient being –0.27.

CONCLUSION: Our study found that regular blood donors had low iron stores, as shown by ferritin levels and other iron indicators. Using the current guidelines (hemoglobin >12.5 g/dL) for donation,or the red cell indices alone do not reflect the donor's actual iron status.

ANALYSIS OF BLOOD UTILISATION PRACTICES IN CARDIOTHORACIC AND VASCULAR SURGERY PATIENTS IN A TERTIARY CARE HOSPITAL.

Topic: Clinical Transfusion practices
Author: Nishtha Gupta
Co-authors: Ravneet Kaur, Gagandeep Kaur, Paramjit Kaur, Kshitija MIttal
Institution: Government Medical College And Hospital, Chandigarh

Introduction: Having a proper knowledge of blood utilisation practices is must to implement an evidence-based multidisciplinary strategy that strives to improve the conscious practice of transfusion of blood products in clinical medicine. It is especially significant in heart surgery, where a large percentage of blood components are required.

Aim and objectives: To analyse the indications and utilisation pattern of various blood components in Cardiothoracic and vascular surgery (CTVS) patients.

Material and methods: A retrospective analysis of blood utilisation in CTVS patients whose blood requisition was received in the department of transfusion medicine at our hospital was done for a period of 4months (January 24 – April 2024). Both elective and emergency OT cases were considered for analysis. The data was collected from the blood requisition forms, crossmatch register, issue register of the department. The OT registers of CTVS department were also looked into. The obtained data was statistically analysed.

Results: A total of 149 CTVS surgeries were performed in our institute within the study period The surgeries were classified into cardiac, pulmonary and vascular surgeries. Thirty six (24.1%) were cardiac surgeries which majorly included valvular repair (n=17), Coronary artery bypass grafting(CABG) (n=10), septal closure (n=4), aortic dissection repair (n=2); 20(13.4%) were pulmonary including video assisted thoracoscopic surgery(VATS) biopsy (n=6), decortication (n=5), hydatid cyst removal (n=3), lobectomy (n=2) and rest were vascular surgeries including angioplasty (n=35), arterial bypass (n=11), artery repair (n=4), catheter thrombectomy (n=4). Of 149 surgeries, 108 (72.4%) were major surgeries and the rest were minor including AV fistula formation (n=19), and endovascular laser ablation (n=17). Out of 149 patients,the majority (74%) were males (n=110) and the rest (26%) were females (n=39). The mean age of the patients was 51.4 ±15.9 years (14-85). Only 80 patients (53.7%) required transfusion of blood components which totalled to 516 units. Maximum utilisation was seen in cardiac cases with a total of 278 units[PRBC (n=95,34%), PC (n=72,26%), FFP(n=62,22%), cryo(n=45,16.2%), SDP (n=4,1%)] being issued in routine surgeries and 37units[PRBC (n=15,40%), FFP(n=12,33%), PC (n=6,16%), cryo (n=4,11%)] in emergency cases. On an average 8.4 units/patient (PRBC=2.8, PC=2.2, FFP=1.8, cryo=1.4) were transfused in routine cardiac surgeries and 12.3units /patient (PRBC=4.9, PC=2, FFP=4, cryo=1.4) in emergency surgeries. The maximum requirement of PRBC transfusion was seen in patients undergoing septal closure [16 units (4 units /patient)] followed by CABG [36 units (3.6 units per patient)]. Most numbers of FFP/patient were issued to patients undergoing CABG [18 (1.8 units per patient)].In pulmonary surgeries, an average of 1.36 units /patient were issued in routine cases whereas 4.1 units/patient and 4.2 units/patient were issued in routine and emergency vascular cases respectively.

Conclusion: Such knowledge of blood utilisation practices in CTVS cases will help to coordinate better among clinicians, anesthesiologists, surgeons, perfusionists, intensivists, and transfusion laboratory teams, so as to provide safe, adequate and effective transfusion support to the recipients as and when needed. This will aid in efficacious execution of patient blood management program.

TINY TRANSFUSIONS: AN AUDIT OF PACKED RED CELL TRANSFUSIONS PATTERNS IN PEDIATRIC PATIENTS.

Topic: Clinical Transfusion practices
Author: Abbas Ghazi Naqvi
Co-authors: Amit Ajay Pawar, Rajat Jagani, Sudeep Kumar, Deepak Kumar, Anoop Sharma
Institution: Armed Forces Medical College

Introduction: Red cell transfusion is a life-saving therapy and plays a pivotal role in most modern day surgical and medical treatments. While being vitalizing, these transfusions especially in pediatric age group come with their own potential complications which range from mild allergic reactions to Transfusion Associated Graft vs Host Disease (TA-GvHD) or may even lead to cardio-pulmonary distress. This necessitates efforts to optimize transfusion practices and minimize unnecessary transfusions. The patterns of transfusion of blood productsare lesser understood for children as compared to adults. This study was undertaken to analyse the current trends in pediatric transfusions and to recognise areas for improvement in patient care and safety.

Aims & Objectives: To analyse packed red blood cells (pRBC) transfusion practices in pediatric population at a tertiary care centre.

Material & Methods: A retrospective study was conducted to scrutinize all pediatric pRBC transfusions for a period of two years from January 2022 to December 2023. All the patientsunder 18 years of age were included in the study. The data for the study group was recordedfrom the physical blood demand and issue forms which included patient's demographic details(age, gender and weight), diagnosis, laboratory findings (Hb) and quantity of packed cells. The data from damaged or illegibly written forms was excluded from the study. Additionally,the study collected data on disease-specific demand and utilisation of pRBC.

Results: During the study period of 24 months, a total of 531 pediatric patients (males: 60.41%, females: 39.44%) received 1524 pRBC transfusions accounting 13.54% of totaltransfusions episodes (n=11249). pRBC issued to hematology department constituted 50.46%

of total transfusions followed by surgery and allied (22.87%), pediatric department (16.84%) and department of oncology (9.83%). Only 71.9% of demand forms included the pre transfusion Hb with median 7.3gm/dL and 23.81% forms did not include weight of the patient. Thalassemia was observed to be the most common diagnosis (46.06%) for warranting pRBC transfusions.

Conclusion: This retrospective study emphasizes the importance of audit of blood transfusions in clinical settings to understand the trends in paediatric transfusions. It identified thalassemia as the leading cause of pRBC transfusion in pediatric age group at our tertiary carecentre in western Maharashtra. Incomplete pre-transfusion documentation across different departments indicates potential for improvement in transfusion practices. An optimized requisition with description of blood parameters will significantly improve appropriateness of transfusion and ensure effective blood bank inventory management, ultimately improvingpatient care and resource utilization.

A STUDY ON PREVALANCE OF ANAEMIA AND TRANSFUSION REQUIRMENTS AMONG PRETERM NEONATES IN NICU OF A TERTIARY CARE CENTRE

Topic: Clinical Transfusion practices
Author: Anuja Sri Terapalli
Co-authors: Jitendra.H.Vacchani, Shweta Upadhyay, Bhoomika Shingala
Institution: MP Shah Government Medical College

INTRODUCTION: According to WHO anaemia is a serious global public health concern. And an estimated 40% children wolrd wide are affected. With the rapidly growing population in our country and the gap in health care resources, the incidence of anaemia in neonates and preterms in specific stands as a challenge to physicians. A physiological dip in red blood cell indices is common among neonates (physiological anaemia) ,preterm neonates how ever due to there immature liver, shorter red cell life span etc cannot cope up with the demand . Hence requiring correction of anaemia through blood transfusion.In some preterms transfusion is thestand alone therapy and is life saving

AIMS AND OBJECTIVES:

1. To determine the pattern of occurence of anaemia among preterm neonates.
2. The frequency of transfusion among preterms with neonatal anaemia.

METHODS: A retrospective study conducted at the NICU of a Tertiary Care Centre for duration of 3 months from i.e February 2024 to May 2024. A total of 15 preterm neonates were taken for study.

RESULTS: Out of the 15 preterm neonates 8 required blood transfusion, 6 of them required multiple blood transfusions. Among the 8 preterm neonates requiring transfusion 6 of them were male and 2 of them were female. 5 of the preterm neonates were extremely preterm with a median age of 27 weeks, 1 of them was moderate preterm with 30 weeks. 3 of them were extremely low birth weight (<1000 grams) and the median weight was 1 kilo gram. 4 preterm neonates had Hb less than 14 gm /dl. Out of the 6 preterms requiring multiple transfusions 2 of them required more than 5 units of pcv transfusion. 3 preterm neonates were on ventilatory support and 2 of them were on room air

CONCLUSION: It was noticed that anemia was more common among male neonates than female neonates. Extremely preterm neonates and under weight neonates required more transfusion than the other preterm neonates.

IMPROVING BLOOD TRANSFUSION CARE BY EMPOWERING NURSING PRACTICES THROUGH AN IN-SERVICE TRAINING MODULE.

Topic: Clinical Transfusion practices
Author: Sehrish Chaudhary
Co-authors: Tyagi Mayurika S, Varma Amit
Institution: Santosh Medical College and Hospital, Ghaziabad, Uttar Pradesh

INTRODUCTION- Blood can't be manufactured artificially, thus donation is required. Blood is the key element in saving one's life. Bloodcomponents are expensive, and their preparation is limited. Theonly transfusion is the right transfusion, given as the right component at right time. Nurses play an important role in transfusion

practices. Thus, this study intrigued nurses' knowledge of blood transfusion. Therefore, it is crucial for nurses to have sufficient knowledge of situations, amount and methods of using blood components, possible adverse transfusion reactions and necessary care.

AIM- This study aimed to assess the impact of an in-service training module on the nurses' knowledge of blood components transfusion in a Medical College hospital.

OBJECTIVE- The objective of the study is

i) To assess the baseline knowledge of nurses regarding blood transfusion.

ii) To evaluate the nursing staff's knowledge/competency before and after the in-service trainingmodule.

METHOD- The cross-sectional study took place at a tertiary care teaching medical college hospital in Delhi NCR in February 2024, following approval from the institutional ethics committee and obtaining informed written consent from the 45 participating nurses. A validated questionnaire with four sections was used to assess the nurses' baseline knowledge of transfusion practices (pre-test), covering demographic data, knowledge of bloodcomponents, transfusion techniques, and indications and side effects of blood components transfusion.

After the pre-test, an in-service training module was conducted, followed by a post-test assessment using the same questionnaire. The knowledge scores from both tests were coded and categorized into three levels - good, average, and poor. Data were analysed using STATA MP17 software.

RESULTS- Prior to the educational program, the nurses had an average understanding of blood and its components, aswell as the techniques and potential side effects of blood component infusion. However, following the training session, the assessment test results indicated a notable enhancement in the nurses' knowledge. Specifically, there was a significant improvement from an average level of understanding to a good level, following the completion of the training module.

CONCLUSION- This study has identified a pressing issue that requires immediate attention. Inadequate knowledge poses a risk of misidentification and bacterial infection among patients. Failure to address this current situation will result in a continued violation of patients' right to receive high-quality care, leading to unfavorable patient outcomes.

Urgent implementation of mandatory, continuous professional development/ trainings for nurses is necessary. Therefore, it is recommended to activate blood transfusion committees in hospitals to enhance the quality of this common procedure and mitigate potential side effects through in-service training for nurses. Additionally, the quality of care can be improved by providing nurses with training on safe blood transfusion practices.

EXPERIENCE OF EXCHANGE TRANSFUSION IN NEONATAL HYPERBILIRUBINEMIA FROM A TERTIARY CARE CENTRE IN WESTERN MAHARASHTRA: A CASE SERIES

Topic: Clinical Transfusion practices

Author: Sadana Usha Sree, Co-authors: Amit Ajay Pawar, Rajat Jagani, Manish Kumar, Sudeep Kumar, Deepak Kumar, Anurag Gairola

Institution: Armed Forces Medical College

Introduction: Neonatal hyperbilirubinemia (NH) is a major concern within the first week of infant life. It remains a significant reason for hospitalization and a serious threat, leading to acute bilirubinencephalopathy. Early identification and management are crucial to prevent permanent neurological damage. Treatment options primarily include intensive phototherapy and exchange transfusion (ET).Exchange transfusion stands out as an effective method for achieving safe bilirubin levels, particularly in high-risk neonates, as it rapidly reduces serum bilirubin concentrations.

Aim and Objectives: We present a retrospective study of four cases of NH with an aim to evaluate the efficacy of ET in reducing serum bilirubin levels to safer thresholds and preventing further complicationsassociated with it.

Method: This retrospective study was conducted at the Department of Immunohematology and Blood Transfusion of a tertiary care center in Western Maharashtra from June 2021 to December 2023, which comprises series of four neonatal cases, admitted to the neonatal intensive care unit (NICU) with hyperbilirubinemia necessitating ET. The study was conducted a comprehensive analysis by assessing various parameters which included antihuman globulin (Indirect/Direct) tests for mother and newborns respectively, glucose-6-phosphate dehydrogenase (G6PD) deficiency in neonates,cord blood and peripheral blood investigations of neonates like complete blood count (CBC), peripheral blood smear (PBS), serum bilirubin, serum electrolytes, and serum calcium levels before and after ET to analyze the outcome of the procedure efficacy in managing NH.

Results: Three out of four neonates exhibited improvement in their clinical condition by significant reduction in bilirubin levels, accompanied by correction of other laboratory parameters which further enhanced overall survival after ET. However, one neonate developed cardiac complications and could not be revived.

Conclusion: Exchange transfusion can be a life-saving intervention in cases of NH. Despite having few cases of NH, we observed ET facilitated in significant reduction of serum bilirubin levels and also inother laboratory parameters leading to improvement in overall neonatal outcome.

THE ROLE OF HEMOVIGILANCE AND CONTINUING EDUCATION IN OPTIMIZING PERI-OPERATIVE BLOOD REQUIREMENT IN ORTHOPAEDIC SURGERIES.

Topic: Clinical Transfusion practices
Author: Richa Mishra
Co-authors: Sirat
Institution: AIIMS Bathinda

Introduction: Perioperative blood transfusions are often required due to the inherent nature of orthopedic surgeries, which can involve significant tissue manipulation, bone resection, and exposure to vascular structures, leading to varying degrees of blood loss. The decision to perform a perioperative blood transfusion is typically based on several factors, including the patient's preoperative hemoglobin levels, estimated blood loss during surgery, the extent of surgical trauma, and the presence of underlying medical conditions or comorbidities that may affect blood volume or clotting function. Hemovigilance practices and continuing education initiatives are required to be integrated in routine transfusion practice to optimize patient blood management and reduce the number of irrational transfusions.

Aims and Objectives: To assess the transfusion practices in orthopedic surgeries and study the effect of hemovigilance and continuing education on pre operative blood ordering and transfusion frequency.

Method: Retrospective observational study was conducted over a period of 3 months on patients who underwent orthopedic surgery. Our analysis centred on scrutinizing blood requisition forms, particularly examining pre- and post-transfusion hemoglobin levels, the utilization of blood components, the total number of transfused units, and the rationale behind each transfusion. Concurrently, resident doctors received comprehensive education on transfusion thresholds and international guidelines, while consultants were duly informed of these updates. Following a one-month intervention period, the forms were reevaluated for the aforementioned parameters, and observations were documented.

Result: Requisition forms of 175 patients were evaluated in pre-sensitisation phase out of which discrepancyin the actual Hb and Hb reported on form was noted in 73.4% (false reporting) of the forms. The mean Hb written on form was 8.8g/dL as opposed to mean 11.5g/dL as the actual Hb. Pre operative transfusion with single unit PRBC was given to 24% of the patients and 2 units were transfused in 8% of the patients. The mostcommon

reason for pre operative transfusion was for obtaining Pre-Anaesthetic Check-up (PAC) clearance (61.2%) followed by anticipated massive blood loss (10%) and ongoing bleed (8.4%). After initiating hemovigilance and guidelines induction for doctors, 64 patients were evaluated in the post sensitisation phase. There was a significant improvement in Hb reporting with correct Hb being reported in 53% forms. Adecrease in pre operative transfusion was also observed which was statistically significant. (p value <0.05). However, no significant decrease in post operative transfusion was noted.

Conclusion: Appropriate knowledge of transfusion thresholds, indications, and alternatives encourage judicious transfusion decisions. Effective coordination and communication among surgeons, anesthesiologists, and transfusion medicine specialists can optimize perioperative transfusion practices, minimize unnecessary transfusions, and reduce the risk of transfusion-related complications. This interdisciplinary approach ensures that patient care is tailored to individual needs, resulting in enhanced patient safety during orthopedic surgeries. By promoting strict hemovigilance practices including vigilant monitoring of the patients' relevant investigations and hemodynamic status, adherence to guidelines, and informed decision-making, healthcare institutions can enhance transfusion practices and improve patient outcomes in the perioperative setting.

COMPARATIVE ANALYSIS OF LIBERAL VERSUS RESTRICTIVE PRBC TRANSFUSION STRATEGIES IN CRITICALLY ILL CARDIAC PATIENTS

Topic: Clinical Transfusion practices
Author: Swajan Tewari
Co-authors: Deepika M
Institution: Vinayaka Missions Kirupananda Variyar Medical College and Hospitals

INTRODUCTION: Critically ill cardiac patients often require blood transfusions to address anemia and maintain adequate tissueoxygenation. However, the optimal transfusion strategy remains a subject of debate, with two primary approaches emerging: liberal and restrictive transfusion protocols. This study aims to introduce and summarize the ongoing discourse surrounding these contrasting strategies in the context of packed red bloodcell (PRBC) transfusions for critically ill cardiac patients.

AIM AND OBJECTIVES: To compare liberal and restrictive packed red blood cell (PRBC) transfusion strategies in critically ill cardiac patients and evaluate their impact on patient outcomes and transfusion-related complications to inform optimaltransfusion practices in critical care.

MATERIAL AND METHODS: This study is a randomized control trial and it includes the patients who were randomly assigned in 1:1 ratio toundergo a restrictive (transfusion triggered by hemoglobin ?8 g/dl) or a liberal (transfusion triggered by hemoglobin ?10 g/dl) transfusion strategy. In the study window period that is Dec'23 to March'24 a total 136patients were taken and divided into two groups. Each group contains a number of 68 patients whose primary clinical outcome is being compared and evaluated.

RESULTS: Out of all the 136 patients only 128 patients completed the mandatory 1 month follow up trial. Out of 68 patients of restrictive group only 62 patients completed the trial and only 26 patients received a total 168 total units of packed red blood cells and out of 68 patients in the liberal transfusion group only 64 patients completed the trial and 60 patients received transfusion a total 158 units of packed red blood cells. In the restrictive vs liberal group, all- cause death occurred in 2 patients (3.22%) in restrictive group vs 3 patients (4.68 %) in liberal group, recurrent myocardial infarction occurred in 1 patient (1.61 %) vs 2 patients (3.12 %), emergency revascularization prompted by ischemia occurred in 1 patient in each group.

CONCLUSION: Among the critically ill cardiac patients a restrictive compared with a liberal transfusion strategy resulted in anoninferior rate of Major Adverse Cardiovascular Event.

KEY WORDS: Comparative, Critically ill, Cardiac, Liberal, Randomization, Restrictive, Transfusion

ARE THE FACTOR 8 LEVELS IN GROUP O PLASMA TOO LOW? IT'S TIME TO REEVALUATE THE DOSE OF GROUP O PLASMA

Topic: Clinical Transfusion practices
Author: Safnasafeer
Co-authors: Ashish Jain, Priyanka Rathod, Dixa Kumari, Deepali Chauhan, Daljit Kaur, Gita Negi
Institution: AIIMS - Rishikesh

INTRODUCTION: The structural differences between the antigens of the ABO blood group system have been well-documented, along with their known connections to various diseases. They can also have an impact on the levels of coagulation factors indifferent 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.A total of 188 fresh frozen plasma from whole blood donors were selected randomly and were included in the study. Blood grouping was done, and factor 8, fibrinogen, PT, APTT, and INR levels were measured. The dosage of factor 8 required for administration is determined by patient's plasma volume, which is calculated using their body mass multiplied by 70ml/kg and adjusted for the hematocrit level then multiplied by the desired increase in factor level.

RESULTS: Among the participants, blood group B was the prevailing type, accountingfor 38.29%. The activity of coagulation factor 8 was found to be highest in blood groupB (mean = 236.44%), followed by blood group A (mean = 182.35%), and blood group AB (mean = 175.72%). In contrast, 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, followed by AB with a mean of 359.32 mg/dl. Blood group B had a mean level of 346.7 mg/dl, while blood 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), followed by blood group B (mean = 11.637 sec), O (mean = 11.725 sec), and A (mean = 12.15 sec). The APTT values were found to be lower in blood group AB (mean = 25.992 sec), followed by B (mean = 26.257 sec), A (mean = 27.77 sec), and O (mean = 28.531 sec). The INR levels were found to be lower in blood group AB (mean= 0.9877), followed by B (mean =0.9906), A (mean = 1.002), and O (mean = 1.007). The average factor 8 levels in an O group FFP is 254 IU / unit, while in group B it is 448.4 IU/unit (assuming the volume of 1 plasma unit is 190 ml). A patient weighing 70kg and with a hematocrit of 40 needs 2900 IU of factor 8 to achieve a 1% increase. It is only possible to achieve this after receiving 11 group O plasma, as opposed to 7group B plasma.

Among the 179 patients who received FFP transfusion in April 2024, a substantialnumber of them (43 patients) required multiple transfusions. The majority of thesepatients belonged to group O (44%), followed by group B (32%).

CONCLUSION: It has been observed that blood group O tends to have lower levels offactor 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.

A NEW WAY TO ANALYSE SEVERITY OF AUTOIMMUNE HAEMOLYTIC ANAEMIA (AIHA)

Topic: Immuno-haematology
Author: Chippy C S
Co-authors: Hem Chandra Pandey, Gopal Patidar, Rahul Chaurasia, Manoranjan Mahapatra
Institution: AIIMS New Delhi

Introduction: Severity of hemolysis in AIHA shows a wide spectrum ranging from fully compensated low grade hemolysis to life threatening severe hemolysis. Authors have classified severity of disease based on laboratory parameters such as hemoglobin, hematocrit, serum total bilirubin, serum lactate dehydrogenase (LDH), serumhaptoglobin and reticulocyte count but all these parameters are not readily available at the time of clinical presentation.[1-5] Evaluation of IgG DAT titre is another way to understand the severity of disease but it is expensive.

Aims and Objectives: We aimed to propose a criterion for assessing severity of hemolysis in AIHA patients.

Method: The study was conducted in Department of Transfusion Medicine at tertiary care centre for period of two years after Institute's ethics committee approval. DAT positive AIHA patients were included. Poly-specific DAT (anti-IgG, C3d) performed with conventional tube test (CTT) and Column Agglutination Technique (CAT).

Laboratory parameters like hemoglobin, serum total bilirubin, serum lactate dehydrogenase, DAT strength and dynamic clinical parameter like transfusion efficacy were collected from hospital information management and blood bank management system software respectively. Monospecific DAT and DAT dilution (anti-IgG 1:10, 1:30, 1:100, 1:300, 1:1000) performed using CAT (Bio-Rad, Switzerland). Those patients for whom Monospecific DAT and DAT dilution titre were not performed were excluded from the study.

The parameters used for scoring include hemoglobin, serum total bilirubin/LDH, blood transfusion and DAT strength by CTT. The cumulative score was calculated to classify the severity of hemolysis in AIHA as no active hemolysis, mild, moderate and severe disease.

Results: Among 92 AIHA patients, 45 of them fulfilled the inclusion criteria. The median age was 30 years and femalepreponderance was seen. Mean hemoglobin was 6.8 g/d. The median total bilirubin and LDH levels were 2.3mg/dL and 538 IU/L respectively. 26 patients received blood transfusion and more than half of them received multiple transfusions. IgG DAT titre of 10, 30, 100, 300 and 1000 were present in 11 (24%), 10 (22%), 5 (11%), 3 (7%) and 16 (36%) patients respectively. The scoring system classified 8 patients as mild, 16 as moderate and 21 as severe AIHA. A positive correlation (Spearman rank coefficient of 0.7) of the scorewas observed with the IgG DAT titre.

Conclusion: The study tried to address the limitations of previous scoring systems by incorporating simple clinical, hematological, biochemical and serological aspects of the disease. The scoring system could be easily adoptedby most centres even in resource limited settings to assess severity of AIHA and hence the need for aggressivetreatment and monitoring. This study is limited by relatively small sample size and usefulness only in IgG DAT positive AIHA patients.

References

1. Wikman *et al.*, *Annals of Hematology, 2005*
2. Das *et al.*, *Annals of Hematology, 2009*
3. Wheeler *et al.*, *Am J Clin Pathol, 2004*
4. Barcellini *et al.*, *Blood, 2014*
5. Li *et al.*, *Transfusion, 2015*

BLOOD COMPONENT UTILIZATION PATTERNS IN CONGENITAL HEART SURGERIES: INSIGHTS FROM A TERTIARY PEDIATRIC HOSPITAL

Topic: Clinical Transfusion practices
Author: Prathma Garewal
Co-authors: Seema Dua, Mukesh Kumawat, Kriti Batni, Satyam Arora
Institution: PGICH Noida

Introduction: Congenital heart surgeries (CHS) require meticulous management of blood components to mitigate perioperative risks and optimize patient outcomes. This study aims to present an analysis of blood component utilization patterns in CHS procedures conducted at a tertiary pediatric hospital to identify trends and opportunities for improvement in transfusion practices.

Aim and objectives: To analyse the blood utilization in CHS and the factors affecting the requirement of blood components in these patients.

Methods: This was a prospective descriptive study done from June 2023 to April 2024 to analyze the factors associated with blood transfusion in CHS patients under 18 years. We analyzed the blood components utilized and the factors influencing transfusion decisions, such as patient demographics, preoperative hemoglobin level, coagulation profile, duration of surgery, overall blood loss during surgery and transfusion requirement.

Result- A total of 40 Cardiothoracic vascular surgeries were performed out of which 20 (7 females, 13 males) were due to congenital causes. Mean age of patients was 5.5 years +/- 4.47 SD (6 months - 11 years) and mean weight – 14.5kg. Mean pre surgical hematological parameters were hemoglobin of 13.9 g/dl and mean platelet count of 2.19 lakh/µ Mean PT/INR was 15.41 seconds/1.2. Five patients were noted to have preoperative anemia (10.34 g/dL +/-1.25 SD). No patient was transfused preoperatively. Nine patients had deranged mean PT/INR was 16.2 seconds/1.27. Fourteen patients had cyanotic and 6 had acyanotic heart disease. Congenital heart diseases included were tetralogy of fallot (TOF; n=5), patent ductus arteriosus (PDA; n=4), ventricular septal defect (VSD; n=9), atrial septal defect (ASD; n=2). Mean duration of surgery was 3.84 hours (Maximum for TOF-5.6 hrs and minimum for PDA-1.8 hrs). Mean blood loss per patient overall was 404 ml (27.86ml/kg) and was maximum in TOF surgeries 580 (40ml/kg)and minimum in PDA 147ml (10ml/kg.) Blood component requirement was highest in patients with TOF posing a high utilization of FFP (52.9ml/kg), followed by PRBC (23.5ml/kg).patients with PDA required only PRBC transfusion (5.58ml/kg). In preoperative anaemia cases mean PRBC transfused was 317 ml (33.4ml/kg) as compared to patients without preoperative anaemia 484 ml(29.54 ml/kg). In patients with deranged PT/INR, mean FFP transfused was 364 ml (18.35 ml /kg) and cryo was 33 ml (1.66ml/kg). In patients with a normal coagulation profile, mean FFP transfused 264 ml (23.55ml/kg)and mean cryo transfused 44.3 ml (3.95ml/kg). Overall, mean hospital stay was of 5 days.

Conclusion: There is growing interest in patient blood management (PBM) for pediatric surgeries as it enables optimal utilization of blood and blood products and avoids unnecessary transfusion. Optimization of pre operative hemoglobin and assessment of maximum allowable blood loss through this study prior to CHS will encourage minimizing transfusions especially in pediatric population and help in establishment of an effective PBM program.

EFFICACY OF GRANULOCYTE TRANSFUSION IN NEUTROPENIA

Topic: Clinical Transfusion Practices
Author: Navami.G.S.
Co-authors: Ganesh Mohan. Shamee Shastry. Deepika Chenna. Deep Madkaikar
Institution: Department of Immunohematology and Blood Transfusion, Kasturba Medical College Manipal, Manipal Academy of Higher Education, Manipal, Karnataka

Introduction: Despite the advances in antimicrobial therapy, neutropenic sepsis remains a major challenge, especially for patients on immunosuppressive therapies. Granulocytes concentrates have been explored as therapeutic option in the few indications as

1. Severe neutropenia as defined by ANC <0.5 x 10^9/L.
2. Under active treatment to achieve remission.
3. Proven bacterial/fungal infection unresponsive to appropriate antimicrobial therapy.
4. Neutrophil recovery is anticipated.
5. A congenital neutrophil dysfunction despite normal counts.

Aims and Objectives: The primary objective was to evaluate the efficacy of granulocyte transfusion in improving clinical outcomes of patients whereas the secondary objective was to assess the factors affecting the yield of apheresis granulocyte concentrates (GCs).

Materials and Methods: A retrospective study was conducted between January 2019 to January 2024. Donors who met Drug and Cosmetic act, 1945, criteria were selected for granulocytapheresis, ABO and Rh matched and established baseline blood counts. The donors were given Dexamethasone 8mg and GCSF 10µg/Kg as mobilization regime 12 hours prior to the collection. Blood counts were checked pre-procedure after mobilization, midway through the collection, and from the finished product to establish the yield and efficacy of apheresis collection. All granulocytes were collected using either Spectra Optia (Terumo BCT) or Com. Tec (Fresenius- Kabi) equipment. Acid Citrate Dextrose-A was the anticoagulant and prophylactic Calcium supplementation was given to the donors and donors were monitored throughout the procedure. The target dose was kept as $0.6x10^9$/Kg of granulocytes for pediatrics and $1x10^{10}$ granulocytes for adult patients. The collected product was properly labeled, irradiated and stored in a designated area at 22-24^{0}C without agitation for up to 24 hours before issue. Before granulocyte transfusion to the patient, chest x- ray was taken and patients were closely monitored during transfusion. Study endpoints were defined as clinical improvement with an increase in neutrophil counts or improvement in sepsis.

Results: There were 38 apheresis granulocyte collections during the study period that were transfused to 22 patients. The average age of the donors was 28.2 (SD=8.12) years and the average age of the patients was 14.8 (SD=14.61) years. The average donor weight was 77.63 Kg (SD=12.93) and the patient's average weight was 33.08±20.42 Kg. The total WBC count before mobilization, after mobilization, yield mid-way through the procedure, and final yield was 7192.81 (±2346.83), 30142.18 (±8239.5), $6.87x10^9$ /ml and $1.77x10^{10}$ /ml respectively. The average yield/Kg of the patient was (0.7±0.6) $x10^9$ in the final product. The average volume collected was 268.74±71.36 ml. Among 22 patients, 18 patients recovered and discharged from the hospital. Pre and post-transfusion neutrophil counts in patients were $0.16±0.40x10^3$/µL and $0.59±0.61x10^3$/µL respectively (P=0.008). One donor experienced a hematoma during collection, and all other procedures were uneventful. No adverse transfusion reactions were reported during the study.

Conclusion: In the current study, granulocyte transfusions were shown to improve the clinical outcomes of the patients, improve the neutrophil counts, and help in recovery from sepsis. Appropriate donor selection and good mobilization resulted in an adequate yield of granulocytes.

ESTIMATION OF BLOOD UTILIZATION IN COMMON ELECTIVE SURGERIES: A KEY TO FORMULATE MAXIMUM SURGICAL BLOOD ORDERING SCHEDULE.

Topic: Clinical Transfusion practices
Author: Tamanna Kalra
Institution: Adesh Institute of Medical Sciences and Research

Introduction: Evaluating blood utilization practices in elective surgeries is essential to address gaps between requisition and the actual usage of blood.

Aim: This study aimed to estimate blood utilization and design a blood ordering schedule as a guide to normal transfusion needs for common elective surgeries.

Method: Observational-cross sectional study was undertaken for 12 months. 53 elective surgeries across different specialties were analyzed including Urological, Cardiothoracic, Gastric, Paediatric, Oncological, Orthopaedic, Obstetrics and Gynaecological and Otorhinolaryngological surgeries. Blood utilization indices – Crossmatch to Transfusion (CT) Ratio, Transfusion Probability (TP), Transfusion Index (TI), Blood Utilization%, Non-Utilization Probability, and Blood Ordering Quotient (BOQ) were calculated against standard blood usage to formulate the MSBOS using Mead's criteria.

Results: For 882 patients, 1160 PRBC units were requested and cross-matched. 574 units were transfused. Non- utilization of 586 units (51%) suggested indiscriminate ordering of blood. The non-utilization of units cross- matched ranged from 27% to 100% in different surgical specialties. TP was 48.64%, varying from 13.37% in Urological Surgeries to 88.89% in Cardiothoracic Surgeries. The CT ratio ranged from 1.37 to 7.31, TI from 0 to 2.03, and BOQ from 1.36 to 7.26 in different procedures. While overall CT ratio, TP, and TI were acceptable, ineffective blood usage was observed in 22 of the 53 surgeries.

Conclusion: Efforts towards rationalizing blood usage are crucial. Developing an MSBOS based on the findings wouldenhance the efficiency of blood utilization in elective surgeries.

Keywords: MSBOS, CT ratio, Transfusion Probability, Transfusion Probability, Transfusion Index, Blood Ordering Quotient.

PULMONARY TRANSFUSION REACTIONS: EXPERIENCE FROM A TERTIARY CARE CENTRE

Topic: Hemovigilance
Author: Neetu Devi, Co-authors: Dr. Kshitija Mittal, Dr. Ravneet Kaur, Dr.Gagandeep Kaur, Paramjit Kaur
Institution: Government Medical College And Hospital, Chandigarh

INTRODUCTION: Pulmonary Transfusion reactions encompass a spectrum of acute adverse pulmonary complications that can arise following blood product transfusion, which includes Transfusion-Associated Circulatory Overload (TACO), Transfusion-Related Acute Lung Injury (TRALI), and Transfusion-Associated Dyspnea (TAD).

AIM: To investigate the incidence, clinical presentation, and outcomes of pulmonary transfusion reactions in patients receiving packed red blood cells (PRBCs), platelets, or fresh frozen plasma (FFP) at our tertiary care centre.

MATERIAL AND METHODS: This cross-sectional observational study was conducted at a tertiary care centre over a period of 1 year from 1st January 2023 till 31st December 2023. The medical records of patients who experienced adverse transfusion reactions following blood components transfusions at our tertiary care centre were reviewed. Patients who received at least one unit of PRBCs, platelets, or FFP during the study period and exhibited clinical symptoms suggestive of a pulmonary transfusion reaction, such as dyspnea, hypoxia, fever, or signs of ARDS, were included in the analysis. Data on patient demographics, transfusion history, clinical presentation, laboratory findings, radiological assessments, and outcomes were collected and analysed.

RESULTS: During the study period, 40,610 blood components were issued, of which PRBC units comprised 52.8 % (21,450). Of 40610 blood components transfused, adverse transfusion reactions were reported in 90 (0.22%) patients. Of these 90 transfusion reactions, 8(8.8%) patients complained of signs and symptoms related to pulmonary complications. All these 8 reactions were implicated to PRBC unit transfusion. The mean age of patients who experienced pulmonary transfusion reactions was 45 years, with a range of 18-72 years. The majority were male (n=7) patients. Blood groups of patients who experienced pulmonary transfusion reactions was A (n=6; 75%) and AB (n=2;25%) Rh D positive. Five (62%) patients who experienced reactions had history of multiple transfusions. The primary indications for transfusion included anemia in 6 (75%) and surgery in 2 (25%) patients. The underlying clinical conditions included orthopedics, medical and surgical conditions. Shortness of breath (SOB) was reported in all the (100%) patients accompanied by a fall in oxygen saturation in 3 (37.5%) patients with 1 patient requiring intubation and invasive ventilation. The pulmonary transfusion reactions were classified as TAD in 4 (50%) cases manifesting as TAD, TACO in 3 (37.5%) and TRALI in 1(12.5%) case. Out of the 8 patients identified with pulmonary transfusion reactions across various departments, 3 (37.5%) patients expired due to septic shock with associated comorbidities. The imputability varied from possible to probable in these cases.

CONCLUSION: Pulmonary transfusion reactions pose a significant risk to patients undergoing blood transfusion procedures. Timely recognition and appropriate management are crucial in minimizing complications and improving patient outcomes. Careful differentiation between TRALI and TACO is important for taking adequate preventive measures.

ANALYSIS OF BLOOD DONOR DEFERRAL IN PLATELETPHERESIS DONORS

Topic: Apheresis and Cellular therapies
Author: Rohan Mahajan
Co-authors: Rohan Mahajan, Gagandeep Kaur, Kshitija Mittal, Ravneet Kaur, Paramjit Kaur
Institution: Government Medical College And Hospital, Chandigarh

Introduction: Application of stringent blood donor selection criteria ensures blood donor safety and quality of the product. However, blood donor deferral results in loss of potential donor and thereby, availability of the product for needy patients.

Aims and Objectives: To analyse the various reasons of plateletpheresis donor deferral at our institute.

Materials and Methods: This was a retrospective observational study conducted from 1st August 2022 to 30th April 2024 in a tertiary care centre. Blood donors who approach for plateletpheresis areselected as per standard operating procedure (SOP) of the centre. Three ml of blood sample is collected from the blood donor in EDTA vial who fulfils the donor selection criteria. Blood grouping and screening for transfusion transmitted infections is performed on blood donor's sample as per departmental SOP. The plateletpheresis procedure is performed as per departmental SOP. Donors who do not fulfil the donor selection criteria are deferred and documented in the plateletpheresis donor deferral record register. Data pertaining to plateletpheresis donor deferral was retrieved from records and analysed for donor characteristics, type of donor deferral and reasons of deferral.

Results: Out of the 1451 male donors enrolled for plateletpheresis procedure, 500 blood donors (34.5%) were

deferred and plateletpheresis was performed on 951 donors. The mean age of the donors was 30.8 ± 7.92 years. Majority (n=487, 97.4%) of the deferrals were temporary. The most common reasons of deferral were presence of poor veins (n=153, 30.6%) followed by low platelet count (n=108, 21.6%) and 39 (7.8%) donors were deferred as blood group was different from patient's blood group. Other reasons of deferral were donors with haemoglobin less than 12.5 g/dl (n=16, 3.2%) and underweight donors (n=16, 3.2%). Thirty-one (6.2%) donors were deferred due to various medications. Thirteen (2.6%) donors were deferred permanently. These included six donors reactive for various transfusion transmitted infections (5 for HBsAg and 1 for anti-HCV antibodies) and seven donors were deferred due to their high-risk behaviour.

Conclusion: - Insights on donor deferral criteria is crucial to refine eligibility criteria and targeted approach to include more donors who meet the criteria.

EVALUATION OF DONOR PARAMETERS AND THEIR RELATION WITH PLATELET YIELD & COLLECTION EFFICIENCY IN PLATELETPHERESIS AT BLOOD CENTRE IN A TERTIARY CARE HOSPITAL

Topic: Apheresis and Cellular therapies
Author: Viraat Singh, Co-authors: Sankalp Sharma
Institution: AIIMS Raipur

INTRODUCTION: The collection efficiency (CE) and platelet yield (PY) of SDP is influenced by donor parameters which mayinfluence length of procedure and consequent procedure mediated donor reactions.

AIM: To study an effect of donor parameters on CE and PY of single donor Apheresis platelets (SDAP).

MATERIAL & METHODS: This retrospective observational study conducted at our blood centre. Data of SDAP procedure was collected from September, 2023 to May, 2024. We used TERUMOBCT Spectra Optia Apheresis System. Data was analysed in Microsoft excel. We estimated the median (95%CI) of the donor parameters. A relationship of donor parameters as independent variables with CE & PY as dependent variables were analysed using Pearson correlation coefficient. $p<0.05$ was considered as statistically significant.

RESULTS: In a total (n=53) plateletpheresis performed during study period, there were 52 male donors (98.11%) and 1 female donor (1.89%). Median age (95%CI) of donors was 31±1.99 years, mean weight(SD) was 77.2±10.12 kg, mean height(SD) was 172.86±5.13 centimetre, mean haematocrit(SD) was 42.8±3.02%, mean(SD) pre- procedure platelet count was 255.37±67.76 lakhs/microliter, mean(SD) donor blood volume processed was 2797.41±449.00 mL, mean(SD) Anticoagulant (AC) to donors was 248.18±47.79 mL, mean(SD) PY (actual) was 4.26±0.83x1011, mean(SD) CE was 82.69±8.79%, mean (SD) platelet loss was 26.87±6.30% and mean(SD) time elapsed for the procedure is 79.99±7.47 minutes . Positive significant correlation was observed between PY and pre-procedure platelet count ($r=0.648, p<0.00001$). Non-significant correlation found between PY and age ($r=0.041$, $p=0.768$), height ($r=0.05$, $p=0.718$), haematocrit ($r=0.183$, $p=0.189$), blood volume processed ($r=-0.093, p=0.506$), donor weight ($r=0.256, p=0.06$), time elapsed for procedure ($r=-0.198, p=0.155$) and platelet loss ($r=0.093, p=0.50$). A negative significant correlation was observed between PY and volume of AC to donor ($r=-0.287$, $p=0.036$). A significant positive correlation was observed between CE and platelet loss ($r=0.299$, $p=0.029$). Non-significant correlation was observed between CE and all other donor parameters. For donors with double dose plateletpheresis (i.e. PY >5.0x10^11) in a single procedure, significant positive correlation was observed between CE and platelet loss($r=0.409$, $p=0.002$) & non-significant correlation was observed between PY and all other donor parameters. For donors with single dose plateletpheresis in a single procedure, significant positive correlation was found between PY and pre-procedure platelet count ($r=0.550$, $p=0.0001$) & between CE and platelet loss ($r=0.407$, $p=0.002$) & non-significant correlation was observed between PY and all other donor parameters.

CONCLUSION: The pre-procedure platelet count was the only donor parameter having positive significant correlation with PY in contrast to CE where Platelet loss was the only parameter which was significantly correlated to it. Volume of AC to donors have non-significant correlation with PY for both single dose plateletpheresis and double dose plateletpheresis donors. Donors with single dose plateletpheresis in a single procedure, pre-procedure platelet count has significant positive correlation with PY and Platelet loss has significant positive correlation with CE. Donors with double dose plateletpheresis in a single procedure, PY was non-significant correlated to all the parameters observed but CE was significantly correlated to Platelet loss.

INSIGHTS INTO PAEDIATRIC PERIPHERAL BLOOD STEM CELL TRANSPLANTS AND TRANSFUSION SUPPORT DURING THE ENGRAFTMENT PERIOD: A RETROSPECTIVE STUDY IN SOUTH INDIA

Topic: Apheresis and Cellular therapies
Author: Ancy Ninan
Institution: Kasturba Medical College

INTRODUCTION: Hematopoietic stem cell transplantation (HSCT) emerged as a treatment modality for life-threatening hematological disorders. An adequate mobilization of hematopoietic stem cells is critical for successfulengraftment of HSCT and donor variables like age, gender, body weight, and pre-procedure CD34 count have been identified as possible predictors of good mobilization in adult HSC donors. Data are scarce regarding paediatric PBSC mobilization and transplant.

AIMS AND OBJECTIVES: To assess various factors affecting paediatric PBSC product yield and to assess transfusion support provided during the engraftment period.

MATERIALS AND METHODS: A retrospective study of paediatric patients (less than 18 years of age) who underwent PBSC transplants, from January 2021 to January 2024, were included in the study. All the demographic and diagnosis details, blood group, weight, volume of product were collected from hospital records, blood center software and various laboratory parameters like complete blood counts, CD34 counts, culture reports were taken from lab software. All the PBSC procedure was done in Spectra Optia.

RESULTS: We had a total of 19 paediatric patients who underwent PBSC procedures during the study period, with a slight predominanc e of males (52 %). The mean age of the patients was 7.6± 5.1 years, with an average weight of 22.8±14.5kg.

In terms of transplant type, 57.8% were autologous, and 42.2% were allogenic. Indications for HSCT were transfusion-dependent thalassemia (31.5%), metastatic neuroblastoma (21%), relapsed Acute Myeloid Leukemia (15.7%), relapsed Hodgkin lymphoma and Severe Combined Immuno Deficiency (10.5%). Among allogeneic HSCTs, all donors were related, with 62.5% of transplants being ABO-matched. 73.6% procedures were done with RBC priming.

Pre-procedure mean MNC was 19.26 x10 3±9.16 x10 3/µL. The mean final CD34 count and MNC count of the product were 1231.5± 974.5/µL and 192.8x10 3 ±73.4x103/µL respectively with an average volume of 202.63 ± 47.63 ml. The average total MNC count and total yield of CD34 cells in the product was 386.6x108±158.72 x10 8 and 2.5 x 10 8± 2.04 x10 8 cells respectively. Based on body weight median yield of CD34+ cells in the final product was 6.7 x106/kg (3.9-23).

In terms of transfusion requirements for patients , mean RBC, RDP, SDP units transfused were 2.22±1.08, 14.5±10.2 and 2.75±1.39 respectively We observed a significant positive correlation of CD34+ cells yield with weight (correlation coefficient=0.24, p=0.007) and age (correlation coefficient=0.2, p=0.05) of the donor/recipient. There was no significant correlation of CD34+ cells with gender of the donor/recipient. It was also observed that MNC yield had a significant positive correlation with CD34 yield (correlation coefficient=0.3) with approximately 2.3% MNC yield equivalent to the CD34 yield.

CONCLUSION: Understanding the factors affecting the yield could lead to more informed decision-making regarding the selection and use of stem cell mobilizing agents, ultimately optimizing the collection process. Present study shows pre-procedural MNC can be used as a predictor for good yield in the stem cell product.

ROLE OF THERAPEUTIC PLASMA EXCHANGE IN VARIOUS NEUROLOGICAL DISEASES IN A TERTIARY CARE HOSPITAL

Topic: Apheresis and Cellular therapies
Author: Ruchika Bhartia
Co-authors: Shatakshi Jindal, Devender Singh Chauhan
Institution: Ram Manohar Lohia Hospital Delhi

Introduction: Therapeutic plasma exchange (TPE) is often used as a treatment modality in various clinical conditions. It is considered as first line treatment as per American Society for Apheresis (ASFA) guidelines in Guillain-Barre syndrome, Chronic inflammatory demyelinating polyradiculoneuropathy and myasthenia gravis & second line treatment for Neuromyelitis optica spectrum disorder and Acute disseminated enchepalomyelitis.

Aims and objectives: To evaluate the role of therapeutic plasma exchange in various neurological diseases.

Methodology: A retrospective analysis of TPE procedures was performed in the Department of Transfusion Medicine in a tertiary care hospital over a period of one year (April 2023 to April 2024). All procedures were performed on Spectra Optia cell separator (Terumo BCT, USA) , either daily or on alternate days depending on the clinical condition of the patient. The demographic details and ASFA category of the patients were recorded. Pre and post procedural clinical signs were analyzed to assess the response to TPE therapy. Details of any adverse events during the procedures were also retrieved.

Results: During the study period, a total of 88 TPE procedures were performed in 21 patients out of which 11 patients were males (52.3%) & 10 were females (47.7%). The mean age of the patients was 32 ± 18 years (7 to 70 years). Majority (n=12; 57.2%) of the patients had ASFA category II indication which included NMOSD (n=11; 52.3%) and Acute disseminated enchepalomyelitis (n=1; 4.7%). Remaining 9 (42.8%) had ASFA category I indication such as Guillain-Barre syndrome (n=5; 23.8%), myasthenia gravis (n=2, 9.5%) and Chronic inflammatory demyelinating polyradiculoneuropathy (n=2; 9.5%). The number of TPE cycles performed per patient varied between 1 - 6. First cycle of TPE was done approximately two weeks after onset of disease. The replacement fluid used in all procedures was Human Serum Albumin (4%) and 0.9% normal saline. Complete clinical recovery, mild improvement or no improvement was observed in 12 (57.2%), 5 (23.8%) and 4 (19.0%) patients, respectively. Nine patients (42.8%) experienced adverse events during the procedure, with hypotensive episodes being the most common (n=7; 33.3%) followed by febrile reaction (n=2; 9.5%). Three (3.4%) procedures were aborted due to central line blockage.

Conclusion: Therapeutic plasma exchange was found effective and safe in different neurological conditions with prompt diagnosis and timely intervention.

EFFECTIVENESS OF PROMPT PLASMA EXCHANGE IN SERIES OF RAT POISON CASES WITH ACUTE LIVER FAILURE.

Topic: Apheresis and Cellular therapies
Author: Palak Aggarwal
Institution: Wenlock District Hospital

Introduction: Yellow phosphorus (rat poison) poison is a protoplasmic chemical agent which is frequently consumed accidentally or intentionally in Dakshina Kannada. This poison has lethal dose of 1 mg/kg which is hepatotoxic and starts affecting liver after 24 hrs of gastrointestinal affects. It evolves phosphine in dilute acid in the digestive tract producing signs and symptoms. It is directly hepatotoxic after absorption. A series of cases are presented in which an effect of plasma exchange among yellow phosphorus poisoning cases within 24- 48 hrs of consumption is assessed

Aims: The study is aimed at investigating the efficacy of immediate plasma exchange intervention in rat poisoning cases.

Objectives:

Primary Objective: To elucidate the potential therapeutic advantages of administering plasmaexchange within a 24-48 hours window following rat poison ingestion as a treatment modality.

Secondary Objective:

1. To evaluate the clinical outcomes such as mortality rates, recovery time, symptom resolution
2. To assess the impact of plasma exchange on biochemical markers (Liver Function tests, Renal function tests etc)

Materials And Methods: A prospective observational study conducted from Jan'21 - Apr'24among 10 yellow phosphorus poisoning cases in Dakshina Kannada. The clinical features, lab data before and after plasma exchange, quantity and time of poison consumed were documented.

Results: The total 10 cases are presented among which 6 cases responded well to plasma exchange with correction of liver enzymes and serum creatinine, among them 2 patients died, 1 patient developed acute kidney injury (referred for hemodialysis) and 1 patient was discharged against medical advice.

Conclusions: The yellow phosphorus poisoning cases with acute liver failure which were treated with daily cycles of plasma exchange within 24-48 hrs of consumption responded well as compared to cases in which plasma exchange was started after 72 hrs of consumption of rat poison. Therefore, in conclusion the survival rate was high in cases of rat poison where plasma exchange was done promptly.

A STUDY TO ANALYZE THE EFFECTIVENESS, IMPREGNABILITY AND CHALLENGES FACED IN THERAPEUTIC PLASMA EXCHANGE IN PEDIATRIC PATIENTS

Topic: Apheresis and Cellular therapies
Author: M Karthick, Co-authors: Girija Nandini Kanungo
Institution: Institute of Medical Sciences and SUM Hospital Bhubaneswar

INTRODUCTION: Therapeutic plasma exchange (TPE) is a procedure in which patient's plasma is removed and is replaced with either human albumin solution(4-5%) or fresh frozen plasma (FFP) in order to remove suspected disease mediators from the body such as pathogenic auto antibodies, immune complexes, complement factors and cytokines. TPE is not a common modality used in pediatric patients as compared to the adult patients due to certain limitations such as low total blood volume, vascular access limitations, side effects and complications during the procedure. Due to which there are only limited studies available with regards to efficacy and safety of TPE in pediatric patients. In the given study, efficacy, safety and limitations faced while carrying out TPE in a total of 16 pediatric patients are discussed.

AIMS AND OBJECTIVE: The aim of the study is to analyze the efficacy and safety of TPE procedure in pediatric age group.

The objective of the study is to discuss and elaborate about the limitations we faced in pediatric patients undergoing TPE before, during and after the procedure.

METHOD: Pediatric patients (n=16) of age group between 5 to 17 who had received TPE from january 2022 to march 2024 were analysed retrospectively. In total, 59 procedures were evaluated. Therapeutic plasma exchange was performed with SPECTRA OPTIA TERUMO BCT Apheresis automated machine using central venous access.

RESULT: Indications for TPE were mainly neurological disorders such as Gullian barre syndrome(n=3) (18.75%), Longitudinally extensive transverse myelitis(LETM)(n=3) (18.75%), meningoencephalitis(n=2) (12.5%), Myasthenia Gravis(n=1)(6.25%). The other indications were Systemic Lupus Erythematosus(n=2) (12.5%), Thrombotic Thrombocytopenic Purpura(TTP)(n=2)(12.5%), Acute Liver failure(n=1)(6.25%), Atypical Hemolytic Uremic Syndrome(aHUS)(n=1)(6.25%) and Septic shock(n=1)(6.25%).

Procedure related complications such as allergic reactions, catheter dysfunction and need of RBC priming in view of low hematocrit were observed.

Symptomatic improvement such as power, cognition, sensation etc., in neurological cases such as LETM and meningoencephalitis were seen. In case of myasthenia gravis, improvement in muscle weakness was observed. In case of Liver failure patients, serum bilirubin, INR, serum creatine improved significantly. Improvement in hematological parameters such as schistocytes %, serum LDH levels, platelet count, and serum bilirubin level in case of TTP and aHUS were observed. Symptomatic improvement in all pediatric patients was observed except one liver failure patient who succumbed to death due to septic shock after 3 cycles of PLEX, procedures being uneventful.

CONCLUSION: TPE is a safe procedure in pediatric patients with advent of better apheresis machines which are capable of maintaining a safe extracorporeal volume in patients with small blood volume. Though there are certain difficulties such as establishing the venous access and convincing the clinicians about the importance of PLEX, TPE has resulted in good clinical outcomes. As per the study's result, TPE is a safe and potentially life-saving treatment for critically ill patients, especially in specialized, experienced facilities with the right institutional protocols and sufficient technical and medical assistance.

EXPLORING THE IMPACT OF INTRODUCTION OF THERAPEUTIC PLASMA EXCHANGE IN ACUTE LIVER FAILURE PATIENTS AT OUR TERTIARY CARE CENTRE IN SOUTHERN INDIA.

Topic: Apheresis and Cellular therapies
Author: Mudium Pushpaja
Co-authors: K.Mahesh Kumar, B. Shanthi, V. Sudhir Kumar, B.Murali Krishna
Institution: NIMS Hyderabad

Introduction: The management of acute liver failure (ALF) involves the removal of toxins and inflammatory mediators while supporting liver function, which is crucial while awaiting transplantation or hepatic regeneration. Therapeutic plasma exchange (TPE) presents a promising approach by effectively eliminating toxins and replenishing essential factors in Acute liver failure.

Aims and Objectives:

1. To assess the effect of Therapeutic plasma exchange on mortality rates among acute liverfailure patients.
2. To evaluate the impact of Therapeutic plasma exchange on biochemical parameters in acuteliver failure patients.

Materials and Methods: This prospective study included all acute liver failure cases referred for therapeutic plasma exchange therapy over the past six months. Therapeutic plasma exchange was performed using a standard volume centrifugation system on alternate or daily basis.

Parameters including acute liver failure severity assessment by Acute liver failure early dynamic scoring (ALFRED Score) . This score includes hepatic encephalopathy grading, ammonia, total serum bilirubin, international normalised ratio (INR) . Other biochemical parameters like Alkaline phosphatase (ALT), Ala nine transferase (AST), lactate dehydrogenase (LDH)were assessed before and after Therapeutic plasma exchange cycles.

Results: Therapeutic plasma exchange was administered to a total of 11 cases, comprising 6 males and 5 females, with an age range of 13 to 65 years. Aetiologies included drug-induced liver injury, viral hepatitis, poisoning, alcoholic liver disease, and Wilsonian liver failure. The therapy commenced on average 4 to 11 days post-admission. Survivors showed significant improvement after undergoing therapeutic plasma exchange, especially when treatment was started early, and their acute liver failure scores were lower. In contrast, individuals who did not survive had persistently elevated biochemical parameters.

Conclusion: Therapeutic plasma exchange emerges as a valuable adjunctive therapy in acute liver failure, demonstrating positive outcomes when initiated promptly and in cases with lower acute liver failure early dynamic scores (ALFRED scores). Early initiation of therapeutic plasma exchange, especially in poisoning cases, holds promise for reducing mortality rates in Acute liver failure. These findings underscore the potential of Therapeutic plasma exchange as a complementary intervention alongside standard medical management in acute liver failure cases. Such findings should be more explored to emphasise the importance of exploring innovative therapies to enhance patient outcomes in critical conditions like acute liver failure.

KEYWORDS: Acute liver failure, therapeutic plasma exchange, acute liver failure early dynamic scores (ALFRED scores).

FACTORS INFLUENCING DONOR COUNSELLING RATE IN WESTERN RAJASTHAN AND EFFECTIVENESS OF WHATSAPP BASED VIDEO COUNSELLING – A PROSPECTIVE INTERVENTIONAL STUDY (FIND STUDY)

Topic: Transfusion transmitted infections
Author: Gautam Harsh
Co-authors: Gautam Harsh, Siddharth Mittal, Vasanth Asirvatham
Institution: AIIMS Jodhpur

Background: Donor notification and counselling are crucial elements in the domain of blood safety and donor care. Transfusion transmitted infections (TTI) reactive donor notification is critical for early clinical management to reduce the severity of disease burden in the community and risk among partners and close contacts.

Aim: Prospective analysis of blood donors in Western Rajasthan to assess their response rate tocounselling and factors influencing the same.

Primary Objective: To analyse the response rate of TTI reactive donors after notification of theirtest results.

Secondary Objective:

1) To assess the factors influencing the response rate of TTI-reactive donors
2) To analyse the effectiveness of What's app-based video counselling in improving response rateto counselling.

Methods: This is a prospective interventional study, approved by institutional review board in which all TTI-reactive donors from January 2022 to December 2023 were included as per inclusion and exclusion criteria. The response rate of TTI-reactive donors to standard three telephonic communication after notification of abnormal test results was analysed. The donors who did not respond after standard communication protocol were labelled as non-respondents. Among non-respondents, a fourth attempt of telephonic communication was made and telephonic survey was conducted who gave their verbal consent. Results of telephonic survey were evaluated to determine the factors responsible for their non-respondent status. Permission for what's app- based video counselling among non-respondents was obtained from Blood Safety division, State AIDS control society and then it was conducted among non-respondents who gave consent.

Results: A total of 18269 donations were screened for TTI between January 2022 to December 2023 among which, 278were found to be TTI-reactive. Among 278 reactive donors, 30(0.16%) were Human immunodeficiency virus (HIV) reactive, 145(0.79%) were Hepatitis B virus (HBV) reactive, 73(0.39%) were Hepatitis C virus (HCV) reactive, 30(0.16%) were Rapid Plasma Reagin (RPR) reactive.

Out of 278 reactive donors, 103 donors were respondents and they reported to blood centre for counselling after standard communication protocol (Response rate – 37%). Remaining 175 donors were non-respondents. Among non-respondents, 86 donors responded to fourth call for telephonic survey. Among 86 donors who underwent telephonic survey, 40 gave complete response. The results of survey revealed that majority of donors did not come for counselling as they are out of station 47.5% (19/40) or unable to come due to busy schedule 40% (16/40) Majority donors preferred what's app-based platform75% (30/40) for counselling or notification of test results. 40%(16/40) donors did not know that their blood is tested for TTI while 45% (18/40) and 22.5 % (9/40) donors were unaware that TTI can be transmitted by blood transfusion and sexual intercourse respectively. Among 86 donors who underwent telephonic survey, whats app video counselling was successfully conducted in 40 donors, leading to overall improvement in response rate by 14%.

Conclusion: Low response rate among notified blood donors in our region poses a challenge and increased risk. Counselling methods should evolve with advancement in communication technology. WhatsApp-based videocounselling offers a convenient and confidential way of improving response rate.

PREVALENCE OF TRANSFUSION TRANSMITTED INFECTIONS AT A TERTIARY CARE CENTRE IN WESTERN INDIA – 8 YEARS RETROSPECTIVE STUDY

Topic: Transfusion transmitted infections
Author: Sainu Ummulkhulzum S
Institution: RN Tagore Medical College Udaipur

Introduction: Blood is a lifesaving resource and safe blood is a universal right. Each nation is responsible for providing safe,efficacious blood and blood products to all who require transfusion to save their lives or improve their health. Despite being therapeutic, blood transfusion also carries the risk of several adverse reactions, mainly the transmission of blood borne infections. To minimize this risk of TTI, WHO recommends stringent donor screening practices, recruiting voluntary, non-remunerated donors from low-risk populations and universal screening of donated blood in all Blood transfusion services. In India, TTI screening of HIV 1&2, HBV, HCV,malaria, and syphilis are mandatory as per DCA & Rule 1945. Accurate estimation of the risk factors and prevalence of these TTI in the blood donors reflect its epidemiology in the population.

Aims and objectives: To study the prevalence of transfusion transmitted infections, namely HIV, Hepatitis B, Hepatitis C, syphilisand malaria among voluntary and replacement blood donors.

Method: This is a retrospective study conducted in a tertiary care centre in Western India by retrieving documents for a period of 8 years from January 2016 to December 2023. A total number of 177900 blood donations were done.HIV, HBV and HCV were tested by ELISA (Genscreen ULTRA HIV Ag-Ab, Monolisa HBsAg ULTRA, Monolisa HCV Ag-Ab ULTRA, BIO-RAD, France). Syphilis was screened by RPR (Ultima RPR Test Kit, BEACON Diagnostics Pvt Ltd, India) and Malaria by rapid card test (Malaria Pf/Pv Antigen Test, Bioline Diagnostics, India). Tests were performed according to manufacturer's instructions. All the reactive blood units were retested and properly labelled as 'Reactive' before discarding.

Results: Out of total 177900 donors, 151439(85.126%) were voluntary donors and 26461(14.874%) replacement donors. Male donors 177011(99.5%) outnumbered female donors 889 (0.05%). A total of 1820(1.023%) blood units were seropositive of which 1244(0.699%) were voluntary donors and 576(0.324%) replacement donors. 1750(0.983%) males were sero-reactive against 70(0.04%) females. Seropositivity for HBV was 1308(0.735%) out of which 921(0.517%) were voluntary and 387(0.218%) were replacement donors.

Seropositivity for HIV was 265(0.148%) out of which 138(0.077%) were voluntary and 127(0.071%) were replacement donors. Seropositivity for HCV was 149(0.083%) out of which 112(0.062%) were voluntary and37(0.021%) were replacement donors. 93(0.052%) tested positive for syphilis of which 70(0.039%) were voluntary and 23(0.013%) were replacement donors. Malaria showed lowest prevalence with 5(0.005%) tested positive and 3(0.003%) being voluntary and 2(0.002%) replacement donors.

Conclusion: Study shows higher prevalence of TTI among males which could be partly attributed to them being major donors. Highest prevalence was found for HBV followed by HIV, HCV, syphilis and malaria. Stringent selection of blood donors, and recruiting and retaining voluntary donors are essential for maintaining a continuous supply of safe blood. Donors should be educated about risk behaviours so that either refrainment from such behaviour or self-deferral from donation is possible. Education, nutrition and motivation should be provided to encourage blood donation among females.

THE IMPACT AND MODALITY OF ID NAT TESTING AND COMPARISON WITH CHEMILUMINESCENCE TESTING FOR SCREENING OF HEPATITIS B, HEPATITIS C AND HIV IN AN INDIAN SCENARIO IN A TERTIARY CANCER CARE SETTING

Topic: Transfusion transmitted infections
Author: Komal Sarwade
Co-authors: Shashank Ojha, Dr. Sumathi H, Dr. Suryatapa Saha, Komal Sarwade
Institution: Tata Memorial Centre, Actrec, Navi Mumbai

Introduction: Ensuring blood safety is the primary goal of transfusion medicine, Transfusion-transmitted infections (TTIs) remain a possibility even with stringent safety protocols and comprehensive serological testing. The Nucleic Acid Amplification Test (NAT) provides significantly improved sensitivity for identifying viral infections when used in blood screening. Due to its exorbitant cost, only a few centres can now use it.

Aims and Objectives: The purpose of this study is to determine the effectiveness of nucleic acid testing (NAT) by evaluating the NAT yield and the influence of donor nucleic acid testing (ID NAT) in relation to chemiluminescence platforms for the detection of HIV, hepatitis B, and hepatitis C viruses.

Methods: This is a pilot retrospective study performed on donors from March 2024 to 12th May 2024. All donors underwent routine serologic testing on dual platform: Electro chemiluminescence (ECLIA) immunoassay and ID NAT using Procleix Ultrio Elite Assay. Results of mandatory serological tests and NAT Yield cases were compared. Results of mandatory serological tests by ECLIA and NAT Yield cases were compared.

Results and conclusion: The study comprised 1534 donors in total. Nine (0.5%) of them tested positive for ID NAT but negative for seronegative. One sample out of nine ID NAT reactive samples tested positive for Hepatitis B using a discriminatory assay. The HBV, HCV, and HIV seroprevalences on the chemiluminescence platform were as follows: HBV: 0.78% (n = 12), HCV: 0.06% (n = 1), and HIV: 0.19% (n = 3). Our study shows ID NAT testing to be superior in preventing Hepatitis B Transfusion Transmitted Infection.

RETROSPECTIVE STUDY TO ANALYZE THE CORRELATION OF REAL-TIME PCR(RT- PCR) FOR DETECTING HCV-RNA LOADING AND THE CHEMILUMINESCENCE IMMUNOASSAY (CLIA) FOR DETECTING ANTI-HCV ANTIBODY

Topic: Transfusion transmitted infections
Author: Akshaya R
Institution: Jubilee Mission Medical College and Research Institute

Hepatitis C virus (HCV) infection is a major cause of severe liver disease including chronic hepatitis, cirrhosis and hepatocellular carcinoma. The HCV burden in public health is estimated at about 71 million people worldwide by World Health Organization (WHO) with at least 400,000 people that died every year from

HCV disease . New hepatitis C treatments with oral direct-acting antivirals (DAAs) showing high rates of response, with short treatment duration is available. HCV can now be eradicated with minimal side effects. Unfortunately, there is no vaccine yet available, but the development of a safe prophylactic vaccine remains a medical priority . For this purpose, Hepatitis B-C subviral envelope particles can be produced by industrialized procedure which seems to be very promising as this HBV-HCV vaccine candidate has been shown to elicit a broadly cross neutralizing activity against HCV . Despite this revolution in the HCV-treatment, one of major challenge to achieve a global eradication of HCV remains to reduce the under diagnosis. It is reported that nearly 170 million persons worldwide are infected with hepatitis C, many of whom are undiagnosed. Although rapid diagnostic tests (RDTs) and point-of-care tests (POCTs) provide a time and cost-saving alternative to conventional laboratory tests, their global uptake partly depends on their performance. Virological diagnosis hepatitis C virus (HCV) infection are based on major discovery that allowed the description of the HCV genome. Later on of the virus replication and cell cycle, and also, importantly, the development of diagnostic tests for the detection of HCV antibodies (Ab) and RNA which were a priority in transfusion.

Aim: To standardize the critical limit(value) of HCV titre using CLIA testing through a retrospectivestudy

Objective : The present study is envisaged with the following objectives:

* Standardize the critical limit (value) of HCV titre using CLIA testing for reducing false positiveresults by correlating with PCR testing through retrospective observational study

Materials and Methods: Retrospective observational study was carried out in Jubilee MissionMedical College, Thrissur, Kerala

Duration: 1 year (1st January 2023- 31st December 2023)

Inclusion criteria –HCV – CLIA reactive respondents Exclusion criteria –CLIA reactive donor group Observation/Result: During the study period, a total of 1678 patients were reported to undergo CLIA testing for HCV . Of which 48 (2.8%) had high titre values and were presumed to be REACTIVE for HCV. From the rest patients, 97(5.78%) showed titre values between 1.02 -19.2 in CLIA hence was advised PCR correlation, of which 42 underwent PCR testing and all were found to be NEGATIVE.

Conclusion: From the study it was observed that the patients with positive CLIA value of >1 &< 20 were found to be PCR – non reactive for HCV during period.

THE INCIDENCE OF TRANSFUSION-TRANSMITTED INFECTIONS AND ACUTE ADVERSE REACTIONS IN TRANSFUSION DEPENDENT THALASSEMIA PATIENTS AT A TERTIARY CARE HOSPITAL

Topic: Transfusion transmitted infections

Author: M F Thasleema Nasreen Institution: JSS Medical College, Mysore

Introduction: Thalassemia is an autosomal recessive disorder characterized by decreased synthesis of one or more hemoglobin polypeptide chains. Beta -thalassemia can be classified into transfusion-dependent and non- transfusion-dependent thalassemia. The aim of blood transfusion in thalassemia is to deliver a safe and effective transfusion regimen whilst minimising the burden of transfusion therapy on everyday life. Transfusion-dependent thalassemia patients are at risk of blood-transmitted infections due to their long-term need for blood transfusion. Hepatitis C virus, hepatitis B virus, human immunodeficiency virus and syphilis are the most common infectious agents that may be transmitted by packed red blood cell transfusions. Adverse transfusion reactions are classified as acute occurring within the first 24 hours of transfusion, and delayed happening after the first 24 hours after blood transfusion. Acute transfusion reactions are the most common transfusion reactions in thalassemic patients, with febrile non hemolytic transfusion reactions and allergic reactions being the most common. Good hemovigilance is key to the delivery of safe, effective transfusion in

any setting and must be in place in the delivery of blood transfusion to those with thalassemia.

Aims and objectives: To determine the incidence of transfusion-transmitted infections (TTI) and acute adverse transfusion reactions (ATR) in transfusion dependent thalassemia patients.

Material and Methods: The prospective study was conducted in the Transfusion Medicine and Blood center from August 2023 - April 2024. Transfusion-dependent β-thalassemia patients registered at the department for regular blood transfusion were enrolled and screened for the presence of viral markers by ELISA test. The positive cases were confirmed for viral DNA/RNA by ID-NAT test. The demographic data of the patient was collected through the structured proforma cum consent form. The adverse transfusion reaction was collected through transfusion evaluation forms and the transfusion workup details at the Blood centre as per the National hemovigilance program of India. The details were entered in the excel sheet for statistical analysis.

Results: A total of 59 beta thalassemia cases enrolled for the regular blood transfusion were studied. The mean age was 12.5 ± 5.7 years with 66.1% male and 33.9% females. Study showed that 81.4% patients were Hindu and 18.6% were Muslim with 28.5% having the history of consanguineous marriage. The predominant blood group of the patients was O (49.1%) and 54.2 % patients were transfused on every 21 day. Only 1 patient was seropositive for hepatitis C (1.69) % and the same was confirmed by ID-NAT (individual Nucleic Acid Testing (ID-NAT). Acute ATR was reported in 0.52 % of total blood transfusions given to the thalassemia patients during the study period.

Conclusion: The incidence rate of infectious adverse transfusion reaction was 1.69% and a non-infectious reaction was 0.52 % thalassemia patients. The information gained from investigation of the incidence rate and types of adverse transfusion reactions in thalassemic patients is of great importance to determine the corrective and preventive measures for minimizing the potential risks associated with blood transfusions.

SERO-PREVALENCE AND NOTIFICATION OF HEPATITIS C REACTIVE WHOLE BLOOD DONORS: OUR EXPERIENCE.

Topic: Transfusion transmitted infections
Author: Sukrit Kaur Janjua
Co-authors: Sukrit Kaur Janjua, Dr Kshitija Mittal, Dr Paramjit Kaur, Dr Gagandeep Kaur, Dr Ravneet Kaur
Institution: Government Medical College And Hospital, Chandigarh

INTRODUCTION: Hepatitis C (HCV) is a transfusion transmittable infection (TTI). The global prevalence of hepatitis C is 1% while the sero-prevalence of Hepatitis C in India is 0.32%. Prevalence of hepatitis C in blood donors in India is reported to vary from 0.07 % to 2.44%.

AIMS AND OBJECTIVES: To determine HCV sero-prevalence and risk factors in whole blood donors elicited during post-donation counselling.

METHOD: This retrospective observational study was conducted in the Department of Transfusion Medicine of a tertiary care centre from 1st January 2019 to 31st December 2023. All the samples collected were tested for transfusion transmitted infections as per the Drugs and Cosmetics Act 1940 and Rules 1941 (DCA) and amendments thereafter in March 2020. Testing for Hepatitis C virus testing was performed using IIIrd generation ELISA kits as per departmental SOPs. Blood donors found anti HCV reactive were notified. A letter was sent to their address and 3 telephonic calls, each at a one week interval, were placed. Blood donors who did not respond were termed as defaulters. Reactive blood donors that responded were counselled maintaining confidentiality. Risk factors related to HCV transmission were elicited. The blood donors were then referred to Gastroenterology Department for further management.

RESULTS: A total of 90,970 donors donated whole blood during the study period. Of these, 534 (0.58%) donors were found anti-HCV reactive. Of 534 anti-HCV reactive donors, 403 (75%) donors were voluntary and

315 (59%) reactive donors belonged to the age group 18-30 years of age. Four hundred eighty three (90.4%) anti-HCV reactive donors could be contacted, of which 213 (44.1%) reactive donors responded. Out of the 213 reactive donors who reverted back, 21 (3.93%) of the reactive donors were aware of their HCV status and had taken treatment for the same. Sixty five donors (30.5%) revealed history of intravenous drug abuse, 72 (33.8%) had tattoos or body piercings, 39 (18.3%) had a history of hospital stay, blood product transfusions or a surgical procedure, 25 (11.7%) had a history of getting injections from unlicensed practitioners (quacks), 16 (7.5%) reported indulging in high risk behaviour (contact with multiple sexual partners or paid sex workers), 28 (13.14%) reported having a history of jaundice in their past, 23 (10.79%) reported exposure to a close family member with hepatitis/jaundice, 11(5.16%) donors reported abusing alcohol and other oral drugs and 18 (8.45%) donors reported no positive history.

CONCLUSION: The study highlights the need to educate young blood donors about the risk factors of HCV. The goal of transfusion services is to provide safe blood components to patients which canonly be possible with a responsible and knowledgeable donor pool.

HEMOSTATIC PROFILING OF BREAST CARCINOMA PATIENTS USING VISCOELASTIC COAGULATION ASSAY: THROMBOELASTOGRAPHY

Topic: Hemostasis and Coagulation
Author: Aparupa Sen Gupta
Co-authors: Anupam Verma, Punita Lal, Priti Elhence, Awale Rupali Bhalchandra, Anjali Mishra
Institution: SGPGIMS Lucknow

Introduction: Disordered coagulation is a challenge confronting oncologists in clinical practice. Breast cancer is the foremost cause of cancer death among women across the globe. Interrelated deranged coagulation and tumor progression together affect the prognosis. Viscoelastic assay: a global coagulation analyser that has the advantage of providing information related to the cumulative effects of plasma clotting factors, platelets, leukocytes, and red cells during all stages of the coagulation and fibrinolytic processes.

Aim: Categorising the breast carcinoma patients according to their hemostatic profiles using TEG.

Objectives: § Finding statistical difference in the coagulation parameters of the two groups under study.

Method: The study is done as a part of thesis in MD curriculum and includes 60 breast carcinoma patients studied between February 2023-February 2024 and divided into two groups: 30 patients each in the pre-surgical group presenting to the department of endocrine surgery (Group 2) and in the pre- radiotherapy group (Group 1) presenting to the department of radiotherapy after surgery.

Factors studied include the ***demographic factors***: Age, duration of the disease, Body mass index(BMI), menopausal status, comorbidities, and family history (breast carcinoma or other carcinomas);***disease-specific factors***: Breast side involved (left/right), TNM (Tumour size, Nodal status, Metastasis) staging, Birads staging, the immunohistochemical parameters- ER, PR, Her-2-neu &Ki67. The ***hematological parameters*** include hemoglobin, hematocrit, platelet and plateletparameters (Mean platelet volume-MPV, platelet-larger cell ratio-LPCR, Platelet distribution width(PDW) and the ***conventional coagulation test (CCT) parameters*** (using platelet poor plasma)include PT, Aptt, INR, Fibrinogen.

Whole blood samples were collected in citrated vials containing 3.2% sodium citrate and EDTA vial respectively to do TEG and test the hematological parameters in the cell counter (Medonic). Data was analysed for statistics by ***IBM SPSS version 26***.

Results: The median values of age, BMI and duration of the disease for the 60 patients are 46(27-79) years, 27.0(19-37) kg/m^2 and 362.50(30-2555) days respectively. 33/60 patients were post-menopausal and 34/60 had right breast involvement. Profiling of the patients according to the TEG parameters are as follows: Group

1(Normocoagulable-14, Hypercoagulable-16) and group 2(Normocoagulable: 13, Hypercoagulable-17) Statistical analysis comparing the coagulation parameters (CCTs and TEG) between the groups was found to be significant only for fibrinogen (*p 0.024;* 314.50(210-545)in group 1 versus 354.0(261-652) in group 2). The difference between the CI between the two groups (Group 1: 3.05(-1.10 to 5.70) versus Group 2: 3.55(-2.60 to 5.80) wasn't statistically significant. Significant correlation was found for ER, PR status and adjuvant chemotherapy status with the TEG profile in group 1 only.

Conclusion: There are limitations considering the sample size. The correlation with the TNM staging is not relevant as number of patients belonging to each stage is small. Parameters need to be analysed according to the regimen of chemotherapy being prescribed. The study helps in predicting the hemostatic alteration on the basis of the hormonal and adjuvant chemotherapy status helping clinicians decide upon giving anti-coagulation therapy in these patients.

CLINICAL TRANSFUSION CHAIN (CTC) TURNAROUND TIME (TATCTC): A NEW QUALITY INDICATOR FOR IMPROVING TRANSFUSION SERVICES AND PATIENT CARE.

Topic: Quality Management and Accreditation
Author: Sathish S
Co-authors: Muthukumaravel, Siddharth Mittal, Mahendra Kumar Garg, Pradeep Kumar Bhatia, Nikhil Kothari, Suresh K Sharma

Institution: AIIMS Jodhpur

Background: Blood Transfusion is a life-saving intervention that has an essential role in the total patient management within the health care delivery. Efficient management of blood transfusions is critical in the Intensive Care Unit (ICU), where timely intervention can significantly impact patient's outcome. Therefore, the time taken for initiating Blood Transfusion is crucial.

Aim and objective: To analyse the turnaround time for PRBC transfusion among AICU patients and identify the factors causing the prolongation of Turnaround Time. Calculating clinical transfusion chain (CTC) TAT a new quality indicator.

Methods: A prospective analysis of the AICU PRBC transfusion turnaround time within the period of April 2024 to May 2024 was conducted. Time was captured for the clinician's blood order, blood requisition and sampling by the nurse, blood bank processing and blood issue, and the transfusion initiation in the AICU patients. We have also contrived a new quality indicator termed CTC which starts from the time the blood unit is ordered till the initiation of transfusion in a patient. Data were collected over a month, encompassing various stages of the transfusion chain in excel sheet.

Results: A Total of 43 blood requests were analysed during the study period. Most of the blood requests were urgent (48.83 %) followed by routine (39.53 %) and emergency (11.62 %) respectively. The average time for Blood order TAT was 10 min in our study, average Blood sampling TAT was 9 minutes, average Crossmatch TAT was 50 minutes, average Blood issue TAT was 7 minutes, average Blood transfusion start TAT was 11 minutes. Average Clinical transfusion chain (CTC) TAT in our study was 225 minutes. Blood Bank processes (compatibility testing and issue) comprised approximately 25 % of this delay (57 min), while rest of the delay happened in the processes (ordering, sample transport, and BT commencement) outside the Blood Bank.

Conclusion: The current study entails evaluation of TAT of different processes from the time a PRBC unit is ordered by clinician to the time transfusion was started. The mean clinical transfusion chain (CTC) TAT in our study was found to be 225 minutes. This could be a new quality indicator which entails both blood centre and clinical processes influencing blood transfusion in a patient. More studies are required on this indicator to set a national and international standard.

EVALUATION OF QUALITY INDICATORS AT BLOOD CENTRE IN A TERTIARY CARE CENTRE; KERALA

Topic: Quality Management and Accreditation
Author: Hadhiya Thahir
Co-authors: Poornima AP, Greeshma S, Kala V L
Institution: Government Medical College, Thiruvananthapuram

INTRODUCTION: Blood transfusion services forms an essential part of the modern health care. 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;one among the important tools in evaluating and monitoring blood transfusion services. In India, the accreditation agency under the Quality-control Council of India-NABH;has defined ten quality indicators-out of which five are mandatory.This study is aimed to assess the five mandatory Quality Indicators of our blood centre. This data helps us to analyse the root cause so as to implement corrective and preventive actions to meet various quality control parameters as defined by NABH.

AIMS AND OBJECTIVES: To evaluate the five mandatory Quality Indicators, proposed by NABH; at blood centre in a tertiary carecentre; Kerala.

METHODOLOGY:

STUDY DESIGN: Prospective Observational Study

STUDY SETTING: Department of Transfusion Medicine of a tertiary care centre; Kerala STUDY PERIOD: One year(December 2022 to December 2023)

STUDY PROCEDURE:

The five mandatory Quality Indicators as proposed by NABH were assessed.

1. **PERCENTAGE OF TRANSFUSION TRANSMITTED INFECTIONS(TTI) :**
   Combined TTI cases(HIV+HBV+HCV+Syphilis+Malaria) x100
   Total number of Blood Donors
2. **ADVERSE TRANSFUSION REACTION RATE:***Number of Adverse Transfusion reaction x100 Total number of blood components issued*
3. **WASTAGE RATE** : (Excluding discards due to TTI reactivity):
   Number of blood components discarded x 100
   Total number of blood components prepared
   TURN AROUND TIME (TAT): *Sum of time taken for crossmatches Total number of crossmatches*

COMPONENT Qc FAILURE: (For each component): *Number of component Qc failures* x100

Total number of components tested

The data was collected and analysed prospectively from the records and registers maintained in the blood centre. For Turn around Time , the sample size was estimated, at 5% level of significance and 10% relative precision, as 125. Emergency cases and elective cases were recorded separately. Samples were collected consecutively till the required sample size is met. The data was compiled and plotted graphically;expressed in tables and charts.

RESULTS: ***Percentage of TTI reactivity*-1.8%**(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-0.2% FNHTR-0.18% followed by TAD, TRALI, TACO. No case of hemolytic transfusion reaction was reported during the period).

Wastage Rate-14% (PRC-0.7% PC-12.9% FFP-0.7%)

***Turn Around Time*-** For elective cases-**80 minutes** For emergency cases- **35 minutesComponent Qc Failures:**

PRC-All passed PC-93.62% passed FFP-92% passed Cryoprecipitate 60% passed (Does not meet the bench mark)

CONCLUSION: Quality indicators are important QMS tool for accomplishment of quality goals. This study helped in assessingthe quality and to identify the flaws in our blood centre.By using this data, one can analyse the root cause and can implement CAPA inorder to sustain quality.

BLOOD UTILIZATION PATTERN AND QUALITY INDICATORS AT A TERTIARY CARE HOSPITAL

Topic: Quality Management and Accreditation
Author: Uma Magheswari. C
Co-authors: Dheemantha. P, Panchakshari Prasanna. B. K, Akshitha Dave
Institution: Bangalore Medical College and Research Institute, Bangalore

INTRODUCTION: Blood transfusion services are an integral part of healthcare system. They provide transfusion support in case of emergencies and elective surgeries. But the overordering of blood leads to the wastage of resources, time and manpower adding to the workload and financial burden on the blood centres. Crossmatch to Transfusion Ratio (C: T) is an importantquality indicator used to estimate the appropriate use of services offered by the blood centres.Other indicators of blood utilization are Transfusion probability (T%) and Transfusion Index (TI).

AIM: To assess the pattern of utilization of blood components using quality indicators at our blood centre.

METHODOLOGY: It is a retrospective, cross sectional study conducted in the department of Immunohematology and Blood Transfusion. The study was conducted over a period of 1 yearfrom January 2023 to December 2023. The data was collected from the previous records and registers. The quality indicators were calculated as: Crossmatch to Transfusion ratio (C: T) = No. of crossmatched units / No. of transfused units, Transfusion Index (TI) = No. of units transfused / No. of patients crossmatched, Transfusion Probability (T%) = No. of patients transfused / No. of patients crossmatched x 100.

RESULTS: During the study period, 8578 blood units were collected. 10578 RBC units were crossmatched, out of which 8016 units were transfused. The overall Crossmatch to transfusionratio (C: T) was 1.31, Transfusion Index (TI) was 1, Transfusion Probability (T%) was 78%.

Department of Obstetrics and Gynaecology had the highest number of units crossmatched followed by the Department of General Medicine. The C:T ratio was found to be 1.06 in the Department of Nephro-Urology, Gastroenterology and Burns ward. Trauma and Emergency Care Centre had a C:T ratio of 2.74 and TI of 0.48.

CONCLUSION: The overall C:T ratio, Transfusion Probability, and Transfusion Index shows that the blood component utilization practices are significant at our blood centre. But there was over ordering of blood by the Trauma and Emergency Care Centre. The utilisation of blood components should be evaluated at regular intervals and Maximal Surgical Blood Ordering Schedule (MSBOS) should also be developed to prevent overordering and wastage of resources eventually leading to an efficient blood transfusion service.

ENHANCING BLOOD CENTRE OPERATIONS THROUGH LEAN SIX SIGMA METHODOLOGIES

Topic: Quality Management and Accreditation
Author: Rowena DL Robins
Institution: Saveetha Medical College and Hospital

INTRODUCTION: Lean Six Sigma is a managerial approach that combines six sigma methods and tools of Lean manufacturing and lean enterprise philosophy, trying to eliminate waste of physical resources, time, effort, and talent while maintaining quality in production and in the organizational processes. It has two objectives 1) A focus on eliminating non-value-added steps in processes and 2) eliminating defects and improving the overall process. The Lean Six Sigma, strategy provides an effective solution to the management of blood Centres, to reduce blood and resource wastage.

AIM and OBJECTIVES: This study is done to

1) Assess the methodologies' impact on blood product wastage reduction in hospitals.
2) Analyze how Lean Six Sigma can improve blood storage and collection efficiency in hospitals.
3) Identify areas for Lean Six Sigma implementation in Blood Centres to drive improvements.
4) Explore Lean Six Sigma benefits and challenges in Blood Centre processes.

METHODOLOGY: This study was done as a prospective study from October 1 2023 to April 31 2024. Areas within the Blood center where Lean Six Sigma could be implemented was selected. Various process aspects of the areas were observed and analysed. Baseline variables in the areas were measured. Lean Six Sigma methodology was implemented in these areas and the baseline variables were re-analysed.

RESULTS: The implementation of Lean Six Sigma in Blood Centres has led to substantial improvements across various operational areas. In the TTI screening area, error rates decreased and screening times reduced resulting in significant cost savings. In the immunohematology lab, standardizing procedures and optimizing workflows led to a 25% improvement in turnaround times and enhanced overall efficiency. The donor area experienced a reduction in waiting times from 45 minutes to 15 minutes, greatly enhancing donor satisfaction and streamlining the donor flow process. In the component separation area, productivity increased by 20%, wastage was significantly reduced, and equipment downtime was minimized through preventive maintenance. Overall, the application of Lean Six Sigma has markedly improved efficiency, reduced costs, and enhanced quality and satisfaction within blood Centre operations.

CONCLUSION : The application of Lean Six Sigma tools uncovered significant opportunities for process improvement. We were able to achieve significant improvements, allowing resources to be reallocated to transfusion utilization, quality programs and safety operations. Implementing Lean Six Sigma methodologies in the blood center aims to enhance operational efficiency and minimize wastage of blood products. By focusing on advanced inventory management, streamlined donor processes, optimized storage and handling, and effective distribution, we can ensure a reliable blood supply. Continuous improvement through staff training, quality control, and emergency preparedness will further sustain optimal performance and resource utilization.

BLOOD CENTRE INFORMATION SYSTEM & MODERNIZATION: A JOURNEY OF SOFTWARE, STAFF, AND SURPRISING SELF- DISCOVERY

Topic: Organisation and Management
Author: Arun V J
Institution: Malabar Medical College & Research Centre

Introduction: Automation systems and information technology can greatly help medical professionals improve working efficiency and optimisation in blood centres. Following increased workload and multiple errors from the technicians, nurses and doctors in handling blood and blood components Hospital Transfusion Committee took the decision of a dedicated blood centre software.

Aims & Objectives: Implementing blood centre software.

Feedback and improving Blood Centre workflow.

Method: The initial phase was the selection of companies that offered blood centre information system services. From a list of 5, we selected "X" company, even though the youngest in the field for its robustness, adaptability & commitment to the cause of improving transfusion services. The service is rolled out in stages, initial 2 training periods for blood centre staff and IT department, followed by installation, trial run and feedback and modification.

Results: Even though the training was carried out successfully, commitment from the technicians proved a difficult endeavour due to lack of interest and computer proficiency. Once the software was rolled out, there were missing data like missed donor entries in many days which made finding missing bags difficult. The errors piled up over 4 months and we had to wipe the data and restart with stricter follow-up where 1 medical officer was in charge of overseeing the entire operations of software which included, daily verification of donations, daily stock component-wise and acting as one point communication between the company and blood centre wherein in all errors were accounted and formal email request was sent to rectify each mistake.

As a part of the software, RFID was tagged to all PRBC bags and BBR temperature was monitored. A barrage of damaged bags led us on an RCA journey which surprised us. The temperature of the BBR will be outside the set limit at the same time every day which was when the PRBC was loaded after screening. The technician failing to monitor the temperature of the BBR would have never been picked up if not for this system.

Inventory management was easier with the digital system. Errors were reduced and time wastage due to searching of blood bags blindly inside the BBR was eliminated as the system instructed on which bag to choose from which BBR.

The system chose the blood bags for crossmatch based on an algorithm so that the First in First out policy was followed which led to reduced wastage due to expiry.

Conclusion

Blood Centre information systems are becoming more relevant for the future as AI and Machine learning are sure to help tackle problems in logistics, data management, donor retention and future camps. The software will help streamline the process flow in the blood centre and pick up any mistakes that might go unnoticed and often reveal mistakes that others try to hide which in turn will affect the quality of services.

CHALLENGES FACED BY TRANSFUSION SERVICES BY A LEADING HOSPITAL OF NORTH WEST INDIA DURING COVID-19 PANDEMIC

Topic: Blood donor and blood donation
Author: Neelam, Co-authors: LOKESH SHARMA
Institution: Jawaharlal Nehru Medical College Ajmer

INTRODUCTION - Covid-19 pandemic has significantly affected transfusion medicine. Widespread blood and convalescent plasma has emerged as therapeutic need in the time of epidemic.

Aims and objectives- To study the challenges faced by blood transfusion services for recruitment of blood and convalescent plasma donors as well as to maintain adequate and uninterrupted blood supply in tertiary level multispeciality hospital.

Materials and methods- Retrospectively study was done and a comparative analysis of blood donations was done from Jan to Dec. Months with previous year donations.

Results - In march, 2020 when first confirmed case of covid 19 detected in Rajasthan.The % of blood donation decreases to 70.4% In march 20 compared with consecutive month of previous year after announcement of lockdown, blood donation reduced drastically and remain 20.1%,31.9% And 20.7% Respectively in month of April, May and June 2020.

Following repeated motivation of donors the % increased in july, aug. And sept. 20 Is 63%,70% and 66% respectively in comparison to previous year donation in these month. Later on due to rising cases of second wave all over world the % blood donations went on decreasing trend to 59.11%, 42.4%, 46.66% In month of Oct., Nov., and Dec.20 Respectively.

Blood transfusion services played a vital role in setting up of plasmapheresis capacity, recruitment of donors through social media and ngo which lead to success in donor mobilization and plasma collection.

Conclusion- Recruitment of blood and convalescent plasma donors was a big challenge for blood transfusion services. Bloood transfusion services should have own strategic plan to deal with such challenges faced during pandemic and should respond promptly.

A COMPARATIVE STUDY ON FREQUENCY OF ADVERSE DONOR REACTION AMONG WHOLE BLOOD DONORS AT OUTREACH CAMPS & BLOOD CENTRE

Topic: Blood donor and blood donation
Author: Dr Sajimol MK
Institution: Government Medical College Thiruvananthapuram, Kerala
Dr Sajimol M K , Dr Kala V L

Introduction: Blood donation considered as a GIFT OF LIFE to another person. According to WHO, safest blood donors are voluntary, non-remunerated & from low risk populations. Sometimes in blood donations they have adverse donor reactions which may even go into an emergency situation affecting the life of the donor. Most common donor reactions include vasovagal reactions and hematomas associated with needle. If donors refrain from blood donation, due to adverse donor reaction or lack of knowledge, it can even affect proper functioning of a blood center.

Aims & Objectives: To compare adverse donor reaction from outreach camps & blood center in a tertiary care centre.

Materials & Methods: The data collected from whole blood donors in a tertiary care centre, Govt Medical College, Thiruvananthapuram for a period of one year, from January 2023 to December 2023. A prospective analytical study on blood donors in the blood centre & outreach camps conducted by the department. Study group included are all the replacement donors coming to the blood center & compared to the voluntary donors in outreach camps. Vasovagal donor reactions in both group analysed and recorded and the frequency compared according to age, weight, sex, first time donor or repeat donor.

Results: Among 32,280 whole blood donations of 350 ml, 2030 voluntary blood donation from outreach camp (6.2%) & 30, 250 from replacement donors coming to blood centre (93.7%). Proportion of females in camps 230(11.3%) & in blood center of 760(2.5%). Significantly higher number of donors in camp were repeat donors compared to the blood center. Out of 32,280 total donations,530 donors had vasovagal reactions about 1.6%. Vasovagal reactions of donors in blood center is about 450 out of 32,280 (1.4%) & that of voluntary blood donation camp comprise 80 (0.25%) only. Donor reactions more in weight less than 65kg and young individuals of first time donation.

Conclusion: Voluntary Blood Donors are the safest donors. We must promote voluntary blood donations by Donor motivation Campaigns, rewards, spread the knowledge of safe and healthy life style among youth & in schools. So that every individual in our community must come to know the importance of safe blood donation. My study should be an eye opener for various organisations, government sectors for promoting voluntary blood donations.

EVALUATION OF ABO BLOOD GROUPING DISCREPANCIES AMONG DONORS AT A TERTIARY CARE HOSPITAL, BLOOD CENTER.

Topic: Blood donor and blood donation
Author: Swathi N
Institution: St. Johns Medical College and Hospital, Bangalore

The most essential tool required for safe and effective transfusion of blood and its components is accurate blood group reporting. Accuracy in blood grouping(BG) decreases the risk of encountering transfusion associated adverse events.

Methods used for blood grouping and typing include testing for Red cell antigens (Forward grouping- FG) and Testing for Antibodies to red cell antigens (Reverse grouping- RG)

In case of a discrepancy between the two methods, further work up is done as required. Ensuring that a discrepancy is resolved is of utmost importance, so that compatible blood units may be made available to patients for transfusion in a timely manner.

AIM: To determine the incidence of ABO blood grouping discrepancies on samples of donors received at a tertiary care hospital, Blood center.

MATERIALS AND METHODS: It is a retrospective observational study conducted from January 2023 to December 2023. All samples from blood donors who came to our blood center (as a part of pretransfusion workup) are included in the study. FG and RG were routinely done and documented. In case of any discrepancy, a detailed serological workup of the cases was conducted for recognition and resolution of the blood group discrepancy.

RESULTS: A total of 13207 donor samples were collected, out of which 2670(20.21%) were A Positive, 4035(30.55%) were B Positive, 4959(37.54%) were O Positive, 910(6.89%) were AB Positive, 249(1.88%) A Negative, 247(1.87%) B Negative, 140(1.06%) AB Negative, 302(1.49%) O Negative. We found a total of

15(0.11%) ABO grouping discrepancies in the samples. 2(13.33%) with Group I discrepancy was noted due to weak Antibodies in the RG. The discrepancy was resolved by increasing Serum: Cell ratio. 5(33.33%) with Group II discrepancy was noted due to weak Antigen/Subgroup. 2 cases were Bombay BG, 2 were A2B BG, 1 was a A weaker subgroup. 2(13.33%) with Group III discrepancy was noted due to rouleaux formation in the RG. The discrepancy was resolved by Saline replacement. 6(40%) with Group IV discrepancy was noted due to Cold Antibodies in the RG. The discrepancy was resolved by incubation at 37 deg C .

CONCLUSION: Though ABO discrepancies are rarely encountered in the Donor population. The most common discrepancy was due to the presence of Cold Antibodies in their Serum samples. Such discrepancies need to be analyzed and resolved completely so as to prevent risk of encountering transfusion associated adverse events and to make required units available to patients in a timely manner.

CAUSES OF WHOLE BLOOD DONOR DEFERRAL IN A TERTIARY CARE HOSPITAL

Topic: Blood donor and blood donation
Author: Sharon Joy
Co-authors: Kala V L
Institution: Government Medical College, Thiruvananthapuram

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 pre-donation 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 3 months duration (Feb 2024 to April 2024). Data was taken from donor deferral registry maintained in blood center. Prospective donors who came to blood center as well those attended voluntary blood donation camps were included. Out of 796 prospective donors registered 737 (89.94%) were males and 80 (10.06%) were females.

Results:- Out of 796 prospective donors registered 666 (83.67%) were found to be fit for donation and 130 (16.33%) were deferred. Out of 130 deferred 96 (73.85%) were males and 34 (26.15%) were females. 128 were deferred due to temporary (98.46%) and 2 (1.54%) were deferred due to permanent causes. Most common cause for deferral was hypertension due to improper medication and anaemia. 38 (29.23%) people were deferred due to each cause. Other causes for temporary deferral were regular medication intake for various diseases, lack of sleep, rashes at phlebotomy sight, underweight, underage, dengue within 6 months. Reasons for permanent deferral were high risk behaviour.

Conclusion:- This study shows hypertension and anaemia as major causes of donor deferral. This shows the need to teach the general population about iron deficiency and iron supplementation as well as the need to do regular screening of vitals and intake of proper medications.

INCIDENCE OF ACUTE AND DELAYED DONOR ADVERSE REACTIONS WITH SEVERITY GRADING.

Topic: Blood donor and blood donation
Author: Arisha Khan, Co-authors: Seema Dua, Kriti Batni, Satyam Arora
Institution: Post Graduate Institute

Transfusion therapy, vital in modern medicine, carries risks like Donor Adverse Reactions (DAR), occurring during or post-donation that pose various challenges. These reactions range from mild to severe, necessitating understanding, grading, and improved preventive measures.

AIMS AND OBJECTIVE: To investigate immediate and delayed DARs and categorize severity using the proposed severity grading system to improve understanding and management.

This prospective observational study was based in a tertiary care pediatric hospital for a period of one month from 1st April to 30th April 2024, in which donors were screened and managed. Monitored delayed DARs, donors were followed up at 24 hours, one week, and two weeks telephonically. If a donor had an acute DAR or gave a positive history on follow-up, imputability was determined according to National Blood Donor Vigilance Program.

A total of 439 donors were screened out of which 13.6% (n= 60) donors were deferred due to various causes and 86.3% (n=379) donors were included in the study. Total whole blood (WB) donation were 356 and apheresis (APH) donors were 23 (n= 18 SDAP, n= 5 granulocytes). Male: Female donors were 354:25 out of which first time donors were 260 and repeat donors were 119. Mean age of the donors were 32 years ±7.7 SD. Total 15 DARs were reported during this study. Among these donations, 12 reactions were reported for WB and 3 for APH.

Acute DARs affected 1.3% donors (n = 5, 3 F and 2 M). 4 WB donors had vasovagal reaction (B Grade-1) and 1 granulocyte apheresis donor had an acute DAR causing hematoma (A Grade-1) due to which the target volume of 300 ml was not achieved and the procedure was aborted after a collection of 270 ml. Mean age group of donors ranged 25 years ± 3 SD in Acute DAR . All acute reactions occurred among first-time donors. Imputability was determined for all reactions and was found to be definite in all acute DARs.

Delayed DARs were analyzed for 83.9 % donations. 16.1% donors could not be contacted due to incorrectly provided information. Out of 379 donors, 2.6% (n=10) donors reported having delayed DAR and 33 years ± 7 SD in Delayed DARs All donors were male out of which 3 were first-time donors. 5 donors had hematoma which was resolved within a week (A Grade-1), 3 donors had hematoma which lasted for more than 2 weeks (A Grade-2), 1 donor showed superficial thrombophlebitis (A3 Grade-2) and 1 donor had other symptoms such as weakness and diarrhea (F Grade-1).

This study focuses on the distribution of reactions across our blood bank, including age and gender, as well as the frequency of both immediate and delayed reactions. Sufficient screening procedures and follow-up monitoring are essential for prompt identification and handling of unfavorable reactions, guaranteeing donor security, and ultimately building donor confidence and attracting new donors.

A RETROSPECTIVE STUDY OF DONOR DEFERRAL PATTERN AT A TERTIARY CARE CENTRE

Topic: Blood donor and blood donation
Author: Vijayshree Sakpal
Co-authors: Panchakshari Prasanna. B.K., Dheemantha . P, Akshitha Dave
Institution: Bangalore Medical College and Research Institute, Bangalore

INTRODUCTION: Blood transfusion is a vital part of health care system and providing safe blood to recipients. However before donation it is necessary to screen the donors and deferred from donating if they have any conditions or diseases that may affect the quality of blood or lead to adverse reactions to patients or donors. This is to ensure the safety and health of the blood donor as well as the recipient. Blood donors deferral can be due to various reasons, vary from region to region. It can be temporary deferral or permanent deferral. So it is necessary to follow the blood donors deferral criteria.

AIM: To analyse the blood donor deferral pattern and its causes among blood donors at a tertiary care blood centre.

MATERIALS AND METHODS: A retrospective data was collected from donor deferral register for a period of 1 year from Jan 2023 to Dec 2023. Results were then analysed statistically to know the causes of deferral.

RESULTS: A total no of 836 out of 8623 donors were deferred. Among them 428 men (4.9%) were deferred and 338 women (4.04%) were deferred. Among the 836 deferred donors ,most common reason for deferral was low Hb % (42.8%) followed by low BP (9.3%), High BP(5.3%), Inadequate sleep (6.9%),weight < 45 kgs (3.8%), Menstrual bleeding (3.8%) History of smoking within 4 hrs (3.8%), History of alcohol consumption within 24hrs (3.5%), History of surgery (3.34%), Tattoo within 1 year(2.39%), History of vaccination (1.6%) and others .

CONCLUSION : In our study, Low hemoglobin levels were found to be the major cause of donor deferral. To avoid this reason of deferral, awareness and continuous education of the donors to improve the hemoglobin levels should be done. All the temporary deferred donors should be educated for the reasons they are deferred. This can help to retain the pool of motivated blood donors.

PREVALENCE OF ADVERSE DONOR REACTIONS AMONG WHOLE BLOOD DONORS- A DESCRIPTIVE STUDY AT A TERTIARY CARE CENTRE IN KERALA

Topic: Blood donor and blood donation
Author: Greeshma S
Institution: Government Medical College Thiruvananthapuram

Introduction: Blood is the most precious and unique gift that one human being can give to another. This life saving fluid cannot be created artificially, but can only be collected from donors. Retention of voluntary donors is the key to safe and sufficient blood supply. Donor retention is adversely affected by donor reactions which includes mild vasovagal reactions to severe ones. Hematoma formation, loss of consciousness, seizures, injuries after venesection or fall are also important. Donors might refrain from donating again due to adverse donor reaction which lowers the blood supply in collection centers.

Aims & Objective: To estimate the prevalence of adverse donor reactions among whole blood donors at a tertiary care centre in Kerala.

To analyze the factors related to adverse donor reactions among whole blood donors at a tertiary care centre in Kerala.

Materials & Methods: This is a retrospective, descriptive study conducted on consecutive 26896 whole blood donors over a period of one year, i.e. from September 2022 to August 2023 in the Department of Transfusion Medicine at a tertiary care centre in Kerala. All the data was collected using documents of our blood centre-donor cards, donor reaction reporting forms and registers.

Results: During this one year study period, a total of 26896 donors donated blood, out of which 19146 (71.19%) were voluntary donors and 7750 (28.81%) were replacement donors. 323 (1.20%) donors experienced donation related adverse effects. Vasovagal reaction was the most commonly observed adverse reaction. Reaction rate among male and female donors were 1.18% (309/26139) and 1.85% (14/26139) respectively. Most of the donors 98.5% (318/323) who experienced adverse donor reactions belong to the younger age groups (<40 years). Higher rate of adverse reactions were observed among first time donors -2.13% (171/8047) while it is 0.81% (152/18849) in repeat donors. Majority of the donors 21.36% (69/323) who had adverse donor reactions belong to lower weight (<70kg).

Conclusion: Donation related adverse reactions are multifactorial determined by age, gender, weight and donation status of donors. Only 1.20% of blood donations were complicated by adverse events and most of these events were mild vasovagal reactions. This study reinforces that blood donation is a safe procedure which could be made even more event free by identifying the donors at risk of donors reactions and by strict adherence to guidelines in donor selection and examination while some are unavoidable reactions.

A STUDY TO ASSESS THE KNOWLEDGE, ATTITUDES, AND PRACTICES REGARDING BLOOD DONATION AMONG RESIDENTS AT A TERTIARY CARE CENTRE IN SOUTHERN INDIA.

Topic: Blood donor and blood donation
Author: M Swetha
Co-authors: V Sudhir Kumar, B Shanthi, K Mahesh Kumar, Murali Krishna
Institution: NIMS Hyderabad

Introduction: Background: In India, where the demand for blood and blood products continues to rise, it's crucial to understand the perspectives and behaviours of healthcare professionals towards voluntary blood donation. Postgraduate medical students, a significant group within the healthcare system, have the potential to influence attitudes and practices related to blood donation through their clinical training and professional roles. However, their understanding, attitudes, and practices concerning voluntary blood donation have not been thoroughly explored.

Aim: The aim was to assess the knowledge, attitudes, and practices about blood donation among residents in our tertiary care centre.

Study and Design: A cross-sectional study was conducted in month of May 2024 among all residents at our tertiary care centre, Telangana. A separate health awareness session was organized, and data were collected and analysed using the Statistical Package of Social Sciences (SPSS).

Results and Observations: Among the 311 residents surveyed, 55.80% demonstrated sufficient knowledge regarding donation criteria and practices in India. Additionally, 82.25% exhibited a positive attitude towards donation, with 53.5% reporting engagement in donation practices among them, 50.6% have donate more than twice. Notably, individuals aged 25 years and above showed a significant association with the practice of blood donation.

Conclusion: While most residents had a positive attitude towards blood donation, actual participation was limited due to insufficient knowledge about donation criteria. Despite their willingness, many had not donated blood. Comprehensive awareness campaigns are essential to bridge this gap and educate individuals about the significance of blood donation, both globally and within their respective areas.

ASSESSMENT OF HEMOGLOBIN LEVELS IN BLOOD DONORS: COMPARING THE HEMO CONTROL PORTABLE DEVICE WITH AUTOMATED HEMATOLOGY ANALYZER.

Topic: Blood donor and blood donation
Author: Kuruva Raghunath
Co-authors: K.Mahesh Kumar, V. Sudhir Kumar, B. Shanthi
Institution: NIMS Telengana

INTRODUCTION: Assessment of haemoglobin is one of the most reliable indicators of anemia. Hemoglobin estimation stands as the only laboratory test carried out prior to blood donation. It's imperative to screen blood donors for their haemoglobin levels to ensure their safety during the donation process and to prevent anemic individuals from donating. This practice also ensures that recipients of packed red cell transfusions receive the required hemoglobin levels. Although there are several methods available for measuring hemoglobin in donors, none has proven to be definitively superior for use in blood donation settings.

AIMS AND OBJECTIVES: To determine the accuracy of finger-prick hemoglobin assessment in blood donors. The performance of a portable hemoglobinometer- Hemo Control (EKF-diagnostic, GmbH, Germany) was prospectively compared with that of an automated hematology analyzer (H360 ERBA Cell Counter).

MATERIALS AND METHODS: This prospective study was conducted on the 300 blood donors who have donated blood in our centre from 1st November 2023 to 1st May 2024 over a period of Six months. Before blood donation, all participants in this study underwent standard screening procedures, which included hemoglobin estimation conducted by trained personnel in the blood bank. Informed consent was taken for blood donation. In this study, hemoglobin levels for 300 blood donors were measured using capillary finger-prick and venous samples with the Hemo Control and automated hematology analyzer(H360 ERBA Cell Counter) respectively.

RESULTS: The study was done on 300 blood samples. The mean Hemoglobin value of Hemo Control (15.33 ± 1.11 g/dl) was higher when compared with the reference automated analyzer (14.8±0.87 g/dl). There was a moderate correlation between hemoglobin levels measured by Hemo Control versus the automated hematology analyzer ($r=0.48$) with a mean difference of 0.53 and a significant difference in variability between the two measurements ($p = 0.007$).

CONCLUSION: The method used for hemoglobin screening of blood donors should be reliable, inexpensive and should give immediate results. The primary goal of hemoglobin screening tests is to prevent blood donors from developing anemia.Thus, employing a suitable hemoglobin estimation method for blood donors is paramount. Hemoglobin concentration measurements obtained from capillary blood samples using Hemo Control do not align well with those from an automated hematology analyzer. It is a comfortable, easy to use and quick method for both donors and staff. However, it cannot effectively distinguish between eligible and ineligible donors, which is crucial for ensuring donor health. Portable hemoglobinometers can serve as a screening tool for blood donors, but critical hemoglobin levels should be confirmed using an automated hematology analyzer.

KNOWLEDGE AND AWARENESS TOWARDS VOLUNTARY BLOOD DONATION AMONG MEDICAL FRATERNITY AT A TERTIARY CARE CENTER

Topic: Blood donor and blood donation
Author: Akshitha Dave
Co-authors: Panchakshari Prasanna B K, Dheemantha P
Institution: Bangalore Medical College and Research Institute, Bangalore

Introduction: Every year more than 90 million units of blood are collected worldwide. In India currently annual blood collection is nearly 73 lakhs. Blood services are still facing a shortage due to increasing demand day by day. Several surveys were performed based on knowledge, attitude and behaviour towards blood donation worldwide. Factors such as insufficient knowledge among donors is one of the primary reasons for declining donor pool.

Aim: To assess the knowledge and attitude among medical fraternity towards voluntary blood donation, and to raise awareness to increase the future blood donations.

Materials and Method: An observational study was conducted at our tertiary care center for a period of 6 months from November 2023 to march 2024.The study population comprised 250 medical professionals which included doctors, medical students, nursing and paraclinical staff who were assessed based on online donor awareness questionnaire form on random basis and results were assessed accordingly.

Results: Out of the 250 medical professionals who participated in this study, males were 187 (74.8%) and females were 63(25.2%). The most common reason marked in the donor awareness form for not donating blood was fear of one's own health status post donation 164 (65.6%), followed by blood centers sell the blood for commercial purpose 155(62%), fear of needles 143 (57.2%), witnessed or experienced donor reaction henceforth decided not to donate 116(46.4%),wastage of blood due to under utilization 97(38.8%) and lastly family and emotional factors discouraging blood donation 47(18.8%).

Conclusion: The most common reason turns out to be fear of one's own health status post donation therefore donor motivation, recruitment and retention at the grass root level is the need for the hour. Formulating and implementing programs and strategies in the form of workshops and CME among medical fraternity will be helpful to improve the donor pool for stable supply of blood in order to meet the increasing demands.

BLOOD DONOR DEFERRAL PATTERN IN A TERTIARY CARE CENTRE IN KERALA

Topic: Blood donor and blood donation
Author: Jasna A M
Institution: Govt TD Medical College, Alappuzha

Introduction: The main goal of blood transfusion services (BTS) is to ensure an adequate and safe supply of blood and blood products globally. Voluntary non-remunerated blood donations are recommended to achieve this goal as these are at low risk for transfusion-transmitted infections. Donor selection is a stringent process that assesses the suitability of prospective donors. It safeguards the health of both the recipient and the donor. It also ensures blood safety and maintains sufficient blood supply by preventing the unnecessary loss of suitable donors for future blood donation.

Aim & Objective

1) To find the deferral pattern of whole blood donors in a tertiary care centre in Kerala

2) To study the causes of deferral in whole blood donors

Materials and Methods: Data retrieved from blood donor records in our blood centre over one year from January 2023 to December 2023 were analysed retrospectively. National guidelines [Drugs and Cosmetics (Second Amendment) Rules, 2020] were used for the selection and deferral of Whole blood donors. Data is entered in Microsoft Excel and analysed using SPSS version 26.

Results: Total registered donors were 13385 (12609 Males and 776 Females). Among them 11945 were selected (11487 Males and 458 Females). Deferral rate was 10.75% (N=1440, 77.9% males and 22.1% females). 94% were temporary deferrals and 6% were permanent.The deferral rate among females (40.97 %) was much higher than for males (8.89%). The commonest cause of temporary deferral in our study was anaemia at 14.1% followed by hypertension at 13.8%. Other main causes of donor deferral were medical causes (9.2%), Vaccination with IDRV (8.8%), Medication (7.4%), and residents of other countries (7.2%). The main causes of permanent deferral were, hypertension with cardiac diseases 2.2% and Allergy to dust (1.2%).

ADVERSE DONOR REACTIONS IN WHOLE BLOOD DONATION – DONOR HEMOVIGILANCE IN A BLOOD CENTRE OF A UNIVERSITY TEACHING HOSPITAL.

Topic: Hemovigilance
Author: S. Divya Bharathi
Institution: JSS Medical College, Mysore

Introduction: Hemovigilance, the systematic monitoring and surveillance of blood transfusion practices, plays a critical role in ensuring the safety and quality of transfusion. Donor hemovigilance is an important aspect of the hemovigilance system, which helps to improve blood donor safety and blood centre operations by reducing donor responses.

Whole blood donation is usually seen as a safe process, on rare occasions, unfavourable responses of various intensities may happen during or after collection. Adverse donor reactions (ADR) in normal healthy blood donors are not unusual. However, these unpleasant effects have a negative impact on donor retention. Adverse event due to blood donation is multifactorial in origin.

Aims and Objectives: The objective of this study was to determine the frequency and type of adverse donor reactions during or after blood donation.

Materials and Methods: This was a retrospective study conducted from January 2023 to December 2023 in the department of Transfusion Medicine at a tertiary care centre in southern India. All whole blood donations made at the centre were analysed. All adverse events occurring during or at the end of the donation were noted using a standardized format as per the guidelines issued by the National Hemovigilance program of India (NH v PI).

Results: During the study period, a total of 8617 donations were done and 45 DARs were reported. The overall DAR rate was 0.5% of the total blood donations. Majority of reactions were reported in age group of 18-30 years (71.1%) followed by 28.8% in the age group of 31-50 years. Among the donors with adverse reactions, 95.5% weighed more than 55kgs eligible for 450 ml of whole blood donation compared to 4.44% of donors with weight less than 55kgs. The DARs rates were higher in the first time (68.8%) compared to repeat donors (31.1%).

Vasovagal reaction (97.8%) was the most commonly observed reaction with only one donor presenting with hematoma. Dizziness (44.4%), hypotension (24.4%), sweating (17.7%), generalised weakness (2.2%), vomiting (6.6%) and loss of consciousness <60 sec (2.2%) were the symptoms noted. Among the 45 adverse reactions, 57.7% donors presented with single symptom, 28.8% had reaction with two and 13.3% having three symptoms.

All the DAR were collected within the blood center (on site) and resolved completely. These generalized systemicreactions (vasovagal) resulted in incomplete donations in 15.5% of donors (7 out of 45reactions).

Conclusion: Adverse donor reaction of 0.5% of all blood donations suggest that blood donation is a relatively safe procedure in our context. Analysis of adverse donor reactions helps in selecting the blood donors who are at risk of donor reactions.

PERCUTANEOUS INTERVENTION IN A HEMOPHILIAC PATIENT-DID WE REALLY BAIL IT OUT?

Topic: Miscellaneous
Author: Lt Col Arun N, Second Operator/DM Resident
Co-Authors: Manoj Ravi
Institution: Jubilee Mission Medical College and Research Institute

A 74 yr old man, known case of Hemophilia A, who had recieved factor 8 transfusions multiple times in the past admitted with resistant hypertension inspite of 5 antihypertensive drugs and had recurrent flash pulmonary edema. He was found to have bilateral renal artery stenosis, probably atherosclerotic. The decision of intervention was taken in view of recurrent pulmonary edema and admissions to CCU and rising creatinine values.

Left renal artery stenting was planned through left radial approach under the cover of factor 8 administration and maintenance, however the approach was changed since the radial artery went into spasm inspite of adequate anxiolytic and sedative.He was approached through right femoral approach and proximal part of left renal artery was stented with BARE METAL STENT.

The data for intervention in hemophilia is limited and after thourough litreture review and eduacting the entire cardio team procedure was done,in terms of choice of anticoagulation, approach, antiplatelet usage and follow up procdure. Task of maintaining factor 8 levels on a daily basis and mainitianing the levels more than 60- 80% was also done by close monitoring.Post procedure he improved but had ?viral pneumonia later and he succumbed, after 5 days of procedure. DID WE BAIL IT OUT REALLY? VIRAL PNEMONIA POST FACTOR 8 ,a common entity during covid times.

BLOOD UTILIZATION PATTERN AMONG ELECTIVE SURGICAL PATIENTS AT SMS HOSPITAL, JAIPUR

Topic: Clinical Transfusion practices
Author: Himanshi Dahiya
Institution: SMS Medical College, Jaipur

INTRODUCTION: In elective surgeries, risk of procedure associated bleeding can be anticipated and therefore red cell requirement can be easily calculated. It is a practice among medical professionals to order more blood than the actual need. These cross-matched/reserved units deprive other patients of blood in emergencies. Monitoring preoperative blood ordering decreases the cost of healthcare by avoiding unnecessary cross-match without compromising patient's safety. The current study is being done to study the blood utilization pattern at our institute through various Transfusion indices.

AIM & OBJECTIVES:

1. To study the pattern of blood components utilization among elective surgical cases admitted in general surgery department at SMS Hospital, Jaipur

2. To calculate various Transfusion Indices for different elective surgical procedures at SMS Hospital, Jaipur

METHOD: A cross sectional prospective observational study was conducted in those patients who underwent elective surgeries in the general surgery department at SMS Hospital, Jaipur from October 2023 to March 2024. Blood requisitions and transfusions were compiled and reviewed. The number of units requested, cross-matched, and transfused along with the number of patients cross-matched and transfused were collected. The blood bank requisition forms, databases, old surgical records, and discharge sheets were reviewed. Transfusion indices including Cross-match, Transfusion Ratio, Transfusion Probability and Transfusion Index and MSBOS were calculated.

RESULT: A total of 1320 patients underwent 52 different elective procedures are included in this study. Totally, 625 red blood cells units were cross-matched and only 365 units were transfused to 254 patients. The overall C/T ratio calculated was 1.7 and TI was 0.5 and T% was 40%.

CONCLUSION: The study indicated an adequate overall ratio of C/T, T% and TI. There is significant blood usage and appropriateness of blood utilization patterns at SMS Hospital. Formulating a blood ordering schedule for elective surgeries, to guide the surgeons regarding blood usage for surgical procedures can decrease over ordering of blood units thereby reducing unnecessary compatibility testing, returning of unused blood and wastage due to outdated units.

CHALLENGES AND MANAGEMENT OF COEXISTING RH NON- D ALLOIMMUNIZATION AND AUTOIMMUNE HAEMOLYTIC ANAEMIA IN PREGNANCY: A CASE REPORT

Topic: Clinical Transfusion practices
Author: Lekshmi GY
Co-authors: Girijanandini Kanungo
Institution: Institute of Medical Sciences and SUM Hospital Bhubaneswar

Introduction: Rh non-D alloimmunization, a significant challenge in pregnancy management, becomes even more complex when accompanied by Autoimmune Haemolytic Anaemia (AIHA), a rare and potentially life-threatening condition. RhD immunoglobulin prophylaxis has shifted the proportion of allo-immunized pregnancies towards non-D Rh antibodies, which lack available prophylaxis.

This report discusses a case marked by the coexistence of both conditions, which was further complicated by intrauterine foetal demise (IUD) at 26 weeks of gestation.

Case summary

A 29-year-old female, G2P1L1 presented with anaemia at 26 weeks of gestation. Ultrasound revealed an IUD with hydrops fetalis with positive Spalding's sign.

Corticosteroid therapy was given on 2nd to 4th day of admission. On 4th and 5th day of admission 2 units of most compatible packed red blood cells of O Rh D negative units (ccee K-) were transfused and Hb increased from 5 g/dl to 8.5 g/dl. MTP was done on 6th day and a dead born male baby (birth wt- 500g) was delivered. The patient was kept on follow up and was advised for repeat antibody titration after 2 months.

Previous obstetric history- 4yr/male child, LSCS, 2.9kg birth wt., no postnatal complication.

Relevant investigations:

Mother's:

- Blood Group: A Rh D Positive (CTT)
- DAT Polyspecific (Anti IgG+Anti C3d): Positive (4+), DAT Monospecific (Anti IgG): Negative
- Antibody Screening (3 cell panel): I, II, III – Positive (4+); A/C – Positive (4+)

- Thermal Amplitude: Positive (4+) at 4°C, Positive (3+) at room temperature, negative at 37°C
- Partial phenotyping: ccee K- (C, E, K Neg)
- Anti E Titration: 1:16 (CTT using double dilution technique)
- Bone Marrow aspiration and biopsy - Markedly hypercellular marrow with relatively poor cell trail, moderate megaloblastic erythroid hyperplasia.

Father's:

- Blood grouping and Rh D Typing- AB Rh D Positive
- Partial phenotyping – ccEE K-First child's:
- Blood grouping and Rh D Typing- A Rh D Positive
- Partial phenotyping – ccEE K-

Discussion: The case illustrates the intricate management challenges posed by Rh non-D alloimmunization and AIHA during pregnancy, culminating in IUD.

The patient exhibited Rh non-D alloimmunization, as evidenced by the anti E critical titre (1:16) and the extended Rh phenotyping. The diagnosis of cold AIHA was supported by laboratory findings including positive DAT (polyspecific) and thermal amplitude. Bone marrow aspiration and biopsy revealed features of haemolytic anaemia.

Due to difficulties in cross matching and an urgent need to raise Hb level, O Rh D negative PRBC (ccee K-) transfusion was given. Haemoglobin levels increased, paving the way for the medical termination of pregnancy to stabilize the maternal condition. The unavailability of cord blood sample prevented the determination of blood grouping, DAT, extended Rh D phenotyping with Kell and advanced IH investigations of the foetus. Identification of the anti-E antibody in patient had significant role in understanding the probable cause of IUD as well as in managing patient's future pregnancy and transfusions. The case underscores that Rh non-D alloimmunisation (anti-E) can lead to significant complications including IUD.

UTILIZATION OF RhD NEGATIVE DONOR RED CELL UNITS: ANALYSIS AT A BLOOD CENTER IN A TERTIARY CARE HOSPITAL

Topic: Blood components and processing
Author: Arpitha Maheswaran
Co-authors: Minal Wasnik Institution: AIIMS Raipur

INTRODUCTION: The Rh system is of importance in transfusion medicine because Rh antigens, especially D antigens, are highly immunogenic, and antibodies to these antigens cause hemolytic transfusion reactions. Because of the low prevalence of RhD negative donors, the utilization patterns of RhD-negative packed red cell units require investigation to ensure that the available units are optimally allocated to the suitable recipients.

AIM: To analyse the utilization of RhD negative packed red cell units at a blood center in a tertiary care hospital.

MATERIAL & METHODS: Retrospective data regarding the use of every RhD negative donor PRBC unit collected at our blood center from 08/01/2024 to 08/05/2024 (for a period of 4 months) was reviewed. Records were reviewed to assess the frequency and indications for RhD-negative red cell unit transfusions. The units discarded because of seroreactivity and expiry were also included.

RESULTS: Out of 4010 donations, there were 94 Rh-negative donors. Of this 16 were A negative, 33 were B negative, 39 were O negative and 6 were AB negative. Out of the total Rh-negative units, 1 unit (1.06%) was discarded due to donor sero-reactivity, another unit (1.06%) due to under-collection, and 8 units (8.51%) due to expiry. Among the remaining 84 PRBC units, 77 were issued, with 14 (18.18%) directed to RhD-positive

recipients and 63 (81.81%) to RhD-negative recipients. Of the issued Rh negative units, 11.68% (9/77) were issued to ABO matched Rh positive blood group recipients and 16.88% (13/77) of O RhD Negative units were issued to non-O group recipients. Altogether, 32 units (41.55%) were distributed within 10 days of collection, while only 7 units (9.09%) were distributed within the last 7 days prior to expiry.

CONCLUSION: The analysis of the utilization of RhD negative donor PRBC units at our blood center is helpful as it can guide appropriate blood inventory management, optimize resource allocation, and enhance patient care and will also avoid shortage as well as wastage of these precious PRBC units.

A STUDY TO ANALYSE PERIOPERATIVE BLOOD UTILISATION IN NEUROSURGERY AND IMPLEMENT STANDARD PRACTISES

Topic: Clinical Transfusion practices
Author: Shivanand Hemant Kumatagi
Co-authors: Vinu Rajendran, Amita R, Debasish Gupta
Institution: AIIMS Bibinagar

Background

Pre transfusion compatibility testing is a method to ensure safe blood transfusion. Two popular testing schemes are type and screen (T & S) and type and crossmatch (T&C). To optimize the balance between delay in issue of blood in T & S and excessive crossmatch in T&C, guidelines such as the maximum surgical blood order schedule (MSBOS) have been developed. This is a study to analyse the perioperative blood utilisation practises in Neurosurgery, develop MSBOS protocols for common procedures and analyse its effectiveness.

Aim: To compare the effect of maximum surgical blood order schedule in Neurosurgery between pre and post-implementation.

Methods: This is a retrospective and prospective observational study conducted for five years, 2018-2022 (4 years retrospective and one-year prospective). All the patients admitted under Neurosurgery department above 18 years for whom blood requisition was sent were included but those who needed massive transfusion or had bleeding disorders were excluded. For each common procedure, following five main transfusion indices were used to evaluate the usage and appropriateness: Crossmatch to Transfused ratio (CTR), Transfusion probability (TP%), Transfusion Index (TI), Blood Utilization (BU%) and Maximum surgical blood ordering schedule (MSBOS = 1.5 × TI).

The cross-matching of RBC units for such cases was followed according to the newly developed MSBOS protocol for one year during prospective period. The transfusion indices were calculated for all the patients of prospective period and compared with the retrospective data.

Statistical Analysis: Categorical and quantitative variables were expressed as frequency (percentage) and mean ± Standard Deviation (SD) respectively. For all statistical interpretations, $p<0.05$ was considered the threshold for statistical significance. Statistical analyses were performed in SPSS, version 20.0.

Results: A total of 2462 patients were included in retrospective period who underwent 30 common Neurosurgical procedures whereas it was 746 in prospective group. The demographic details which included age, gender and blood group were analysed. Overall CT ratio reduced from 3.6 to 2.4 and blood utilization increased from 27.40% to 41.55%. The patients for whom type and screen was performed increased from 18% to 75%. A total of 7 procedures were successfully managed with T & S alone.

HEPATITIS A AND LEPTOSPIROSIS DUAL INFECTION INDUCED FULMINANT HEPATIC FAILURE SUCCESSFULLY TREATED WITH STANDARD VOLUME THERAPEUTIC PLASMA EXCHANGE: A CASE REPORT

Topic: Clinical Transfusion practices
Author: Anuneet Tripathi
Co-authors: Akarshan Gupta, Amit Kumar Chatterjee, Amit Kumar, Pandeep Kaur, Davood Bava, Ankita Nigam
Institution: NIMS Jaipur, Rajasthan

Introduction: Acute liver failure (ALF), when occurs in a previously normal liver, is known as Fulminant Hepatic Failure (FHF). It is a medical emergency most commonly caused by acetaminophen toxicity and viral hepatitis. Other causes are ingestion of hepatotoxins/drugs, autoimmune hepatitis, acute Budd-Chiari syndrome, heat stroke, and leptospirosis. Although Therapeutic Plasma Exchange (TPE) is mostly used as a bridge therapy to Liver Transplant (LT), some patients may recover during TPE itself. TPE removes toxins, inflammatory mediators and restore hemostasis. As per American Society for Apheresis (ASFA) guidelines, ALF is a Category I, grade 1A indication for high volume TPE (HV-TPE) and Category III, grade 2B for standard volume TPE (SV-TPE). We report this case as dual infection induced FHF successfully treated with SV-TPE is scantly reported in literature.

Case Report: A 19-year-old female presented with fever and jaundice for 7 days, decreased urine output and altered sensorium for 1 day. Symptoms began with leg pain, followed by fever, chills, and rigors. Upon admission, patient was intubated and was on mechanical ventilation, and was receiving antibiotics and sedatives. Diagnostic tests revealed high WBC counts (10.31*103/ ?l), high total bilirubin (4.98 mg/dl; Direct/Indirect: 3.88/1.10), high SGOT and SGPT (811 U/L, 2682 U/L). PT/INR was found to be deranged (35.8 sec/2.84) with a high serum ammonia level (409 ?g/dl). Reports also showed positive markers for hepatitis A IgM and Leptospira IgM, indicative of a dual infection. She was then shifted to Medical ICU (MICU) with the diagnosis of ALF with Hepatitis A and Leptospirosis.

A request for TPE was received in the Department of Immuno-Hematology and Blood Transfusion (IHBT) on day 3 of admission. Blood group of the patient was O Rh(D) Negative. Plasma exchange was initiated daily for three consecutive days on Spectra Optia using Normal Saline and Fresh Frozen Plasma as replacement fluid, with 1.3, 1.5, and 1.5 plasma volumes exchanged in the first, second, and third procedures. During the first procedure, Noradrenaline was administered due to hypotension, while the second and third procedures were conducted with a slightly positive fluid balance to address the hypotension. Two days after the 3rd procedure, the patient regained consciousness, orientation, and responsiveness to commands, after which she was observed for five days before discharge.

Discussion: HV-TPE is a cumbersome procedure, which can also cause volume overload and cerebral edema. SV-TPE is a safe and compliant alternative, possibly improving survival by reducing cytokine storm and ammonia levels, albeit evidence for its efficacy is limited. As tachycardia and hypotension are inherent to ALF, maintaining a slightly positive fluid balance can prevent an impending hypovolemia. TPE in leptospirosis prevents tissue damage and immune complex injury, while in hepatitis A, it aids hepatic and cardiac recovery.

Conclusion: SV-TPE is a safe and effective alternative to HV-TPE in treating ALF, even in severe and complicated cases such as a dual infection.

FRESH FROZEN PLASMA UTILIZATION PATTERN IN A TERTIARY CARE HOSPITAL IN KERALA

Topic: Clinical Transfusion practices
Author: Riya Mathew
Institution: Govt TD Medical College Alappuzha

INTRODUCTION: Blood Transfusions are an important part of clinical management in the modern health care system. Fresh frozen plasma (FFP) is one of the components obtained from whole blood. Regular audits of the utilization pattern would help in better understanding of clinical transfusion practices and will ensure optimal use of the blood components.

OBJECTIVES

1. To study the pattern of utilization of Fresh frozen plasma
2. To evaluate the outcome of Fresh Frozen Plasma transfusion in bleeding and non-bleeding patients.

METHODS: A hospital based descriptive study was conducted among consenting patients receiving FFP transfusion including paediatric patients during the study period from January 2022 to December 2022. FFP requests where the clinical details were not available or those with missing data and requests from outside hospitals were excluded.

Data was collected using a printed proforma. All the patients included in the study were followed up for their clinical outcome and PT/INR values after transfusion. The data was entered in Microsoft Excel software and statistical analysis was done using SPSS version 26 software.

RESULTS: Out of the study population (N =301) 62.5% were males and 37.5% were females. Most of the patients were within the age group of 41-60 years (38.9%). Majority of patients (48.5%) receiving FFP transfusion were from the General Medicine Department. The two most common indications for FFP transfusion were coagulopathy (30.23%) and Chronic Liver Disease (CLD) (12%). Appropriate use of FFP transfusion was observed in 66.1% whereas 33.9% transfusions were inappropriate based on the Directorate General of Health Services (DGHS) guidelines. Out of the inappropriate transfusions,34.3%was from the General surgery department. Inappropriate FFP transfusions were mostly seen in pre operative patients for the correction of mild elevation of PT/ INR without bleeding (48%) and hypoalbuminemia (17.6%).

A SURVEY ON KNOWLEDGE, ATTITUDE AND PRACTICES OF NURSING OFFICERS ON BLOOD TRANSFUSION IN A TERTIARY CARE CENTRE IN KERALA

Topic: Clinical Transfusion practices
Author: Jasmi Nandan
Institution: Govt.TD Medical College, Vandanam, Alappuzha

A Survey on Knowledge, Attitude and Practices of Nursing officers on Blood Transfusion in A Tertiary Care Centre in Kerala

INTRODUCTION: Blood transfusion is a routine medical procedure that is highly effective and potentially life-saving treatment for many patients. Most of the complications related to blood transfusions are due to

clerical and technical problems. Nurse's skill and knowledge are very crucial to assure safe transfusion practices.

OBJECTIVES

1. To assess the knowledge, attitude and practices of nursing officers on blood transfusion in a tertiary care centre.

MATERIALS AND METHODS:

Data was collected from nursing officers of our institution, using a validated questionnaire in the form of google form for this cross sectional study. Survey consisted of three sections: 1. Demography, 2.Knowledge, 3. Attitude and Practice.

The questionnaire consisted of 24 questions with a score of one each and was equally divided to analyse knowledge, attitude and practice. The data was analysed using Excel and SPSS version 26.

RESULTS: A total of 110 nursing officers participated in this ongoing study. Out of the study subjects 14.5% had work experience of less than 1 year and 54.5% had work experience of 1-10 years.

The median knowledge score (KS) was 7 with an Interquartile range (IQR) of 2. Out of the total study population 60.9% had knowledge score of 6-12, remaining 39.1% had 1-6 score. Out of the total study subjects only 2.7% had minimum knowledge score of 3. 6.3% of the participants with less than 1 year experience shows maximum knowledge score of 11 .Maximum knowledge score among the study group with 1-10 year of experience was 10 (1.7%).

The median practice score is 9 (IQR = 2). 89.1% of the study participants had score of 6-12, remaining 10.9% had 1-6 score. Out of the total 16 participants with work experience less than 1 year shows maximum practice score of 10(6.3%).Only 5.9% of the participants with more than 10 year experience shows the maximum practice score of 12.

CONCLUSION: The median knowledge score (KS) was 7and the median practice score was 9 among nursing officers in this study. Nurses' knowledge and skills are fundamental to developing and strengthening the quality of blood transfusion procedures. Continuous Nursing Education for the improvement of nurses' knowledge and skills as well as routine monitoring should be carried out to ensure safe practice in blood transfusion.

COMBINED COAGULATION FACTOR VIII AND FACTOR IX DEFICIENCY A CASE REPORT

Topic: Clinical Transfusion Practices
Author: Palak Aggarwal
Institution: Wenlock District Hospital

Introduction: Congenital hemophilia B is a rare, inherited X-linked bleeding disorder caused by deficiency of factor IX (FIX). Acquired Hemophilia A is a rare, acquired bleeding disorder which presents as new onset bleeding in older adults due to development of autoantibodies against factor VIII (FVIII). This report describes the diagnosis and management of a patient with congenital hemophilia B and acquired hemophilia A and the development of inhibitors to factor VIII.

Aims: To diagnose a case of uncontrolled bleeding in known Hemophilia B and acquired Hemophilia A.

Objectives:

Primary objective:

To evaluate the cause of low levels of Factor VIII in Hemophilia B.

Secondary objective

To assess the factor assay of Factor IX and Factor VIII.

To detect Factor VIII inhibitors by Inhibitor screening.

To quantify the inhibitor levels by Modified Bethesda assay.

To outline the treatment options for combined deficiencies.

Materials and methods: Evaluation of clinical data, determination of FVIII and FIX levels and genetic analysis of F8 and F9 genes by clinical exome sequencing.

Results: Patient diagnosed with severe congenital hemophilia B (FIX - 0.8 %) and acquired hemophilia A (FVIII - 0.3%). F9 gene analysis showed a hemizygous nonsense variant in exon 7 of the F9 gene (chrX:g.139560774G>T ;Depth :60x) that results in a stop codon and premature truncation of the protein at codon 253.

Conclusion: The bleeding in patients with hemophilia B and factor VIII inhibitors can be difficult to control and uncontrolled bleeding has serious clinical consequences. AICC (Anti-inhibitor coagulant complex) with sequential therapy of factor rVIIa significantly decreased overall bleeding events in patients with severe hemophilia A and Hemophilia B (factor VIII inhibitors).

A RETROSPECTIVE STUDY TO ANALYSE THE REASONS FOR DISCARDING BLOOD AND ITS COMPONENTS IN A BLOOD CENTRE OF A TERTIARY CARE HOSPITAL IN SOUTHERN INDIA.

Topic: Quality Management and Accreditation
Author: Shanu S
Co-authors: Swajan Tewari
Institution: Vinayaka Mission Medical College Salem, INDIA.

INTRODUCTION: A quality management system properly followed in all stages of collection, processing, storing and issuing of blood products ensures decrease in discard rate of each blood component. The donated blood should be considered valuable and wastage of blood units has a negative impact on Blood Transfusion System. So proper utilization is necessary with minimal wastage.

AIM AND OBJECTIVE: To analyse the reasons for discarding blood and its components and interventions that can be used to optimize their use.

MATERIALS AND METHODS: This was a retrospective study of various causes of discard of blood and blood components and the data was collected from the discard register of blood centre in Tertiary care hospital in Southern India for a period of 1 year from January 2023 to December 2023. A total of 1898 blood donors donated blood. The total number of products discarded and the reasons for discarding was retrieved from this record.

RESULTS: A total of 311 blood components were discarded out of 3994 blood components prepared. The discard rate was 7.7%. Among the blood components discarded, the most common units were platelets-183 units that is 76% discard rate. The reason for this was due to short shelf life of platelets. Packed cells were discarded due to expiry, transfusion transmissible infections and low volume and the discard rate was 4.6%. FFP were discarded mostly due to damage of bag while handling and the discard rate was 2.1%.

CONCLUSION: Implementation of blood transfusion policies, proper screening of donor, sensitizing the clinicians on rational use of blood products, training of blood bank personnel & notification of permanently deferred donors will help in reducing the discard rate. This study helped in identifying areas to focus for intervention to further reduce the discard rates of each blood component by analysing different reasons of discard at various levels of quality management..

KEYWORDS: Blood, donors, discard rate, platelet, wastage

A RETROSPECTIVE STUDY TO ANALYSE THE DISCARD OF BLOOD COMPONENTS AT A TERTIARY CARE HOSPITAL

Topic: Quality Management and Accreditation
Author: Durga Devi .M
Co-authors: Panchakshari Prasanna B.K, Dheemantha.P, Akshitha Dave
Institution: Bangalore Medical College and Research Institute, Bangalore

INTRODUCTION:

Blood transfusion is a major part of the health care system and there is no substitute for human blood. The requirement of transfusion arises every 2 seconds in India and the estimated clinical demand is 14.6 million whole blood units every year but there is always a shortage of 1 million. Hence every unit of blood collected is highly valuable and has to be used wisely.

AIM: To analyze the reasons for discard of various blood components.

MATERIALS AND METHODS: A retrospective cross-sectional study was carried out at our tertiary care center, for a period of one year from January 2023 to December 2023. Details regarding the whole blood units and the components prepared were collected from the donor and the component registers. The various reasons for discard were obtained from the discard register. The discard rate for each component was calculated as the ratio between blood component discarded to the total number of components prepared and it has been expressed as a percentage.

RESULTS: During this study, a total of 7787 whole blood units were collected from January 2023 to December 2023. The discard rate for packed red blood cells (PRBC) was 3.9%, for Fresh frozen plasma (FFP) it was 15.9%, for platelets it was 30.4%. The most common reason for PRBC discard was seroreactivity (1.5%) and under collection (1.2%). For FFP discard the most common causes were breakage of bags (5.2%) and lipemic (4.9%). And for platelets, expiry (17.4%) was the common cause of discard.

CONCLUSION: The wastage of blood is unavoidable due to various reasons. We can reduce the discard rate by creating awareness among the staff and also by training them in blood collection, component separation, and storage, by following the first in and first out policy and also by estimating the clinical demand of each component.

Keywords: Discard, Blood components

TURN AROUND TIME FOR BLOOD DONATION PROCESS - A PROSPECTIVE STUDY

Topic: Quality Management and Accreditation
Author: Gunasekaran G
Institution: Tirunelveli Medical College

INTRODUCTION: Turnaround time (TAT) is one of the quality indicators of blood bank defined by National accreditation board for hospitals and healthcare providers (NABH). The operations in the blood bank rely on blood units collected from non-remunerated blood donors. The workflow can sometimes have gaps or

bottlenecks that prolong TAT of the blood donation process. This can result in bad experience to the donor. It may discourage donors to donate.

AIM & OBJECTIVES: To evaluate the turnaround time of the blood donation process.

MATERIALS AND METHODS: This was a prospective cross-sectional study done at the Department of Immunohematology and Blood Transfusion for two months (April& May 2024). Blood donation process starting with registration, Hemoglobin estimation, medical examination, blood collection and post donation care were individually observed. The data collected was entered in Microsoft excel and analyzed.

RESULTS: Preliminary observations noted, out of 30 donors observed, mean TAT for donor to complete blood donation was 44.1±14.54 minutes, pre donation phase mean TAT was 27.2±14.51 minutes. Prolongation of pre-donation TAT was due to the donors' food intake more than 4 hours, many donors arriving simultaneously, and the duty changeover of phlebotomists at 1 pm. Donation phase mean TAT was 5.56±2.83 minutes. Post donation phase mean TAT was 11.33±3.09 minutes. The final observed results will be submitted during the conference.

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 many donors come for donations. Creating awareness among first-time donors may alleviate the problems with food intake.

ASSESSING BLOOD USAGE IN ELECTIVE PROCEDURES: AN OBSERVATIONAL STUDY IN A TERTIARY CARE CENTRE

Topic: Quality Management and Accreditation
Author: Bhavani T
Institution: Saveetha Medical College, Chennai, Tamil Nadu

INTRODUCTION: The limited availability of blood makes it imperative that Hospitals and transfusion centres employ blood utilization indicators to ensure effective and efficient use. Requesting blood prior to a surgical procedure for perioperative transfusion is a common practice in surgical patients. Blood products are requested in the absence of definite indication. Hence this study was conducted to assess blood utilization practice in our hospital.

AIMS AND OBJECTIVES:

1) To calculate the overall Crossmatch to Transfusion ratio (C/T ratio) and C/T ratio among different surgical departments

2) To calculate the overall Transfusion Probability (TP) and TP among different surgical departments

METHOD: This is a retrospective, descriptive study conducted at Saveetha Medical College and hospital, Chennai. The period of study was 3 months from January 2024 to April 2024 and was analyzed. PRBC requests of all elective surgical patients sent to our blood bank in the study period were included. Data collected were age, gender, admitting department, ABO-Rh blood group, and number of units requested for the surgery. The number of units crossmatched and units issued on the day of surgery and post operative day 1 was collected

RESULTS: Blood was requested for 1861 patients and a total of 704 patients were transfused with total 797 PRBS units. Overall Crossmatch to transfusion ratio and transfusion probability were 2.33 and 37 % respectively(normal C/T ratio : ? 2.0 – significant blood usage and normal TP : > 30 %). The overall results show significant blood usage. Among different departments, better blood utilization was seen in CTVS department with C/T ratio and TP were 1.19 and 77% respectively, while poor indices were from obstetrics and gynecology unit with C/T ratio and TP were 5.14 and 41.1 % respectively

CONCLUSION: Our analysis reveals that certain departments within our healthcare facility exhibit inefficient blood usage practices. Based on our findings, we can modify the laboratory and transfusion practices for elective patients while maintaining our inventory and minimizing wastage due to outdating. We recommend for our hospital to develop its own Maximal Blood Ordering Schedule to improve efficiency of blood ordering and utilization.

ESTIMATION OF DAILY BLOOD REQUIREMENTS OF BLOOD CENTRE AT A TERTIARY CARE CENTRE; KERALA

Topic: Organisation and Management
Author: Hadhiya Thahir
Institution: Government Medical College, Thiruvananthapuram

INTRODUCTION:

Blood, being a scarce resource, is a vital commodity in the modern health care system. The demand-supply gap for blood/components continue to persist in many health care institutions. Blood inventory management demands a fine balance between ensuring blood availability and keeping wastage to a minimum. There are various methods to calculate the daily blood requirements. The question is regarding which method to adopt while calculating the blood requirements that meets the need of the blood centre with minimum wastage.

AIMS AND OBJECTIVES:

Primary Objective:

To calculate daily blood unit requirements of blood centre at a tertiary care centre; Kerala

Secondary Objective:

To compare the average daily issue of blood components in the blood centre with the predictive blood component requirements as calculated by two different methods.

METHODOLOGY:

STUDY DESIGN: Descriptive study

STUDY SETTING: Department of Transfusion Medicine at a tertiary care centre; Kerala

STUDY PROCEDURE:

- The average daily issue of blood components at the blood centre is calculated.
- The predictive daily RBC requirement is calculated using the following two methods:

METHOD 1:

BASED ON THE BED STRENGTH OF THE INSTITUTION:

Estimated blood requirement = (Number of acute hospital beds x 20) + (Number of normal beds x 7)

METHOD 2:

BASED ON PAST UTILISATION:

Estimated blood requirement= Utilisation in previous year+ 10% (Discard) + 5% (Disaster) + 10% (Increase in demand/bed strength)

The predictive daily blood requirement is calculated using the above two methods and is compared with the actual daily issue of the blood components at our centre.

RESULTS:

The average daily issue of blood components at our blood centre in the year of 2023 is around 90

Packed Red cell units in a day

Predictive daily blood requirement using various methods:

METHOD 1: Based on bed strength of the institution is 74 packed Red cell units/day

METHOD 2: Based on past utilisation is 94 Packed Red cell units per day.

Thus, Method 2; Based on past utilisation; gives a closer prediction to the average daily blood component issue.

CONCLUSION:

Moving towards 100% voluntary blood donation, it requires predicting the average daily requirement of blood components of the institution so that the out-door and in-house camps can be planned accordingly. Thus, the method for predicting the blood requirement needs to be adopted with caution in order to bridge the gap between supply and demand with minimum wastage so as to ensure its appropriate usage.

SPONDYLOENCHONDRODYSPLASIA WITH SYSTEMIC LUPUS ERYTHEMATOSUS : A CHALLENGE FOR TRANSFUSION

Topic: Immuno-haematology
Author: Varsha Chandran Lalgopal
Co-authors: Shubhangi LaD, Damayanti Dey, Sonal Gupta
Institution: Mahatma Gandhi Mission Medical College and Hospital, Kamothe , Navi Mumbai

INTRODUCTION: Spondyloenchondrodysplasia (SPENCD) is an Autosomal Recessive skeletal dysplasia caused by loss of function mutations in Acid Phosphatase 5, tartrate resistant (ACP 5).

Hypomorphic mutations in ACP5 hinder the formation of endochondral bone and produce an interferon signature,which results in unique dysplasias of the spondylar and metaphyseal bones as well as extra skeletal morbidities such as immunological dysregulation and neurological involvement.

Systemic Lupus Erythematosus (SLE) is a complex autoimmune disease with multisystem involvement. AIMS AND OBJECTIVES

Aims: To provide the best matched blood for safe transfusion. Objectives

To distinguish between Auto and Allo-antibodies. To identify irregular Allo antibodies.

METHODS: A 7 year old female child presented with fever, non-projectile vomiting and decreased activity since 2 days to the casualty. On examination she was conscious, oriented and had hypertonicity of all limbs. Previous medical records suggestive of Spondyloenchondrodysplasia with Monophasic Systemic Lupus Erythematosus. No significant family history noted. History of multiple transfusions since 18 months of age.

INVESTIGATIONS

Hemoglobin	-	3.6g/dl
Leucocyte count	-	8610/mm
Platelet count	-	250,000 / microL
Direct coombs test	-	Positive (+2 strength)
Indirect coombs test	-	Positive (+2 strength)
Antibody screening and identification	-	Pan-agglutination
Adsorption and Elution Technique	-	Autoantibody along with Anti K, Anti c, Anti E

TYPE & SCREEN VERSUS CONVENTIONAL COOMBS CROSS MATCH – A RETROSPECTIVE OBSERVATIONAL STUDY ON POLICY FOR PRE-TRANSFUSION TESTING PROTOCOLS

Topic: Immuno-haematology
Author: Vijit Joon
Institution: Saveetha Medical College, Chennai, Tamil Nadu

Introduction: Pre-Transfusion testing involves blood grouping and cross Major Match testing, especially at 37*c to detect clinically significant IgG antibodies. As per AABB the standard cross match testing can be substituted by Type & Screen.

Antibodies against blood group antigens can result in Haemolytic Transfusion reaction , hence both antibodies screening and cross matching tests will be useful to detect them. Typing and screening is done to detect any such clinically significant antibodies, while cross matching will detect any incompatibility of the patient against PRBCs.

Aims and Objectives

1. Identify any mismatch among results of Type & Screen against Crossmatch testing for PRBC.
2. To determine which tests has better results, thereby determine if Type & Screening can be adopted as a pretransfusion testing .
3. Identify alloantibodies among the patients.
4. Safety , cost and Turn around time comparison between Type & Screen against conventional cross match testing.

Method: All PRBC requests were as a routine protocol in our institute tested for blood grouping, Antibody screening and Cross matching simultaneously. Retrospective data was collected for a one year period duration, which included all RBC crossmatch requests, where type & screen was carried out alongwith routine cross match . The data was collected in regard to antibodies detected and the incompatible cross matches among each of the requests.

Results: There was no case where the antibody screen was negative and AHG crossmatch testing became incompatible. Of all cases where the antibody screening was positive incompatible cross match were seen in around 95 %, rest of the cases had compatible results in spite of having an allo- antibody, which would have been missed had only cross matching was done.

Conclusion: The screening cell panel adequately detected the clinically significant antibodies among our patient population in our study. The type and screen policy can be safe, efficient, cost-effective, and beneficial to the transfusion service. Adopting Type & Screen as pre-transfusion testing protocol will be beneficial in maintenance of adequate blood stocks and proper immunohematology analysis of the patients.

A CASE REPORT ON THE IDENTIFICATION OF WEAK A SUBGROUP WHILE RESOLVING ABO DISCREPANCY OF A HEALTHY DONOR

Topic: Immuno-haematology
Author: Neema Vijay, Co-authors: Minal Wasnik, Sankalp Sharma
Institution: AIIMS Raipur

Introduction: ABO subgroups are usually recognised due to an ABO discrepancy showing unexpected reactions in forward and reverse grouping. Subgroups of A includes A1, A2, A3, Ax, Aend, Am, Ay and Ael. Subgroups weaker than A2 occur rarely and are characterised by reduction in the number of A antigen sites present on red blood cells, accompanied by a corresponding rise in H reactivity.

Case report: A 35-year-old healthy replacement donor donated blood in our blood centre. Routine blood grouping using Qwalys Evo, Diagast which works on the principle of Erythrocyte Magnetised Technology (EMT), showed O RhD positive in forward grouping (no agglutination with anti-A, anti-B, and anti-A,B) whereas in reverse grouping there was agglutination with B cells only. Blood grouping was repeated by Tube method at temperatures 4°C, 24°C and 37°C which showed same results. Considering this as a case of ABO discrepancy, immunohematology workup was done which included testing with lectins A1 and H, Direct Coombs test (DCT), antibody screening by 3-cell panel, adsorption elution studies, and saliva testing for secretor status. History of the donor was taken to exclude underlying disease conditions, medications, and prior transfusions.

Testing with A1 lectin showed no agglutination. Testing with H lectin showed strong agglutination (4+). DCT and antibody screening were negative. Cold adsorption of red cells with human polyclonal B plasma (Anti-A) and commercial monoclonal anti-A sera were done at 4°C for 1 hour followed by Lui freeze-thaw elution at - 30°C for 10 mins. The final eluates were tested with in-house pooled A cells and O cells. Eluates showed agglutination with pooled A cells and absence of agglutination with pooled O cells. Saliva inhibition test showed the secretor status of H substances and absence of A and B substances.

Discussion: Routine blood grouping showing O RhD positive in forward grouping and agglutination with B cells in reverse grouping indicates Group II ABO discrepancy. The absence of agglutination of red cells with anti-A and anti A,B in forward grouping, strong reactivity with H lectin, absence of anti-A1 in plasma, eluate showing agglutination with pooled A cells, and presence of H substances in saliva, collectively indicate weaker subgroup of A phenotype predominantly suggestive of Ael. Presence or absence of A transferase enzyme and molecular studies help in further confirmation. Donor was registered in institutional rare donor registry and counselled regarding blood transfusion and screening of family members.

Conclusion: Identifying weak subgroups is crucial as they are often mistyped as O phenotype leading to potential harm with transfusion and transplantation.

Keywords: Weak subgroup, ABO discrepancy, Blood grouping

SEEKING SYMMETRY IN ASYMMETRY: AN UNUSUAL CASE OF HDFN DUE TO ANTI-AB ANTIBODY

Topic: Immuno-haematology
Author: Aakarsh Marthati, Co-authors: Para K Trivedi, Siddharth Mittal, Dyvik S, Sushil Kumar Choudhary, Sanmukh R. Joshi
Institution: AIIMS Jodhpur

Introduction: Most common cause of immune haemolytic disease of the foetus and newborn (HDFN) is ABO incompatibility with an estimated risk of 2.9 percent in India. HDFN caused by ABO antibodies is usually in A 1 or B babies of group O mothers. Although severe ABO HDFN is uncommon, several cases of red cell haemolysis requiring exchange transfusion were reported. We describe a case of ABO HFDN due to asymmetrical nature of Anti-A, B antibody found in group O mother's serum.

Case Presentation: A female neonate born to 28 year, second-gravida (Gravida-2, Parity-1, Living-1) at 40 weeks gestation weighing 2110g by emergency lower segment caesarean section was admitted to neonatal intensive care unit due to neonatal hyperbilirubinemia within 24 hours of life.

Neonatal CBC showed Hb 18.8gm/dl, platelet = 1.85L/ul, and blood group was A Rh D positive. Repeat CBC on day 2 demonstrated a drop in Hb by >1.5 gm/dl with direct antiglobulin test positive (DAT; Strength-3+). Peripheral smear showed reticulocytosis and increased spherocytes. Mother blood group was O Rh D positive with negative antibody screening via 3-cell panel. There were no complications during ante-natal period. After ruling out infections, red cell membrane defects, clinical suspicion of ABO HDFN was considered in view of ABO incompatibility between mother and baby and positive DAT. The monospecific DAT showed presence of IgG and absent complement. The neonatal serum showed presence of anti-A (strength 1+) and anti-B (strength 4+) isoagglutinins with in-house pooled A1 and B cells in polyspecific AHG card after incubation at 370C suggesting transplacental transfer of maternal anti-A/B/A,B antibodies. Eluate prepared from DAT positive red cells via acid elution method showed atypical findings. The eluate was non-reactive with pooled A1 cells and O cells but was reactive (strength 3+) with pooled B cells in polyspecific AHG card after incubation at 370C suggesting presence of anti-B antibody or anti-B activity of IgG antibody (anti-A, B antibody) coating the A group neonate red cells. This unusual presentation has few possible explanations. First it could be due to asymmetrical cross-reactivity of group O sera previously reported where antibody eluted from A cells reacts with B cells only. Second the anti-A activity of anti-A,B antibody found in O group mothers which crosses the placenta could be neutralised by soluble A substances in the neonate's plasma but it can still coat the neonate red cells carrying A antigen because of its affinity towards a common epitope found on both A and B antigen or it possesses dual specificity to A and B antigen. Thirdly, it could be due to elution process, during which anti-A antibody/ activity of the eluate was neutralized by A antigen shed from neonate red cells undergoing elution.

Conclusion: This case highlights a unique and atypical immunohaematological presentation of ABO HDFN due to asymmetric and cross-reactive nature of anti-A,B antibody. During evaluation, immunohaematologists should be aware of this unique characteristic of anti-A,B antibody.

IDENTIFICATION AND BLOOD MANAGEMENT IN THE PRESENCE OF AN ANTIBODY AGAINST A HIGHLY PREVALENT ANTIGEN IN A PATIENT UNDERGOING CARDIAC SURGERY: A CRISIS TO DEAL WITH

Topic: Immuno-haematology
Author: Dilna Christy Edison
Co-authors: Joseph Philip, R.S. Mallhi, Ritika Basnotra
Institution: Bharati Vidyapeeth Medical College, Pune

INTRODUCTION

Cardiac surgeries are established to be associated with perioperative blood loss following which allogeneic blood transfusions are unavoidable. Extensive anticoagulation and Cardiopulmonary bypass (CPB) make these surgeries even more reliant on the availability of blood components. A minimum of 4-6 units of packed RBCs, FFPs, RDPs, and Cryoprecipitates must be reserved for Coronary Artery Bypass Graft surgery (CABG) patients, to start with the procedures. As a TM specialist, the occurrence of an antibody against a highly prevalent antigen is a nightmare in such situations, and combined teamwork is mandatory in such arduous circumstances. We, at our centre, encountered a patient with double vessel disease, planned for CABG surgery, and on evaluation found to have anti-e.

AIM & OBJECTIVES

1. To fulfil the transfusion requirement of a patient with an antibody against a highly prevalent antigen.

METHOD

63-year-old male diabetic and hypertensive with a history of Coronary artery disease, post-Percutaneous Coronary Intervention to Right Coronary Artery (RCA) in 2015, presented with dyspnoea and angina on exertion for 1 month. Repeat angiography revealed patent stent in RCA and stenosed segments in the Left Anterior Descending and Left Main Coronary Artery. The patient was planned for CABG on CPB, followed which, blood demand and samples were sent to our department for reservation of blood components. Blood grouping showed discrepancy, with B Rh D positive in forward grouping and O Rh D positive in reverse grouping. The historical blood group of the patient was B Rh D positive, raising the suspicion of an allo/autoantibody interfering with the grouping. Auto-control was negative and IAT showed a 4+ reaction. Antibody screening and identification revealed anti-e. Rh-Kell phenotyping confirmed the patient to be negative for 'e' antigen. We informed the surgeon, the challenges in finding a compatible unit for a patient with anti-e, and proposed the possibility of autologous donation and other patient blood management strategies, the preoperative Hb being 14g/dL. Crossmatching the patient's sample with the entire B (RhD positive and negative) and O (RhD positive and negative) units in our inventory showed 02 units of B Rh D positive to be compatible. We discussed the situation with our neighbouring blood centre, and 02 B Rh D positive units were found compatible in their inventory. The surgeon suggested an Off-pump CABG in anticipation of the lesser requirement of component transfusion. The procedure took place with a perioperative PRBC requirement of only 4 units. The intra and postoperative periods were uneventful.

RESULTS & CONCLUSION

The presence of antibodies against a high-prevalent antigen is often challenging for blood transfusion services in terms of providing compatible blood units. This will delay the procedure, which in turn affects the quality of

treatment, the patient receives. Our case was quite demanding since the patient was in urgent need of CABG surgery, which compels a minimum of 4-6 PRBCs and other blood components. Timely recognition of the antibody, blood-conserving techniques, and appropriate assistance from our neighbouring blood centre, helped us in managing the case effortlessly.

INTERPRETATION OF COOMB'S TEST[DAT&IAT] IN INCOMPATIBLE CROSSMATCHES IN TERTIARY CARE HOSPITAL

Topic: Immuno-haematology
Author: Swastik Kumar Patel
Co-authors: Bhoomika Shingala, Jitendra H Vachhani
Institution: Shree M P Shah Medical College Jamnagar

Introduction: Pre transfusion testing is necessary, for the provision of safe and effective blood and blood components. Purpose of these tests to provide best possible compatible blood or blood components to patients so that possibility of destruction of recipient's own RBC reduce. Cross matching is important part of pre transfusion testing. Cross match testing divided into Major cross match and minor cross match. Problem occurred during crossmatching should be resolved by appropriate guidelines and standard operating procedure [SOP].

Aims and objectives: To find out incidence of incompatible crossmatching. When incompatible crossmatching occurred then evaluation of coomb's test includes direct antiglobulin test [DAT] as well as indirect antiglobulin test [IAT].

Methods: This is retrospective study undertaken in tertiary care hospital during the period from September 2021 to September 2023. Blood samples collected from appropriate donors and patients who need transfusion for complete blood grouping and crossmatching. Among incompatible crossmatches we performed DAT and IAT via Matrix gel card method.

Inclusion criteria: We found 172 incompatible crossmatches so they include in our study.

Exclusion criteria-Preanalytical errors such as contamination of blood samples due to improper collection and transportation.

Results: This study includes 172 cases [0.22%] showing incompatible crossmatches out of 78412 crossmatches. Out of 172 patients most common incompatibility was present in females 113 [65.6%]. Out of 172 patients ,92 patients showed DAT positive and 83 patients showed IAT positive.

IAT & DAT are directly associated with incompatible crossmatch cases.38 [22.10%] patients have both IAT &DAT positive, 45[26.16%] patients have IAT positive and DAT negative, 54 [31.40%] patients have IAT negative and DAT positive,35[20.40%] patients have both IAT &DAT negative.

AN INTERESTING CASE OF CLINICALLY SIGNIFICANT ANTI- P1 ANTIBODY IN A PAEDIATRIC CASE.

Topic: Immuno-haematology
Author: Shabeel. P, Co-authors: Sazia Samir, Aarushi Sahni, Sheetal Malhotra, Lakhvinder Singh, Ashish Jain, Ratti Ram Sharma
Institution: PGIMER, Chandigarh

Case description: One year old male child was referred to our institute's paediatric emergency department with complaints of fever, vomiting and loose stools. A blood requisition was sent to our department for a packed

red blood cell (PRBC) unit, the indication being severe anaemia under evaluation (Hb 2g/dl). The patient had received 30ml of A Rh D Positive PRBC transfusion from outside hospital which was associated with hemolytic transfusion reaction characterised by hematuria and fever. Upon investigation, the hemoglobin decreased to 2 gm/dl, which was 6 gm/dl before the patient received transfusion from outside hospital as documented.

Aims and objectives: Immunohematology workup for crossmatch incompatibility and to identify any allo or auto antibody if present.

Method: IH workup including blood grouping, antibody screening, antigen phenotyping, enzyme treatment was done by conventional tube technology (CTT) and column agglutination technology (CAT).

Results: Blood group of the patient was found to be 'A subgroup Rh D Positive' with Anti-A1 lectin negative. Reverse grouping showed anti-A antibody. Blood group confirmation was to be done with repeat sample after 3-6 months.

Presence of Anti-P1 alloantibody was identified in the patient's serum. Anti- E and Anti- Lua could not be ruled out. Enzyme treatment of the serum showed enhanced results on antibody screen and ID.

Patient was transfused with 'O Rh D positive' PRBC negative for P1, Lua and E antigen. Patient became clinically stable with a rise in Hb to 8.5 gm/dl.

Discussion: Anti-P1 is usually naturally occurring IgM cold reactive agglutinin which is enhanced with enzymes. In rare cases, it can fix the compliment at 37 degree Celsius and results in hemolytic transfusion reactions. In our patient, Anti-P1 had a high thermal amplitude reacting at anti human globulin (AHG) phase, hence clinically significant.

DEVELOPMENT OF ANTI C ANTIBODY IN MULTITRANSFUSED PATIENTS- A CASE SERIES

Topic: Immuno-haematology
Author: Resna Jose
Institution: Government Medical College Thiruvananthapuram

Introduction

Blood transfusion is an inevitable part of management of hematological disorders like thalassemia, sickle cell anemia and hematological malignancies. Rate of alloimmunisation is higher in this population. Getting crossmatch compatible antigen negative units in this group is challenging sometimes.

Aims and Objectives

In this case series, I have enumerated three anti c Antibody developed patients who needed repeated transfusion in our centre.

Methodology

The causes of alloimmunisation in multitransfused patients in our centre was analysed, and three anti c Antibody developed patients were included

Result

Case 1

A 43 year old man was presented to casualty with cardiac failure and severe anemia, Heamoglobin was 4.2g/dl. Blood requisition form was sent to our department with properly labeled sample.

Immunohaematological workup was done in view of incompatibility. His Blood group was B Rh D positive, Direct antiglobulin test was negative and Autocontrol at all temparature was negative.Antibody screening and identification pattern suggestive of anti c antibody. Multiple bags were crossmatched with papainisation after

considering prevalence of c antigen, crossmatch compatible bag typed for c, and issued same bag.

Case 2

A twenty seven year old man with anemia under evaluation was presented to hematology Outpatient department with tiredness, his haemoglobin was 6.6g /dl, immunohaematological workup was done when noted incompatibility. His blood group was B Rh D positive. Direct antiglobulin test and auto control at all temperature was negative. Indirect Antiglobulin Test positive, antibody screening and identification pattern suggestive of anti c and E Antibody. Phenotype matched donor from rare donor regestry was called, bled and issued after crossmatching.

Case 3

A twenty-eight year old male, with lost follow up of thalassemia intermediate for last eight months presented to hematology Outpatient department with cardiac failure and severe anemia , Heamoglobin was 3.8g/dl.

Antibody screening and identification pattern suggestive of anti c Antibody. Multiple bags were crossmatched on emergency basis, compatible bag tested for c antigen, and issued same.patient was further transfused with two more Packed Red cell units which was phenotypically matched from rare donor regestry

Conclusion

Issuing crossmatch compatible antigen negative units in emergency situation is cumbersome in centres with high blood requirement and less manpower. Doing extended phenotyping before first transfusion and issuing phenotype matched Packed Red Cells is much better to avoid transfusion reaction and wastage of manpower and time.

SICKLE CELL ANEMIA WITH VARIANT D AND MULTIPLE ALLO- ANTIBODIES, INCLUDING ANTI-D AND ANTIBODY AGAINST UNKNOWN ANTIGEN: A CLINICAL CHALLENGE

Topic: Immuno-haematology
Author: Nayana Vk
Institution: AIIMS Bhubaneswar

INTRODUCTION

Sickle cell Anemia (SCD) is prevalent among certain tribal populations in Odisha, characterized by a multitude of variant RBC antigens and a high rate of alloimmunization. The variant expression of antigens, along with the wide variation in antigen pools between the healthy donor population and the patients, complicates the identification of compatible PRBC units. A 23-year-old female patient with SCD and splenomegaly, experiencing multiple hemolytic episodes and a rapid drop in hemoglobin after each PRBC transfusion from a peripheral center, posed a dilemma in providing compatible blood, even in life-threatening anemia. Despite receiving fewer than five transfusions in her lifetime, this patient developed multiple alloantibodies, including Anti-D, due to her variant D antigen. Finding crossmatch-compatible units from the limited O-negative inventory created another hurdle. The donor pool was reduced to a single donor, her blood-related brother, which proved insufficient to cope with her hypersplenism and anemia.

AIMS AND OBJECTIVES

1. To detect the cause of Anti-D alloimmunization in an O-positive individual.
2. To identify and differentiate the multiple alloantibodies from a pan-positive antibody identification panel with variable strength of reactions.

3. To correlate with the molecular reasons for the expression of variant D antigen.

METHODS

Blood grouping and antibody identification in the patient revealed a weaker D antigen and a pan- positive antibody screen. The variability in reaction strength among panel cells suggested the presence of multiple alloantibodies rather than a single antibody against a highly prevalent antigen. Eleven O-positive panel cells exhibited consistently higher reactions compared to the five O- negative panels. Considering the potential for weakened D antigen expression and altered immunity in SCD patients, the presence of anti-D was suspected. Immunohematological workups included antibody identification in different phases, varying cell-serum ratios, temperatures, and incubation times. Additional tests, such as multiple adsorption elution, DTT, papain and chloroquine treatments, random crossmatch with over 200 O-positive and O-negative donor units, and screening of the first- degree relatives, were done. In the meantime, the sample was sent to higher center for molecular blood grouping.

RESULTS

Blood group of the patient showed a weak (2+) reaction with anti-D, which was exactly similar to that of her mother and two brothers. The pattern of Anti-D with the antibody identification panel after prolonged room temperature incubation confirmed the presence of Anti-D alloantibody. Despite multiple efforts, the specificity of other antibody/antibodies couldn't be identified. All the available O- negative donor units (28) were crossmatch incompatible. The only compatible unit available was from her brother, who was HbAA. The molecular blood grouping showed Weak D type 17 and partial D 4.2 (RHD *09.01.00/RHD DAR1), notorious for alloimmunization.

CONCLUSION

SCD patients should receive minimal transfusions using extended RBC phenotype-matched AHG crossmatch-compatible blood to prevent alloimmunization and life-threatening hemolytic transfusion reactions. Early detection of variant antigens, especially Rh antigens, is crucial for optimal transfusion services. Molecular blood grouping in high-risk cases is essential to pinpoint the cause of alloimmunization and variant antigen expressions accurately. Relying solely on serology can overlook variant antigens, potentially leading to alloimmunization.

IMPACT OF CANCER ON BLOOD GROUP TYPING: ADDRESSING DISCREPANCIES

Topic: Immuno-haematology
Author: Juilee Shalik Charmode
Co-authors: Soumya Das, Rounak Dubey, Neha Gangane, Shipra Sonkusare, Aishwarya V, Pinjari Chinigi Sab
Institution: AIIMS Nagpur

Introduction: Blood group discrepancies pose a significant challenge to safe transfusion practices. Determining the patient's blood group and issuing group-compatible blood components is essential for patient safety. Patient's clinical history is of utmost importance in resolving blood group discrepancies. The association of blood groups with various disease states has been well documented in the literature. Malignant conditions are also associated with blood group changes. In solid organ malignancies, excessive blood group substances produced by the tumor cells can lead to blood group discrepancies. Few such cases had been reported in literature. In this report, we have discussed a case of ovarian tumor mass with discrepancy in serum grouping.

Case report: Blood group discrepancy was noted in a 38-year-old female, case of high-grade serous carcinoma of ovary. Cell grouping showed O Rh D positive blood group and serum grouping revealed B group. The results were similar with a repeat sample and conventional tube technique as well. The results were same after incubation

at 4^0C also. Reaction with anti-A1 lectin was negative and reaction with anti-H lectin was 4+. Clerical errors were also ruled out and repeat sample also showed similar reactions.

The historical blood group was O Rh D positive. Saliva secretor status also showed presence of H blood group substance. We suspected that there might be B blood group substance secreted by the tumor in the patient's serum which inhibited the reaction with anti-B antiserum. Inhibition of hemagglutination was seen upto 1:2 dilution of the patient's serum. Excess B substance neutralized the naturally occurring Anti B giving rise to the discrepancy. We concluded that the patient's blood group was O Rh D Positive and 3 crossmatch compatible O Rh D positive units were reserved for the patient.

Discussion and Conclusion: Several studies in the past have been reported on malignancies and their effects on blood groups. Blood group discrepancy due to blood group substances has been reported to occur in pancreatic, ovarian, colonic, and bile duct carcinoma and, pseudo-mucinous ovarian cysts. Presence of blood group substances in the serum neutralizing the typing antiserum is a very rare phenomenon. Blood group discrepancies arising from the same are thus difficult to resolve. It is important to resolve the discrepancies to avoid any unsafe transfusion. Molecular methods would be able to give definitive results in such cases. However, more feasible serological techniques can be helpful in resolving these blood group discrepancies. Another aspect which needs to be studied more is the association of excess blood group substance to clinical prognosis of the patient.

CLINICAL AND LABORATORY PROFILE OF INCOMPATIBLE CROSSMATCH DUE TO ALLOANTIBODIES

Topic: Immuno-haematology
Author: Arpita Parmar
Co-authors: Paramjit Kaur, Ravneet Kaur, Gagandeep Kaur, Kshitija Mittal
Institution: Government Medical College and Hospital, Chandigarh

INTRODUCTION: Incompatible crossmatch during pre-transfusion testing can result from many reasons. Presence of alloantibodies in the patient's serum is a major cause. Timely resolution of incompatible crossmatch is a challenge faced by blood centres.

AIMS AND OBJECTIVES: To study the clinical and laboratory profile of patients with incompatible cross match due to alloantibodies.

METHOD: This retrospective cross-sectional study was conducted from June 2023 to May 2024 in a tertiary care center. Records of all cases of incompatible crossmatch due to alloantibodies in the patient serum were retrieved from the special immunohematology (IH) register and analysed. A standardized protocol involving detailed history pertaining to age, gender, diagnosis, clinical features, previous transfusion and drug intake was recorded in all cases. The laboratory parameters were also evaluated. The cell and serum grouping (using conventional tube technique), direct antiglobulin test (DAT), indirect antiglobulin test (IAT), autocontrol, antibody screening and identification using CAT (column agglutination technique) results were retrieved. Patient and donor unit phenotyping results and transfusion details were also recorded.

RESULTS: During the study period, a total of 36,386 units were crossmatched for 57,023 patients. Incompatible crossmatch due to alloantibodies was encountered in 49 patients. Of 49 patients, the majority were females (n=34; 69.4%). The mean age of the patients was 34±17 years (2-72 yrs). The indication was medical in majority of the patients (n=19;38%), followed by anemia in pregnancy (n=12; 24%), surgical indications (n=11; 22%), solid organ malignancy (n=4,0.08%) and Rh D negative pregnancy (n=3,0.06%). The mean hemoglobin at presentation was 7.5±3.2 g/dl (2.5-14.0 g/dl) and more than half of the patients had pallor on clinical examination (n=27, 55%). Sixteen patients (32%) had history of recent transfusion within 3 months or were

multitransfused. Seven (14%) showed group 4 discrepancy between cell and serum grouping. The DAT and autocontrol were positive in 8 (16%) cases and IAT was positive in 46 cases (93%) with varying strengths (1+ to 4+). The most common alloantibodies identified were anti-M (n=10, 20%), anti-E (n=7, 14%), anti-c (n=6, 12%), anti-Lea (n=4, 0.1%), anti-Fya (n=3, 0.06%), anti-C, anti-D, anti-Leb, anti-Jkb in 2 each and anti-e (n=1). Combined alloantibodies included anti-E+C (n=5, 10%), anti-D+C (n=3, 0.06%), anti-Jkb+E (n=1, 0.02%) and cold autoantibody+anti-Fya (n=1). Patient phenotyping was performed in 33 patients (67%) and found negative for the corresponding antigen against which the antibody was identified. Corresponding antigen negative crossmatch compatible units were transfused in 31(63%) patients without any adverse reaction. A special IH card was issued to all patients along with counseling for further transfusion.

CHALLENGES IN TREATING A SNAKE BITE VICTIM WITH ABO DISCREPANCY- A RARE CASE REPORT

Topic: Immuno-haematology
Author: Rajeswari S
Co-authors: Anandeeswari B, Sintha M
Institution: Madurai Medical College

INTRODUCTION: ABO discrepancy occur when unexpected reactions occur in the forward and reverse grouping. Group 1 ABO discrepancy may arise due to many factors such as clerical/technical errors, age, malignancies like Leukemia or Lymphoma and patients on immuno suppresive agents. Here we report a case of missing antibody following Anti Snake Venom (ASV) administration in a 6-year-old child.

AIM & OBJECTIVE: The aim of my study is to solve the ABO discrepancy in a snake bite victim admitted in our tertiary care centre. To ensure the safe transfusion practices, it is important to solve blood group discrepancies.

METHOD: We received the requisition form for a 6-year-old child diagnosed as Venom induced consumptive coagulopathy from the paediatrician for 2 units of FFP. All tests were done by conventional tube method. After ruling out clerical / technical errors, the child's Forward grouping was A Positive and Reverse grouping was AB

Reverse grouping with A and B cells at room temperature for 30 minutes shows no agglutination. Reverse grouping at 40C for 15 minutes shows weak positive reaction in B cells. Auto-control at different temperatures shows negative results. DAT and IAT was also negative. As the child is in coagulopathy and the discrepancy is not solved, we issued 2 units AB FFP and 3 units AB Random donor platelets.

His father's blood group was A positive and mother's blood group was O positive.

Secretor Status of child's saliva confirms A secretor.

To check the effect of anti-snake-venom on blood group antibodies, we selected a group A serum sample from a normal blood donor and performed reverse typing in the presence and absence of anti-snake venom. Reverse grouping in a normal A donor's serum shows 2+ with ASV and 3+ reaction without ASV in B cells respectively. 11 days after ASV administration, blood grouping of the child was repeated and found to be A Positive with no discrepancy in reverse grouping.

RESULTS: We inferred that blood group discrepancy was due to ASV. The child's blood group was confirmed as A positive. We issued 2 units compatible Packed red blood cells, 6 units Random donor platelets and 1-unit FFP of blood group A for this child.

CONCLUSION: This case draws special attention that the Immunoglobulins in ASV may cause this group 1 ABO discrepancy. It is important for Transfusion Medicine specialists, Clinicians and Blood centre technicians to be aware of this possibility when interpreting blood grouping reports for patients who have received ASV.

PREVALENCE OF WEAK Rh D AMONG WHOLE BLOOD DONORS AT A TERTIARY CARE CENTRE IN KERALA

Topic: Immuno-haematology
Author: Greeshma S
Institution: Government Medical College Thiruvananthapuram

Introduction : RhD (D or RH1), originally identified in 1939, was the first clinically important blood group to be found following the discovery of ABO 39 years earlier. One of the most immunogenic Clinical problems are believed to be caused by five antigens: D, C, c, E, and e. Weak D or Du is one of the weaker D variations which is characterized as a quantitative variation, with just a few typical D antigens per red cell but all epitopes present. The significance of weak D lays in the fact that transfusion of red cells from a weak Rh D positive person to a D negative person may result in alloimmunisation and subsequent exposure to such D positive red cell can lead to fatal hemolytic reaction or hemolytic disease of newborn in a sensitized pregnant female.

Aims & Objective: To estimate the prevalence of Rh weak D among whole blood donors at a tertiary care centre in Kerala.

Method: This is a cross-sectional study conducted on consecutive whole blood donors who are being declared fit as per National guidelines for donor selection over a period of three months, i.e. from 5th September 2023 to 4th December 2023 in the Department of Transfusion Medicine at a tertiary care centre in Kerala. All blood donor samples are tested for Rh typing using monoclonal anti D sera and Rh D negative groups are further tested for Rh weak D testing in an AHG gel card. Data was analyzed using percentage of Rh D positive, negative & weak Rh D among donors.

Results: During this three months study period, a total of 7752 healthy blood donors donated blood. Among these, 6978 (90.02%) were Rh- D factor positive while 774 (9.98%) donors were Rh- D factor negative. Among the Rh-D factor negative individuals, 42 (5.43%) were weak Rh D positive. i.e. 0.54% of the whole blood donors are having weak Rh D factor positivity.

Conclusion: This study shows the prevalence of weak D antigen in our donor population who are representatives of Kerala. All health care workers should be aware of weak D to avoid anti- D alloimmunisation. All serologic weak D positive individuals should be given a blood group card showing their Rh D status as donor and recipient. For safe blood transfusion and to prevent transfusion related complications, comprehensive National transfusion guidelines need to be laid down to standardize the protocol for D antigen testing for donors as well as patients.

PREVALENCE OF MAJOR CROSSMATCH INCOMPATIBILITIES - A DESCRIPTIVE STUDY AT A TERTIARY CARE CENTRE IN KERALA

Topic: Immuno-haematology
Author: Hadhiya Thahir
Institution: Government Medical College, Thiruvananthapuram

INTRODUCTION: Crossmatching is an integral part of pre- transfusion testing, ensuring safe blood transfusion. Incompatibilities in crossmatch is one of the major challenges for a transfusion medicine expert. This study is intended to determine the prevalence of incompatibilities in major crossmatch and to analyse the causes for the same.

AIMS AND OBJECTIVES:

PRIMARY OBJECTIVE: To estimate the prevalence of incompatibilities in major crossmatch in a tertiary care centre. SECONDARY OBJECTIVE:

To analyse the causes of an incompatible crossmatch

MATERIALS AND METHODS: A descriptive cross-sectional study was conducted in the department of Transfusion Medicine at a tertiary care centre in Kerala. During the study period from September 2022 to August 2023(1 year), all the major crossmatches were done by column agglutination technique (CAT) in AHG phase using Bio-Rad gel cards (Anti IgG+C3d gel cards). In case of any incompatible result, the same was resolved using appropriate steps. From the data collected, all the incompatibilities in major crossmatch were noted and analysed.

RESULTS: During the study period, out of a total of 41,975 major crossmatches (AHG Phase), 125 were found to be crossmatch incompatible (0.29%).

Crossmatch incompatibility was found to be higher in females (63.2% n-79) than in males (36.8%n-46)

In 73.6% cases(n-92), there was history of prior sensitization events, while in 26.4% cases, there was no history of prior sensitization events.

Out of the total crossmatch incompatibilities, 44.8%- due to autoantibodies(n-56)

36%- due to alloantibodies (n-45)

16.8%- due to miscellaneous causes (sample errors/ Technical errors) (n-21)

2.4%- due to alloantibody with an underlying autoantibody. (n-3)

Among the crossmatch incompatibilities due to alloantibodies(n-45);

73.33%- Single alloantibody (n-33)

20%- Multiple alloantibodies (n-9)

6.66%- Alloantibodies of unknown specificity(n-3)

The most common alloantibody was found to be anti-small c antibody (30.36%) followed by anti E antibody (16.07%), Anti M antibody (12.5%), Anti S antibody(12.5%). Other alloantibodies detected were anti C(8.92%), anti D(7.14%), anti Jka(5.35%), anti P(1.78%), anti e(1.78%), anti Fya(1.78%), and anti K(1.17%).

CONCLUSION: Incompatible crossmatch poses a challenge in the field of transfusion Medicine. The prevalence of an incompatible crossmatch in our centre was 0.29% The most common cause for an incompatible crossmatch in this study was the presence of autoantibodies (44.8%)

This challenge can be resolved by proper Root Cause Analysis, to a greater extend.

AN ALGORITHMIC APPROACH TO RULE OUT ANTI-G BY SEQUENTIAL ALLO -ADSORPTION IN RESOURCE-LIMITED SETTINGS: A CASE REPORT

Topic: Immuno-haematology
Author: Ankita Nigam, Co-authors: Akarshan gupta, Amit kumar Chatterjee, amit kumar, Davood Bava, Pandeep Kaur, Anuneet Tripathi
Institution: NIMS Jaipur, Rajasthan

INTRODUCTION: The G antigen of Rh blood group system, produced by the RhD and RHCE genes, is present in most D-positive and/or C-positive red blood cells (RBCs) but absent in D-negative and C-negative RBCs. Anti-G resembles anti-C plus anti-D serologically, complicating accurate antibody identification. Hemolytic disease of the

fetus and newborn (HDFN) can result from antibodies against Rh antigens, with anti-C causing milder symptoms than anti-D. Proper antibody specificity determination is thus vital to ensure appropriate Rh immunoglobulin (RhIg) prophylaxis during pregnancy. We report a case of (anti-D + anti-C) identification after excluding anti-G, in a resource-limited setting where enzyme treatment or acid elution facilities are not available.

CASE REPORT: A 24-year-old pregnant woman (G3P2) at 36 weeks and 2 days gestation presented with labor pain. Her first baby, who was a female, had no jaundice, while her second, an O Rh D-positive male, had jaundice treated with exchange transfusions. The blood group of the patient was O Rh D-negative and antibody screening was positive. Her newborn, an O Rh D-positive female, had high bilirubin levels, requiring phototherapy and exchange transfusion. Antibody identification testing suggested either of the various combinations of anti-D, anti-C, and anti-G.

To differentiate anti-G from anti-D and anti-C, differential adsorption and elution were performed. Patient plasma was adsorbed with R2R2 (D+ G+ C?) cells to remove anti-G and anti-D, leaving anti-C. The post-adsorbed plasma was tested, and R2R2 cells were eluted to isolate bound antibodies. The eluate was then adsorbed with rr' (D-G+ C+) cells to remove anti-G, leaving anti-D. Final eluates were tested with R2R2 and rr' cells to confirm the presence of specific antibodies. This revealed the presence of anti-D and anti-C, but not anti-G. Confirmation was achieved using the baby's samples, showing consistent results. Due to anti-D presence, RhIG was not administered post-delivery. Anti-D titer was 1:64, and anti-C titer was 1:4.

DISCUSSION: This case report highlights the differentiation of anti-G from anti-C and anti-D antibodies using a simplified heat elution method without acid treatment or enzyme modification. Fazal et al. used ficin-treated cells for adsorption, which differs from our study, they employed a heat-based elution method similar to ours. Yousuf et al performed adsorption in a low-ionic-strength solution (LISS) containing polyethylene glycol following which acid elution was done. Soumya Das et al employed differential adsorption and elution techniques using enzyme-treated R2R2 cells, followed by cold-acid elution of the absorbed cells. In another study, Palfi et al conducted adsorption and elution techniques using polyethylene glycol (PEG).

CONCLUSIONS: While employing specialized methods can enhance the detection of IgG antibodies, resource-constrained settings should not deter one from conducting testing using untreated cells and simple heat elution to differentiate between anti-G and anti-C/D antibodies, as it is documented in studies that IgG antibodies can be detected through heat elution.

DETECTION AND MANAGEMENT OF BOMBAY/ PARABOMBAY BLOOD GROUPS:- A CASE SERIES

Topic: Immuno-haematology
Author: Sharon Joy
Institution: Government Medical College, Thiruvananthapuram

Introduction:- Bombay blood group was discovered by Dr Y M Bhende in the year 1952. Bombay phenotype individuals have inherited 2 recessive alleles of H gene with genotype hh.

Aim:- To understand detection and management of Bombay blood group patients in a tertiary care center.

Method:- Descriptive observational study

Case 1:- 28 year old G3P2L2A0 38 weeks gestational age and historical blood group O Rh D positive was referred from local hospital since her blood was found to be incompatible with all O Rh D positive and Rh D negative units. Forward grouping showed no agglutination with Anti A and Anti B but reverse grouping showed agglutination with A, B and O cells. Since the results were discordant with each other forward grouping with Anti H lectin was done which showed no agglutination. IAT and Antibody screening showed 4+ reaction. Saliva inhibition test was done and she was found to be a secretor. A diagnosis of Para Bombay blood group was done. Since she was already in labour pain there was no time to contact donors from blood donor register. 10 of her immediate relatives were screened and her elder brother was found to Para Bombay blood group itself. His blood was collected, components were separated, cross matched and kept ready in case of any need for transfusion. Her delivery was uneventful and the blood was stored in the blood center till expiry date.

Case 2:- 73 year old male with historical blood group O Rh D positive was posted for surgery. Forward grouping showed no agglutination with Anti A, Anti B. Reverse grouping showed agglutination with A cells, B cells and O celsl. Since the results were discordant, forward grouping with Anti H lectin was done, it showed no agglutination. IAT and Antibody screening showed 4+ reaction. Saliva inhibition test showed he is a classical case of Bombay blood group. Same was informed to surgery medical officer. Surgery was postponed. His immediate relatives were screened, none were Bombay blood group. Donors from donor registry were contacted. Blood was collected and components separated. Surgery was uneventful. Blood components were stored up to expiry period

Case 3:- Primi with 21 weeks of gestation came for cervical encirclage. Her blood sample was sent to department for IH workup. Forward grouping showed no reaction with Anti A and Anti B, reverse grouping showed agglutination with A cell, B cell and O cell. Since there is discrepancy in two types of groupings forward grouping with Anti H lectin was done, it showed no agglutination. IAT and Antibody screening showed 4+ grading. Saliva inhibition test showed that she is a classical case of Bombay blood group. Components collected for another patient was available at the time.Cross matching was done and found to be compatible. Procedure was uneventful

Conclusion:- Forward and reverse blood grouping must be done every time a patients blood sample is brought to blood center so as not to miss rare blood groups

AN ASSESSMENT OF EFFECT OF PLATELETPHERESIS ON HEMATOLOGICAL AND BIOCHEMICAL PARAMETERS IN REPEAT PLATELET DONORS.

Topic: Apheresis and Cellular therapies
Author: Radhika Rameshwar Khande
Co-authors: Jayashree Sharma, Swarupa Bhagwat, Parag Fulzele, Darshan Adulkar
Institution: King Edward Memorial Hospital and Seth GS Medical College, Mumbai

INTRODUCTION: Apheresis efficiently collects specific blood components like platelets, plasma yielding high-quality products. Plateletpheresis, isolating platelets while returning other components to the donor poses risks such as cell loss and donor complications. Anticoagulants like citrate may cause calcium and magnesium fluctuations, potentially leading to donor hypocalcemia. Proposed prospective study aim to understand and mitigate these risks, especially in repeat platelet donors to ensure donor health and product quality.

AIM: This study aimed at analyzing the significance of alteration in hematological and biochemical parameters in donors after repeated plateletpheresis procedure.

MATERIALS AND METHODS : In this study we analysed 125 plateletpheresis procedures done among 25 repeat single platelet donors (SDP) over the period of 7 months (October 2023 to April 2024). In this study we analysed the biochemical and haematological parameters like RBC count, HB, HCT, MCV, MCH, MCHC, RDW, Calcium, Potassium, Sodium, Chloride, Total protein, Albumin of a donor just before starting the plateletpheresis procedure and analysed the same at the time of next platelet donation. This was repeated for next four consecutive donations. Healthy voluntary donors were selected who were going to donate the platelets every 15 days of interval for four consecutive times.

RESULTS : Changes in Biochemical parameters: Calcium levels (mg%) showed a slight decrease from visit 1 (9.13± 0.39) to visit2 (9.11 ±0.37), visit3 (9.11±0.36) to visit4 (9.14± 0.39).

Sodium (mEq/L) visit1 (133.45 ±2.81) visit2 (133.11± 2.32) visit3 (133.32± 2.67) visit4 (132.50± 1.93).

Potassium (mEq/L) visit1 (3.71 ±0.14) visit2 (3.57± 0.11) visit3 (3.40 ±0.15) visit4

(3.52 ±0.12)

Chloride (mEq/L) visit1 (98.71± 0.74)visit2 (98.23± 1.45) visit3(98.55± 1.12) visit4(97.76± 0.98)

Total Protein (gm%) visit1(6.58 ±0.28) visit2 (6.32 ±0.31) visit3(6.62± 0.36) visit4 (6.63± 0.28).

Albumin (gm%) visit1(4.00± 0.13) visit2(4.02± 0.14) visit3(4.04± 0.16) visit4(4.01±0.12)

Hematological parameters : RBC count (1lakh/ul) visit1(4.41± 0.53) visit2(4.48± 0.52) visit3(4.59± 0.53) visit4(4.49± 0.52).

HB (g/dl)visit1(13.44± 0.44) visit2 (13.61 ±0.49) visit3(13.58± 0.44) visit4 (13.61±0.49).

HCT (%)visit1(41.89 ±2.41) visit2(41.70 ±2.43) visit3(42.02± 2.41)visit4(41.90±2.43)

MCV (fL) visit1(83.05 ±3.82) visit 2(83.11 ±3.85) visit3(80.51± 3.97)visit4(81.45±3.63).

MCH (pg) visit1(27.51± 1.82) visit2 (27.50 ±1.78) visit 3(27.80± 1.40) visit4(

26.60± 1.97).

MCHC (g/dL) visit1(31.54± 1.34) visit2(31.69± 1.31) visit3 (33.04 ±1.46) visit4

(32.52± 1.33).

The calculated p values for all parameters were more than 0.05 suggesting it to be not significant.

CONCLUSION:

In this study we observed that there wasn't any alteration or deficiency in any haematological or biochemical parameter in repeat frequent plateletpheresis donors thus suggesting the procedure is safe for them.

AN EVALUATION OF THE FACTORS DETERMINING THE HEMATOPOIETIC STEM CELL COLLECTION FOR ALLOGENEIC TRANSPLANTATION IN A TERTIARY CARE CENTRE

Topic: Apheresis and Cellular therapies
Author: Archana C C
Co-authors: Shashank Ojha, Suryatapa saha, Arun Kumar
Institution: Tata Memorial Centre, Actrec, Navi Mumbai

Introduction

Allogeneic hematopoietic stem cell transplantation (HSCT) is a pivotal treatment for various hematologic malignancies. Peripheral blood stem cells (PBSCs) are increasingly favored due to their enhanced engraftment and collection feasibility. Successful collection of allogeneic PBSCs involves numerous factors, including donor and procedural aspects such as age, sex, BMI, mobilization agents, and hematological parameters.

Aims & Objectives

This study aimed to evaluate the various parameters influencing the collection of hematopoietic stem cells in allogeneic stem cell transplantation.

Materials & Methods

A retrospective analysis of 100 allogeneic stem cell collections from July 2018 to April 2024 was conducted. Demographic characteristics (age, sex), donor parameters (e.g., BMI, pre CD34 count, WBC pre count, mobilisation agents), and procedural variables (e.g.,total blood volume processed, cell separator used, venous access) were compared with dependent variables, including WBC count and absolute CD34 cell count in the product, which is determined using flow cytometric enumeration. Linear regression analysis was employed, considering $P < 0.05$ as statistically significant.

Results

Among the 100 allogeneic donors, 44 were male and 56 were female, with a mean age with standard deviation as 29.8 (+13.9) years and a mean donor BMI of 23.7 (+6.2) kg/m². The baseline for WBC pre count and CD34 pre count is 50.9 (+22.6) and 125.4 (+74.7) respectively. Venous access was peripheral in 71 (71%) donors and central venous access in 29 (29%) donors. Donor BMI showed a significant association with both absolute CD34 cell count (P=0.04) and WBC count (P=0.01) in the product. Pre-mobilization CD34 count had a significant association with absolute CD34 count in the product (P<0.001). Peripheral venous access showed significant association with absolute CD34 cell count in the product (P=0.01), whereas central venous access showed no significance. While the choice of cell separator did not significantly affect collection efficacy. Donor parameters such as age, sex, hematocrit, platelet count, and total blood volume processed showed no statistical significance (P>0.05). Plerixafor mobilization did not show significant association, likely due to its limited use, i.e, 18 out of 100 cases.

Conclusion

This study emphasise the significance of donor BMI and pre-mobilization CD34 count in determining hematopoietic stem cell collection efficacy for allogeneic transplantation. Moreover, the comparable efficacy of both cell separators highlights their equal capability in stem cell harvest. The significance of peripheral venous access over central access may arise from the limited utilization of central venous access, with central access predominantly reserved for pediatric donors where sufficient flow rates via peripheral lines are uncertain. The lack of significance regarding Plerixafor mobilization could be attributed to its infrequent use in addition to GCSF mobilization. Considering the generally strong health status of allogeneic donors, the necessity for Plerixafor before collection is minimal.

ADVERSE EVENTS DURING APHERESIS PROCEDURES: AUDIT AT A TERTIARY CARE CENTRE

Topic: Apheresis and Cellular therapies
Author: Kumari Jyoti
Co-authors: Jayashree Sharma, Swarupa Bhagwat, Parag Fulzele, Darshan Adulkar
Institution: King Edward Memorial Hospital and Seth GS Medical College, Mumbai

INTRODUCTION: The increased demand for platelet transfusions has led to the widespread use of technologically advanced apheresis procedures supervised by transfusion medicine specialists. Apheresis involves drawing blood from donors, separating it using automated cell separators, and extracting the required component before returning the rest to donors. Adverse reactions during apheresis, reported at frequencies ranging from 0.37 to 6.81%, include unique events like hypocalcemia due to anticoagulant use and longer donation periods. Our center evaluated the incidence of adverse events associated with modern apheresis technique to understand and prevent such occurrences, aiding in the formulation of preventive measures.

AIM: The study aimed to scrutinize adverse incidents in apheresis procedures to enhance voluntary apheresis donations.

MATERIAL AND METHODS : This study, conducted from January 2019 to December 2023, focused on plateletpheresis donors meeting specific criteria. Donors were healthy adults aged 18-60, weighing 55kg. with hemoglobin levels ?12.5 gm/dL and platelet counts more than or equal to 150000/µL. They had not taken NSAIDs in the past 72 hours and tested negative for HIV, HBV, HCV, malaria, and syphilis. Apheresis procedures were conducted using a cell separator, and adverse events were categorized into donor-related, equipment malfunction, and technical issues, documented by trained staff.

RESULTS : A total of 1740 apheresis procedures were conducted, with 1708 being plateletpheresis and 32

therapeutic plasma exchange (TPE) procedures for 7 patients. Adverse events totalled 102 (5.86%);out of which 85 (83.43%) were donor- related, 16 (15.71%) equipment-related, and 1 (0.86%) technical. Donor- related issues included 20 (19.6%) vascular injuries, 47 (46.1%) anticoagulant reactions, and 13 (12.73%) vaso-vagal reactions. Equipment issues included 5 (4.93%) air purge failures, 3 (2.94%) defective kits and 8 (7.84%) AC ratio abnormalities. Technical issues due to wrong programme selection 1(0.29%)

CONCLUSION: Adverse events related to plateletpheresis, such as local reactions like hematomas, often result from improper phlebotomy techniques causing blood leakage. Although female donors might experience more adverse events, our study found no issues in female donors undergoing plateletpheresis due to small sample size. Citrate reactions, caused calcium chelation, occurred in 2.7% of cases, managed with oral calcium tablets. Systemic reactions, mainly vasovagal responses, were higher for 1st time donors. Equipment- related problems, like air purge failures, can be mitigated with proper training and maintenance. The overall incidence of adverse events was 5.86%. differing from other studies, likely due to donor characteristics and procedural variances. Despite risks, meticulous vigilance, superior training, and donor education can minimize adverse events, ensuring a safe and pleasant experience for apheresis procedures. This will lead to increase in voluntary apheresis donations.

AN INTEGRATED APPROACH: IVIG, PLASMAPHERESIS, AND REHABILITATION IN SEVERE CASE OF GBS.

Topic: Apheresis and Cellular therapies
Author: Stephy Varghese K
Co-authors: Ch.Srinivasa Rao
Institution: ESI Medical College, Sanath Nagar, Hyderabad

Introduction: Guillain-Barre Syndrome (GBS) is a rare immune-mediated polyradiculoneuropathy that typically presents as acute flaccid paralysis. It is often preceded by infections such as upper respiratory tract infections or gastrointestinal infections. GBS is broadly classified into two categories: Acute Inflammatory Demyelinating Polyradiculoneuropathy and Acute Axonal Motor Neuropathy. Classical GBS presents with progressive limb weakness and absent reflexes. Both IVIG and plasmapheresis are equally effective in improving outcomes by accelerating recovery. TPE exchanges 1-1.5 plasma volumes 5-6 times over 10-14 days, while IVIG is given at 0.4g/kg per day for 5 days. Early initiation of physiotherapy is crucial. Despite of different treatment options the outcome in GBS remain unsatisfactory and mortality is high in children. Significant percentage are left with disabilities. Therefore, numerous studies are exploring drug choices, doses, newer medications, and physiotherapy to assess patient outcomes.

Case details: History: A 13-year-old girl presented with sudden onset bilateral lower limb pain persisting for 7 days, accompanied by fever, vomiting, and difficulty walking for the past 3 days. No significant past history.

On examination: the child was conscious with stable vitals. Patient exhibited bilateral LMN facial palsy, with power of 4/5 in the upper limbs and 3/5 in the lower limbs, along with areflexia in all four limbs along with poor respiratory efforts. The baseline laboratory investigations were normal. CSF analysis showed albumin- cytological dissociation. Nerve conduction studies revealed sensory motor axonal neuropathy of bilateral lower limbs.

Management: In order to maintain ventilation patient intubated and started on mechanical ventilation. 5 cycles of therapeutic plasmapheresis were done every alternate day from day 1. Each procedure exchanged 1.2 total plasma volumes using albumin as replacement fluid. Patient also received 5 doses of IVIG at 400mg/kg/day following each plasmapheresis. Other supportive treatment also given.

Outcome: Motor power and respiratory efforts improved after the third plasmapheresis cycle. The child was extubated and shifted to noninvasive ventilator support on the 10th day of admission, gradually weaning off to room air over the next 4 days. Daily sessions of static and dynamic trunk balance, limb strengthening, and

gait training exercises were provided. Over 10 days of rehabilitation, the child regained trunk and lower limb strength. At discharge, the child exhibited 5/5 power in the upper limbs and 4/5 power in the lower limbs.

Conclusion: Immunotherapy should be initiated as early as possible and should not be delayed for confirmation of diagnosis. The choice of drug depends on availability and affordability. In severe cases, both types of immunotherapy can be tried. Early rehabilitation should be initiated to decrease deficits.

References

1. Shahrizaila N, Lehmann HC, Kuwabara S. Guillain-Barré syndrome. Lancet. 2021 Mar 27;397(10280):1214-1228. doi: 10.1016/S0140-6736(21)00517-1. Epub 2021 Feb 26. PMID: 33647239.
2. Nikolaus M, Kühne F, Tietze A, Thumfart J, Kempf C, Gratopp A, Knierim E, Bittigau P, Kaindl AM. Modified Zipper Method, a Promising Treatment Option in Severe Pediatric Immune- Mediated Neurologic Disorders. J Child Neurol. 2022 May;37(6):505-516. doi: 10.1177/08830738221089476. Epub 2022 Apr 18. PMID: 35435761; PMCID: PMC9160959.

EFFECT OF DONOR VARIABLES IN PLATELET YIELD OF SDP PROCEDURE.

Topic: Apheresis and Cellular therapies
Author: Akhil V George
Institution: GMC Srinagar

Abstract: Single donor platelets are more effective than random donor platelets. SDPs are being increasingly used in transfusion centres due to better quality, better platelet increments in patients, lesser contamination, less risk of multiple donor exposures and TTI's.

One SDP unit is equivalent of 6-8 units of RDPs, as it increases the overall yield of platelets collected. However various factors affect the outcome of SDP yield. Such factors are discussed in this study.

Aims and objectives: The aim of the study was to analyse the effect of various donor parameters on the yield of single donor platelet procedure.

Materials and methods: A two-year retrospective study on SDP procedure was conducted in the department. A total of 151 procedures were studied which were done on spectra optia continuous flow cell separator.

Donor variables such as age, gender, predonation platelet count, haemoglobin, haematocrit, weight were studied for their effect on platelet yield of SDP.

Statistical analysis was done for study of relationship between platelet yield and donor variables.

Results: The mean age of SDP donors was 29.9 years with maximum in the age group 21-30 years. The mean pre donation platelet in the donors were 2.03.*10^5/?L per unit. The mean post donation platelet count was observed as 3.432 *10^11 per unit. As per guidelines of Association for the Advancement of Blood & Biotherapies, plateletpheresis (Single Donor Platelets) unit must have platelet count of 3x10^11 which in turn raises platelet count by 30,000-60,000 per microliter. Mean range found in haemoglobin count was found to be 14.81gm/l. Following Mean was found for hematocrit (43.19 %) and weight(73.4kg).

Statistically significant direct correlation was observed between predonation platelet count and platelet yield. (R=0.6076, P<0.0001).

Between the variable platelet yield and haemoglobin , although a positive correlation, the relationship between the variables is weaker (r=0.3348, p value=0.00026) compared to the predonation and postdonation yield.

Also statistical significance between weight and platelet yield (r=0.2497, p value=0.0019), between age and platelet yield(r= 0.1252, P-Value is .126199) were observed which was not not strong as compared with other parameter relationships.

Strong statistical significance between platelet yield and haemotocrit (0.4585,p value <0.0001).

CONCLUSION: Use of SDP is on the rise as compared to RDP. In this study, relationship between pre donation platelet yield and post donation platelet yield was found to be strong. Interventions can be done which help i increase pre donation platelet yield, like donor health programmes that would target SDP donors. Donors who were deferred for acute reasons could be motivated for future donations. By doing so the SDP donor inventory can be enlarged which would result in better patient outcome.

THERAPEUTIC RED CELL EXCHANGE FOR ACUTE BONE PAIN CRISIS IN A PATIENT WITH SICKLE CELL DISEASE: A CASE REPORT

Topic: Apheresis and Cellular therapies
Author: Rowena DL Robins
Institution: Saveetha Medical College and Hospital

INTRODUCTION: Red cell exchange (RCE) or Erythrocytapheresis is a curative apheresis procedure which replaces malformed red blood cells with healthy donor cells. It is indicated for various sickle cell crises, including acute neurological syndrome, acute chest syndrome, vaso-occlusive crisis, multi-organ failure and priapism. RCE can be done manually or via automated machines. Automated RCE will rapidly reduce the sickle cell load, thereby helping to reduce the related complications.

We report our experience of automated Red Cell exchange in a 31-year-old male patient diagnosed with sickle cell anemia and who presented to us with acute bone pain crisis.

CASE REPORT: A 31-year-old male patient was brought to our casualty with complaints of severe bone pain in multiple joints. He was a known case of Homozygous Sickle cell disease. His HPLC was done and the hemoglobin S concentration was 79.3%. Hemoglobin level was decreased. Reticulocyte count, LDH and total Bilirubin levels were elevated. Urgent hematologist opinion was sought and the patient was initiated on T.Hydroxyurea. We were also advised to do an emergency automated Red cell exchange for the patient. We undertook the procedure on the Com.Tec Fresenius Kabi machine. Following the procedure the Hemoglobin S concentration decreased to 20.4% and his symptoms improved. He was kept for observation for 5 days and then discharged.

CONCLUSION: Automated red cell exchange in Sickle Disease patients provide a safe and effective way to provide immediate relief in symptoms. It also helps to prevent long term complications in these patients. Our case helps to highlight the importance of immediate initiation of red cell exchange for these patients.

ANALYSIS OF PRE AND POST PROCEDURE HAEMATOLOGICAL PARAMETERS IN DONORS OF DOUBLE DOSE PLATELETPHERESIS PROCEDURE: A STUDY FROM TERTIARY CARE ONCOLOGY CENTRE IN INDIA

Topic: Apheresis and Cellular therapies
Author: Salamma Bodagala
Co-authors: Priti Desai, Anisha Navkudkar, Abhay Kumar Gupta
Institution: Tata Memorial Hospital, Parel, Mumbai

Introduction: Platelet transfusion is important in patients undergoing cancer treatment. The requirement for apheresis platelets has increased in recent years. It is mandatory for platelets inventory maintenance to manage

medical emergencies associated with bleeding. Donor pool is same or shrinking in recent years. This can be managed by collecting a double dose of platelets (DDP) from the donor with a single procedure. DDP collection with available modern machines through stringent inclusion criteria will be helpful. Thus, helps in splitting of single procedure platelet unit into two units.

Aim and Objectives: To analyze the pre-procedure and post-procedure hematological parameters in donors of double dose plateletpheresis procedure along the platelet yield.

Materials and methods: This was a prospective observational study, IEC (Institutional Ethics Committee) approved and CTRI (Clinical Trail Registry of India) registered, done over a period of one month. A total of 30 voluntary plateletpheresis donors were selected as per the eligibility criteria of National guidelines [Drugs and Cosmetic (second amendment) Rule, 2020 and Directorate General of Health Services (DGHS)]. All donor were recruited after written informed consent. The DDP unit was collected by setting the target yield as 6×1011. Donor's pre-procedure, post-procedure (after 15 minutes of collection) blood samples and representative sample from the plateletpheresis unit were collected for Complete Blood Counts (CBC). Appropriate statistical tool applied using SPSS version 25.

Results: The mean age of donors were 40.3 years±10.9 (range: 21-58 years). Statistically significant increase from pre-procedure to post-procedure, Hemoglobin (HB) (mean pre-HB:14.57± 1.02 g/dl; mean post-HB: 15.24±1.11g/dl), Hematocrit (HCT) (mean pre-HCT: 44.99±2.63%; mean post-HCT: 46.51±3.07%) and White blood cells (WBC) (mean pre-WBC: 7.19±1.51×103/µl; mean post WBC- 7.65±1.72×103/µl) was observed ($p<0.01$). Similarly, a statistically significant decrease in platelet count (PLT) (mean pre-PLT: 346±42×103/µl; mean post-PLT: 239±44×103/µl) was observed ($p<0.001$) and no significant difference was seen in Mean Platelet Volume (MPV). The obtained platelet yield in all the plateletpheresis units were significantly higher ($p<0.001$) when compared to the targeted yield set, 6×1011 (mean obtained yield 6.6±0.5×1011). Plateletpheresis unit mean volume was 464±16ml.

Conclusion: This study suggests that the significant increase in HB, HCT, and WBC with the decrease in PLT in post-procedure CBC was due to the relative platelet and plasma loss. These changes in hematological parameters were within the normal limits. Hence, the double-dose plateletpheresis procedure is considered safe.

SEROPREVALENCE AND TRENDS OF TRANSFUSION TRANSMITTED INFECTIONS AMONG BLOOD DONORS IN A TERTIARY CARE CENTRE IN CENTRAL INDIA

Topic: Transfusion transmitted infections
Author: Alaka Vijayan C
Co-authors: Ramesh Chandrakar
Institution: AIIMS Raipur

Introduction: Transfusion Transmitted Infections (TTIs) pose a significant problem in the context of Blood Transfusion. In India, donated blood is screened for five infections: HIV, Hepatitis B (HBV), Hepatitis C (HCV), Syphilis, and Malaria. Understanding the seroprevalence and changing trends of TTIs among blood donors is crucial for ensuring safe blood supply.

Aims and objectives: To determine the seroprevalence and trends of TTIs in blood donors at a tertiary hospital in Central India.

Method: A retrospective analysis was conducted on the seroprevalence of TTIs (HIV, HBV, HCV, Syphilis and Malaria) among blood donors at a tertiary care centre in Central India over a 7-year period from 2017 to 2023. Data regarding gender, type of donation, and serological test results were collected from departmental registers and analysed.

Result: Out of 30,283 blood donors during the study period, 467 (1.54%) were reactive for TTIs, including 9 donors with multiple infections. 459 of 29,532 males (1.55%) were reactive, compared to 8 of 751 females (1.06%). Among 26,301 replacement donors, 420 were reactive (1.59%), while reactivity in voluntary donors was 56 out of 3982 (1.4%)

The overall seroprevalence of TTIs was 1.57% (476 out of 30283). Specific prevalence rates were: HIV 0.22%, HCV 0.23%, HBV 0.63%, Syphilis 0.49%, and Malaria 0.01%. There is a shifting trend in seroprevalence of infections across the study duration. The prevalence of TTIs showed variation over the years: 0.76% in 2017, 1.03% in 2018, 0.68% in 2019, 0.99% in 2020, 1.02% in 2021, peaking at 2.12% in 2022, and slightly decreasing to 2% in 2023.

HIV prevalence was 0.38% in 2017, decreasing over the years and rising again in 2022 (0.36%) and 2023 (0.27%). Prevalence of HCV increased from 0 cases in 2017 and 2018 to 0.31% in 2022 and 0.26% in 2023. HBV prevalence was lowest in 2017 and ranged between 0.48% and 0.79% thereafter. Syphilis prevalence varied notably: it was high in 2017 (0.25%), decreased in 2018 (0.19%), sharply dropped in 2019 (0.04%), rose again in 2020 (0.19%), and stabilized in 2021 (0.12%), which increased in 2022 (0.64%) and 2023 (0.82%). Malaria was extremely rare, with only 2 cases (0.04%) recorded in 2021. Linear regression analysis showed that HBV, HCV, HIV, and Syphilis exhibited statistically significant trends over the years ($P<0.05$, CI: 95%).

Among the 9 donors with coinfections, four had Syphilis with HIV, two had Syphilis with HCV, one had Syphilis with HBV, and two had HIV with HBV.

Conclusion: Blood donors being the representatives of healthy population in a region, the epidemiological research on TTI in blood donors provide insights on the burden of these infections in society, which may go unrecognized otherwise. The fact that voluntary donors are less reactive than replacement donors highlight the importance of voluntary donor recruitment. The increasing trends of TTI in recent years can be attributed to enhanced diagnostic practices.

NOTIFICATION OF SEROREACTIVE DONORS AND THEIR RESPONSE RATE AT A TERTIARY CARE

Topic: Transfusion transmitted infections
Author: Sangavi Rajasekaran
Co-authors: Dheemantha P, Panchakshari Prasanna B K, Akshitha Dave
Institution: Bangalore Medical College and Research Institute, Bangalore

Introduction: Donor notification and counselling plays a major role in both donor care and blood safety. Supply of safe blood starts with a healthy blood donors and time to time upgradation of testing strategies and methodology for Transfusion Transmitted Infection(TTI). Blood donors found to be seroreactive are informed about their status by calling them for postdonation counselling.

Aim: To observe the response rate of notified seroreactive blood donors and to prevent them from further blood donation periodically.

Methods: Total 7787 blood collection units were screened for TTI. All seroreactive blood donors data was collected retrospectively from the records over a period of one year from January 2023 to December 2023 at a tertiary care center. All Seroreactive donors were notified through phone calls and letters for counselling and referred to respective center for further testing and management.

Results: There were 7787 blood donors from January 2023 to December 2023, out of that 122 blood donors were found to be seroreactive. Out of 122(1.57%) seroreactive blood donors,41(0.53%) Reactive only for HIV, 62(0.79%) Reactive only for HBsAg ,18 (0.23%) Reactive only for HCV,1(0.12%) Reactive for both HIV and HBsAg, Syphilis and malaria were nonreactive. Out of 122 TTI reactive donors,107 (87.70%) seroreactive

donors responded through phone and postal communication. The remaining 15 (12.29 %) seroreactive donors did not respond to any communication.

Conclusion: Donor notification and post donation counselling of seroreactive blood donors helps in reducing the burden of TTI among blood donors by preventing them from blood donation periodically.

TRANSFUSION TRANSMISSIBLE INFECTIONS AMONG BLOOD DONORS AND THEIR RELATIONSHIP WITH THE PERSONAL BEHAVIOUR OF THE DONOR.

Topic: Transfusion transmitted infections
Author: Arun Tintoo
Co-authors: Tyagi Mayurika S, Varma Amit
Institution: Santosh Medical College and Hospital, Ghaziabad, Uttar Pradesh

INTRODUCTION : Transfusion-transmitted infections (TTI) continue to pose a significant challenge in the context of blood transfusion. Despite a decreasing risk of TTI, the potential for contamination of blood products with both known and unidentified pathogens remains a concern. To mitigate this risk, rigorous donor screening, highly sensitive screening tests, and effective pathogen inactivation procedures are essential. The prevalence of transfusion-transmitted infections (TTIs) among blood donors varies among different geographic populations. Therefore, assessing the seroprevalence of these infections among blood donors is crucial for informing preventive and control strategies.

AIM AND OBJECTIVE: The aim of this study was to determine the seroprevalence of transfusion-transmitted infections among blood donors and their relationship with the personal behavior of the donor.

MATERIALS AND METHODS: This study was a cross-sectional study conducted at a Tertiary Care Hospital in Northern India, following approval from the institutional ethics committee and obtaining the informed consent of the donors. The study took place from November 2023 to April 2024. Socio-demographic data, personal behavioural data, and other relevant factors were gathered using a pre-tested structured questionnaire. Each donor underwent screening for transfusion-transmitted diseases, including 4th generation ELISA for HIV, HBsAg, and HCV, as well as rapid card tests for Syphilis (antibodies of treponema pallidum) and Malaria (Pan-pLDH) in accordance with the blood centre policy. The collected data was then analyzed using the statistical software STATA MP 17.

RESULTS : In this study, a total of 1255 blood donors were examined, and 31 donors tested positive for at least one pathogen (HBV, HIV, HCV, VDRL, or MP). The seroprevalence rates for HBV, HIV, HCV, VDRL, and MP were 1.11%, 0.07%, 0.47%, 0.79%, and 0% respectively. This means that 2.47% of the total donors were reactive to at least one pathogen, and all reactive donors were male. Among the reactive donors, 87% were between 18 and 40 years old, while 13% were between 41 and 60 years old. Additionally, 38.7% of the reactive donors had blood group B Positive, followed by 29% with blood group A Positive. Further analysis revealed that there is a significant association between the infected population and socio-demographic and personal behavioural data.

CONCLUSIONS: This study has revealed that a noteworthy proportion of blood donors carry transfusion-transmissible infections. Implementing rigorous screening and preventive measures is vital to safeguard the well-being of transfusion recipients. Additionally, this study has determined that socio-demographic and personal behavioral factors among blood donors are linked to TTI.

MANAGING TRANSFUSION SUPPORT CHALLENGES IN A LEUKEMIA PATIENT WITH BOMBAY BLOOD GROUP: A CASE STUDY.

Topic: Immuno-haematology
Author: Rakesh Kumar
Co-authors: Nishith Nayan, Shweta Ranjan, Bankim Das
Institution: AIIMS Patna

The Bombay blood group, characterized by the absence of A, B, and H antigens on red blood cells (RBCs), presents a rare challenge in transfusion medicine, occurring in approximately 1 in 10,000 individuals in India and even less frequently in other populations. We present a case report of a 14-year-old female with both the Bombay phenotype and leukaemia (T-cell ALL), emphasizing that the complexities in treatment and the critical need for multidisciplinary collaboration among haematologists, oncologists, and transfusion specialists is crucial in developing patient blood management strategies.

Upon admission with severe anaemia and haematuria, the patient received transfusions that led to a severe transfusion reaction due to incompatible blood. Further investigations revealed the Bombay phenotype and concurrent leukemia. Managing this patient necessitated navigating the intricacies of transfusion compatibility and leukaemia treatment, compounded by the rarity of the Bombay phenotype.

To address the challenge of obtaining compatible blood products, extensive efforts were made, including family screening, reaching out to blood centres nationwide, and voluntary directed blood donations. Despite initial delays, collaborative efforts among healthcare professionals, NGOs, and blood centres ensured the timely provision of compatible blood, highlighting the importance of national donor registries and rare blood group awareness

This case underscores the necessity for comprehensive blood grouping methods, multidisciplinary approaches in patient management, and the establishment of rare blood group registries to optimize outcomes for individuals with rare blood types like the Bombay phenotype. Additionally, cryopreservation of rare blood should be considered to preserve this valuable resource for future use

DESIGNING AND VALIDATING A STRUCTURED BLOOD TRANSFUSION SHEET WITH NOTES (BTSN): A QUALITY INITIATIVE TO REDUCE ERRORS IN CLINICAL TRANSFUSION PRACTICES

Topic: Clinical Transfusion practices
Author: Manish Raturi
Co-authors: Yashaswi Dhiman, Dushyant Singh Gaur, Shashi Bhatt
Institution: Swami Rama Himalayan University

Introduction: Human errors can impact patient safety during blood transfusions. Continuous improvement based on past errors and near-misses that act as 'free lessons' is, therefore, crucial. The British Society of Haematology (BSH) on the Safety of Blood Component transfusions has published an advisory including recommendations on patient consent and a structured process with a bedside checklist for blood transfusion (BT). Additionally, in our hospital, the process of documenting consent and BT notes varies from one ward to

another. Free text in the notes was the most common approach used by resident doctors (RDs) and nursing officers (NOs) throughout the hospital. This concern was raised by one of the surgeons in the Hospital transfusion committee (HTC) meeting in June 2023 with a need for a structured BTSN form to be used by all the stakeholders involved before and during blood administration.

Methodology: A structured BTSN (Step -I has patients' demographics, Step II has the type of components and rate of administration to be filled by a resident doctor, step-III taking informed consent and step-IV comprising of details of blood unit transfused with the monitoring of vitals to be filled by an NO) was designed by our three Transfusion Medicine faculty and the content validation of the same was performed by a dedicated hemovigilance nursing officer (HNO), the fourth member of our team. Our HNO handed out these meticulously designed BTSN forms to all the transfusion nursing practitioners (TNP) in both the 54-bed-ICU and a 34-bed critical care cancer ward respectively, to complete them and revert with the filled details. Additionally, their feedback was taken about this whole process and documented for records. We applied the Content Validity index, considering the value as appropriate if ? 0.80.

Results: A total of 128 BTSN forms were filled and returned to our HNO for content validation. All TNPs stated that patient consent for transfusion was obtained and documented in 100% of cases. The content of the BTSN forms was considered valid, with a global CVI of 0.95. However, feedback indicated that "Step II" was inadequately filled by the RDs, with a CVI of 0.84% and 0.58% respectively. This section was incomplete and being filled by the NOs instead of doctors. Suggestions for adjustments were made and discussed in the next HTC meeting and further corrections such as the addition of terms, namely, "to be filled by doctors or nurses" were incorporated and printed into the final version of the BTSN forms. This was done in collaboration with the quality cell of our hospital before their actual implementation bedside.

Conclusion: The introduction of structured BTSN forms as a quality initiative has reduced the use of free text in BT notes, promoting safer clinical transfusion practices.

Keywords: Blood Transfusion Notes, Quality Initiatives, Blood Administration, Clinical Transfusion Practices

ANALYSIS OF DISCARD RATE PATTERN IN A NEWLY OPENED BLOOD CENTRE OF A TERTIARY CARE HOSPITAL

Topic: Blood components and processing
Author: Priyadarsini Jayachandran Arcot
Co-authors: Karan Kumar, Purushottam Kalla
Institution: Aiims Kalyani

Introduction: Blood is a precious resource. All means must be taken to prevent its wastage. The discard rate in Indian Blood centres ranges from 2.89-10%. Most common reason for discard are due to seropositivity and expired components. In this pilot study, we have studied and analyzed the discard rates, reasons for discard and pattern in a newly opened Blood Centre of a tertiary care hospital.

Methodology: The discard rate due to various reasons were analyzed retrospectively from Dec 2023 to April 2024 (first 5 months of Blood centre functioning). The rates were categorized for each type of blood component and the reasons of discard viz. under collection, outdated shelf life of components, presence of clot, open system, hemolysis, red cell contamination, positive for allo/auto antibody, reactive for transfusion transmitted infection and other reasons.

Results: The overall discard rate from Dec 2023 till April 2024 was 14.5%. Among which, platelets discard was almost 50%. The most common reason for discard was outdated units (65%) followed by under collection (17.8%). Analysis of discard rates month-wise showed that the highest rates of discard were found in the initial months of Blood Centre functioning (Dec-Feb) and there was significant decrease in discard rates of March and April.

Discussion: When the blood centre functioning began, all the nursing officers were new recruits and were new to the process of blood donation phlebotomy. There was no experienced nursing officer posted in the Department. During the first month (Dec 2023), the faculty who were experienced in phlebotomy hand held the nursing officers and the nursing officers performed very few phlebotomies independently. In the next 2 months (Jan-Feb 2024), the nursing officers performed phlebotomy independently and the discard rate due to under collection was highest during these months. As they gained experience, the discard rate due to under collection decreased significantly in the next months. Similarly, the platelet requirement could not be predicted accurately during the first months of Blood centre functioning leading to increased platelet preparation than the actual demand. Also, the clinicians had to be gradually sensitized to the round the clock availability of platelet products, their shelf life and to effectively utilize them. Gradually, the platelet preparation was tailored according to the demand and the utilization also increased. Thereby reducing the discard rate of platelets due to their outdated shelf life.

Conclusion: Trained manpower for phlebotomy, sensitization of clinician and component preparation based on prediction of demand can significantly reduce discard rate.

TO EVALUATE THE EFFICACY OF CHEMILUMINESCENCE BASED PLATFORMS TO NON TREPONEMAL TESTS IN DETECTION OF SYPHILIS AMONGST BLOOD DONORS IN NORTHERN INDIA.

Topic: Transfusion transmitted infections
Author: Sudeep Kumar
Co-authors: Amit Pawar
Institution: Dept of IHBT AFMC Pune

Introduction: Syphilis is one of the mandatory TTI that is routinely screened in blood centres. Previous studies have shown non-treponemal tests to have lower specificity and sensitivity compared to the treponemal tests. Also, these tests cannot be automated, manual testing for these tests is time- consuming and their result interpretation may be subjective. At our Transfusion Centre, the donated blood was subjected to syphilis screening using the Chemiluminescence Immunoassay (CLIA) to address these issues.

Aim: The aim of the study was to evaluate the efficacy of CLIA and Rapid Plasma Reagin (RPR) in detection of Treponema pallidum in donated blood units and to evaluate the positive results with the gold standard FTA-ABS.

Materials and Methods: 59,472 blood donor samples collected from Jan 2017 to March 2020 were analyzed for the syphilis seroreactivity by using chemiluminescence technology based TPA assay or non-treponemal RPR assay, based on the availability of reagents and confirmatory test FTA ABS was conducted on 22 seroreactive samples collected from Jan to Mar 2020. Based on the results obtained, the sensitivity and specificity of both methods as well as the rate of false reactivity and false negativity was evaluated.

Results and Discussion: In the year 2017, 32 samples (0.17%) out of 18987 were found to be reactive for syphilis by RPR. In 2018, 149 samples (0.84 %) out of 17,798 using VITROS Syphilis TPA assay, were reactive. In 2019, 14 samples (0.09%) out of 15,074 donor samples were found to be reactive by RPR. In first 3 months of 2020, 22 samples (0.55%) out of 3977 found to be positive by the VITROS Syphilis TPA assay. To verify the seroreactivity in VITROS Syphilis TPA assay, 22 samples were retested in non- treponemal RPR assay and confirmatory treponemal FTA- ABS assay. In the Syphilis FTA-ABS test, out of 22 samples tested, 17 samples were confirmed as positive and 5 samples were negative. These 5 discordant Syphilis FTA -ABS test results had low S/Co value with very low level of antibody in fully automated VITROS Syphilis TPA assay. In this study, non-treponemal RPR assay showed poor sensitivity, missing about 20 samples which are found to be true positive in both VITROS Syphilis TPA assay and Syphilis FTA ABS test.

Conclusion: Use of advanced techniques like CLIA based syphilis screening assay will not only enhance the safety of the transfused blood, but also help in optimization of manpower with the use of fully automated platforms.

EFFECT OF INTERRUPTED AGITATION ON QUALITY OF RANDOM DONOR PLATELETS: AN ARMED FORCES PERSPECTIVE

Topic: Miscellaneous
Author: Amit Ajay Pawar
Co-authors: Anoop Sharma, Rajat Jagani, Sudeep Kumar, Ujjwal Dimri
Institution: Armed Forces Medical College

Introduction: During the shipping and transportation of platelet concentrates (PCs) from blood centers to hospitals or war- affected areas in military settings, PCs experience minimal agitation for several hours up to 1–2 days. However, during stationary periods, PCs may suffer inefficient oxygen transfer.

Aim: This study aims to explore whether interruption enhances quality and viability or has a detrimental impact on PCs stored for 5 days.

Methodology: In this exploratory study, we collected whole blood from eligible voluntary donors and prepared random donor platelets (RDP) using the Platelet-Rich Plasma (PRP) method. The RDPs were stored in gas permeable bags in an incubator for 5 days at 20-24°C. In the control group, continuous agitation was maintained, while in the test group, agitation was interrupted from day 1 to day 5 of storage. Activation markers (CD62P and Annexin V) and blood gas parameters were analyzed on days 1, 3, and 5. Our findings compared the quality of platelets stored without agitation to those stored with continuous agitation, using a sample size of 10 RDP units in each group.

Results: Agitation interruption in high platelet count RDPs led to increased lactate concentration after 5 days of storage. Lactate concentration correlated with bicarbonate, glucose, and pH levels throughout the study. As lactate rose, all three parameters declined. 4-day agitation disruption in PCs resulted in pH values like reference preparations. In low PC units, glucose persisted until day 5, mirroring outcomes in high PC units with a 4-day agitation interruption.

Conclusion: Our study indicates that platelets tolerate longer agitation-free periods than previously known. Notably, CPD- plasma, with elevated glucose, may lead to higher lactate levels associated with lower pH values. However, favorable in vitro parameters do not always align with in vivo outcomes. Rigorous patient evaluations are essential to validate our findings.

RETROSPECTIVE ANALYSIS OF RH & K FREQUENCY IN TRANSFUSED HEMOGLOBINOPATHY PATIENTS IN A TERTIARY CARE REFERRAL CENTER

Topic: Immuno-haematology
Author: Debasish Mishra
Co-authors: Ansuman Sahu, Satya Prakash, Somnath Mukherjee
Institution: All India Institute of Medical Sciences, Bhubaneswar

Introduction : Hemoglobinopathy patients prevalent in Eastern India are mostly of Sickle cell disease and thalassemia. Sickle cell disease patients mainly need transfusion in vaso-occlusive crisis presenting with severe acute chest syndrome, stroke, sequestration crises, etc. Thalassemia patients regularly require transfusion on a monthly or fortnightly basis. These multi-transfused patients are at high risk of alloantibody formation,

particularly against antigens of Rh and Kell blood group system. Rh blood group system contains highly prevalent antigens like e antigen. Hence, obtaining antigen-negative blood units in these situations is difficult. There are studies on the prevalence of Rh and K antigens in blood donors.

Aim and Objectives: of the study is to know the prevalence of these antigens in hemoglobinopathy patients for a better registry of blood donors in reference to the prevalence of Rh and K phenotypes.

Material and Method : This retrospective study was conducted in the Department of Transfusion Medicine & Blood Centre, AIIMS Bhubaneswar, from January 2022 to December 2023. The proportion of ABO, Rh and K antigen phenotype were determined using the Column agglutination technique (Tulip Diagnostic, Goa, India). Data was retrieved from the Immuno- hematology work-up register and compiled in Microsoft Excel 2016, USA.

Result: Out of 119 transfused Hemoglobinopathy patients, 71 had sickle cell disease, 43 had beta thalassemia major, 13 had sickle beta thalassemia, and 1 had a thalassemia intermedia. The age range is seven months to 65 years, with 71 males and 48 females. The frequency of the ABO Blood Group in Hemoglobinopathy patients is O 44.6%, B 30.4%, A 17.7%, and AB 7.3%. The Rh & K phenotype frequency is C 92.4%, c 36.1%, E 11.8%, e 96.6%, K 2.7%, C mixed field 0.9%, c mixed field 5.9%, and e mixed field 0.9%. Mixed field reactions are due to a recent transfusion. The probable Rh Genotype of these Patients is R1R1(DCe/Dce) 64.7%, R1R (DCe/Dce) 10.8%, R1R2(DCE/Dce) 5.9%, R2R2 (DcE/DcE) 3.4%, rr (ce/ce) 2.7%, r'r (Ce/ce) 1.7% and mixed field in 10.8%.

Discussion: Ranjan S et al, 23 show that the frequency of Rh and K antigens are as follows: C" was 90.47%, "c" was 50.47%, "E" was 15.9%, "e" was 99%, and "K" was 2.67%, similar to our results.

Conclusion: C and e are two highly prevalent antigens, according to our study. Alloantibody against these two antigens, if it occurs, it is difficult to provide blood. Hence, we must focus on these two antigens for the rare blood registry to transfuse antigen-negative units in an emergency.

COMPARISON OF MANUAL AND AUTOMATED COMPONENT PREPARATION FROM WHOLE BLOOD

Topic: Blood components and processing
Author: Karan Kumar
Co-authors: Priyadarsini Jayachandran Arcot, Mrinal Samanta, Purushottam Kalla
Institution: All Indian Institute of Medical Sciences, Kalyani

Introduction: Component separation from whole blood is a significant process, serving as the foundation for Blood centre functioning. The quality of blood components prepared, significantly impacts patient outcome. Hence, choosing an efficient technique to separate components from whole blood is crucial. This study aims to compare the manual and automated method of whole blood separation.

Methods: Retrospective analysis of manual and automated component separation methods were analysed from Dec 2023 – April 2024. The manual separation method involved centrifugation by Cryofuge 16 (Thermo Fischer Scientific) followed by manual extraction by plasma expresser. For the automated separation, the Reveos Automated Blood Processing system (Terumo BCT) was used. Component separation by both the methods were exclusively performed by 2 trained technicians. The key parameters assessed in both methods included processing time, quality of components and discard rate (due to human error and equipment error).

Results: From Dec 2023 – April 2024, a total of 1054 whole blood units where processed, 530 by manual method and 524 by automated method. The automated method significantly reduced the processing time. The components prepared by both the methods passed the quality control criteria. However, the platelet yield was significantly higher in the automated method. The discard rates due to human error and equipment error (like red cell contamination, leakage, open system, etc.) was 1.3% in manual method. No unit was discarded due to these reasons in the automated method.

Discussion: The comparison of manual and automated whole blood separation methods in this study provides valuable insights. Automated systems offer efficiency, standardization, minimal manpower interference / involvement and high-throughput in component processing. The initial cost of equipment, cost of blood bags and maintenance pose a challenge in resource-limited settings. But the life-cycle cost of Blood centre can be significantly reduced by saving funds on manpower. Manual methods remain relevant for facilities with limited resources or those requiring flexibility in processing. The choice of method should be based on not just the quality outcomes but also the operational context and resource availability; as these factors significantly influence the feasibility and effectiveness of the chosen method.

Conclusion: This study underscores the importance of continuous improvement and adaptation in blood processing techniques to meet the evolving needs of healthcare delivery, ensuring the highest quality of blood components for patient care. Both manual and automated whole blood separation methods have their merits and demerits. Automated methods are recommended for larger facilities prioritizing efficiency and standardization, while manual methods may be more suitable for smaller operations or in settings where the cost of automation is prohibitive. Further research focusing on long-term cost-benefit analysis and adaptability to emerging technologies will enhance decision-making in selecting the optimal whole-blood separation method.

DECIPHERING THE LANDSCAPE OF TRANSFUSION MEDICINE RESEARCH: INSIGHTS FROM WORD CLOUD ANALYSIS ON MOST STUDIED TOPICS

Topic: Miscellaneous
Author: Shamee Shastry
Institution: Kasturba Medical College Manipal

Background: knowing the common topics of scientific research in a field provides researchers with valuable insights that can guide their work, foster collaboration, and contribute to the advancement of knowledge in their respective disciplines. In the present study, we have used Word cloud analysis as a tool for gaining insights into common research topics published in the Journals of Transfusion Medicine.

Method: We compiled the titles of research articles published in the leading five journals of transfusion medicine spanning from 2021 to 2023. The keywords from the titles were extracted by the experts in Transfusion Medicine. The keywords were analysed using word cloud analysis software. Based on the word cloud analysis, the frequency visualization, key theme identification and qualitative text analysis was performed.

The 'word it out' and 'word cloud generator' software and N-grams were used for the analysis.

Results: We have compiled 518 research publications from the journals 'Transfusion Medicine and Hemotherapy', 'Transfusion', 'Vox Sanguinis' and 'Blood Transfusion'. Based on the frequency of keywords, the common topics of publication in descending order were; Pathogen reduction technology, RBC transfusion, convalescent plasma, COVID-19, alloimmunization, apheresis, stem-cell, freeze-dried plasma, transfusion-related acute lung injury. ATMPS (Advanced Therapy Medicinal Products). Visual text analysis images are created for easy interpretation.

Conclusion: The present word cloud analysis has proven instrumental in elucidating trends and patterns that might have remained obscure or challenging to understand through traditional journal reading.

SINGLE CENTRE EXPERIENCE OF GRANULOCYTE COLLECTION FROM G-CSF AND DEXAMETHASONE–TREATED DONORS FOR ADMINISTRATION IN NEUTROPENIC PATIENTS WITH INFECTION

Topic: Apheresis and Cellular therapies
Author: Divya Setya
Co-authors: Ankit Malhotra, Rahul Sharma, Ravi Dara
Institution: Manipal Hospital Jaipur

BACKGROUND: With increase in severity of neutropenia as a result of chemotherapy, there is an increase in the risk of severe infection. Granulocyte transfusion as a therapy has been available for many years now. However, its efficacy has never been demonstrated conclusively. Aim of the study was to analyse the safety and efficacy of granulocyte transfusions collected by apheresis and share our experience of granulocyte collections from G- CSF and dexamethasone mobilized donors.

MATERIALS AND METHODS: A prospective, observational study was conducted in the department of Transfusion Medicine at a large tertiary healthcare setup. All patients with neutropenia (ANC<500/cumm^3) with infection who were prescribed granulocyte transfusion were included in the study. Donors for granulocyte collection were stimulated with G- CSF (10mcg per kg) and dexamethasone (8mg). Data on granulocyte collections and transfusion, patient outcome and adverse events was collected and analyzed. ANC was estimated after 6 hours of transfusion.

RESULTS: A total of twenty-five donors were stimulated with G-CSF and dexamethasone for granulocyte collection. Collections were performed after a mean duration of 16.4 hours from the time of G-CSF administration. Mean volume of product was 389ml and mean dose transfused was 3.6 x 10^10 granulocytes. Out of 25, 14 transfusions were for eight patients suffering from ALL, nine for three from AML, and two for a patient with aplastic anemia. Mean number of granulocyte transfusions required was 2. Pre-transfusion mean WBC count was 104/cumm^3 and mean ANC was 12/cumm^3 whereas post-transfusion mean WBC counts were 1050/cumm^3 and mean ANC was 818/cumm^3. All transfusions were well tolerated and none of the patients experienced any transfusion associated adverse events. Platelet count in the collected product resulted in significant increment of recipient platelet count reducing the need for platelet transfusions. Survival at 30 days was 100%. All patients recovered from chemotherapy induced neutropenia.

CONCLUSIONS: G-CSF and dexamethasone together help in favorable mobilization of donors for granulocyte collections. The overall effect of granulocyte transfusion on the ANC counts of recipients was found to be statistically significant. All transfusions were well tolerated without any serious adverse events. Granulocyte transfusions are life-saving interventions which can be easily collected with the right mobilization regime and can be safely administered.

GREY ZONE SAMPLE TESTING IN ENHANCING BLOOD SAFETY

Topic: Transfusion transmitted infections
Author: K Mahesh Kumar
Co-Authors: B Murali Krishna, Sudhir Kumar Vujhini, Shanthi B, Vinay Kumar
Institution: Nizam's Institute Of Medical Sciences

Introduction: By introduction of highly sensitive screening assays, incidence of Transfusion transmitted infections has decreased over the years. Nucleic acid Amplification Test (NAT) technology is considered as an advanced screening method for screening of donors in the context of reducing the window period. But, in developing countries like India, installation of NAT technique in all blood centers is not feasible due to cost factor. So, ELISA test still remains a prominent screening tool in most blood centers in India. Estimation of grey zone samples with repeat testing can further enhance the safety of blood transfusion in resource poor developing nations.

Aim & Objectives: Analysis of 'Grey-Zone' samples in transfusion transmitted diseases screening at our Blood centre.

Materials & Methods: Study done at NIMS Blood centre, three years data (between 2021 and 2023) was collected prospectively from TTI screening laboratory. Grey-Zone samples were identified and tested again, with same or different manufacturer's ELISA / CLIA. Grey-Zone: optical density (OD) values lying between cut-off OD and 10% below the cut-off OD (0.9 x cut-off OD) were identified.

Results: - will be discussed….

KEYWORDS: Grey Zone, Transfusion Transmissible Infections, Blood , Screening.

A STUDY ON THE MORTALITY IN PAEDIATRIC PATIENTS UNDERGOING MASSIVE TRANSFUSION FOR CARDIAC SURGERY-EXPERIENCE FROM A TERTIARY CARE CENTRE

Topic: Clinical Transfusion Practices
Author: Shouvik Basu
Co-Author: Amita R Nair, Vinu Rajendran, Debasish Gupta
Institute: Sree Chitra Tirunal Institute for Medical Sciences and Technology

INTRODUCTION: Cardiac Surgery is a vital part of any tertiary care centre that accounts for a major share of the total blood transfused in the hospital and a part of these patients end up getting massive transfusion due to various factors like uncontrolled blood loss during surgery, ongoing blood loss post surgery, sub-clinical DIC, significant hypotension in spite of adequate Intravenous fluid replacement. Massive transfusion is defined as the replacement of one or more blood volumes in 24 hours. More practical definitions can be :

- ≥10 blood unit transfusion within 24 hours; or
- Transfusion of ≥4 blood units in 1 hour; or

- Replacement of 50% of blood volume in 3-4 hours; or
- A rate of loss of blood ≥ 150 ml/hour

Massive transfusion is an important factor for mortality during surgery as well as for post-surgical patients. In our hospital, we studied the mortality rates in the paediatric age group patients who had undergone massive transfusion for cardiac surgery over a 6 month period.

AIMS AND OBJECTIVES:

1) To find out the mortality rate in paediatric age group patients undergoing massive transfusion for cardiac surgery
2) To determine the effectiveness of an increased plasma : RBC ratio transfusion for massive transfusion in clinical practices for paediatric age group
3) To study the beneficial effects of Cryoprecipitate transfusion in improved survival rates for paediatric cardiac surgery

METHODS: In the 6 month study, all the paediatric patients of cardiac surgery undergoing massive transfusion were studied for the total number of units transfused of individual component viz. RBC, FFP, Platelets and Cryoprecipitate. Post surgery they were followed up for a period of 2 weeks and the paediatric patients who expired following complications were noted. The mortality rate was calculated.

RESULTS: In the paediatric age group, 33.33% patients expired within 7days of massive transfusion, the figure coming to 7 patients among the total number of 21 undergoing massive transfusion.

Patients receiving comparatively higher Plasma : RBC transfusion had better survival rates than patients with low Plasma : RBC transfusion.

Paediatric patients receiving 3 or more RBC units within 24 hour period had more than 80% mortality. Transfusion of Cryoprecipitate within 24 hours of starting of massive transfusion had much better survival rates, with 100% of paediatric patients who survived post massive transfusion receiving 2 or more Cryoprecipitate units.

CONCLUSION:

1) Massive transfusion in the paediatric age group has significantly high mortality rate.
2) Higher Plasma : RBC transfusion is associated with better survival rates. Thus, early initiation of FFP and Platelet transfusion may be started along with RBC transfusion.
3) Early Cryoprecipitate transfusion alongside RBC and Plasma products leads to significant better survival in the paediatric age group. So early initiation of Cryoprecipitate transfusion may be started which can lead to better outcomes and survival for paediatric cardiac surgery patients.

AMBER COLOURED PLASMA COLLECTED FROM BLOOD DONORS - COMMON CAUSE BUT OFTEN IGNORED

Topic: Miscellaneous
Author: Baby Saritha G
Co-authors: Amita R, Debasish Gupta
BABY SARITHA. G, AMITA. R, DEBASISH GUPTA
DEPARTMENT OF TRANSFUSION MEDICINE, SCTIMST, THIRUVANANTHAPURAM-11, KERALA
ABSTRACT

In our Blood center, we have observed that in two blood units collected from healthy blood donors gave amber coloured plasma after centrifugation. Even after repeated centrifugation the colour persisted. After analysis

we ruled out hemolysis/free hemoglobin as a cause of coloured plasma. We have carried out LC-MS analysis and peaks observed were similar to quinic acid, which is an active constituent in coffee. Both our donors had history of very high intake of coffee regularly. As coloured plasma cannot be used for transfusion, this finding emphasizes the importance of taking history of donor food habits during counselling.

ACQUIRED 'B' ANTIGEN: A RARE CASE STUDY

Topic: Immuno-haematology Author: Sindhu. M. S Institution: SCTIMST

Introduction: Acquired B phenomenon occurs when the bacterial deacetylase converts N-acetyl galactosamine to alpha- galactosamine, which is structurally similar to the immunodominant sugar of the B-antigen, galactose. A1 individuals can thus rarely present with this phenomenon - the acquired B. Also, there can be an overall decrease in the antibody production during immuno-suppression.

Case Report: This is a case report of 68-year-old female patient admitted in tertiary care center for the treatment of Transverse Myelitis. She was on immuno-suppressive treatment with methyl prednisolone. Blood and urine culture report showed E-Coil infection.

At the time of admission, her blood grouping was found to be A+ on forward grouping and reverse grouping did not shows any reaction. At the time of plasma exchange we received a second sample, which showed weak B antigen detected by gel method and no antibodies were detected. For the confirmation of blood grouping a third sample was received which also showed the same reaction pattern. So, the patient was typed as AB+ and 42 AB+ Fresh frozen plasma (FFP) was transfused. After three weeks the patient developed anemia. Fresh blood sample showed the weakening of B antigens and appearance of Anti B. We noted absence of anti-B in the early stages and subsequently after the cessation of immuno suppressive treatment, there was appearance of anti-B .

Conclusion: Patient was originally A+ and developed acquired B due to E-coli septicemia. Anti-B appeared after cessation of immuno-suppressive therapy. Absence of Anti-B in the initial stage was attributed to immunosuppresive therapy. Therefore, great attention must be given to blood typing for patients receiving immuno-suppressive therapy.

IMPACT OF COVID 19 PANDEMIC ON OUTDOOR VOLUNTARY BLOOD DONATION DRIVE PROGRAMMES AND RELATED OUTREACH ACTIVITIES IN BLOOD TRANSFUSION SERVICES.

George Paul Thaliath, Angel Mary Sam, Amita R, Debasish Gupta

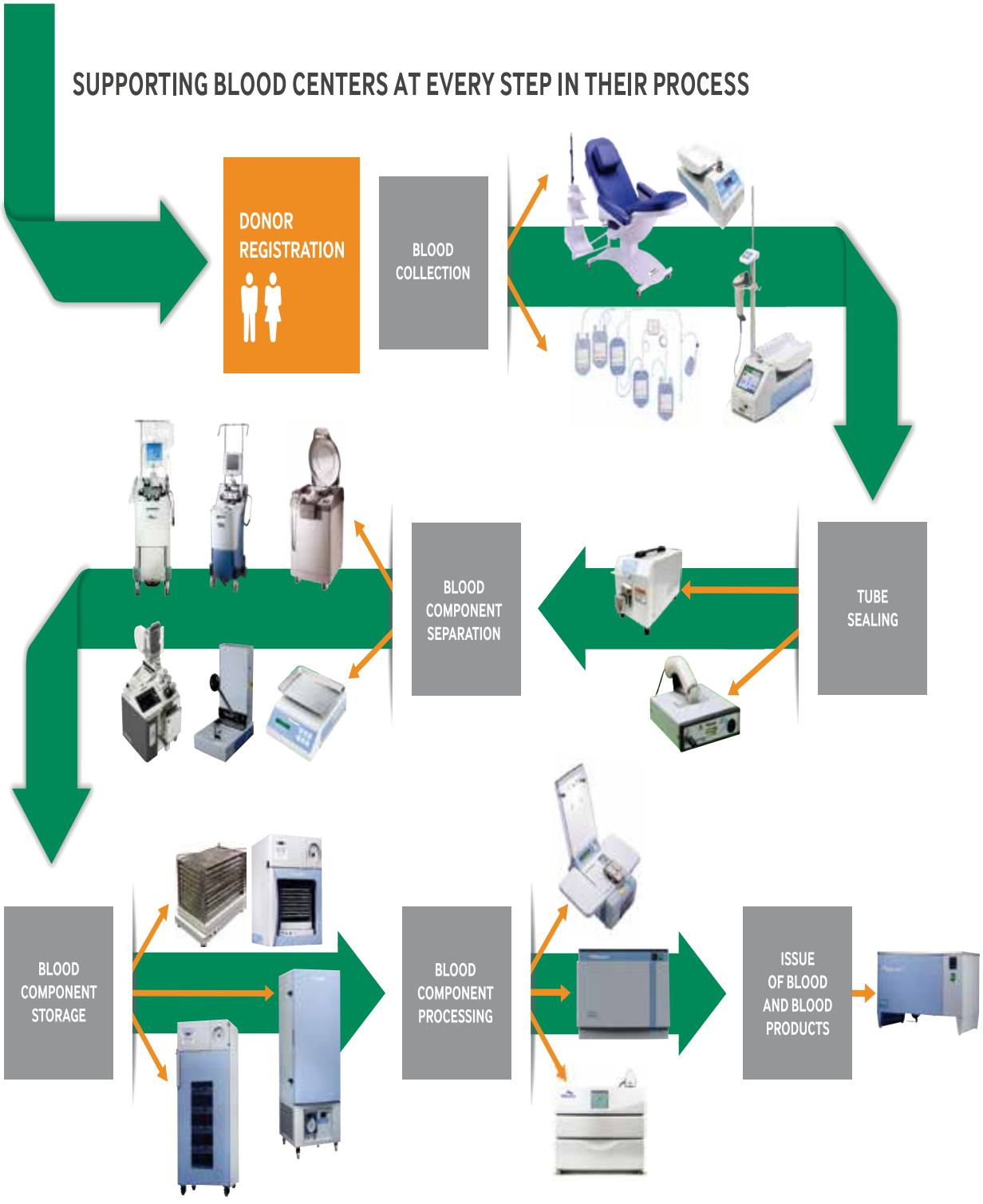
Introduction: The Covid 19 outbreak has put forth and significantly changed the social interaction activities. Outdoor blood donation drives heavily depend on the dynamics of socialization and human interaction in the social environment. The study puts an effort to highlight the influence of the pandemic on the outdoor blood donation drive and its far-reaching implications.

Method: This is a retrospective study regarding the voluntary donations prior to the pandemic, during the pandemic and post pandemic. The required data was taken from the records of a blood centre in a tertiary care centre in South India. Six-year (2017-2023) data was collected and a comparative analysis was made.

Results: In the pre pandemic phase, since camps were organized regularly, the blood centre was fully supported by voluntary blood donors. Total number of camps were 172 in 2017, 182 in 2018 and 185 in 2019. Average number of blood donation camps were 14 in a month. The replacement donors were completely stopped at

this phase. During the pandemic phase, there was significant restriction due to lockdown and camps could not be conducted. The annual donation drives during the pandemic phase (2020) was only 52 and this averaged 4-5 camps in a month. This resulted in dependence on replacement donation. The percentage of replacement donors exceeded 50% of total donation. As the travel restriction and social movement and gathering sanctions were lifted, the number of mobile blood donation drives increased. There were 70 Mobile donations in 2021, 99 in 2022 & 124 in 2023. It reflects an increase in the number of mobile donation drives. This consistently maintained a growth rate above 25% in the post pandemic period in number of donation drives.

Conclusion: The Covid-19 pandemic and the restrictions imposed has significantly influenced the voluntary blood donation pattern in the region. Once the pandemic started subsiding, there was a significant rise in the outdoor blood donation drives.



Terumo Blood and Cell Technologies is a medical technology company. Our products, software, and services enable customers to collect and prepare blood and cells to help treat challenging diseases and conditions. Our company around the world believe in the potential of blood and cells to do even more for patients than they do today.

TERUMO BLOOD AND CELL TECHNOLOGIES

regencare®

South India's First
Regenerative Medicine Centre

Cochin & Calicut

Ph: +91 7306 567548

www.regencare.in

Conference Secretariat
Department of Transfusion Medicine
Sree Chitra Tirunal Institute for Medical Science & Technology
Trivandrum - 695011