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Reductions in Red Blood Cell Shelf Life Negatively Affects Outdate Rates or Supplier Logistics

Type Of Abstract: Administrative

Andrew Shih 1 *
University of British Columbia MD, FRCPC, DRCPC, MSc

Lawrence Sham 2
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Abstract Description:

Background
Concerns exist with transfusion of older RBCs affected by the “storage lesion” to cause patient harm, though randomized trials have not shown harm with older RBCs. However, studies had few patients receiving RBCs at extreme ages and in vivo animal studies have demonstrated putative concerns, where some jurisdictions are considering decreasing RBC shelf-life. Some jurisdictions also allow for RBC shelf-life past 42 days, potentially mediated by additive solutions demonstrating up to a two-week shelf-life improvement in RBC quality measures. Thus, we sought to predict the impact of changes in RBC shelf-life to inventory management at a tertiary care center participating in a RBC redistribution program.

Methods
Our institution utilized a discrete-event simulation model to mimic RBC supply chain processes, validated prospectively during optimization. RBCs are redistributed to our institution around one week of expiry to prevent outdating. During weekdays, routine orders are placed once daily when RBC inventory is less than ideal stock. Data from 2016 to 2017 was used to simulate impact to mean values of inventory management key quality indicators from changes to RBC shelf-life when changed to 28, 35, and 49 days. Our primary outcomes were changes in outdate rates (ODRs).

Results
Our institution receives approximately 26,000 RBC units/year. At baseline (shelf-life of 42 days), the age of blood received (ABR) from the blood supplier was 12.1 days, the ABR from external sites was 34.1, 9.5% RBCs were received via redistribution, the ODR was 0.2%, and the stat order rate was 1.1 times/week. When shelf-life increased to 49 days, 7.9% RBCs were received via redistribution and the ODR was 0.1%. When shelf-life decreased to 28 and 35 days, 28.4% and 14.9% RBCs were received via redistribution and the ODRs were 4.8% and 1.7% respectively. Both increasing frequency of routine orders and decreasing inventory levels may mitigate impacts to ODR from decreasing shelf-life to 28 and 35 days respectively.

Conclusion
Decreasing RBC shelf-life to prevent putative patient harm will negatively affect ODRs and supplier logistics. The ODR at shelf lives of 28, 35, 42 and 49 days were calculated to be 4.8%, 1.7%, 0.2%, and 0.1% respectively. Further study of the effects of extreme RBC age is needed or mitigating these effects through interventions to improve RBC quality during storage, such as additive solutions, are needed.
Are you a Match? International Collaboration for Rare Phenotype Transfusion

Type Of Abstract : Administrative

Gwen Clarke ¹
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Francine Flahr ² *
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Susan Shank ³
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Bernie Eurich ⁴
Canadian Blood Services MLT

Abstract Description :

Background: Canadian Blood Services and blood suppliers around the world collaborate to ensure rare phenotype red cell units are available to patients who need them. In late 2018 Canadian Blood Services Rare Donor Program were approached to search for donors with an In(b) negative phenotype for a child with anti In(b) in need of transfusion. Sufficient numbers of compatible donors and units were not available in Canada or elsewhere. The In(b) negative phenotype occurs mainly in individuals of Iranian, Pakistani and Indian ethnicity. In general, this phenotype occurs in < 1/10 000 individuals; in the specified ethnic groups, it occurs in up to 1 - 2 per 1000 donors.

Design and methods: An international media campaign was designed by a US blood supplier to spread the word about a 3 year-old with neuroblastoma and with anti In(b) antibodies. Potential donors were directed to the OneBlood Website and invited to self- select according to ethnic group, and to provide contact information. OneBlood organized potential donors by country and emailed donors telling them that the blood supplier for their region would be in touch.

In late December 2018 Canadian Blood Services received a list of potential donors. The Rare Blood Program worked with marketing and communications, logistics, donor testing, product distribution, clinic services, legal and the national call center to communicate with prospective donors and to arrange a process for testing donor samples for In(b) status through OneBlood.

Similar strategies for identifying and testing donors were developed by blood suppliers around the world.

Results: Approximately 1320 potential Canadian donors have responded. So far, 115 have booked appointments to donate. None have tested In(b) negative.

Internationally 15 000 individuals responded and 3500 donations have been tested by OneBlood. 5 new In(b) negative donors have been identified.

Conclusions: Canadian Blood Services and blood suppliers around the world collaborate to ensure access to rare phenotype blood donations. A recent search for blood with a very rare phenotype has focused worldwide attention on this collaboration. Canadians have responded to the need and collection and testing of these donors is ongoing.
A Quality Improvement Initiative to Reduce Platelet Outdates

Type Of Abstract: Administrative

Jeff Kinney 1
Ziad Solh 2
Western University MD
Ian Chin-Yee 3

Abstract Description:

Introduction/Objective: The shelf life of platelet products makes it challenging for blood suppliers and hospitals to manage inventory. London Health Sciences Centre (LHSC) includes University Hospital (UH) and Victoria hospital (VH), with an annual transfusion rate of approximately 22,000 red blood cell and 4,000 platelet units. Platelet wastage rate was approximately 7.5% at UH and 21% at VH. The objective of the study was to reduce hospital platelet wastage by 50%.

Design and Methods: Using a cause/effect Fishbone diagram and process mapping, factors leading to platelet outdating were identified. Interventions were implemented in January 2017 and outcomes were measured. External factors like platelet storage extension from 5 to 7 days (started August 2017) were also considered.

Results: Contributing factors were pre-existing high inventory goals, lack of adherence to inventory levels by technologists, platelets expiring more often on a specific weekday, and inconsistent product redistribution from UH to VH. Interventions included 1) adherence to policy for inter-hospital redistribution in the last 24-hours of shelf life, 2) ensuring platelet requests were not a fixed standing order Monday-to-Friday but a flexible number based on historical trends, and 3) re-evaluating the ratio of irradiated to non-irradiated platelets stocked. The primary outcome measure was the proportion of platelet products expiring at LHSC following interventions. After implementation of interventions, the percentage of expired units dropped from 7.5% to 5.8% at UH, and from 21% to 11.2% at VH. With platelet storage duration increasing from 5 to 7 days and sustained hospital interventions, a further cumulative reduction in expired product was seen at UH from 5.8% to 1.2%, and at VH from 11.2% to 4.7%.

Conclusion: Hospital inventory management strategies including redistribution of product and changes to inventory ordering practices had a large impact on reducing platelet wastage at our centre even before extension of storage duration. A cumulative effect of inventory management and platelet storage extension was observed. It is not known if a change in storage duration had occurred prior to any other hospital interventions if a more significant decrease in platelet outdate would have been observed. Strategies for inventory management may vary depending on local factors including proximity to CBS and ability to redistribute blood products nearing expiration.
Ontario Bedside Audit of Blood Administration: 2018

Type Of Abstract: Administrative

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Ontario Regional Blood Coordinating Network MLT

Abstract Description:

Introduction: One of the highest risks of transfusion is the risk of receiving a blood component intended for another recipient. The estimated frequency of transfusion of the wrong (incompatible) ABO blood group per RBC transfusion episodes is approximately 1 in 40,000. The primary cause of these incidents is failure to follow clerical or technical procedures.

Objective: The goal of this audit was to collect data from at least 50% of hospitals across Ontario, compare results against the results from the 2011 Bedside Audit to see if there have been improvements in compliance with current standards for the administration of blood at the bedside.

Method: Using the Bedside Audit web-based tool found on www.transfusionontario.org, data fields and protocol were updated from the 2011 audit to reflect current Canadian practice standards for administration of blood products. The revised documents and tool were piloted by 3 sites to test functionality of the form and ease of access and data entry on the web-based tool. Following the pilot, all Ontario hospitals with a licensed transfusion service (TS) were invited to participate and collect data for 3 months. Small hospitals were asked to complete 2 audits, community hospitals 5 audits and teaching hospitals were asked to audit 10 transfusions.

Results: 59% of Ontario hospitals participated and performed 455 audits. This represented an increase in participation by 10% and a 28% increase in the number of audits performed compared to the 2011 audit. No audit section showed 100% compliance. Sections included Order confirmation check (92%), Identification of patient check (97%), Verification of component check (95%) and Procedure check (91%). There was a 6% improvement seen in confirming that the patient’s identification matched the TS label / tag in the presence of the patient compared to the results in 2011. The ward/area that seen the greatest improvement was Chronic-care/Rehab (17%).

Conclusion: The goal of achieving participation of 50% of Ontario hospitals was exceeded. The 2018 Bedside Audit demonstrated that there has been improvement in bedside practice and improved compliance with current standards for the administration of blood component/products. However, there is still room for further improvement.

Acknowledgement: Transfusion Services staff at participating facilities. Ministry of Health and Long-Term Care for ongoing funding support.
Provincial Platelet Audit

**Type Of Abstract**: Administrative

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**Abstract Description**:

**Objective**

To estimate the proportion of inappropriate platelet transfusions in Ontario hospitals and identify the patient and provider factors associated with the inappropriate use. The results should provide guidance in focusing remediation efforts to improve the appropriate use of platelets.
Methods

A prospective audit was undertaken to capture clinical indications and laboratory data for platelet transfusion episodes occurring in participating Ontario hospitals for a 4 week period using an electronic tool. A minimum number of platelet orders to be audited was pre-determined based upon hospital classification (small community, large community, teaching). Indications for each transfusion order, including dose were collected. The appropriateness of the clinical indication was assessed by either an automated adjudication process (Excel formulas) or manually by 2 hematologists (independently) according to validated criteria.

Results

Sixty-nine (46%) of 150 eligible hospitals participated; data on 1903 platelet orders from participating sites were received. For analysis, the adult (>18 years) data was separated from the pediatric (≤18 years) data. Of the 1693 platelet orders for adults, 975 (57.6%) orders were classified as appropriate, 702 (41.5%) orders were deemed inappropriate, and 16 (0.9%) were indeterminate. For the 210 pediatric platelet orders, 68 (33%) were classified as appropriate; 133 (63%) were inappropriate; and 9 (4%) were deemed indeterminate.

The highest inappropriate categories for the adult orders were: 1/ Prophylaxis for spontaneous bleeding with thrombocytopenia due to hematologic malignancies and a platelet count > 10x10⁹/L which accounted for 53% of the inappropriate platelet orders; 2/ Therapeutic for major elective non-neuraxial surgery and a platelet count ≥ 50x10⁹/L (10% of inappropriate orders); 3/ Therapeutic for non-CNS bleeding with WHO grade 2 and a platelet count ≥30x10⁹/L (9% of inappropriate orders).

Similar findings were found in the pediatric platelet orders with the highest inappropriate platelet use (29%) for prophylaxis and thrombocytopenia due to hematologic malignancies for platelet count >10x10⁹/L.

Conclusion

The audit results have shown that inappropriate platelet transfusions are occurring in all patient groups, perceived indications and hospital classifications. Broad educational and system changes are needed to bring about improvements in all areas of platelet transfusion practice in Ontario.

Acknowledgements

Participating Ontario hospitals and the Ministry of Health for continued funding support.
Abstract Description: Introduction: The Ontario Contingency Plan for Management of Blood Shortages (version 3) was released February 2017. A provincial blood shortage exercise was planned and held to test the plan. The simulation scenario was a Red Phase RBC shortage due to contamination in the additive solution, resulting in an immediate critical shortage of RBC without impacting other blood components. Method: A working group planned the exercise and presented orientation sessions to inform all participants of the objectives and expectations of the exercise. The exercise was triggered by a meeting of the Ontario Emergency Blood Management Committee on the afternoon of May 15, 2018. All 150 hospitals in the province were notified the following morning by Canadian Blood Services and all were expected to participate. One of the key objectives of the exercise was to raise awareness of a new web-based emergency management communication tool (EMCT) created by the Ministry of Health and Long-Term Care (MOHLTC). Results: A survey was sent out, after the exercise, to gather feedback from participants. One hundred seventy-three responses (representing 139 hospitals) were received. Hospitals reported that simulated triage decisions would have resulted in deferral of about 75% of the RBC normally transfused in the province in this time-period. Several hospitals reported delays in receiving notification from Canadian Blood Services and while many respondents expressed confusion over the appropriate use of the EMCT, 87% were now aware of it. Eighty-eight percent of respondents reported that their hospital does not hold their own exercises and 91% stated they found this exercise very helpful. Improvements in hospital preparedness (redistribution and documentation of decisions) were noted compared to previous exercises held. Recommendations for improvement were identified and focused primarily around communication. Conclusion: By planning and holding regular provincial blood shortage exercises, stakeholders enhance understanding of national, provincial and hospital plans, roles and responsibilities and can identify gaps and opportunities for improvement to their plans, processes and communication tools. Holding periodic exercises improves the ability to respond with a collaborative and standardized approach to provide best possible care for patients should an actual blood shortage occur.
Administration of Intravenous Immunoglobulin through a Blood Warmer

Type Of Abstract : Administrative

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Abstract Description :

**Background:** The clinical indications for treatment with Intravenous Immunoglobulin (IVIG) are broad, with novel applications discovered each year. IVIG products are usually stored in a refrigerator to extend shelf life, and are typically received cold for administration. Blood warmers are routinely used to reduce the risk of complications associated with the infusion of cold blood components; however, it is not known if the use of blood warmers to infuse IVIG is safe.

**Methods:** Blood warmers are not mentioned in the monographs for the IVIG products available through Canadian Blood Services (CBS), specifically GAMMAGARD Liquid™, IGIVnex™, GAMUNEX™, and Privigen™. The manufacturers of some of these products were contacted to inquire about the existence of any data supporting or opposing the use of blood warmers for IVIG administration.

**Results:** None of the manufacturers were able to provide any data regarding the administration of their products through a blood warmer. CSL Behring discouraged blood warmer usage based on the lack of specific recommendations in their product monograph. Grifols advised that quick warming of IVIG could decrease Ig potency and/or increase aggregation and fragmentation. Similarly, Shire (now Takeada) cautioned against blood warmer usage, referencing the 2nd edition of *the Immunoglobulin Therapy Standard of Practice*, which states: “Refrigerated Ig products should never be brought to room temperature by placing in a hot/warm water bath, or in any other manner that would rapidly increase the temperature of the product, as this can alter Ig product parameters and increase the risk of bacterial and/or fungal contamination”. Both Grifols and Shire stated that ultimately, the decision of whether or not to employ a warmer is at the discretion of the treating physician.

**Conclusions:** There is little to no English-language data regarding the administration of IVIG through a blood warmer. Until studies are done to investigate the effects of blood warmers on IVIG infusion, it is recommended that hospitals maintain some IVIG products at room temperature, which is permitted by manufacturers GAMMAGARD Liquid™, IGIVnex™, GAMUNEX™, and Privigen™. These room temperature IVIG products could be used for patients requiring the use of blood warmers for blood infusion.
Ontario AB Plasma Audit 2018

Type Of Abstract: Administrative

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Abstract Description:

Introduction: The Ontario Regional Blood Coordinating Network (ORBCoN) conducted a provincial AB plasma audit to gather information on the utilization of AB plasma in Ontario.

Nationally a downward trend in plasma utilization has been seen, with an increase in the proportion of AB plasma requested by hospitals. AB plasma is considered the universal plasma donor group and is used for initial resuscitation of massively bleeding patients and in urgent situations where there is no blood group on file.

Objective: As this was the first provincial AB plasma utilization audit performed, the primary objective of the audit was to quantify the amount of AB plasma being transfused to non-AB recipients and to determine the reasons for this use.

Method: All Ontario hospitals with a transfusion medicine laboratory (n=150) were invited to participate in the audit. Data points surveyed were collected over a three month period using a web-based survey tool. Results were exported for analysis by ORBCoN.

Results: Eighty-two (82) hospitals participated, capturing 89.5% of the provincial AB plasma shipped by Canadian Blood Services during the audit period. Audit results showed that 24.7% of AB plasma was transfused to an AB recipient and 75.3% to a non-AB recipient. The most common reasons for transfusing group AB plasma to patients of other ABO blood groups were: (1) for use in a Massive Hemorrhage Protocol (MHP) before the patient’s blood group was known (32.4%) and (2) to avoid outdated plasma originally thawed for a MHP but not used (24.8%). The disposition of AB plasma for reasons other than transfusion was relatively small, with the highest percentage being outdated due to being thawed for a MHP but not used and outdated (7.0%).

Conclusion: The disposition of AB plasma in Ontario, AB to AB recipients, AB to non-AB recipients was determined with a high percentage (75.3%) of AB plasma being transfused to non-AB recipients. Knowing where AB plasma is being transfused will help to develop strategies to aid in the reduction of unnecessary AB plasma transfusions and lead to the sustainability of AB plasma supply.
Acknowledgements: Transfusion Medicine Staff, participating Ontario hospitals

CBS, providing shipment data

MOHLTC, funding support
Evaluating Perpartum Transfusion Risk and Pretransfusion Testing in Fraser Health

Type Of Abstract : Administrative

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Abstract Description :

Background Increasing incidence of severe atonic postpartum hemorrhage in British Columbia cannot be explained by changes in maternal characteristics or obstetric practice. Additionally, trends in performing admission pre-transfusion testing in Fraser Health (FH) are on the rise. FH is one of the largest health authorities in BC and serves 1.8 million people with 8 delivering facilities providing maternity services from community to tertiary care for approximately 15,000 deliveries per year. FH responded to this temporal trend by developing a comprehensive postpartum hemorrhage protocol that included risk assessment on admission to ensure resources are directed appropriately. During development of the admission risk assessment tool (ARAT), it was deemed necessary to appraise the risk factors in relation to the FH perinatal population.

Methods The study used data routinely collected for all 29,425 births over a two year period and included clinical factors associated with peripartum hemorrhage. Data were verified by linking Transfusion Medicine Laboratory records and manual chart review when needed. Crude and adjusted relative risk (RR) of hemorrhage and transfusion were calculated. Receiver operating characteristic (ROC) curve analysis were used to evaluate the performance of the ARAT in predicting transfusion.

Results Risk factors were grouped into low, medium or high risk of transfusion. Elements in the low risk group had a RR of less than 2, including elective caesarean section (0.96). Factors in the medium or high risk group had a RR of ≥ 2, including third trimester hemoglobin

Conclusion In conclusion, FH’s ARAT is a suitable predictor of transfusion. When used to inform pre-transfusion testing, patients at risk will be identified, unnecessary pre-transfusion testing will be avoided, and resources will be focused where need is greatest.
Impact of Climate on Platelet Discard Rates

Type Of Abstract: Administrative

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Abstract Description:

Introduction: Our transfusion service is responsible for distributing blood components including platelets to several sites. Standards have a very narrow storage and transport temperature range of 20 to 24°C (Table 2 CSA Z902-15). Our policy is to check temperature of units using Fisher Scientific infrared guns if the component feels cold to touch upon receipt. During colder winter months, a trend of increased platelet discards with temperatures on receipt documented at less than <20°C prompted evaluation of the transport processes from our contracted couriers. The courier is required to record in vehicle temperatures and to keep the blood transport boxes as close to the driver as possible.

Material and Methods: Retrospective analysis of the in-vehicle recorded temperatures from data loggers was performed. The number of in date platelet discards was obtained from the Sunquest laboratory information system and month end reports. February and May of 2018 were used as representative of winter and spring weather conditions.

Results: In vehicle temperatures in February ranged between 12.1°C and 27.3°C; average = 18.1 +/- 3.5 SD. In May they ranged between 19.6°C and 24.3°C with 22°C average +/- 0.9 SD. For February there were 35 in date platelet discards, 26 (74%) of which were due to documented temperature excursions in contrast to a single in date platelet discard in May. In February of 2018, three deviation approvals for platelets whose temperatures were between 18.1-18.4°C in order to enable patient support for bleeding.

Conclusion: The extreme cold temperatures can be challenging to transport blood components particularly platelets which need to be kept at room temperature. Recent studies have shown that cold-stored platelets exhibit superior hemostatic potential and may offer a better solution to bleeding patients. Since cold Canadian winters are unavoidable; cold-stored platelets may be the only alternative and standards should be modified to allow this alternative. We have now also implemented a policy to quarantine “cold” platelets upon receipt in the refrigerator to allow deviation and transfusion for patients experiencing thrombocytopenic bleeding while waiting for additional inventory to be received.
Patient and caregiver experiences: Survey results from the 2017 transition of intravenous immunoglobulin products in Québec

Type Of Abstract: Administrative

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Abstract Description:

Introduction / Objective

Canadian Blood Services and Héma-Québec, are non-governmental bodies tasked with safety, procurement and distribution of blood products. They ensure the supply of IVIG for Canada through multiyear agreements with manufacturers and is obligated to renew supply contracts at predetermined intervals. This can lead to patients needing to switch from their current immunoglobulin to another for reasons other than product safety or efficacy. Limited data exists on the experience of patients undergoing such IVIG transitions.

Design / Methods

During the 2017 transition process, the Association des Patient Immunodécients du Québec (APIQ) developed a 12-question survey that was emailed in August 2017 to approximately 120 patients, parents and caregiver members of the Association. An additional 30 questionnaires were distributed in select hospitals that had an Immunology PID clinic. The survey was designed to capture patient’s experience as they transitioned to other IVIG products.

Results

From the 150 questionnaires distributed a total of 79 respondents answered all questions.

Survey results show that the majority of patients (57%) were comfortable having to switch products, and rated their comfort level as four or five out of five when they learned about the transition to a new IVIG product. In addition, survey results demonstrate that the information provided to respondents during the transition was adequate, but unavailable to many. Most respondents (70%) who received product- or transition-specific documentation felt that it was useful; however, almost half of respondents reported not receiving any information (48%).

Conclusions

In conclusion, the survey demonstrates that overall the respondents received good information and generally felt supported; however, a need exists for the distribution of information to be more widespread. In order to optimize the management of future transitions,
companies, patient support groups and the government should work together to determine how to reach more patients during the transition process.
Maintaining an inventory of rare reagent red cells and antisera across multiple reference laboratories at Canadian Blood Services

Type Of Abstract : Administrative

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Abstract Description :

Background:

An inventory of rare red cells and antisera is a vital component of any immunohematology reference laboratory. The red cells demonstrate rare phenotypes and the antisera possess antibodies for which no commercial equivalents exist.

Examples include cells which lack high prevalence antigens or those with low prevalence antigens. Rare sera have antibodies to rare red cell antigens.

Previously, each Canadian Blood Services Reference Laboratory managed a local inventory of cells and sera using data management software which varied by site. A new database was implemented to standardize data management and provide national inventory access and tracking.

Method:

Inventory is supplemented by: deidentifying and freezing rare cells or antisera from patient and donor samples; and subscribing to SCARF (Serum, Cells and Rare Fluids Exchange Program), where members post offerings of rare cells and antisera.

The inventories at each laboratory were evaluated and reorganized. A new and consistent labelling format and nomenclature was developed, and the cells and sera approved for retention were uploaded into the new database. The entries were validated, and staff trained to search and use.

Results:

For nomenclature, cell typing is designated as the antigen without brackets and +/-, e.g. Fya+. Antisera is designated as the antigen name, e.g. Vel to indicate anti-Vel. Vials are labelled with: sample ID, lot number, tank location, supplier, ABO group, and principal antigen.

These reagents are available at the following labs: Ottawa: 822 red cells and 494 antisera, Brampton: 1422 red cells and 361 antisera, Vancouver: 813 red cells and 485 antisera, and Winnipeg: 655 red cells.

The shared database is hosted locally but “viewable” from all reference labs. This software will not interface with testing platforms, laboratory information systems or donor red cell inventory databases.
Conclusion:

Maintaining a collection of rare red cells and antisera is an essential tool for solving complex antibody investigations. The new database allows for efficient use of resources nationwide by allowing inventory search across sites, creating custom panels and downloading commercial panels. It delivers an effective and easy-to-navigate inventory management system which enhances Canadian Blood Services reference laboratories’ testing capability, and provides better service for perinatal, hospital transfusion patients and donor investigations.
BC Provincial Blood Coordinating Office, 20 years of promoting excellence in transfusion medicine through ongoing engagement, innovative technology, and best practice

Type Of Abstract: Administrative

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Abstract Description:

Introduction / Objective

The British Columbia Provincial Blood Coordinating Office (PBCO) was created in 1997 by the BC Ministry of Health to provide leadership and coordination of blood-related issues and activities during a time of great transition in Canada’s blood system. The recommendations of the Royal Commission of Inquiry on the Blood System in Canada (Krever Commission) aimed to address many limitations of the system at that time.

Today, the PBCO plays a key role in provincial blood and blood product utilization programs and, in collaboration with provincial stakeholders, facilitates the advancement of transfusion medicine practices through unique initiatives that support the effective and appropriate use and safe provision of blood and blood products across the province.

Design and Methods

Since its inception, and starting with the development of the Central Transfusion Registry (CTR), the PBCO has been committed to building a safer blood system for patients in BC. The CTR was the first population-based transfusion registry in Canada, and remains one of the largest such registries in North America. All hospital blood banks in BC and Yukon submit an extract of their transfusion records each reporting period. The PBCO embraces a proactive and innovative approach to information technology. The CTR, coupled with this innovation, provides the infrastructure upon which BC’s transfusion medicine utilization, quality and safety initiatives are built.

Results

The PBCO has helped advance transfusion medicine practice in BC. Dr. David Pi, the original founder of the PBCO, is the recipient of this year’s Ortho Award in acknowledgement for his innovation, creativity and leadership. 2019 also marks the 20th anniversary of the CTR so it is timely for the PBCO to share how the programs and initiatives that have been developed over the last two decades have had a direct and tangible impact on quality and utilization management.

Conclusions
Through its many programs, initiatives, and projects, the PBCO has facilitated best transfusion practice and continues to promote the appropriate, safe, standardized and sustainable use of blood, blood products and their alternatives throughout BC.

Acknowledgements

BC PBCO staff, Transfusion Medicine Advisory (TMAG), Technical Resource (TRG) and Nursing Resource (NRG) Groups.
Assessing The Ottawa Hospital’s Use of Irradiated Blood Products in CLL Patients Treated with Purine Analog Therapy: A Needs Assessment

Type Of Abstract: Clinical

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Abstract Description:

Introduction: Purine analogs are a class of cytotoxic drugs used to treat chronic lymphocytic leukemia (CLL). Their use has been associated with a rare but fatal complication of blood transfusion known as transfusion-associated graft-versus-host disease (TA-GVHD). Irradiation of cellular components may prevent TA-GVHD. Canadian guidelines suggest that all purine analog-treated patients necessitating blood transfusions should receive exclusively irradiated blood products. We hypothesized that a proportion of purine analog-treated patients requiring blood transfusions at The Ottawa Hospital (TOH) had been administered non-irradiated blood products, subsequently increasing the potential risk for TA-GVHD.

Objective: Elucidate the deficiencies in the current standards of practice of blood transfusion at TOH for fludarabine-treated CLL patients.

Methods: The Division of Hematology clinical database for Myelodysplastic/Myeloproliferative Neoplasms and Leukemia was used to select all consecutive CLL patients treated with fludarabine-based therapies at TOH between January 1, 2010 and December 31, 2016. Patient demographic information, relevant disease characteristics, treatment regimens, baseline blood counts, and irradiation status of transfused blood were collected.

Results: We identified 166 fludarabine-treated CLL patients during the study period. There were 116 (70%) male subjects, 83/116 (50%) had advanced stage disease at treatment onset, and the median age at treatment initiation was 63 (range 34-84). The most common treatment regimen was the combination of fludarabine, cyclophosphamide and rituximab. After a median follow-up of 49 months, 65 (56%) patients required blood transfusions. Only 6/65 (9%) received exclusively irradiated blood while 59/65 (91%) received at least one unit of non-irradiated blood.

Conclusions: The majority of CLL patients treated with fludarabine who received blood transfusion were administered non-irradiated blood. Although no cases of TA-GVHD were observed during the study period, current practices at TOH place CLL patients at an unnecessary risk. This practice gap appears to have been at the level of clinical ordering. We anticipate closure of this gap by implementing an updated policy on the use of irradiated blood products at TOH, coupled with physician order entry as part of our migration to a new electronic medical record system. We plan another audit in the future to address the effectiveness of these policy changes.

Disclosure: None.
Transfusions of Activated Platelets Impact Count Increments and Time Between transfusions in hematology-oncology patients

Type Of Abstract : Clinical

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Abstract Description :

Introduction/Objective:
Most hematology-oncology patients receive platelet transfusions prophylactically, at a set transfusion threshold. Up to 35% of patients who depend on platelet transfusion support become refractory to platelets, failing to achieve the expected response to transfusion. The CoDIVO study demonstrated a platelet concentrate (PC) screening test could predict count increment. The CoDIVO randomized trial hypothesized patients who received only non-activated PC, would have better post transfusion increments than those receiving PC of any quality. Planned analysis did not show significant difference between the treatment arms, with several possible reasons identified including the high incidence of platelet refractoriness (50/200 enrolled). However, recent results from other institutions using the same screening test showed a benefit when hematology-oncology patients received only non-activated platelets. These results informed retrospective analysis of the CoDIVO trial data.

Design and Methods:
A randomized trial conducted at Vancouver General Hospital, BC, Canada from 2011 to 2014 enrolled 200 hematology-oncology inpatients. The retrospective analysis examines impact of transfusion of activated PC. Platelet activation was measured by dynamic light scattering (ThromboLUX, LightIntegra Technology Inc.). Clinical effectiveness was determined as average post-transfusion corrected count increment (CCI) and hours between transfusions before and after receipt of activated PC.

Results:
Of 922 transfusions in 180 patients, 1-hr CCIs at or after first activated transfusion were 9% lower than after non activated transfusions (14.9 (14.0, 15.9) vs 16.4 (15.2, 17.5) p= 0.006). Likewise, 24-hr CCIs at or after the first activated transfusion were 15% lower than those after non-activated transfusions (7.97 (7.06, 8.88) vs 9.37 (8.21, 10.5) p=0.007). After an activated transfusion the time between transfusions was decreased by 9.1 hrs or 18% (p = 0.001). Data were analyzed by Emmes Canada using a linear mixed effects model, 95% confidence interval and Wald-type intervals.

Conclusions:
These data suggest that average count increments are lower and the time between transfusions is shorter after activated platelet transfusions. Screening PC for activation status and avoiding transfusion of activated platelets to hematology-oncology patients could address the gap between platelet supply and demand, and potentially improve patient care.
Anti-M: A case of hemolytic disease of the fetus and an approach to prenatal management

Type Of Abstract: Clinical

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Abstract Description:

Background
Anti-M is usually a cold-reacting antibody and is rarely implicated in hemolytic disease of the fetus and/or newborn (HDFN). It is commonly encountered, however, accounting for 10-15% of all prenatal antibodies, and it can be difficult to be certain of its significance. This results in frequent titres of limited value. To illustrate the full spectrum of prenatal anti-M, we present a case report followed by an approach to prenatal anti-M testing supported by the literature and review of our practice.

Case Report
A 24-year-old G3P1 Caucasian female had anti-M identified with all other clinically significant antibodies excluded on routine testing at 11-weeks’ gestational age (GA). A titre of 512 was obtained with reactions persisting following dithiothreitol (DTT) treatment. Paternal phenotype was M+N-. Given the high titre, the patient underwent middle cerebral artery doppler monitoring for fetal anemia. Following an abnormal doppler result, two intrauterine transfusions (IUT) were performed at 30- and 34-weeks’ GA for a pre-IUT fetal hemoglobin of 80g/L and 106g/L. Delivery occurred at 36-week’s GA with DAT negativity and no evidence of neonatal anemia or hemolysis. Phototherapy was provided for mild hyperbilirubinemia (99-109 umol/L) at birth.

Methods
A retrospective review of all prenatal anti-M’s and their associated titres was undertaken at CBS BC & Yukon Diagnostic Services (BCY DS) between January 2015 to July 2018. Solid-phase testing was used for all initial antibody investigations. A review of the literature was also performed capturing all cases of anti-M-related HDFN and their associated titres and outcomes.

Results
A total of 369 anti-M’s were identified at BCY DS with 84% having a titre < 1. Fifty-two cases of anti-M HDFN have been reported in the English literature with 92% having titres ≥ 4. An approach to prenatal anti-M’s was adapted with repeat samples requested at 26-28 weeks in those with an initial titre ≤ 2. If the titre is 4 or 8, titres are performed monthly or biweekly depending on the trimester. The critical titre for prenatal anti-M is 16. DTT treatment is reserved for high-titre cases.

Conclusion
Prenatal anti-M’s are common, low-titre, and mostly insignificant. An approach has been developed to eliminate unnecessary testing in most prenatal anti-M patients, while capturing those with hemolytic potential.
Impact of Deferral Criteria Changes on Donor Deferral Rates

Type Of Abstract: Clinical

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Abstract Description: Background: Donor criteria are revised to reflect current knowledge, decrease deferrals, and enhance efficiency. In 2018, 5 questions were removed from the donor questionnaire, and many criteria were changed. We assessed the impact of changes on deferral rates. Methods: In April 2018 deferrals for having an HIV test in last month and sexual partner from Togo or Cameroon (HIV-1 variant risk) were removed, deferral for history of hepatitis (ever) and receipt of blood products (12 months) reduced to 6 months and deferral for tattoo and piercing reduced from 6 to 3 months. In August 2018, the definition of malaria risk areas was revised so those who spent time where mosquito avoidance alone was recommended became eligible, and many donors with stable heart disease were eligible 1 year after a cardiac event, rather than permanently deferred. Whole blood donation deferrals for the above reasons and the number of donations for September – December 2017 (Period 1) and September – December 2018 (Period 2) were identified in the National Epidemiology Donor Database using deferral codes and deferral rates were calculated for 4-month periods pre and post-changes. Results: All changes resulted in a significant decrease in deferrals for that reason (p<0.0001). Tattoo and piercing resulted in 7,276 deferrals in Period 1 vs 3,538 in Period 2, malaria risk travel 8,187 in Period 1 vs 5,055 in Period 2, receipt of blood products 373 in Period 1 vs 174 in Period 2, history of hepatitis 156 in Period 1 vs 5 in Period 2, and myocardial infarction 98 in Period 1 vs 16 in Period 2. For criteria removed, having an HIV test in the last month deferred 194 donors whereas Togo/Cameroon criteria deferred 9 donors in Period 1. Unfortunately, for medical problems, such as many cardiac conditions, it was difficult to assess impact due to lack of precise deferral codes. Conclusions: Deferrals declined substantially, with approximately 16,500 -22,000 fewer deferrals (1.5 - 2% of total donor presentations) expected annually. Reduced deferrals and a shorter donor questionnaire improve donor satisfaction and clinic efficiency and contribute to the adequacy of the blood supply.
Premedication for the Prevention of Nonhemolytic Transfusion Reactions: A Systematic Review and Meta-Analysis

Type Of Abstract : Clinical

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Abstract Description :

Introduction
Nonhemolytic transfusion reactions (NHTRs), most frequently febrile nonhemolytic transfusion reactions (FNHTRs) and allergic transfusion reactions (ATRs), are common complications of transfusion, and efficacy of prophylactic premedication remains controversial. This systematic review and meta-analysis assess the efficacy of premedication in the prevention of NHTRs in adult and pediatric patients receiving allogeneic blood transfusion.

Design and methods
A systematic search using MeSH terms in CENTRAL, MEDLINE, EMBASE, ISI Web of Science, and clinicaltrials.gov was performed from inception until October 2018. All randomized controlled trials comparing premedication to placebo or no treatment were included. Using preestablished criteria, two reviewers independently selected abstracts for full-text review, identified eligible studies, assessed the risk of bias, and performed data extraction. Outcome measures were reported as relative risks (RR) with 95% confidence intervals (CI). Data were combined for similar outcomes where appropriate and a random-effects model was used. Analyses were performed at the patient-level and transfusion-level where appropriate.

Results
Of 805 studies screened, three studies met the inclusion criteria; two randomized hematology-oncology patients while the third included hemoglobinopathy patients aged less than 22 years. A total of 517 patients received 4,444 transfusions (2,013 red cell transfusions and 2,431 platelet transfusions). All trials randomized either patients or transfusions to acetaminophen and an antihistamine versus placebo. Pooled patient-level analyses for NHTRs, FNHTRs and ATRs were RR 0.92 (95% CI 0.63 - 1.35), RR 0.54 (95% CI 0.26 - 1.1) and RR 1.37 (95% CI 0.81 - 2.31), respectively, showing no benefit of premedication. Transfusion-level analyses demonstrated similar results. Only 27 patients with prior transfusion reactions were randomized as these types of patients were excluded from two studies. The quality of evidence was low due to risk of bias and imprecision. None of the studies reported on other patient important outcomes such as prolongation of transfusion, length of stay, or interventions required for reaction management.

Conclusion
Routine premedication with acetaminophen and an antihistamine was not found to be effective in the primary prevention of NHTRs. The impact of premedication in patients with a history of transfusion reactions remains unknown, and should be the topic of future randomized controlled trials.
Oral iron versus intravenous iron for preoperative anemia management: the ONTraC experience

Type Of Abstract: Clinical

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Abstract Description:

Introduction: A key pillar of patient blood management (PBM) in the surgical setting is treating pre-operative anemia. The role of oral versus intravenous (IV) iron has been assessed in small randomized and observational studies. However, relative impact in a real world setting is uncertain. We evaluated the effect of oral versus IV iron on hemoglobin increment prior to surgery.

Design and Methods: This retrospective study is from the Ontario Transfusion Coordinators Network (OnTraC) database from PBM nurses in 25 Ontario hospitals, having a primary role of managing anemia preoperatively. Data collected includes procedure type, time from initiation of PBM measures to surgery, oral or IV iron treatment and initial and preoperative hemoglobin. Primary outcome was change in hemoglobin concentration.

Results: In patients specifically referred to the PBM coordinator throughout 2017, surgeries included knee (54.7% of all referrals) and hip (26.1%) replacement, cardiac surgery (9.9%), gynecology (7.1%) and colon resection (1.3%). 63% of the referrals for knee replacement were female, for hip replacement 55% female, for CABG 18% female, CABG+Valve 27% female and for valve surgery 40% female. In the 9,640 patients specifically referred to the coordinator, 887 (9.2%) received IV iron and 862 (8.9%) received oral iron as the only PBM measure (50.2% received oral iron in addition to other PBM measures). For 73% of patients treated with IV iron the lead time prior to surgery was <21 days; for oral iron, 62% had a lead time <21 days. Mean hemoglobin increment following treatment was -6±18 g/L for oral iron only and +11±15 g/L for IV iron (p < 0.001). For patients treated with oral iron, only the populations undergoing colon resection, general surgery and gynecologic surgery had an increase in hemoglobin. All groups receiving IV iron had an increase in hemoglobin.

Conclusions: Whilst oral iron may be effective, when there is a short lead time to surgery IV iron had a larger hemoglobin increment than oral iron, advocating for the importance of early detection of anemia to maximize time available for oral iron supplementation and supporting the use of intravenous iron when the lead time to surgery is short.
Clinical Outcomes and Management Following Intracranial Hemorrhage in Acute Leukemia

Type Of Abstract: Clinical

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Abstract Description:

Background

Intracranial hemorrhage (ICH) is a common complication in acute leukemia (AL), associated with significant morbidity and mortality. There is evidence to support prophylactic platelet transfusions when the platelet count is less than 10 x 10⁹/L¹ ², however, there is little to guide platelet transfusion practice following ICH. Clinical judgement would support improving thrombocytopenia to reduce the risk of new or progressive bleeding. The objectives of this study were to understand predictors of long-term mortality in AL patients with ICH and to understand institutional platelet transfusion practice.

Methods

This retrospective study included all adult patients with a diagnosis of AL and ICH at a single centre between January 1, 2009 and December 31, 2016. Demographic, clinical and radiologic data was collected. The primary outcome was overall survival (OS) for patients who survived the initial 72 hours following ICH.

Results

89 of 2576 patients diagnosed with AL experienced ICH and were included. On the day of ICH, the median platelet count was 32 x 10⁹/L (range 0 - 545). Thirty patients had a platelet count < 10 x 10⁹/L. Thirteen patients exhibited evidence of platelet transfusion
refractoriness. The median OS was 6 months (range 2 – 8). Causes of death were progressive disease (53%), infection (9%), bleeding (7%), and treatment-related mortality (7%). Older age and higher white blood cell count at the time of ICH were predictive of poorer OS. In the 90 days following ICH, a lower platelet count was associated with inferior survival. Platelet transfusions were provided for a platelet count < 10 x 10^9/L (21%), 10 - 30 x 10^9/L (54%), and 30 - 50 x 10^9/L (17%). Neither the median platelet count nor the platelet transfusion threshold differed between patients who had new or progressive bleeding and those who did not.

Conclusions

In patients with AL, survival following ICH is poor. Most cases of ICH occur when platelet count is greater than 10 x 10^9/L suggesting that thrombocytopenia, is not the only risk factor for ICH. Following an ICH, platelet transfusions to a higher target are of unclear benefit and are frequently not achievable. Until further prospective data are available, aggressive correction of coagulopathy, cytoreduction and management of sepsis may reduce the risk of initial bleeding.
Harmonizing the Investigation and Management of Warm Autoantibodies Across Two Health Authorities in British Columbia

Type Of Abstract: Clinical

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Abstract Description:

Background

Warm autoantibodies (WAAs) present challenges in the laboratory with interference in antibody investigations and compatibility testing. Many are clinically insignificant therefore unnecessary investigations are common and result in transfusion delays and over use of laboratory resources. Some are associated with hemolytic anemia and must be recognized. Additionally, the lack of local standardization leads to inconsistent management. We sought to rationalize and standardize WAA investigation and management across two health authorities (HAs) in British Columbia (BC).

Methods

Beginning in 2017, a multidisciplinary panel from both HAs and Canadian Blood Services (CBS) developed harmonized WAA investigation algorithms based on pragmatic considerations and best evidence. Parameters included: 1) respecting testing methodologies and resources already in use at each HA 2) using tube methods as the gold standard for specificity, 3) eliminating non-value added testing, 4) providing extended-phenotype matched units given increased donor

27
phenotyping capacity at CBS, and 5) minimizing reinvestigations after transfusion of extended-phenotype matched RBCs or if no recent transfusions. Retrospective data was used to determine feasibility and impact of implementing this new algorithm.

Results

Based on results from one health authority over a period of one year, there were 134 patients reported with WAAs based on previous investigations, leading to 183 elutions, 14 autoadsorptions, and 74 investigations through CBS performed (usually alloadsorptions). After these investigations, 9 patients would have underlying alloantibodies. In those alloimmunized patients, 2 may have been potentially prevented by providing extended phenotype-matched units.

Of these, the majority would be reclassified using the new algorithm as “all clinically significant alloantibodies excluded” on antibody panels on tube methods that would be provided least-incompatible crossmatched units, leaving only 44 patients classified as WAAs under the new investigation algorithms. This would reduce additional investigations to only 35 elutions and 44 investigations through CBS. Provision of extended-phenotyped RBCs to patients with WAAs was feasible the majority of the time through CBS.

Conclusion

We propose new algorithms for WAAs that aims to standardize and streamline testing and management, developed in conjunction with BC HAs and CBS. Reduction in reagent cost and technologist time can be redirected to value-added patient care. These algorithms require further stakeholder feedback and prospective assessment for validation.
Systematic Reviews of Scores and Predictors to Trigger Activation of Massive Transfusion Protocols

Type Of Abstract : Clinical

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Abstract Description :

Background

The use of massive transfusion protocols (MTPs) in the resuscitation of hemorrhaging trauma patients ensures rapid delivery of blood products to improve outcomes, where the decision to trigger MTPs early is important. Scores and tools to predict the need for MTP activation have been developed for use to aid with clinical judgement. We performed a systematic review to assess 1) the scores and tools available to predict MTP in trauma patients, 2) their clinical value and diagnostic accuracies, and 3) additional predictors of MTP.

Methods

MEDLINE, EMBASE, and CENTRAL were searched from inception to June 2017. All studies that utilized scores or predictors of MTP activation in adult (age ≥18) trauma patients were included. Data collection for scores and tools included reported sensitivities and specificities and accuracy as defined by the area under the curve of the receiver operating characteristic (AUROC).

Results

45 articles were eligible for analysis, with eleven validated and four unvalidated scores and tools assessed. Of four scores using clinical assessment, laboratory values, and ultrasound assessment the modified Traumatic Bleeding Severity Score (TBSS) had the best performance in individual studies (AUROC 0.915-0.98; sensitivity 80-97.4%). Of those four scores, the Trauma Associated Severe Hemorrhage (TASH) score is most well validated (AUROC 0.51-0.99; sensitivity 2.6-90%; 11 validation studies). Using clinical assessment and ultrasound assessment without laboratory results, the ABC score balances accuracy with ease of use (AUROC 0.655-0.934; sensitivity 38-90%). Without ultrasound use but using clinical assessment and laboratory values, the Vandromme (AUROC 0.64-0.9; sensitivity 53.4-78.9%) and Schreiber (AUROC 0.8; sensitivity 85.8%) scores have the highest accuracy and sensitivity respectively. The Shock Index (SI) uses clinical assessment only with fair performance (AUROC 0.627-0.859; sensitivity 34.9-94%). In studies that compared scores, generally scores performing the most to least effectively were the TBSS, TASH, Prince of Wales Hospital score, and the ABC score. Other clinical variables, laboratory values, and use of point-of-care testing results were identified predictors of MTP activation.
Conclusion

The use of scores or tools to predict MTP need to be individualized to hospital resources and skill set to aid clinical judgement. Future studies for triggering non-trauma MTP activations are needed.
Facilitating research on blood transfusion: The Ottawa Hospital Transfusion Data Mart

Type Of Abstract : Clinical

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Abstract Description :

Introduction/Objective: The Ottawa Hospital (TOH) is a 1200 bed, 3-campus academic teaching hospital in Ottawa, Ontario. TOH is the tertiary care referral center for adults in a region of over 1.2 million residents. To facilitate quality improvement and research at TOH, the Ottawa Hospital Data Warehouse (OHDW) was developed. The OHDW is a repository of routinely collected health administrative data, which is pulled from various hospital data systems on a regular basis.

Design and Methods: To facilitate blood transfusion research at TOH, the Transfusion Data Mart (TDM) was created in 2016. A subsection of the OHDW, the TDM is a data repository containing data on all transfused patients at TOH from 2006 onwards, including patient and admission characteristics, transfused blood products, diagnoses, procedures, laboratory tests, acute care unit stays, and transfers within the hospital.

Results: Since its inception in 2016, the TDM has increased transfusion research capacity at TOH. The TDM expedites conduct of observational studies as all relevant data on transfusion recipients and blood products is stored together, and facilitates linkage with data from Canadian Blood Services, provincial databases, and other institutions. The TDM is also being used to conduct interventional studies: a ‘paperless’ pragmatic trial is currently underway at TOH where participants are tracked and all data points are collected entirely through the TDM, thereby markedly reducing the cost and time to perform clinical trials. Additionally, the TDM facilitates quality improvement practices at TOH through the creation of dashboards that provide a rapid snapshot of current transfusion trends and variations. Looking to the future, the TDM can be paired with machine learning techniques to identify patients at high risk of bleeding and transfusion who would benefit from blood management and conservation strategies.

Conclusion: The TDM facilitates observational and interventional transfusion research, and has the potential for future big data and artificial intelligence applications. Similar transfusion data repositories can be developed at other centers to increase capacity in transfusion research.
The Impact of Blood Donor Demographics and Manufacturing Method on Recipient Quality of Life and Change in Hemoglobin

Type Of Abstract: Clinical

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Abstract Description:

Introduction/Objective: Factors contributing to blood product quality, include manufacturing method, storage length, and donor characteristics (age, race, sex). Canadian Blood Services uses two methods; whole blood filtration (WBF) or red cell filtered (RCF) method. Quality of life can is important for chronically transfused patients, and may be impacted by blood product characteristics. This n-of-1 feasibility study examined differences in transfusion outcomes associated with differences in red cell donors and manufacturing in chronically transfused patients.

Design and Methods: Seven patients (2 female, 5 male) with myelodysplastic syndrome were enrolled and randomized to receive sex-matched RCF units or sex-mismatched WBF units for the first transfusion and the alternate for their next transfusion. The primary endpoints were the change in hemoglobin between transfusion episodes and the patient’s response to a transfusion quality of life survey (QUALMS). Secondary analysis included the patient’s vital signs (temperature, blood pressure, pulse) during the transfusion, and the hematocrit, hemolysis, and hemoglobin levels of the transfused red cell product.

Results: Of the seven patients enrolled, one was excluded because they received blood products in emergency. Patients were transfused with 2 to 3 units per episode, with transfusion intervals of 10 days to 1 month. Analysis was undertaken to evaluate trends from the feasibility study. There was no difference in quality of life. There was a trend toward a greater increase in hemoglobin between episodes from sex-matched, RCF units (x̄=0.033 g/ml) t compared to sex-mismatched WBF units (x̄=0.020 g/ml). There were several limitations, including limited blood product availability, patient complications, short notice for patient appointments, and non transfusion patient treatment affecting the quality of life survey.

Conclusions: This feasibility study identified issues and generated recommendations for conducting a larger scale study. This research is important to ensure high quality products are available to optimize outcomes and quality of life for chronically transfused patients.
Positive impacts of Laboratory Operations following a Successful Implementation of a Walk-away Blood Bank Analyzer

Type Of Abstract : Clinical

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Abstract Description :

Positive impacts of Laboratory Operations following a Successful Implementation of a Walk-away Blood Bank Analyzer

Author/Co-authors and Affiliations
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Background
Victoria hospital is a 200 bed regional hospital located 140 Km northwest of Saskatoon. Due to chronic staff shortage and significant staff turnovers, working towards full automation has been a clear mandate for our laboratory administration. A successful implementation of the Ortho Vision Analyzer™ was the final step to achieve total laboratory automation. The instrument was delivered and installed in March 2018, designated key trainers were trained on site and manufacturer's installation, operation and performance protocols were satisfactorily carried out.

Materials and Method
Implementation objective was to ensure accuracy of ABO and Rh determinations of Vision using ID-MTS™ Gel Cards when compared with ABO/Rh manual tube. Results from Vision for antibody screen were compared with solid phase, the Capture technology for antibody screen and antibody identification. Once the platform's operation and performance protocol had been satisfactorily qualified, "go-live" would commence immediately.

Results
Validation
193 samples were tested by Vision and results were compared with the test of records and by our reference laboratory using Vision. ABO and Rh determinations, antibody screen (56 -/51+), and crossmatch (49 compatible/51 incompatible) had 100% concordance. Gel detected an additional anti-M while both detected 2-K.3-E,2-c,1-C and 2-Fyα.

Implementation

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<td>1949</td>
<td>115</td>
<td>168</td>
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<td>100</td>
<td>98.2</td>
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</tbody>
</table>

? = equivocal results due to mix field reactions or fibrin, corrected manually by technologists

Conclusion
The successful implementation of Vision has achieved our goal of full laboratory automation in 2018. Encouraged by 100% CAP survey accuracy to date, staff members have gained confidence and efficiency evident by the ease of daily shift changes and on shifts. Average hands-on time of T&S has bee reduced by 15 minutes and the turnaround time is now at 30-35 minutes. Furthermore, identical instruments used by reference laboratory and, with network capability to be established, will further improve transfusion safety in our health region.
Follow Up on Plasma Donors with Monoclonal Gammopathy at Canadian Blood Services

Type Of Abstract: Clinical

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Abstract Description:

Background:

Serum protein electrophoresis (SPE) is performed on Canadian Blood Services plasma donors who donate frequently (less than 56 days). Donors are indefinitely deferred if the SPE and immunofixation (IMF) demonstrate monoclonal gammopathy (MG). Donors with MG are notified of the finding by letter and are encouraged to follow-up with their physicians as this finding may indicate monoclonal gammopathy of undetermined significance (MGUS) or a malignant blood disease.

This study compared both the testing performed by Canadian Blood Services and the workup performed by donors’ physicians.

Methods:

We requested that all donors deferred for MG between October 2017-March 2018 contact us with the results of external investigations. Verbal donor reports regarding health status were obtained by a blood center physician or nurse, and external laboratory results were obtained and reviewed where possible.

Results:

8 of 9 donors responded to requests for further information.

Canadian Blood Services results: All donors had normal total protein (TP) and gamma globulin (GG). MG of Isotype IgG was identified in 8 (6 Kappa, 2 Lambda light chain), and Isotype IgM in 1 (Lambda light chain). Observed bands were faint, with only 4 (all IgG) donors meriting M protein quantity (MPQ) assessment, yielding values of less than 1.00 g/L (for 2 donors), 1.6 g/L, and 2.5 g/L.

External Investigations: Per verbal reports, MG was again noted in 6 of 8 donors on subsequent testing by the donors’ providers. No other abnormalities were identified. MG was not identified in one donor on repeat testing, and one donor did not undergo subsequent work up due to a recent negative checkup. Donors were all clinically healthy and will have follow-up every 6-12 months.

Conclusion: Canadian Blood Services findings demonstrated normal TP and GG for all donors deferred for MG by SPE. Additionally, MPQs were either too low for quantification, or were below levels that typically generate clinical concern. Evidence supports that MPQ less than 15 g/L constitutes a very low risk of developing malignancy (5% at 20 years). However, MGUS diagnosis requires MPQ of greater than 30g/L. External workup showed no indication of malignancy and the follow-up plan was reassessment every 6-12 months.
A case of red blood cell alloantibody re-stimulation following renal transplantation

**Type Of Abstract**: Clinical

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**Abstract Description**:

**Introduction:**

Non-ABO red blood cell (RBC) alloantibodies after renal transplantation are infrequently described in literature. Yet, the appearance of these antibodies post-transplant may be of clinical significance. The Duffy (Fya) antigen is expressed on epithelial linings of renal peritubular capillaries, and mismatch has been associated with chronic rejection-related histologic changes. Furthermore, anti-Fya has been implicated in cases of acute transplant rejection.

**Aims and Methods:**

We report an unusual case of anti-Fya and anti-E re-stimulation in an immunosuppressed adult patient post renal transplantation.

**Case Description:**

A 69 year old female with multifactorial end stage renal disease and history of multiple RBC alloantibodies (anti-c, -E, -Cw, -Fya, -K) underwent deceased donor renal transplantation. Sensitization events include prior renal transplant 7 years ago, RBC transfusions, and two pregnancies, which resulted in a calculated panel reactive antibody (cPRA) of 69%; the patient was a 14/18 HLA mismatch with the donor. The patient is B Rh Positive and on the day of transplant, the antibody screen did not detect previous RBC alloantibodies. She received immunosuppression with anti-thymocyte globulin, prednisone, and tacrolimus. Postoperatively she received 9 units RBCs, 7 units plasma, and 2 platelet doses. RBC units were antigen negative and crossmatch compatible but challenging to acquire due to historical alloantibodies. On post-transplant day 10, anti-Fya became detectable in patient’s plasma (titre=8). On post-transplant day 30, anti-Fya and anti-E became detectable (not tittered). Subsequent serological testing revealed the donor to be O Rh Positive, E positive and Fya positive. The patient maintained normal renal function. Repeat antibody screen performed 110 days post renal transplant revealed a negative antibody screen and disappearance of her known RBC alloantibodies.

**Conclusion:**

In this case, RBC alloantibodies were re-stimulated by a donor kidney positive for both E and Fya antigens in a heavily sensitized patient following renal transplantation despite aggressive immunosuppression. This case highlights the transplanted organ as a potential cause for RBC antibody re-stimulation following transplant. Furthermore, this case prompts questions around the utility of extended phenotype matching when transfusing pre-transplant patients of high immunologic risk to facilitate blood acquisition and to avoid formation of potentially clinically significant antibodies.
Development of estimated red cell unit hematocrit for red blood cell exchange – a quality improvement initiative

Type Of Abstract : Clinical

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Abstract Description :

Introduction:
One treatment option for Sickle Cell Disease (SCD) is red blood cell exchange (RBCX). RBCX is preferred to simple transfusions in some situations, as it reduces concentration of hemoglobin (Hb) S more rapidly than simple transfusions, while reducing risk of hyperviscosity and iron overload. RBC unit hematocrit (HCT) levels are required for calculating total RBC volume for RBCX. Historically at our centre, a manual HCT was performed on each RBC unit. However, potential adverse consequences of performing manual HCT include: shortened shelf life for RBC units, risk of unit contamination, risk of transcription and calculation errors, and delay in providing blood products. We sought an alternative method for determining RBC unit HCT for RBCX.

Design and Methods:
In 2016, a plan was developed to determine an average RBC unit HCT for RBC units used in RBCX at hospitals within the Hamilton Regional Laboratory Medicine Program (HRLMP). Concurrently, new hematology analyzers were being validated, therefore RBC unit HCT validation was included. HCT verification of reference interval and estimation were determined using EP Evaluator software. Total volumes for RBCX using the measured and estimated mean HCTs were compared, as well as studies measuring issue to release times before and after implementation of the mean HCT were completed.

Results:
Between March 2016 and June 2017, HCT levels were measured for 230 RBC units. Statistical analysis revealed a mean HCT of 0.5990 L/L (SD 0.0233 L/L). We compared the total volumes that would be required for 14 RBCX procedures using measured versus estimated mean HCTs. Predicted differences in RBC volume for RBCX procedures between the two methods were clinically insignificant at 0-50mL. With measured HCT, time from issue to release was 38 to 144 minutes; with estimated mean HCT, time was reduced to 2 to 12 minutes.

Conclusions:
There are benefits to using the estimated mean HCT in RBCX for SCD patients: RBC units maintain original shelf life, there is no additional risk of unit contamination, and associated transcription/calculation errors are avoided. Moreover, we achieved much faster turn around times in providing RBCX blood products to clinical areas.
The Heart of the Matter: New Cardiac Criteria's Impact on Donor Eligibility

Type Of Abstract: Clinical

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Abstract Description:

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Background

The Donor Selection Criteria Manual (DCSM) is utilized by Canadian Blood Services' (CBS) screening staff to assess donor eligibility. If eligibility is in question, the donor is temporarily deferred and a Medical Enquiry (ME) is required. Periodic DSCM updates are implemented to optimize donor assessment and eliminate the need to defer donors while an ME investigation is being conducted.

In August 2018, significant changes to the DSCM cardiac criteria were implemented specifically focusing on Congestive Heart Failure (CHF), Coronary Artery Disease (CAD), and Heart Murmurs. These changes were informed by a previous study of MEs performed by West Medical Services' (WMS). We subsequently hypothesized that the criteria change would result in a reduction in the number of MEs requested for cardiac conditions.

Design and Method

Quantitative data from the WMS ME datasheet was analyzed for three-months pre and post-cardiac criteria implementation. MEs were divided into sub-categories based on the conditions requiring investigation according to the DSCM deferral table codes. All criteria changes were encompassed in the Cardiac-general sub-category. Pre and post Cardiac-general numbers evaluated to determine if criteria change had an impact on the type and amount of MEs generated as a result.

Results

Cardiac-general MEs decreased from 95 pre- to 42 post-criteria change (55.8%). Breakdown analysis of the DSCM category was as followed: CAD decreased from 10 to 6 (40%); Heart murmurs from 6 to 1 (83%); CHF showed no change.
Conclusion

Implementation of specific cardiac eligibility criteria in the DSCM resulted in a sharp decrease in the number of Cardiac-general MEs submitted to the medical office. Findings suggest the DSCM changes enabled the clinic more autonomy to safely accept donors without the aid of the ME process. Limitations of the data include the inability to quantify the number of cardiac donors being accepted at the clinic level and the short three-month analysis period. This type of data analysis will be advantageous for recommendations of future DSCM criteria changes based on observable trends of ME acceptance and deferral decisions by CBS physicians ultimately leading to a more efficient blood system and satisfied donor base.
Trends and outcomes in multicomponent blood transfusion: An 11-year cohort study of a large multi-site academic center

Type Of Abstract: Clinical

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Dean Fergusson 4

Abstract Description:

Introduction/Objective: Most studies reporting on blood component utilization investigate blood products separately from one another, thus overlooking patients transfused with more than one type of blood product (multicomponent transfusion). These patients are of importance, as they are large consumers of blood products, and likely have different characteristics and outcomes than non-transfused patients and patients transfused with only one blood component type. Our study aimed to determine the prevalence of multicomponent transfusion at a large multi-site academic center, as well as the patient characteristics and outcomes associated with multicomponent transfusion.

Design and Methods: We conducted a retrospective cohort study of transfused adult inpatients at the Ottawa Hospital between 2007 and 2017. Eligible transfusions were red blood cells (RBCs), platelets, plasma, cryoprecipitate and/or fibrinogen concentrate. Data was obtained from the Ottawa Hospital Data Warehouse and Transfusion Data Mart. Descriptive analyses were done to determine multicomponent transfusion prevalence. Patient characteristics and outcomes associated with multicomponent transfusion were assessed using multivariable regression modeling. Models were adjusted for relevant baseline patient characteristics, illness severity, and comorbidity burden.

Results: Of 55,719 adult transfused inpatient admissions, 25% received a multicomponent transfusion. Multicomponent transfusion prevalence was highest in hematology (51%), cardiac surgery (45%), critical care (40%), and cardiology (33%) patients. Multivariable regression models showed that males and patients aged 26 to 45 had the highest odds of receiving multicomponent transfusion. Risk-adjusted regression models showed that multicomponent transfusion was associated with increased odds of in-hospital mortality (OR=3.48, 95% CI: 3.26, 3.73), greater odds of institutional discharge as opposed to discharge home (OR=1.22, 95% CI: 1.15, 1.30), and a 1.58 time increase in duration of hospitalization (95% CI: 1.54, 1.62), compared to transfusion of only RBCs.

Conclusion: Multicomponent transfusion recipients make up a large proportion of transfused patients and may have poorer outcomes. It is necessary to continue studying these patients, including outcomes and transfusion appropriateness, to inform best practices in this population.
Impact of mass casualty events on blood product utilization: The 2019 Ottawa bus crash

Type Of Abstract: Clinical

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Abstract Description:

Introduction/Objective: On January 11th, 2019, a bus crash in Ottawa, Ontario killed three passengers and injured another 23, of whom 12 sustained major blunt force trauma injuries. Eighteen victims were sent to the Ottawa Hospital (TOH), where many required transfusion and some required transfusions of a large number of blood products. To gain a better understanding of how mass casualty events affect hospital blood use we examined blood product utilization at TOH around the time of the January 2019 bus crash.

Design and Methods: Data on blood utilization on the day of the bus crash and the following three days (mass casualty period), and during one month before and one month after the bus crash (non-mass casualty periods) at TOH was obtained from the TOH data warehouse. All transfusions of red blood cells (RBCs), platelets (PLTs), frozen plasma (FP), cryoprecipitate and fibrinogen concentrate administered to emergency department patients and inpatients during each time period were included. To account for temporal variation in trauma admissions and associated blood utilization, similar days of the week were compared to each other. All data was anonymized and de-identified.

Results: There was a large increase in blood product utilization during the mass casualty period compared to the month before and after the bus crash. The total number of blood products transfused during the mass casualty period was 2.5 times higher for all patients and 10 times higher for trauma patients specifically, compared to the average use during similar periods in the month before and after. The number of RBC units transfused during the mass casualty period was double the average of the month before and after. The number of PLT and FP units transfused tripled during the mass casualty period compared to the average in the month before and after, while cryoprecipitate and fibrinogen concentrate doubled.

Conclusion: Blood product utilization at TOH markedly increased on the day of the 2019 Ottawa bus crash compared to that of normal, non-mass casualty periods. An understanding of how mass casualty events impact hospital blood product utilization can help hospitals and blood suppliers improve emergency preparedness for future events.
Confirmation of RhD alloimmunization rates in patients receiving Rh mismatched red cells

Type Of Abstract: Clinical

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Salwa El Malti
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Abstract Description:

Introduction/Objective - In 2013, our transfusion service created a policy allowing Rh positive unmatched blood in Rh negative females of childbearing potential and males over 4 months as well as switching large volume users of Rh negative red cells (RBCs). To ensure appropriate safety, our transfusion service committed to ongoing evaluation of alloimmunization and reactions following implementation of this policy. Our initial validation demonstrated an alloimmunization rate of 19% and published ranges are 21-22%.

Design and Methods – Similar to our initial validation, Blood bank records and daily Rh mismatch reports from Sunquest were examined to identify Rh negative patients receiving at least one unit of Rh positive RBCs between January 2017 and December 2018. Parameters captured included age, sex, blood group, indication, date of the transfusion, number of units transfused, administration of Rh Immune Globulin, transfusion reactions, and antibody screen information. Patients included in the rate calculation were limited to individuals who had no prior anti-D and had an antibody screen performed at least 10 days after the transfusion.

Results – In the initial study, a total of 79 cases were identified with 26 meeting study eligibility. The 2017-2018 study had 77 patients identified with 29 eligible. In the current cohort, one patient formed anti-D for an alloimmunization rate of 3%. The initial study had 5 patients for a rate of 19% (P-value: 0.0536). Comparison of current to the published rate was significant (P-value: 0.01828). Another patient was positive for anti-E and an inconclusive antibody in the current cohort. No hemolytic reactions were seen in either cohort.

Conclusions – The alloimmunization rate of 3% points toward a lower rate of anti-D formation previously reported and published. As a result, the risk of our policies is acceptable when balanced with the benefit of conserving Rh negative RBCs. The similar lack of follow-up testing seen in both studies indicates a need to implement more follow-up testing to more accurately assess potential harm. The lack of increase in the number of cases identified despite increasing overall red cell utilization was unexpected.
An audit of plasma transfusion appropriateness and adverse reaction rates in Saskatoon tertiary care hospitals

Type Of Abstract : Clinical

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Abstract Description :

Introduction: Inappropriate use of plasma is common. Results of a 2013 plasma utilization audit in Ontario identified that 52% of plasma orders were for inappropriate clinical indications and frequently underdosed. To assess local practice, we completed a plasma utilization and adverse event rate audit in the two largest tertiary care hospitals in Saskatoon, Saskatchewan.

Method: This retrospective, quality improvement manual chart audit included all patients who received fresh frozen plasma and frozen plasma (collectively plasma) between January and September 2017 at Royal University Hospital and St. Paul’s Hospital. Data collected included: patient demographics, indication for plasma transfusion, dose administered, coagulation parameters pre- and post-transfusion, and documented adverse transfusion reaction. Appropriateness of plasma utilization was judged according to the Ontario Clinical Practice Recommendations for the Use of Frozen Plasma.

Results: A total of 270 patients received plasma transfusion during our study period. Patients undergoing plasma exchange were excluded. Final analysis included 200 adult and 44 pediatric patients who received 891 plasma units during 391 transfusion events. Among adult patients, 50.5% (145/287) of plasma transfusion events were inappropriate, predominantly 26.5% (76/287) for an INR of 1.5 or less. Despite availability of prothrombin complex concentrates, 4.9% (14/287) of plasma transfusion events were for warfarin reversal. Among pediatric patients, 79.8% (83/104) of plasma transfusion events were inappropriate, predominantly 38.5% (40/104) for hemodynamic support without either coagulopathy or massive hemorrhage. Overall, adult patients received a mean of 2.94 units and pediatric patients received 12 mL/kg per plasma transfusion event. No adverse reactions to plasma transfusion were formally reported to the Transfusion Medicine Lab. However, evidence of transfusion associated circulatory overload was documented in the patient chart following plasma transfusion in 6.0% (12/200) of adult recipients. Of these, 4 patients received plasma for inappropriate indications. There were no adverse transfusion reactions in pediatric patients.

Conclusion: Our study demonstrated inappropriate plasma transfusion in a majority of cases, particularly in the pediatric population. In general, the overall dose administered appears appropriate. Adverse reactions to plasma were clearly under-reported. These results highlight plasma transfusion utilization, and adverse event recognition and reporting as areas of educational need among clinicians.
Eleven-Year Retrospective Study of Hyperhemolysis Syndrome in Sickle Cell Disease.

Type Of Abstract: Clinical

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Abstract Description:

Introduction/Objective: Blood transfusions (RBC) in sickle cell disease (SCD) may trigger hyperhemolysis syndrome (HHS). This retrospective study evaluated HHS in adult SCD patients registered within an academic hemoglobinopathy program.

Design and Methods: SCD HHS events tagged in the laboratory information system (01/04/2009-31/12/2018) were reviewed. Patients were managed at an academic adult hemoglobinopathy centre (main site [MS]), with shared care at community hospitals (CH) and/or affiliated academic hospitals (AH). Policies mandated a minimum Weiner-Kell match (PAM) for event-free (HHS-, serially screen-) patients, and extended antigen matching (JK, FY, S) for immune responders.

Results: Of 804 SCD patients, 19 (2.4%) suffered ≥1 HHS (median 1, range 1-5/patient [2 with 2-5 events]), for 25 HHS episodes (1 case q20 weeks). At MS (30,684 RBC to 279 SCD recipients), HHS occurred 14 times (1:2192). Median age was 30y (IQR 30–41), and females dominated (68%, P=0.023). Pre-HHS antibody screens were positive in 11/20 (55%). Externally, 8 events occurred at (5 different) CH, and 2 at one AH. Of 16 retrievable transfusion indications, 11 were appropriate (anemia-[4], acute chest syndrome-[5], progressive end-organ dysfunction-[1], or pre-operative optimization-[1]); 5 others (31%) were for vaso-occlusive crisis (VOC) alone (with 4 situated at a CH). Nadir hemoglobin (Hb) was 29–60 g/L, median 40 (IQR 34-46). Meaningful serologic changes (“gained” specificities) occurred in 7 (6 previously screen+, 1 previously screen-), while as many events were seronegative (4 previously screen-, 3 previously screen+); 1 case exhibited no change; 10 had missing data. Gained specificities were for targets beyond PAM (Goa+Fya[1], Fy3[1], Fya+s[1], M[2], S[1]), and despite PAM (K[1], E[1]). Of 17 assessable events, treatments comprised steroids (70.6%), IVIg (58.8%), and EPO (52.9%), with other agents (rituximab,
oxygen carriers, or hyperoxygenation) in 11.8%. One death (4.5% [95%CI: 1-25%]) occurred soon after presentation and before treatment (when investigations for sepsis and hemorrhage were underway).

**Conclusion:** HHS occurred in 2.4% of patients, and recurred in 10% of those once-affected. The associated transfusion contexts were acute, with 1/3rd of occurrences following VOC, which by itself is a discouraged transfusion trigger. HHS responded to aggressive immunomodulatory, pro-erythropoietic treatment, but was fatal in one case.
Role of Canadian Blood Services Rare Blood Program (RBP) in the Management of Perinatal Patients with Antibodies Against Rare Blood Group Antigens

Type Of Abstract : Clinical

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Abstract Description :

Introduction: In 2018, Canadian Blood Services (CBS) formalized a national Rare Blood Program (RBP) for Canada (except Quebec). The RBP includes the management of frozen and off-the-shelf rare blood inventory, with a formalized process for requesting rare blood units for transfusion. The activities of the program are coordinated by a centralized Rare Blood Office and overseen by a physician advisory group. Requests are assessed by a CBS physician with expertise in blood group serology. The RBP physicians are available on an on-call basis to assist in locating and obtaining rare units for patient. Donors who may be suitable for inclusion on the Rare Donor Registry are actively recruited. An important role identified for the RBP is the support and management of perinatal patients with antibodies against rare blood group antigens.

Design: Two perinatal patients tested by the perinatal testing laboratory at CBS Edmonton were found to have allo-anti-U in their plasma. Anti-U is associated with a mild to severe risk for both hemolytic disease of the fetus and newborn (HDFN) and hemolytic transfusion reactions. U is a high prevalence antigen with an occurrence of 99.9% in the Caucasian population and 99% in the African American population. The RBP was informed of the serological findings by the testing laboratory.

Results: Communication was initiated between the CBS RBP physician and the treating physician. The CBS rare blood inventory was searched to identify suitable units for mother and infant. Transportation logistics were discussed in the event that urgent transfusion became necessary. The physician was asked to notify the CBS RBP of any anticipated transfusion as soon as possible. Communication included the hospital designated for delivery and the relevant Fetal Maternal Medicine Clinic.

Conclusion: The RBP has an important mandate to ensure that rare blood units are available in the event of a perinatal blood requirement for either mother or fetus (neonate). CBS physicians are available to assist the primary care provider in the management of these complex transfusion situations.
Impact of changes in minimum hemoglobin and interdonation interval criteria on donor hemoglobin levels at Canadian Blood Services

Type Of Abstract: Clinical

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Abstract Description: Background: Blood donation results in substantial iron loss. After iron stores are depleted, hemoglobin (Hb) levels may decline. Normal Hb levels are above 120g/L for females and above 135 g/L for males. To reduce iron deficiency in whole blood donors, we increased the minimum interdonation interval for females and raised the Hb cut-off for males. We assessed donor Hb distribution and deferral rates before and after these changes. Methods: For females, a change in donor messaging and donation booking software from a minimum of 56 to 84 days between donations (Dec 2016) was followed by the criterion change (March 2017). For males, the Hb cut-off was increased from 125g/L to 130g/L (March 2017). Donor presentation Hb levels from July 1 to Dec 31, in 2016, 2017, and 2018 were extracted and deferral rates calculated from eProgesa. Results: For females, mean Hb was 135.0 g/L, 136.2 g/L, and 138.0 g/L in 2016, 2017, and 2018 respectively, and the percentage of presentations with a Hb below 120 g/L was 6.7%, 4.9%, and 3.7% in the 3 time periods. For males, mean Hb was 149.9 g/L, 150.6 g/L and 152.9 g/L, and the percentage of presentations with a Hb below 120 g/L was 0.60%, 0.44%, and 0.30% for the 3 time periods. Hb deferral rates decreased by 3.8% in females and increased by 0.6% in males, resulting in an overall decrease of 1.5% (all comparisons p< 0.001). The number of donations per donor in a 12 month period also decreased primarily for females, while the number of donations from first time donors or lapsed donors (individuals who had not donated for over 12 months) increased. Conclusions: Donor Hb distribution curves shifted to the right, resulting in a large reduction in deferrals for females. Clinic efficiency was enhanced by the overall decrease in Hb deferrals. There was a close to 50% decrease in presenting donors with Hb below 120 g/L, who are most likely to experience adverse health effects due to iron deficiency anemia. Results were related both to reduced donation frequency in repeat donors and expansion of the donor base.
Blood donation by trans individuals after introduction of national criteria

Type Of Abstract: Clinical

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Abstract Description: Background: There is no international consensus on criteria and little data on screening trans blood donors. Canadian Blood Services introduced standardized eligibility policies in 2016. Trans donors are screened in their birth sex unless they have undergone genital alignment surgery. We describe trans donors’ demographic characteristics and deferral rates. Methods: Starting in November 2016 a code was added to the computer system for trans donors, to guide component production to reduce TRALI risk. Donation records with the code from November 2016 to August 2018 were extracted with demographic data, infectious disease results, answers to screening questions, and deferrals. To compare trans donor deferral rates with the general donor base a control group was drawn matched for age (+/- 5 years), region, donation status, entry into the donor pool (+/- 60 days), and sex in eProgesa (5 controls per trans donor) and odds ratios (OR) calculated. Demographic characteristics were compared to the CBS donor base. Results: Over the 22 month period 192 trans donors made 490 donations. Trans donors were more likely to donate in BC&Y (23% vs 16%) and be under 26 (52% vs 20%) but had a similar proportion of first time donors (22% vs 21%). 57% were taking hormonal therapy and 22% saw a physician related to trans medication or surgery (18% both). Seventy-four (39%) took male hormones; 36 (19%) took female hormones and/or androgen suppressants. 19% of trans donors vs 13% of controls donors (p=0.001) were deferred per donation attempt. Trans donors were more likely to be deferred for surgery OR 18.6 (95% CI 6.8 – 50.9) and medication OR 4.1 (95% CI 1.6 – 10.6). There were no infectious disease positive donations from trans donors. Conclusions: Trans individuals are successfully donating and contributing to the blood supply. Compared to other donors, they are younger and living in BC&Y, although all regions and age groups are represented. Approximately 61% would be identified as possibly trans individuals by hormonal and/or other medical or surgical care; the majority are trans males. We are committed to working with the trans community to improve the donation experience for trans donors.
An audit of current MTP practice and processes following pre-thawed plasma implementation

Type Of Abstract: Clinical

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Abstract Description:

Background
Massive transfusion protocols (MTPs) have become commonplace over the past decade with the evolution of component ratios, addition of anti-fibrinolytic agents, and extrapolation to non-trauma patients. Despite the storied history of MTPs, improvements can always be made in implementation, adherence and efficiency. Therefore, an audit was performed following pre-thawed plasma implementation at a major trauma centre in BC.

Methods
A retrospective MTP audit was completed for the period between October 1, 2017 to September 30, 2018. Only MTP activations from the emergency room were included. The MTP activator indicates the number of RBC units required and the lab issues plasma, platelets and other products based on the ratio provided and on an as needed basis. The implementation of pre-thawed plasma occurred on April 30, 2018. Information was collected on MTP indications, components requested and issued, time to component issue following RBC issue, tranexamic acid (TXA) administration, and length of MTP until termination or transfer to an OR.

Results
There were 45 MTPs (32 trauma) activated from the ER. The plasma-to-RBC ratio requested was 1:1 for 36 MTPs, 1:2 for 3 MTPs, and another ratio or no plasma requested for 6 MTPs. The ratio was met 95.0% of the time. Thirty-five MTPs had plasma transfused with 17 occurring before pre-thawed implementation and 19 after, representing a total of 276 plasma units. Mean and median times for all plasma issues was reduced from 13.7±11.4 to 8.7±8.5 minutes and 13.0 (IQR 3-23) to 5.0 (IQR 3-13.5) minutes respectively (p<0.0001) following pre-thawed implementation. TXA bolus was administered in 83.9% of eligible patients (n=31) with 46.1% infused pre-hospital. In contrast, only 57.6% of patients received an 8-hour infusion following the bolus. The mean duration before MTP termination or OR transfer is 199.0±174.3 minutes with a mean of 110.9±134.9 minutes elapsing between the last component issued and MTP deactivation.

Conclusion
The implementation of pre-thawed plasma had its intended effect of significantly reducing all plasma issue times throughout the MTP. Despite this gained efficiency, several areas for improvement were identified including TXA administration, ratio simplification, and delayed MTP termination.
Transfusion of K negative RBC for Females of Child-bearing Potential

Type Of Abstract: Clinical

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Abstract Description:

Introduction: ABORh(D) matching for red blood cell (RBC) transfusions is the standard of care to ensure safe blood transfusion and to circumvent alloimmunization to D antigen. Prevention of Rh(D) alloimmunization is especially important for females of child bearing potential, in that maternal anti-D is known to cause hemolytic disease of the fetus and newborn (HDFN). Anti-K is known to also cause severe HDFN. With no available prophylaxis, there is no protection against anti-K alloimmunization for pregnant females. While the incidence of K antigen is low, only 9%, its immunological nature makes it a frequent antibody producer. Alloimmunization is mostly attributed to transfusion of K positive red blood cells (RBC). Selection of K negative RBC for blood transfusion to females of child-bearing potential will prevent development of anti-K in this vulnerable patient population.

Method: In May 2017 we implemented a process for all female patients of child-bearing potential to be transfused with K negative RBC with the exception of massive transfusion.

Results: Pre-implementation between January to April 2017, there were 816 RBC units transfused to females of child-bearing potential. An audit showed 46% of these RBC were K negative. The remainder of the units had K status unknown. Post-implementation of the new process we transfused 774 females in this category with 4411 RBC units between May 2017 to November 2018. Of these 88% were K negative. Our K negative RBC inventory was most often sufficient and in-house phenotype was performed only when supply was depleted.

As of Nov 26 2018, CBS commenced K antigen testing on all donors and end labeling of the K negative RBC units. As a result of this change, between December 2018 to February 2019, 169 female patients of child-bearing age received 740 RBC transfusions. Of these units, 94% were K negative.

Conclusion: Considering the severity of HDFN due to anti-K we are proactively contributing to the prevention of anti-K alloimmunization as a result of transfusion in the female population of child-bearing potential. Considering CBS has implemented universal K phenotyping, this should be an important endeavor for all transfusion services in Canada.
Transfusion Trends in Cardiovascular Surgery: ONTRaC experience

Type Of Abstract : Clinical

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Abstract Description :

Introduction: Allogeneic blood transfusion associated with cardiovascular surgery accounts for a significant proportion of Ontario blood component utilization. Transfusion rates in CABG are highly variable, with one international study quoting rates of 20-95% (van der Linden 2016). Advances in patient blood management (PBM) including diagnosis and treatment of preoperative anemia, surgical and perfusion techniques, and restrictive transfusion triggers over the years have resulted in decreased transfusion rates. We evaluated transfusion trends at the ONTRaC sites.

Design and Methods: This retrospective study is from the Ontario Transfusion Coordinators Network (OnTraC) database from PBM nurses in 25 Ontario hospitals. The reported transfusion rates are based on the data collected on the consecutive patients undergoing elective isolated CABG (60 patients), CABG plus valve replacement (60 patients), and isolated open heart valve replacement (60 patients) at each of the participating 10 cardiac sites, from February 1 until July 31 annually (about 600 patients total).

Results: Since the program inception in 2002, RBC transfusion rate for CABG has decreased from 60.1% to 24.4%. The number of RBC units transfused per patient decreased from mean 3.3 units per transfused patient at baseline to 2.6 units in 2018. There remains however variability in transfusion rates between sites (14.5% (lowest) versus 31.7% (highest)) but overall there was a significant reduction in inter-institutional variability over time. Moreover, preoperative hemoglobin (Hb) was associated with RBC transfusions. For example, 75% of patients with Hb less than 100g/L underwent RBC transfusions, whereas only 10% of those with Hb more than 140g/L had RBC. Platelet transfusion rates have decreased from 11.9% in 2006 to 8.3% in 2018. Plasma transfusion rates have decreased from 14.7% in 2006 to 6.3% in 2018. In 2016, data on open heart valve replacement alone or in combination with CABG were added. Over the past 2 years, RBC transfusion rates for these procedures remain stable at 31% for isolated valve replacement and valve plus CABG at 53%.

Conclusions: Over the years, transfusion rates of RBC, plasma and platelets have substantially decreased in isolated CABG.
Rapid verification of variant D phenotype by genotyping in a regional laboratory

Type Of Abstract: Clinical

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Abstract Description:

Introduction: Red cell genotyping can complement phenotyping to minimize the limitations of using serology alone. This is relevant to expectant mothers who carry a variant RHD allele that confers an alloimmunization risk should their fetus carry a conventional RHD allele. In this setting, genotyping offers a high-throughput method to resolve these cases and to identify mothers who can safely forego unnecessary Rh(D) immune globulin (RhIG) prophylaxis. The aim of this project is to operationalize a regional prenatal testing algorithm that would allow for rapid verification of variant D phenotype to help guide clinical decision-making for RhIG prophylaxis.

Methods: The TM laboratory at our center is a regional reference site for 16 hospitals in Ontario. For 5 years we have used red cell genotyping to help resolve complex serological results, which include cases with variable D reactivity using traditional phenotyping methods. Our laboratory also offers high risk prenatal testing for expectant mothers within our region. This is typically done following their first prenatal visit between 8-12 weeks gestation. At this time a blood group and antibody screen is requested by the health care professional most responsible for their care through the pregnancy.

Results: To date we have genotyped 51 samples from expectant mothers and females of child bearing potential (< 45 years old) with variable D typing. Weak D type 1, 2 or 3 was identified in 33 (65%) of cases. The majority of samples were analyzed in 2018 and of 33 tests performed, 19 (57.6%) were identified as weak D type 1, 2 or 3. For these females, if pregnant, we would not recommend the use of RhIG at 28 weeks and post-partum, saving 38 doses.

Conclusions: Our goal is to set up a rapid-turnaround method of resolving variable RhD phenotyping using a genotyping platform within a regional TM laboratory. This will allow expectant mothers with weak D type 1, 2 or 3 to safely forego RhIG prophylaxis. This will result in more efficient and appropriate utilization of RhIG, may help decrease anxiety among expectant mothers who have a low risk of alloimmunization and reduce the unnecessary use of RhD negative units should the need for transfusion arise.

Acknowledgements: This project received funding support from the Canadian Blood Services Blood Efficiency Accelerator Program.
A suspected septic acute transfusion reaction associated with possible bedside environmental/reverse contamination of a platelet pool by Vancomycin-resistant Enterococcus faecium

Type Of Abstract: Clinical

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Abstract Description:

Introduction/Background

A 27-year-old male patient presented with relapsed acute leukemia with complications of RSV infection, sepsis and pneumonia. He was transfused with a 5-day-old buffy coat platelet pool. Approximately 80 ml of platelet concentrates were transfused; the transfusion was interrupted after 18 minutes when the patient developed possible septic symptoms (chills, rigors, skin rash, nausea and vomiting).
Design and Methods

Medical Microbiology testing and pulse-field gel electrophoresis was done in Mount Sinai Hospital using standard approaches. Investigation of blood components was carried out as per Canadian Blood Services protocols. Clinical history was obtained from transfusion medicine practitioners.

Results

Blood cultures obtained both peripherally and from a central venous access device revealed Gram positive cocci in chains; subsequently identified as vancomycin-resistant *Enterococcus faecium* (VRE). The platelet pool was refrigerated for 24 hours before being sent to the microbiology laboratory. Gram staining did not reveal the presence of bacteria in the platelet sample; however, coagulase negative *Staphylococcus* and VRE were isolated. Chart records indicated that the patient had been rectally colonized with VRE for several weeks prior to this episode. Antibiotic sensitivity and pulse-field electrophoresis profiles of several VRE isolates from the patient prior and post transfusion and the platelet pool revealed that all were closely related. The patient later died following complications unrelated to the blood product transfusion.

Conclusions

Microbiological and molecular investigations concluded that the platelet pool was not responsible for this possible septic transfusion case. The patient was colonized with a closely related VRE strain prior to transfusion. It is postulated that a patient-to-platelet pool retrograde contamination with VRE occurred during transfusion. Suspected septic symptoms presented by the patient may have been due to bacteria residing in the central line and being dislodged by the platelet concentrates; though records don't indicate which line was used to transfuse the implicated platelets. Alternatively, VRE could have been present in the environment surrounding the patient and the platelet pool could have been contaminated post-transfusion. This report highlights the importance of investigating and reconciling/confirming the molecular relatedness of bacteria isolated from blood products and patients to determine the root cause of septic transfusion reactions.
One Patient’s Disease is Another’s Treatment: Hereditary Hemochromatosis and Blood Donation

Type Of Abstract: Clinical

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Abstract Description:

Introduction
The main treatment for iron overload from hereditary hemochromatosis (HH) is phlebotomy performed in a healthcare setting or a blood collection centre. Canadian Blood Services (CBS) currently allows people with HH to donate blood, providing they meet all other donor eligibility criteria; standard donation interval is applicable; and no phlebotomy has occurred within 7 days. Individuals with late complications from hemochromatosis such as liver cirrhosis or heart failure are not eligible. HH affects 1 in 300 individuals of European descent; many will require decades of phlebotomy, with potential contribution to the blood supply. With this audit, we aimed to assess the rates of eligibility and blood donation among HH patients.

Design and methods
Medical records of 50 patients with iron overload undergoing regular phlebotomy were retrospectively reviewed. Consecutive patients attending the clinic of two hematologists with knowledge of CBS donation criteria were selected between June and November 2018. Charts were assessed for diagnosis and whether patients were phlebotomized at CBS. If not, eligibility was evaluated and the reason for not donating was recorded. Descriptive statistics were used to report rates of eligibility and donation.

Results
All patients had iron overload at diagnosis; 47 had genetic confirmation of HH, and the others had clinical evidence of iron overload requiring phlebotomy. Regular blood donation occurred in 23 (46%). Regarding the other 27, 24 (89%) were ineligible; reasons included high-frequency phlebotomy (33%), positive viral markers or infectious risk factors (29%), donor risk (25%), anticoagulation, history of cancer and intolerance of 500 mL phlebotomy (4%). Two of the eligible patients not donating had no identifiable reason, but the third had a negative donation experience. While the eligibility rate was 52%, some patients were in their initial de-ironing treatment phase with high-frequency donation and may become eligible once they enter maintenance phase.

Conclusions
High rates of blood donation are achievable among eligible HH patients, which represents approximately half of this population, when counselled by physicians with knowledge of CBS donation criteria. These patients can contribute to the blood supply. Education aimed at clinician and patient awareness may be of benefit and warrants further study.
Patient-centred outcomes in anemia and oncology: A systematic review

Type Of Abstract: Clinical

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Abstract Description:

Introduction: Anemia is common in patients undergoing treatment for cancer and can reduce quality of life (QOL). Blood transfusion and erythropoietin-stimulating agents (ESAs) can relieve symptoms of anemia, but also harbor patient risks. Patient-reported outcomes measures (PROMs) evaluate the impact of disease on QOL. To date, little has been described about the use of PROMs in anemia research. Objectives: To evaluate the reporting quality of PCOs in studies investigating interventions for treating anemia in oncology patients and whether interventions to treat anemia in oncology patients resulted in improved PCOs. Methods: We conducted a systematic search of PUBMED, EMBASE, PsychInfo, and CINAHL databases for studies published from inception until March 2018. Eligibility criteria included full-text observational cohorts, case series, and clinical trials published in English. Inclusion criteria were any studies with patients diagnosed with cancer and anemia who were undergoing any treatment for anemia and studies measuring at least one PCO before and after anemia intervention. Results: Of the 3533 studies found, 62 studies met all inclusion criteria. 36% of studies investigated patients with solid cancers. In 74% of studies, patients were receiving active chemotherapy. Over half (58%) were RCTs, of which 36% were double-blind, 50% were open-label, and 14% did not report blinding. QOL was listed as a primary outcome in only 26% of studies. 87% of studies investigated ESAs, while only 5% of studies investigated transfusion. 30% of studies did not report an error measure for PCOs, 31% did not report p-values for PCOs, while many studies did not address PCOs in the discussion. The FACT/FACIT PROM was most frequently used (48%). 41% of studies did not report how the employed PROM was completed. No significant association was found between QOL as measured by FACT/FACIT tools and hematological outcomes (p=0.97). Conclusions: Open-label study designs, significant reporting variability, and lack of primary QOL outcomes contribute to bias and poor rigor in PCO reporting in oncology studies. Though an invasive procedure and used frequently in practice, few studies have looked into the impact of blood transfusion on PCOs. High-quality studies are required to ensure that oncologic patients receive treatments most likely to improve QOL, while enabling judicious use of scarce or costly anemia therapies.
INCIDENCE OF TRANSFUSION ASSOCIATED CIRCULATORY OVERLOAD AFTER RED CELL TRANSFUSION AND USE OF FUROSEMIDE IN A TERTIARY CARE CENTER

Type Of Abstract: Clinical

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Abstract Description:

Introduction: Transfusion associated circulatory overload (TACO) is a common complication of red blood cell (RBC) transfusion, occurring in 1-8/100 transfusion episodes. To date, observational studies have identified that pre-transfusion furosemide can decrease the risk of TACO development. We sought to evaluate the overall incidence of TACO in hospitalized adult inpatients receiving RBC transfusion at our center, and ascertain timing of furosemide administration to patients at risk of TACO.

Design and Methods: A retrospective review of 150 adult inpatient charts was completed, involving 328 red cell transfusion events between July to September 2017 at Royal University Hospital in Saskatoon, SK. Data collection included: patient demographics; presence of pre-existing TACO risk factors (age ≥70, heart failure, renal dysfunction, severe euvoletic anemia, positive fluid balance); number of RBC units transfused; and furosemide timing relative to the RBC transfusion.

Results: The mean patient age was 59.2 years. A mean of 1.5 RBC units were administered per transfusion event with a mean pre-transfusion hemoglobin of 70.5 g/L. At least one TACO risk factor was present in 192/328 (58.5%) RBC transfusion events. Furosemide was administered in 50/192 (26.0%) patients at risk of TACO, with the majority receiving furosemide between RBC units (44.0%) or after RBC transfusion (38.0%). Clinical evidence of TACO was identified following 14/328 (4.2%) transfusion events, where 7 patients had a history of heart failure and 6 had renal dysfunction; 2 had no predisposing risk factors. Furosemide was received by 9/14 (64.2%) patients who developed TACO, including 1 pre-transfusion, 4 between RBC units, and 5 post-transfusion. Only 1/14 TACO events was formally reported as an adverse transfusion reaction. There were 5 deaths in the TACO group, 2 of which were associated with heart failure or volume overload.

Conclusions: Our study confirms that TACO following RBC transfusion is a common serious transfusion adverse reaction, which carries a prominent patient mortality association. There appears to be a significant gap in TACO risk identification, appropriate furosemide use, and TACO recognition and reporting. These results highlight the need for clinician education to enhance safe transfusion practice and inform health policy to reduce TACO risk among hospitalized inpatients.
Outpatient red blood cell transfusion practice associated with two small community hospitals: A retrospective audit

Type Of Abstract: Clinical

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Alan Timnouth 4

Abstract Description:

Introduction / Objective Guidelines for Red Blood Cell (RBC) transfusion are mostly based on evidence from hospital inpatients. This retrospective audit was designed to better understand current RBC transfusion practice for outpatients associated with small community hospitals.

Design and Methods Using the laboratory information system, information was retrospectively studied for RBC transfusion in outpatients associated with two small community hospitals (Hospital 1: 70 beds, Hospital 2: 50 beds), for a 1 year time period, from July 1, 2017 to June 30, 2018 and who had a hemoglobin level within 96 hours pre-transfusion. Emergency room and inpatient encounters were excluded, as well as outpatient transfusions occurring within 1 month of emergency room or inpatient RBC transfusions. Multiple unit RBC transfusions were defined as those occurring within 48 hours of each other.

Results For the 1 year time period there were 55 outpatient encounters for Hospital 1 and 56 outpatient encounters for Hospital 2 with a documented hemoglobin level within 96 hours pre-transfusion. The mean pre-transfusion hemoglobins were 76 g/L for Hospital 1 and 78 g/L for Hospital 2. The percent of hemoglobins less than 80 g/L before outpatient RBC transfusion was 65% in Hospital 1 and 58% in Hospital 2. The total number of RBC units transfused was 191 at Hospital 1 and 240 at Hospital 2. The number (%) of RBC units were transfused as follows: as single unit transfusions 40/191 (20.9%) at Hospital 1 and 26/240 (10.8%) at Hospital 2; as two unit RBC transfusions 136/191 (71.2%) at Hospital 1 and 192/240 (80%) at Hospital 2; as three unit RBC transfusions 15/191 (7.9%) at Hospital 1 and 18/240 (7.5%) at Hospital 2 and as four unit RBC transfusions 0/191 (0%) at Hospital 1 and 4/240 (1.7%) at Hospital 2.

Conclusions For outpatients associated with two small community hospitals, the mean pre-transfusion hemoglobin was less than 80g/L. The majority (more than 70%) of RBC units were transfused as two unit RBC transfusions.
Leading Change in Obstetrical Patient Blood Management: Riding the Ferrous Wheel

Type Of Abstract: Clinical

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Abstract Description:

Patient Blood Management- or patient centered blood management is the application of evidence- informed medical and surgical concepts designed to maintain hemoglobin concentration, optimize hemostasis and minimize blood loss in an effect to improve patient outcomes. Anemia in pregnancy has been identified as a global health problem affecting 41.8% of pregnant women worldwide. Anemia in pregnancy can lead to greater maternal and infant morbidity and mortality. In June 2017, the Network for the Advancement of Patient Blood Management, Hemostasis and Thrombosis (NATA) published new guidelines with consensus statements outlining recommendations for patient blood management in the obstetrical population, these included two recommendations regarding the use of IV iron in women with severe iron deficient anemia. Prior to this publication nurses from the Winnipeg Regional Health Authority (WRHA) Blood Management Service (BMS) received consults for severe post-partum hemorrhage and in 2013 women between 13-32 weeks gestation. In 2016, through collaboration with the Women's Health Program, BMS expanded criteria to include patients up to 40+ week's gestation. In a small convenience sample positive correlations were found between BMS interventions and reducing blood transfusions in this population. Results from a validation quality audit as well as a patient satisfaction survey will be described in this poster. The authors hope to share with health care team member's information of best practices for optimizing obstetrical iron deficient anemia and describe how a community based program can improve patient care.

Acknowledgements: Dr. Brian Muirhead Medical Director, Blood Management Service
WRHA Blood Management Service Nursing Team
Huixin (Emma) Zhang Data Analyst, Blood Management Service
Shauna Paul Manager, Blood Management Service
USE OF DONOR ON LINE ACCOUNTS (ePORTAL) TO INFORM DONORS OF FERRITIN RESULTS

Type Of Abstract: Clinical

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Canadian Blood Services MD

Sheila O’Brien 2 *
Canadian Blood Services RN, PhD

Chantale Pambrun 3
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Abstract Description: Background: Informing donors of their iron stores, assessed by plasma ferritin, may motivate increased iron intake and reduce the risk of anemia and low hemoglobin deferrals. In previous ferritin testing studies at Canadian Blood Services, donors with low ferritin were mailed their results. 32% of active whole blood donors have an on-line account (ePortal), used to book 41% of donations, which allows donors to view their hemoglobin results. These percentages are increasing. We assessed the feasibility of informing donors of their ferritin results using ePortal. Methods: 2,000 randomly selected repeat donors with an ePortal account were tested for ferritin and results uploaded into ePortal. The quantitative result appeared on the home screen, while the interpretation graph (low, normal, high) and information about iron required clicking on icons. Account activity was monitored using Google Analytics, providing some information about donors accessing the ePortal and clicking to obtain additional information about results and iron needs. Donors were informed by email (email blast) that their result was available; those with low ferritin (< 25 µg/L) within 4 weeks of donation and those with normal ferritin 3 months post-donation. An on-line questionnaire was sent to donors asking about their experience. Results: 426 (21%) of donors had low ferritin. Email blasts increased ePortal account activity 30-50%; there were 2055 clicks to the interpretation graph and 987 clicks for additional information. 797 (40%) of donors completed the survey questionnaire; of these, 66% noticed their ferritin result; 46% knew if it was low or normal. Nearly all (89%) said the information was easy to understand and 74% said the result was useful. Few donors called the National Contact Centre (n=33) or a medical office (n=3) for more information. Conclusion: As in previous studies, donors were supportive of ferritin testing and found the information useful. However, under the study conditions access to and understanding of ferritin results was suboptimal. Further research is needed to improve ease of use of the on-line application, ideally including more information on the home screen. Implementation of ferritin testing should include multiple points of donor contact to raise awareness.
Assessing Medication Use for Donor Eligibility

Type Of Abstract : Clinical

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Canadian Blood Services Sr. Biostatistician

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Canadian Blood Services MD

Abstract Description : Background: All prospective blood donors are asked about medications and are deferred if any pose a donor or recipient risk. The name of each medication taken and reason for use are documented by staff at each donation attempt. There are 6 medication questions on the Donor History Questionnaire (DHQ), including any medication use in the last 3 days, vaccination and specific medications over different time frames. We aimed to determine the percentages donors answering yes to medication questions by demographic variables. Methods: All donors who completed the DHQ in 2017 were included in the analysis. Donors’ answers to each of the 6 medication questions were extracted from the National Epidemiology Donor Database, as well as sex and age. The number and percentage of donation attempts in which a donor answered yes to each medication question were calculated. Donors who answered yes to any medication question were sorted by sex and by age group, the totals and percentages calculated. Results: Overall, 34% of donors answered yes to medications in the last 3 days, 8% to vaccination, and less than 0.1% to others (38% any). Slightly more were female (42 vs 36%), of those who answered yes to any medication question, as well as by individual question. The percentage of donors answering yes to any medication question increased progressively in each age group from 24% of 17-19 year olds to 57% aged 60+ (p< 0.0001 for trend). Conclusion: More than one third of all donation attempts answer yes to a medication question and require further questioning and documentation. This is more common in older donors and follows a similar trend to general population medication use. The documentation process requires that medications each donor is taking be put into the IT system each time they attempt to donate, thus addressing medications is labor intensive and increases the length of the donor interview. IT solutions that would allow previously reported medications to come forward in the system for subsequent donations should be explored.
Canadian Blood Services Implementation of Front End Automation Instrumentation

Type Of Abstract : Clinical

Shirley Donaldson 1 *
Canadian Blood Services MLT

Abstract Description :

Background:

In November 2018 Canadian Blood Services (CBS) automated the process for the management of the routine donor testing program at the existing Donor Testing Laboratory in Brampton. Previously, routine donor specimens were manually processed in the Specimen Management area of the laboratory.

Method:

To assess a high through-put front-end specimen handling system to direct select blood specimens into specific donor testing pathways designed to improve both laboratory workflow and patient health. The development included; the installation and validation of the specimen handling system, development of the interface to the eProgesa blood product management system, and the laboratory information system (LIS).

The LIS was updated to; receive additional donor information from eProgesa, order selective testing as required, direct the front-end instrument via a new middleware system; and allow for correct test instrument sorting. This integration of robotics and multiple information technologies allows for the direction of individual donor specimens into specific test pathways including selective West Nile Virus, Chagas and Kell phenotype testing.

The changes also allowed for; automated accessioning of donor specimens, decapping of specific specimens, aliquotting of specific specimens thereby reducing the processing time from initial receipt of specimens to delivery to testing instruments.

On 2018-11-26 the automation of the routine donor specimens was successfully implemented on the Roche Diagnostics cobas p612 instrument at the Brampton Testing Laboratory.

Results: The Roche Diagnostics cobas p612 system as a front-end specimen handling system for the routine donor testing program has met or exceeded the monitoring metrics, including operating cost, and staffing to workload. It has led to a reduction in specimen processing time of 60 minutes. Plans are in place to introduce the instrumentation into the new CBS Calgary Testing laboratory in late 2020.

Conclusion:

Front End Automation has allowed a cost-effective approach to specimen management and has improved the ability to manage additional selective testing as testing requirements increase without additional staffing.
Targeted lookbacks of Hepatitis C Virus (HCV)-positive donations, Canadian Blood Services: 2015-2017

Type Of Abstract: Clinical

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Abstract Description:

Introduction/Objective

Since 1995, a small number of studies have reviewed targeted lookbacks following detection of Hepatitis C Virus (HCV) in Canadian blood donors. This study reviews targeted HCV lookback at Canadian Blood Services (CBS) in the era of highly sensitive nucleic acid amplification tests (NAT). The timing of this study reflects accessibility to paper records for the lookback team in a single administrative location at CBS.

Design and Methods

Multiple donor screening tests were used, June 22, 2015 - December 31, 2017; the cobas® MPX 2.0, the cobas® MPX for use on the cobas® 6800/8800 Systems MPX8800 Assays (Roche) for NAT, the Abbott PRISM HCV, manufactured in Germany for PRISM and manufactured in the U.S for use on PRISMnEXT for serological testing, and the HCV INNO-LIA Score (FujiRebio) for confirmatory testing. NAT test volumes were extracted from the CBS Business Intelligence Warehouse. HCV targeted lookback data were extracted using standard lookback procedures.

Results

2,149,135 donations were screened for HCV using NAT for this period. There were 124 HCV positive donors, 25 being repeat.

Table 1. Outcomes of targeted lookback studies
<table>
<thead>
<tr>
<th># HCV-positive Repeat donors</th>
<th># Components Transfused</th>
<th># Donations Investigated (all repeat donations)</th>
<th># Recipients-follow-up occurred</th>
<th># Recipients HCV Positive</th>
<th># Recipients HCV Negative</th>
<th># Recipients-follow-up not possible</th>
<th># Recipients Deceased</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>63</td>
<td>60</td>
<td>12</td>
<td>1</td>
<td>11</td>
<td>21</td>
<td>30</td>
</tr>
</tbody>
</table>

One recipient who was HCV Antibody positive (July 18, 2017) /NAT positive (October 3, 2017), had received red blood cells (RBC) on May 2, 1988. The linked donor tested HCV NAT/antibody positive April 17, 2017 (associated fresh frozen plasma component destroyed); this donor had donated only the index whole blood donation on April 7, 1988, with no other recipients identified.

Conclusions

The one “positive” lookback investigation involved a transfused unit collected in 1988, prior to CBS implementing donor screening (HCV antibody: 1990; HCV NAT: 1999), so it is difficult to determine the mechanism of this HCV infection. Blood donor HCV NAT/antibody screening is largely responsible for contemporary, extremely low residual risk of transfusion-transmitted HCV. Targeted HCV lookback of transfused units tested by current methods is highly unlikely to detect evidence of transfusion transmission.
A tale of two donors: Understanding risk factors for a human immunodeficiency virus false-positive test result.

Type Of Abstract : Clinical

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Canadian Blood Services MD

Peggy Huppe 4
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Mark Bigham 5
Canadian Blood Services MD

Abstract Description :

Introduction/Objective

Highly sensitive nucleic acid amplification tests (NAT) plus serology greatly improve the sensitivity and specificity of human immunodeficiency virus (HIV) virus screening in blood donors. Here we identify some classic characteristics of true and false-positive HIV tests in blood donors.

Design and Methods

The cobas® MPX 2.0 on the cobas®6800/8800 Systems MPX8800 Assays (Roche) was used for HIV NAT. The Abbott PRISM HIV O Plus on the PRISMnEXT was used for HIV-1/2 serological testing. Viral load testing was done at a reference laboratory. Follow-up testing was done at Provincial laboratories in the donors' jurisdictions. Donor interviews and engagement of other clinicians was led by a Canadian Blood Services Medical Officer (MO). A review of laboratory processes was carried out.

Results

Table: A comparison of HIV results in two donors, Donor 1 and Donor 2.

<table>
<thead>
<tr>
<th>Donor</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Male</td>
<td>Male</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>29</td>
<td>67</td>
</tr>
<tr>
<td>Province of residence</td>
<td>Alberta</td>
<td>British Columbia</td>
</tr>
<tr>
<td>Date of donation</td>
<td>2019-02-05</td>
<td>2019-02-12</td>
</tr>
<tr>
<td>First time or repeat donor; last prior donation</td>
<td>First</td>
<td>Prior; last prior donation 2018-07-06 (whole blood)</td>
</tr>
<tr>
<td><strong>Risk factors</strong></td>
<td>4 recent sexual contacts (local and international), dates unknown; recent tattoo in past 5 months</td>
<td>None identified</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>HIV O Plus Serology</strong></td>
<td>Reactive S/CO: 108.98; 127.33, 119.56</td>
<td>Negative</td>
</tr>
<tr>
<td><strong>MPX CT</strong></td>
<td>HIV-1 31.25 (pool); 28.87 (individual)*</td>
<td>HIV-1 39.39 (pool); 39.46 (individual)</td>
</tr>
<tr>
<td><strong>Results of clinical laboratory testing for HIV-1/2</strong></td>
<td>HIV NAT positive (2019-02-14 specimen) HIV-1 serology positive</td>
<td>HIV NAT negative (2019-02-15 specimen) HIV serology and HIV-1 p24 negative</td>
</tr>
<tr>
<td><strong>Laboratory process review</strong></td>
<td>No issues identified</td>
<td>Process issue identified at specimen pooling step</td>
</tr>
<tr>
<td><strong>Classification</strong></td>
<td>True positive</td>
<td>False positive</td>
</tr>
</tbody>
</table>

*Follow-up reference laboratory testing: HIV-1 viral loads of 3-8 x 10³ copies/ml

**Conclusions**

Late-positive NAT PCR values (>35-40+ cycles) on repeat donors not linked to a positive HIV serology or epidemiological risk exposure correlate should be interpreted with caution. These may be early infections or potential false-positive results. Donor risk factors should be probed in greater depth. Follow-up clinical laboratory results should also be reviewed. Laboratory process reviews may identify protocol breaches in molecular hygiene. Donors with false-positive test results may be eligible for Canadian Blood Services' donor re-entry program.
Impacts of Best Practice Recommendation Interventions on Autologous Utilization at Canadian Blood Services

Type Of Abstract : Clinical

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Abstract Description :

Background:
A review of Canadian perioperative autologous donation (PAD) demonstrated steady decline from 2007 to 2015. Subsequently, interventions to promote best practice recommendations (BPR) for PAD have occurred. We performed a review of PAD from 2016-2018 to assess the efficacy of these interventions.

Methods:
2016-2018 PAD data was extracted electronically.
April 2017: Blood Brief provided 2014-2016 PAD data from 44 hospitals to heighten awareness of usage trends.
May 2017 to October 2018: Canadian blood operators, and the Provincial and Territorial Liaison Committee engaged to create the 2018 National Advisory Committee on Blood and Blood Products statement, which recommends PAD only for patients with rare phenotypes where allogeneic support would be difficult, and transfusion likely.
September 2017: 31 Ontario PAD prescribers between April 2016 and July 2017 were lettered with BPR.
March 2018: Blood Notes hospital newsletter shared BPR.

Results:
PAD collection decreased from 122 donations/79 donors/67 hospitals in 2016, to 37 donations/18 donors/9 hospitals in 2018. Following the interventions in 2017, all regions reduced PAD collection and Southwestern Ontario sharply reduced (35 in 2016 and 0 in 2018). Nationally, only 2.53% PAD collected in 2016 and 0% collected in 2017-2018 were for rare donors.
90% of PAD requests were from Ontario. 74% of the 31 Ontario physicians lettered in 2017 did not further request PAD. PAD was requested by 13 new and 8 repeat Ontario physicians from Oct 1, 2017-Dec 31, 2018. 70% of these requests were from orthopedic (40%) or obstetrics/gynecology (30%). 5 of 21 (24%) of the requests received during this period were averted by BPR discussion with the donor or physician.

Conclusion:
BPR interventions to reduce PAD were very effective. However, all collections in 2017-2018 were outside of BPR of rare phenotypes only. Orthopedics and Gynecology continue to be the heaviest users of PAD despite the lack of evidence to support. Alternatives such as perioperative blood conservation programs provide system benefits of improved patient outcomes and reduced PAD. A focused effort of continued collaboration with hospitals, blood conservation programs, and focussed BPR sharing might provide further reductions especially in disciplines that order the most PAD.
Naturally occurring anti-I with broad thermal amplitude in a neonate

Type Of Abstract: Clinical

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Abstract Description:

Background: The I antigen is present on more than 99% of adult red cells but is weakly expressed to absent on umbilical cord red cells. Anti-I is a common cold-reactive IgM autoantibody which is typically clinically insignificant, but in certain circumstances (e.g. *Mycoplasma pneumoniae* infection, pregnancy) anti-I with broad thermal amplitude may be implicated in autoimmune hemolysis. Naturally occurring anti-I IgM has also been found in neonatal plasma and cord blood specimens. We report a case of neonatal anti-I identified due to its broad thermal amplitude.

Case: An anemic male neonate (group O, D+) was found to have a positive antibody screen on a specimen collected in preparation for high-risk surgery. There was no prior intrauterine or neonatal transfusion. The maternal antibody screen was negative and there was no history of maternal RhIG administration. Patient plasma showed 1-2+ reactivity with screening cells by solid phase (NEO, Immucor). Panels showed 1-3+ reactivity at antihuman globulin phase in gel (Panocell, Immucor). The autocontrol was negative. Polyspecific direct antiglobulin test and acid elution (Elu-Kit II, Immucor) were also negative indicating that a high incidence alloantibody was most likely present. The patient phenotype was determined to be C+,c+,E+,e+,K-,Fya+,Fyb-,Jka+,Jkb+,M+,N+,S-,s+. Serologic crossmatch showed multiple full phenotype-matched red cell units to be 1-2+ incompatible. Patient plasma was non-reactive with umbilical cord red cells, consistent with anti-I. The patient was transfused aliquots from a phenotype-matched red cell unit pre-operatively and perioperatively with no evidence of reaction.

Conclusion: Anti-I with broad thermal amplitude may naturally occur in neonates and can complicate pretransfusion testing. In our case, the antibody was clinically insignificant with no evidence of hemolysis following transfusion of I+ adult red cells.
Donath-Landsteiner testing in a pediatric hospital: review of positive pediatric cases and one positive referred-in adult case

Type Of Abstract: Clinical

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Abstract Description:

Introduction/Objective: Paroxysmal cold hemoglobinuria (PCH) is a rare form of autoimmune hemolytic anemia diagnosed by a positive Donath-Landsteiner (DL) testing and caused by a biphasic IgG autoantibody with P specificity. Rare in adults, it is more commonly encountered in children following a viral infection. Here we report the results of DL testing at a reference testing site.

Design and Methods: The academic pediatric hospital laboratory performs DL testing for its own patients and for referred-in samples. Direct and indirect tests are performed on samples drawn on-site, whereas only indirect testing is performed on referred-in samples, as unseparated serum is subject to autoantibody binding to red blood cells (RBCs) in the cooler post-collection/shipping period, with potential hemolysis in the laboratory rewarming period. A test is positive if hemolysis occurs only in tubes that contain patient’s serum (± fresh normal serum) incubated with RBCs on ice for 30 minutes and then at 37°C for 1 hour.

We performed a review of all the patients for which a DL test was requested during the 2012-2019 period.

Results: Of 30 patients for which DL testing was done, 8 (27%) had a positive result. Of these, 6 patients (75%) were 3-4 years of age. All were previously healthy without any underlying disease. Their direct antiglobulin test (DAT) was positive with polyspecific reagent (2+ to 4+) and for complement (3+ to 4+). In only one case, DAT was also weakly positive to anti-IgG. One patient with positive DL testing was 16 years of age, had immune deficiency and autoantibody. His DAT was positive for anti-IgG only. Negative cases included other causes of hemolysis: sickle cell disease, hereditary spherocytosis previously undiagnosed, thrombocytopenic thrombotic purpura, and autoimmune hemolytic anemia. All the referred-in samples on adult patients were negative until recently. This first adult case with a positive DL testing is currently under further investigation for whether this represents true PCH or a false positive DL test.

Conclusion: PCH is more commonly seen in young children. It can also be rarely reported in adults and should be suspected when usual investigations for autoimmune hemolytic anemia fail to identify another diagnosis.
A retrospective study of the added value of parallel titers compared to serial titers

Type Of Abstract: Clinical

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Lani Lieberman ⁵

Abstract Description:

BACKGROUND: Prenatal antibody titers for alloimmunized patients are subject to multiple sources of variation. A parallel titer on the previous sample at the same time as the current sample is recommended. The purpose of this study was to determine the added value of parallel titers.

STUDY DESIGN AND METHODS: Retrospective study of samples from consecutive prenatal patients with at least two prenatal antibody titers performed in the same pregnancy at a single institution between October 2010 and March 2017. Data were collected to determine the sensitivity and specificity of a significant increase (2-fold or greater) in serial titers compared with the gold standard of using parallel titers. Cases of hemolytic disease of the fetus and newborn (defined as a neonate with cognate antigen with any one of the following were instituted: intrauterine transfusion, intensive phototherapy, IVIG or RBC or exchange transfusion) were described.

RESULTS: There were 155 serial prenatal titers performed in 59 alloimmunized pregnant women. 19 samples (12%) had a serial titer increase of 2-fold or greater with 8 false positive samples (increase less than 2-fold when using parallel titers). 36 samples (23%) had a serial titer increase of 1-fold with 2 false negative samples (increase of 2-fold or greater using parallel titers). 100 samples (65%) had no increase (or a decrease) in serial titer with none having an increase of 2-fold or greater using parallel titers. The sensitivity of a 2-fold or greater increase in serial titers was 84.6% (95% CI 55-98%) and the specificity was 94.37% (95% CI 89-98%) when compared with parallel titers. Three cases of HDFN occurred all with initial titers of 64 or higher.

CONCLUSION: This study questions the value of parallel titers on every prenatal titer performed. When no increase in serial titers was observed, parallel titers added no new information.
Neonatal Outcomes after Transfusion of ABO Non-Identical Red Cells  
(Neo-ABO Study)

Type Of Abstract : Clinical

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Rebecca Barty

Na Li

Nancy Heddle

Tara McDougall

Amit Mukerji

Christoph Fusch

Ziad Solh *

Western University MD

Abstract Description :

Background/Rationale: Necrotizing enterocolitis (NEC) is a major cause of neonatal morbidity and mortality, particularly in very low birth weight (VLBW; < 1500 grams) neonates. The exact etiology of NEC is unclear. In VLBW neonates, studies have suggested a temporal association between red blood cell (RBC) transfusion and NEC, although the existence of a transfusion-associated NEC remains controversial. Studies have yielded conflicting results regarding the association between NEC and neonatal ABO group in those who are transfused. At our hospital sites, all neonates receive O group RBCs regardless of patient ABO group, but some Canadian hospitals use ABO identical blood for neonates. The objective of this study is to determine if VLBW neonates receiving ABO non-identical RBC transfusion (neonate groups A, B, and AB) have an increased risk of NEC and mortality compared to neonates receiving ABO identical RBCs.

Methods: A retrospective observational study was conducted using data from the Transfusion Research, Utilization, Surveillance, and Tracking (TRUST) database, Canadian Neonatal Network (CNN) database, and supplemental chart review. All VLBW neonates admitted to the McMaster Children’s Hospital Level III NICU or St. Joseph’s Healthcare Hamilton NICU between April 1, 2004 and June 30, 2016 in Hamilton, Ontario, Canada were included. Multivariate Cox regression models were fitted with time-dependent covariates and stratification variables to study the development of NEC and mortality.

Results: Between 2004 and 2016, there were 2235 VLBW neonates. Among them, 1026 (45.9%) received at least one RBC transfusion included for analysis. For the ABO non-identical recipients the mortality rate was 14.1 % (n=82/580) and NEC rate was 11.0% (n=64/580). For the ABO identical recipients the mortality rate was 14.0% (n=61/437) and the NEC rate 10.8% (n=47/437). The results of the multivariate Cox regression model show exposure to ABO identical versus ABO non-identical RBCs was not significantly associated with NEC (HR 1.16, 95% CI 0.63-2.13), or mortality (HR 2.02, 95% CI 0.78-5.20).

Conclusions: A statistically significant association between ABO identical versus non-identical RBCs and outcomes of NEC and mortality was not observed in our large cohort. A prospective multi-centre trial is required to determine the safest transfusion practice for VLBW neonates in Canada.
Understanding Nurses’ Perspectives in Transfusion Reaction Management

Type Of Abstract: Clinical

Wenxin Miao 1
University of Western Ontario

Shannon Sibbald 2

Ziad Solh 3 *
Western University MD

Abstract Description:

Introduction/Objective: Transfusion premedication is common practice in patients who experienced transfusion reactions (TRs), but studies have not shown a beneficial effect of routine premedication on TR recurrence. Premedication may result in overlooking the TR reporting process and may prevent more appropriate TR management and patient care. As part of a Knowledge Translation project undertaken at a large tertiary academic hospital to implement better TR reporting and reduce unnecessary premedication, this study performed a needs and barriers assessment to understand nurses’ practice and perspectives regarding TR management.

Methods: In four hospital units, a qualitative study was performed using semi-structured face-to-face interviews with nurses. Interview transcripts were thematically coded and analyzed. Rigour and validity of results were supported through research team discussions and member checking/participant feedback.

Results: There were 45 nurses included in the study: 15 adult inpatient, 9 adult outpatient, 12 pediatric inpatient, 9 pediatric outpatient nurses. Results confirmed that premedication of patients who have previous TRs is common practice at this hospital. Most nurses consider premedication an effective preventative intervention and they advocate for premedication if they notice a history of TRs. Physicians make the decision about whether or not to order premedication. Nurses are aware of the institutional policy on reporting TRs to Transfusion Medicine. A nurse’s decision to report a TR is influenced by 1) the physician’s assessment of the severity of the TR, 2) the nurse’s own assessment of the severity, and 3) the institutional TR diagnostic guideline. Five barriers for nurses to report TRs were identified: 1) pre-existing symptoms masking TRs; 2) unaware of the importance of reporting minor TRs; 3) unfamiliar with institutional TR diagnostic criteria; 4) technical difficulties in the paper-based reporting process; and 5) busy workload. Three facilitators of reporting TRs were identified: 1) support from physicians, fellows, nurses, and unit clerks; 2) support from the Transfusion Medicine laboratory for technical issues; 3) online and paper-based resources about TR criteria.

Conclusions: This study identified barriers and facilitators to TR reporting from a nursing perspective. This assessment will help tailor interventions to improve TR reporting and reduce unnecessary premedication. This study also informs other health care organizations when implementing evidence-based transfusion practices.
Compliance with the National Advisory Committee’s guidelines for the use of irradiated red blood cell products: the London Health Sciences Centre experience

Type Of Abstract : Clinical

Eri Iida 1
London Health Sciences Centre PhD, MD (trained in Japan)

Jeff Kinney 2

Donna Berta 3
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Ian Chin-Yee 4

Ziad Solh 5 *
Western University MD

Abstract Description :

Introduction and Objectives: The National Advisory Committee (NAC) on Blood and Blood Products published guidelines in 2017 for the use of irradiated (IRR) blood products. We evaluated compliance with guidelines at London Health Sciences Centre (LHSC).

Design and Methods: All patients who received IRR red blood cell (RBC) transfusions at LHSC from July 1 to September 30, 2018 were identified. Using a retrospective chart review, IRR indication was assessed for compliance with guidelines with a goal of 90% compliance. Hospital areas, both clinical and laboratory, in need of practice improvement were identified.

Results: A total of 825 units of IRR RBCs were issued to 300 individual patients in the 3 month study period; 245 (81.7%) adult and 55 (18.3%) pediatric patients. Physicians requested IRR blood in 121/300 (40.3%) patients: 70/245 (28.5%) adults and 51/55 (92.7%) pediatric patients. 179/300 (59.7%) patients received 259/825 (31%) IRR RBC without physician request or any indication for IRR RBCs based on the latest guidelines; the majority 175/179 (97.8%) were adult patients. Of the 121 patients with irradiated blood requests, 55 (78.6%) adult and 22 (43.1%) pediatric patients met the NAC guidelines. In the adult population, autologous or allogeneic hematopoietic stem cell transplant (HSCT) patients received IRR RBCs beyond the recommended post-transplant period. Adult hematology patients received IRR RBCs for hematological malignancies outside guidelines. Of 29 pediatric patients who received IRR RBCs outside guidelines, 27 (93%) were hematology/oncology patients diagnosed with malignancy, thalassemia, sickle cell disease, and other transfusion-dependent conditions, and 2 (7%) were preterm neonates.

Conclusions: IRR RBC utilization at LHSC does not meet the 90% compliance goal with NAC guidelines. Pediatric patients and IRR RBC inventory excess accounted for the majority of the inappropriate IRR RBCs utilization at LHSC. Supplying IRR RBCs for patients without physician request occurs to minimize waste of IRR RBC inventory which has a shortened shelf-life. IRR RBC inventory at LHSC can be safely reduced without resulting in an IRR inventory shortage for patients who need IRR products. Stop dates for providing IRR RBC to HSCT patients will be introduced. Further research is needed to determine if patient outcomes are affected by overutilization of IRR RBC.
Characterization of the NanoEnTek ADAM-rWBC2 performances in residual white blood cell quantification in leukoreduced blood components

Type Of Abstract : Scientific

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Héma-Québec

Marie-Joëlle De Grandmont 2
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Min Sung Kim 4
NanoEnTek Inc.

Danny Brouard 6 *
Héma-Québec

Abstract Description :

Introduction: In Canada, 1% of manufactured leukocyte-reduced (LR) products are tested for quality control (QC). The standard states that the absolute quantity of residual white blood cells (rWBC) per bag must be < 5 × 10^6 in 100% of products tested. Currently, flow cytometry is the gold standard method for low-concentration testing of rWBC in red blood cells (RBC) and platelet concentrates (PC). However, this analytical method is labor-intensive and requires frequent maintenance. The newly developed fluorescence imaging cell counter ADAM-rWBC2 (NanoEnTek, Seoul, Korea) is increasingly popular amongst blood banks for blood component rWBC quantification purposes. The aim of this study was to compare the ADAM-rWBC2 method performances for rWBC quantification with the flow cytometry method (FCM).

Methods: To compare both methods, samples obtained from LR-RBC (n=40) and LR-PC (n=40) were analyzed simultaneously within 48 hours of leukoreduction. rWBC counts were measured using the ADAM-rWBC2 kit (rWBC kit, cat. #AD1K-050) and the FCM (BD Leucocount kit, cat. #340523), according to the manufacturer’s instructions. Accuracy was compared in LR-RBC and LR-PC spiked with known concentrations of white blood cells (WBC) isolated from ABO-compatible donors. Linearity and precision were established for the ADAM-rWBC2 assay using FCM as the reference method with non-LR products containing [rWBC] ranging from 0 to 200 WBC/µL. Sample throughput and average analysis time were monitored to assess productivity.

Results: rWBC counts (n=80) were < 5 x 10^6 WBC/bag in all LR blood component samples. A Bland-Altman analysis was performed over the paired data set and results indicate that there is a general agreement between both methods. rWBC values obtained with the ADAM-rWBC2 method were slightly lower in RBC (bias=0.15 WBC/µL) and higher in PC (bias=0.41 WBC/µL). Linear regression analyses showed a good correlation between both methods in RBC (R^2=0.98) and PC (R^2=0.99). Precision (CV range:4.3-9.3%) and accuracy (range:93-96%) obtained with ADAM-rWBC2 were acceptable.
Conclusions: The cost-effective ADAM-rWBC2 method generates fast and accurate results that are comparable to those obtained by the FCM. Considering the performance study results, the ADAM-rWBC2 assay represents a reliable method for rWBC determination in LR-blood components and is suitable for QC operations.
Modelling Ferritin Levels in Canadian Donors

Type Of Abstract: Scientific

John Blake 1 *
Canadian Blood Services PhD

Sheila O'Brien 2
Canadian Blood Services RN, PhD

Abstract Description:

Background: Donors lose about 220-250 mg of iron with each whole blood donation. Iron deficiency is common in blood donors, particularly young females and high frequency donors. Ferritin testing can identify iron deficiency before hemoglobin drops.

Objective: This study estimates the impact of ferritin testing on CBS whole blood collections; specifically, the number of donations expected, the number of tests conducted, and the number of donors with low ferritin levels.

Design/Methods: A simulation model was constructed which follows a cohort of donors. Each is imbued with a gender, age, donation status (first time vs. repeated), and donation frequency. On each simulated day, the simulation searches the donor list for that date, looking for individuals with appointments. If a donor is scheduled to provide a donation, he/she is removed from "today's" donor list, a donation is collected, and the donor is booked for his/her next appointment. If the donor is eligible, a ferritin test is conducted. Donors that are tested and found to have a low ferritin level have their next donation date altered to incorporate any extended deferral period. Two scenarios were simulated with a ferritin test on every fifth donation: 1) the inter-donation interval for males is 56 days, for females 84 days (current); and 2) ferritin below 25 mcg/L results in 6-month deferral.

Results: In the current scenario, 793,000 repeat donations are collected; 123,000 would be a fifth donation and, if tested, 56,000 would have had low ferritin. If donors are deferred for 6 months, we anticipate 767,000 donations, of which 118,000 would be a fifth donation and 53,000 of those tested would have low ferritin. Thus, a reduction of 26,000 donations is expected.

Conclusions: If all donors were tested for ferritin on every fifth donation with 6-month deferral for individuals with low ferritin, the expected reduction in whole blood collections would be 3.3%. The shortfall would need to be addressed through enhanced donor recruitment or by encouraging donation from less frequent donors. Impact on donation volume can be reduced by increasing the interval between ferritin testing or targeting only specific donor demographics.
CD44 Antibodies - A Recombinant IVIg Alternative Mediates its Anti-Inflammatory Activity by Fc Gamma Receptor Inhibition

Type Of Abstract : Scientific

Gurleen Kaur 1
St. Michael's Hospital MSc Candidate

Peter Norris 2
Keenan Research Centre for Biomedical Science, St. Michael's Hospital

Alan Lazarus 3 *
CBS PhD

Abstract Description :

Introduction – Intravenous immunoglobulin (IVIg) is an effective treatment for many autoimmune diseases, including immune thrombocytopenia (ITP). However, Canada is not self-sufficient in plasma donation required for manufacturing IVIg, and a recombinant replacement is desired. In most patients, platelet destruction is thought to occur due to autoantibody-sensitized platelets, triggering Fc gamma receptor (FcγR)-mediated phagocytosis. Using a murine model, we demonstrated that antibodies directed against CD44, can ameliorate ITP at a 3-log fold lower dose than IVIg. This therapeutic activity has been suggested to occur through inhibition of the phagocytic process; however, the exact mechanism remains unknown. We hypothesize that CD44 antibodies may be binding and inactivating the FcγR pathway of platelet destruction. Different IgG subtypes bind to specific subclasses of activating FcγRs; if our hypothesis is correct, anti-CD44 should be therapeutic if able to bind the same subclasses of FcγRs as anti-platelet antibody.

Methods - Macrophages were pre-treated with a CD44 antibody, washed, and then exposed to opsonized platelets. The activity of intact CD44 antibodies was compared to Fc inactivated versions: deglycosylated and F(ab’)2 fragments, to determine the significance of the Fc region both in vitro, and in vivo using a passive murine antibody-mediated ITP model.

Results - Macrophages treated with intact CD44 antibodies resulted in inhibition of platelet phagocytosis. In comparison, CD44 antibodies failed to inhibit phagocytosis when deglycosylated or made into F(ab’)2 fragments. Mice treated with intact, deglycosylated or F(ab’)2 anti-CD44 also demonstrated a requirement for a functional Fc region in successful ITP amelioration. Furthermore, anti-CD44 (murine IgG1) could only inhibit in vitro phagocytosis, and ameliorate ITP in vivo when an IgG1 anti-platelet was utilized, as they are both known to bind only FcγR3. Changing the subtype of the anti-platelet antibody to an IgG2a (binds FcγR1, 3, 4) overcame this restrictive CD44 effect. These results suggest that CD44 antibodies protect against platelet destruction by binding and inhibiting the activating FcγR pathway required for the phagocytosis of opsonized platelets.

Conclusion – The ability of CD44 antibodies to prevent phagocytosis of platelets, and ameliorate ITP appear to be dependent on its binding to FcγRs, using their Fc region.
Aggregates in apheresis platelet concentrates: can it be predicted from donor’s history?

Type Of Abstract: Scientific

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Pascale Riverin 5
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Abstract Description:

Design and Methods

Introduction: Aggregates in apheresis platelet concentrates (aPC) is a common phenomenon. Although the generation of platelet (PLT) aggregates seems multifactorial (i.e. collecting apparatus, aPC temperature during transportation and storage, seasonal effects, etc.), donor predisposition could be one of the major elements underlying it. The aim of this study was to determine whether there could be an association between donor characteristics and observations of aggregates in their aPC products.

Design and Methods: All aPC were collected using a TRIMA Accel® Automated Blood Collection System (Terumo BCT, Tokyo, Japan). After a minimal resting time of 10 minutes, all aPCs were sent to our processing center to be received and thoroughly checked. In case of PLT aggregates, products were allowed to rest for an additional one-hour period before storage under agitation. Data used in this four-month study were obtained from 1117 aPC donors and their respective 2830 donations. After stratification of donors based on their total number of donations and their donations containing aggregates, logistic regression analyses, adjusted by age and sex, were made to estimate the occurrence of PLT aggregates in various scenarios.

Results: PLT aggregates were observed in 15% (420 /2830) of aPC donations analyzed. While 78% of donors (867 /1117) gave platelet aggregation-free aPCs, 14% of donors (158 /1117) that gave at least two aPCs had 50% or more of their donations containing aggregates and were responsible for 68% (285 /420) of all aggregate-containing aPCs observed during the study. It was estimated that an increase in the number of aPC donations from a given donor would likely increase the risk to detect aggregation in one of his subsequent donations (OR 15.2, 95% CI 7.9 – 29.4 for a seventh versus a first donation). Furthermore, it was shown that a first aPC donation with aggregates would increase the risk to detect aggregates in subsequent donations (OR 4.97, 95% CI 3.03 – 8.22).
**Conclusions:** Some donors seem to have a predisposition to produce clumpy aPC. To reduce products losses, it could be wise to redirect them to other types of blood donations if aggregates are observed on their first donation.
Detection of novel regulatory platelet ligands and pathogenic platelet antibodies

Type Of Abstract : Scientific

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Reid Gallant 4
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Tyler Stratton 5

Michael Thompson 6
University of Toronto

Heyu Ni 7
Canadian Blood Services MD, PhD

Abstract Description :

Introduction / Objective: Fibrinogen (Fg) binding to αIIbβ3 is considered an essential mechanism of platelet aggregation. However, we found in the absence of Fg and VWF platelet aggregation persists but is ceased in β3−/− mice. Indicating, that Fg-independent platelet aggregation is mediated by unknown ligands of αIIbβ3 (JCI 2000, JTH 2006, Blood 2009), termed “X-ligands”. How X-ligands regulate hemostasis/thrombosis, effect stored plateles, or if they cause adverse post transfusion effects are unknown. Immune thrombocytopenia (ITP) is a common bleeding disorder caused primarily by autoantibodies against platelet αIIbβ3 and/or GPIbα. Currently intravenous immunoglobulin (IVIG) is a first line treatment for ITP. We first reported, and others have confirmed, that anti-GPIba antibody-mediated ITP is often refractory to IVIG therapy (Blood. 2006). Hence, detection of αIIbβ3 and GPIba autoantibodies would help inform physicians regarding treatement and conserve IVIG. However, the "gold standard" assay for ITP autoantibodies, MAIPA, is unreliable and is rarely clinically utilized, leaving clinicians to rely on empirical treatment.

Design and Methods: Our aim is to develop a detection strategy to identify novel ligands of αIIbβ3 and GPIbα and pathogenic anti-platelet antibodies. We have developed self-assembling monolayer (SAM) coatings with either αIIbβ3 or GPIbα covalently and site-specifically immobilized and were synthesized on silica beads. Fluorescence microscopy and flow-cytometry were employed for analysis.
**Results:** αIIbβ3 coated surfaces bound Fg as well as conformational and linear epitope specific anti-αIIbβ3 mAbs. GPIbα coated surfaces bound both conformational and linear epitope specific anti-GPIbα mAbs. Also, αIIbβ3 beads were incorporated into murine wild-type and VWF/Fg⁻/⁻ platelet aggregates, demonstrating interaction with yet unidentified x-ligands. Furthermore, we developed a flow-cytometry assay for the detection of ITP autoantibodies from patient sera.

**Conclusions:** These data indicate αIIbβ3 and GPIbα adopt ligand binding conformations when immobilized on the SAM. This work presents the first use of SAM attached platelet surface receptors, primarily integrins, and demonstrates the enormous potential that these synthetic coatings possess in research and diagnostics.
The Kunitz Protease Inhibitor domain of Protease Nexin 2 slows thrombolysis in vivo

Type Of Abstract: Scientific

William Sheeld 1 *
Canadian Blood Services PhD

Louise Eltringham-Smith 2
Canadian Blood Services

Abstract Description:

Introduction/Objective: Protease Nexin 2 is a protein secreted from activated platelets. It contains a 57-amino acid Kunitz Protease Inhibitor (KPI) domain that inhibits coagulation factor XIa and other proteases. We previously fused KPI to human serum albumin (HSA) and showed that fusion protein KPI-HSA has a longer circulatory half-life than KPI, and more durably inhibits chemically-induced thrombosis in mice than unfused KPI. KPI-HSA inhibits FXIa 17- to 40-fold more rapidly than it inhibits plasmin. We sought to determine if the antiplasmin activity of KPI-HSA is relevant in vivo.

Methods: Recombinant hexahistidine-tagged KPI-HSA or HSA was expressed in Pichia pastoris yeast and purified by nickel-chelate affinity chromatography. The carotid artery of anesthetized CD1 mice was surgically exposed and treated with 10% (w/vol) ferric chloride and blood flow was monitored by Doppler ultrasound. After complete arterial occlusion, mice were injected with 0.44 mg recombinant long-lasting tissue plasminogen activator (Tenecteplase, TNKase), or TNKase combined with either HSA or KPI-HSA, and the time to restore flow (TRF) was measured. Arteries not patent at the close of the observation period were considered to have a TRF of 60 min.

Results: Groups of 6-8 mice were treated with saline vehicle only; 0.94 mg HSA; or 0.94, 0.47, or 0.235 mg KPI-HSA. The fractions of mice with arterial flow restored were: 8/8; 6/6; 0/6; 4/6; and 1/6, respectively. TRF was: 34 ± 17; 32 ± 11; 60**; 57 ± 6*; and 39 ± 13 minutes, respectively (mean ± SD; *, p <0.05, **, p < 0.01 vs. vehicle by ANOVA with post-tests).

Conclusions. KPI-HSA inhibited thrombolysis in vivo in a dose-dependent manner. Since its previously determined antithrombotic activity was shown at the same 0.94 mg/mouse dose used in this study, it is likely limited by its effects on fibrinolysis. Protein engineering efforts to increase the specificity of KPI-HSA for FXIa over plasmin are warranted to achieve a more potent antithrombotic agent for potential therapeutic use.
Platelet Vesicles are Potent Inflammatory Mediators and Washing Red Blood Cell Products with Automated Cell Processor Reduce the Inflammatory Phenotype

Type Of Abstract : Scientific

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Jason Acker 2
University of Alberta/ Canadian Blood Services MBA PhD

Abstract Description :

Introduction / Objective: Studies suggest that washing red cell concentrates (RCCs) to remove soluble mediators and/or inflammatory components, such as extracellular vesicle (EVs), may reduce the immunomodulatory activity associated with blood components and may lead to better post-transfusion clinical outcome. This study tested the hypothesis that non-red blood cell (RBC) generated vesicles in RCC are potent mediators of RCC pro-inflammatory activity in vitro, and washing RCCs can reduce these vesicles, and subsequently decrease the inflammatory activity of RCCs.

Design and Methods: Sixteen RBC units produced using whole blood filtration methods were pooled-split to generate four groups based on pre-wash storage time (n=4 per group); washed day 2, unwashed day 2, washed day 14, and unwashed day 14 post collection. Each experimental group was sampled 24 h and 7 d postwash for testing. In vitro quality of RBCs, residual cell, number and cell of origin of EVs, cytokines released by monocyte, and expression of human umbilical vein endothelial cells (HUVECs) adhesion molecules were assessed.

Results: RCC units from all experimental groups were within the acceptable quality assurance limits for hemolysis, hematocrit, and hemoglobin. Washing was not sufficient to remove residual platelets from RCCs. RCCs washed on day 14 and stored for 24 h had significantly lower concentrations of residual white blood cells (WBCs), RBC-EVs and WBC-EVs compared to their respective unwashed RCCs. Irrespective of washing and storage time, washing led to a significant reduction in platelet-EV count compared to unwashed RCCs (p<0.05). Compared to negative controls, unwashed RCCs were associated with higher production of inflammatory cytokine (MCP-1 and IL-8, TNFα) and expression of HUVEC VACM-1, which were significantly reduced by washing. The expression of E-selectin on HUVECs was significantly induced by washing compared to controls (p<0.001). Correlation analysis showed that platelet-EVs were associated with the inflammatory activity associated RCC supernatant. Spiking washed RCCs supernatant with platelet-EVs showed significant increase in IL-8, MCP-1, VCAM-1 and E-selectin in group washed on day 14 (p=0.002) when compared to negative controls.

Conclusion: This study shows that platelet-EVs in RCCs are associated with pro-inflammatory activity. As washing significantly reduced RCC immunomodulatory activity, implementation of this process may improve transfusion outcomes.
Outcomes of an Emergency Department Rapid Referral Anemia Program at The Ottawa Hospital

Type Of Abstract: Scientific

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The Ottawa Hospital Research Institute MSc

Guy Hebert 3
The Ottawa Hospital MD

Dean Fergusson 4

Antonio Giulivi 5

Elianna Saidenberg 6
The Ottawa Hospital

Alan Timnouth 7

Abstract Description:

INTRODUCTION
Although patients commonly present to the emergency department (ED) with symptomatic anemia or on the advice of a health-care provider following critical laboratory results, there are currently no guidelines for ED anemia management. This often results in inappropriate red blood cell (RBC) transfusions when more appropriate therapies, such as intravenous (IV) iron, exist.

An anemia algorithm was introduced in The Ottawa Hospital (TOH) ED on January 1 2017, which recommends treatments with RBC transfusions and IV iron based on symptoms, anemia severity, and laboratory evidence of iron deficiency. Patients may also be referred to an Anemia Rapid Referral Clinic (ARRC) for further investigations and treatment.

OBJECTIVE
To compare ED transfusion practices prior to and following anemia algorithm implementation.

METHODS
Using TOH Datawarehouse, we identified ED patients between January 1 2016 - December 31 2017 who (1) had a hemoglobin < 100 g/L or who received a RBC transfusion and (2) were discharged from the ED. Anemia management was compared in patients “Before” and “After” January 1st 2017.

RESULTS
The proportion of patients transfused was not statistically different between the two cohorts. In those transfused, significantly more patients were transfused only a single unit and the mean RBC units transfused was lower in the After cohort. A significantly greater number of patients in the After cohort received IV iron.

In the 75 patients referred to the ARRC, the mean hemoglobin (72.2 g/L) and MCV (79.4 fl) were lower than the whole cohort. Of these patients, 39 were transfused, 20 (54 %) received 1 RBC unit and 25 (33%) patients received IV iron.

CONCLUSIONS
The implementation of an ED anemia treatment algorithm reduced the number of multi-unit transfusions and increased the use of IV iron among discharged patients. In patients referred to the ARRC, the degree of anemia was more severe resulting in a higher transfusion rate, but more patients received only a single unit transfusion and IV iron.
<table>
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<tr>
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<th>Before</th>
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<tr>
<td>N</td>
<td>3544</td>
<td>3631</td>
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<tr>
<td>Hemoglobin (mean±SD)</td>
<td>87.3 ± 10.5</td>
<td>87.4 ± 10.8</td>
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<tr>
<td>MCV (mean±SD)</td>
<td>87.1 ± 11.6</td>
<td>86.7 ± 11.2</td>
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<tr>
<td>No. of patients transfused RBCs (%)</td>
<td>516 (14.6)</td>
<td>496 (13.7)</td>
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<tr>
<td>No. given 1 RBC (%)</td>
<td>166 (32.2)*</td>
<td>222 (44.8)*</td>
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<tr>
<td>No. given 2+ RBCs (%)</td>
<td>350 (67.8)*</td>
<td>274 (55.2)*</td>
</tr>
<tr>
<td>Mean No. of RBC units per patient (±SD)</td>
<td>1.78 ± 0.71*</td>
<td>1.65 ± 0.78*</td>
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<tr>
<td>Proportion of patients given IV iron (%)</td>
<td>19 (0.5)*</td>
<td>104 (2.9)*</td>
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* p-value < 0.05
An innovative Trial Assessing Donor Sex on Recipient Mortality (iTADS)

**Type Of Abstract**: Scientific

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Alan Timnouth ³

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Mt. Sinai Hospital    MD

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EORLA Laboratory     Laboratory Manager

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Angie Tuttle ¹⁵
The Ottawa Hospital Research Institute
Abstract Description:

Introduction
While red blood cell (RBC) transfusions are the most frequent in hospital medical procedure patient outcomes vary following a RBC transfusion and may be related to the characteristics of the donors. Observational studies suggest that donor sex may have a significant impact on recipient survival. Determining the impact of donor sex on the outcomes of RBC transfusion recipients is important as this could have a significant impact on patient outcomes and the health system.

An innovative, prospective, multi-center, double-blind, pragmatic, randomized trial has been designed to confirm whether a transfusion strategy of receiving predominantly male donor RBC units only will improve survival compared to a transfusion strategy of predominantly female donor RBC units only in all hospital patients requiring a transfusion.

Methods
Eligible patients requiring an RBC transfusion will be randomized to receive RBCs from a male donor or RBCs from a female donor. Assignment to the study treatment will be maintained throughout the study period including any subsequent hospitalizations. Based on Tri-Council Policy criteria, waived consent is being used with subsequent notification of study participants. All RBC shipments from Canadian Blood Services contain an additional blinded coded list to indicate the treatment group of RBC units, allocation labels are placed on the units upon receipt. All hospitals blood banks have been organized to permit blinded randomization within the trial specific platform and administration of the appropriate red cell unit type. Data collection and outcome measures will be ascertained using routinely collected clinical and administrative electronic data.

Results
The results will answer if donor sex affects patient survival as well as, the effects of male RBC units on major morbidities and across major patient subgroups on transfusion recipient outcomes. The trial has randomized over 2000 patients to date.

Conclusions
While evaluating the effects of donor sex on recipients, iTADS will also build the capacity to conduct large innovative prospective pragmatic clinical trials in transfusion medicine using electronic clinical and administrative data.

Acknowledgements
General and Civic campuses of The Ottawa Hospital and the University of Ottawa Heart Institute, Canadian Blood Services, Canadian Institutes of Health Research
Fibrinogen Utilization Management

Type Of Abstract : Scientific

Destiny Huff 1 *
Alberta Public Labs MLT

Abstract Description :

Fibrinogen Utilization Management - Transition phase in replacement of Cryoprecipitate (Cryo) by Fibrinogen Concentrate (FC)

Destiny Huff, Joanna McCarthy, Deanna Dillabough, Nicole Gettle

Goal: To encourage the use of Fibrinogen Concentrate in place of Cryoprecipitate. The benefits of using FC instead of Cryo are to provide more accurate and consistent dosing, rapid provision and administration and pathogen inactivation to increase patient safety.

Activities: When an order for Cryoprecipitate is received for adult patients, the ordering physician is contacted by Transfusion Medicine to offer Fibrinogen Concentrate. If the ordering physician has questions or concerns then the TM Physician is contacted to speak with the ordering physician.

Impact: The start date for screening cryoprecipitate orders was July 2016 at FMC and May 2017 at PLC, RGH and SHC.

<table>
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<tr>
<th>All Urban Sites – FMC, ACH, RGH, PLC, SHC</th>
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<td>Cryo-pools Transfused</td>
</tr>
<tr>
<td>2015</td>
<td>242</td>
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<tr>
<td>2016</td>
<td>154</td>
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<tr>
<td>2017</td>
<td>46</td>
</tr>
<tr>
<td>2018</td>
<td>22</td>
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Note: Each total dose = Pooled Cryo, 10 Units ($1173.33) or FC, 1 gr ($350.24)

Lessons:

- There have been no reported Transfusion Reactions with Fibrinogen Concentrate.
- Less cost to the health system is associated with Fibrinogen Concentrate.
- Less product handling with Fibrinogen Concentrate decreases the time delay to issue the product for a bleeding patient.
- Less product wastage
  - Cryo is generally discarded when not transfused (4 hour expiry)
  - If not reconstituted, FC can be returned to TM and reissued.
- FC has longer shelf life than cryoprecipitate (3 years vs. 1 year)
- FC is stable at a greater temperature range (+2°C to +25°C vs. -20°C)
- No patients have been negatively impacted by the change to FC

Impact to patient care:

- In clinical practice outside of a formal study, we determined the following from our statistics:
  - In 2015 cryoprecipitate was given exclusively
    - 152 patients were transfused with cryoprecipitate. 58 of these patients received Massive Transfusion Packs.
    - Percent patient survival was 62%
In 2018 Fibrinogen Concentrate was given almost exclusively

- 212 patients were transfused with Fibrinogen Concentrate. 59 of those patients received Massive Transfusion Packs
- Percent patient survival was 62%
Comparison of hospital extracted data of Transfusion Associated Adverse Events (TAAEs) to those reported to the Ontario Transfusion Transmitted Injuries Surveillance (TTISS-ON)

Type Of Abstract : Scientific

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Nancy Heddle ⁴

Abstract Description :

Introduction
Canadian hospitals can use ICD10 coding for transfusion complications (10 codes: nine T80 codes and J95.81) as part of their discharge abstract database (DAD). Ontario Transfusion Transmitted Injuries Surveillance System (TTISS-ON) captures transfusion associated adverse events (TAAEs) from Ontario hospitals with Hamilton hospitals capturing all TAAE (mild to severe).

Objective: Using Hamilton hospital data, we compared the number and type of TAAEs extracted from DAD (hospital coding) to TAAEs reported to TTISS-ON to determine concordance.

Design and Methods: This retrospective study used data from 2017. Hospital DAD data were queried for the 10 transfusion complication codes to identify TAAEs. TAAEs reported to TTISS-ON from the 4 Hamilton hospitals were identified. The two TAAE data sets were linked by the blood product number.

Results: In TTISS-ON, there were 127 admissions from Hamilton hospitals where TAAEs were reported, including 42 febrile non hemolytic; 34 minor allergic, 6 severe allergic/anaphylactic, 3 hemolytic, 23 delayed serological, 42 IV Ig headaches, 7 TACOs and 2 other results of investigation (hypertension and non specific pain). TAAEs extracted using DAD coding from the hospitals indicated 78 admissions involving a transfusion coded complication. In 33 admissions (42%) patients were not even transfused. The ICD10 coding implicated 10 blood product numbers in DAD that matched to TTISS-ON reported TAAEs; 2 cases of febrile non-hemolytic reactions; 5 minor allergic reactions; 1 severe allergic/anaphylactic reaction (corresponding ICD10 code T80.8 described as - shock, hemolysis or reaction necrotizing enterocolitis); and 2 patients that had a minor allergic reaction that corresponded to the ICD10 code T80.9, defined as a transfusion with lymphocytes, plasma, or blood. ICD10 codes in both non transfused and transfused patients in DAD extracted data included T80.8 coded complications as well as TRALI, embolism, infection/sepsis, serum reactions.

Conclusions: There was poor concordance between transfusion complications coded in the DAD using ICD10 codes and TAAEs reported to TTISS-ON (Hamilton Hospitals) The transfusion complication codes were frequently being applied to adverse events in patients not receiving transfusions.
Plasmin converts clotting factor Va from a procoagulant to fibrinolytic cofactor

Type Of Abstract : Scientific

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The University of British Columbia  MD/PhD Student

Ed Pryzdial 2

Abstract Description :

Introduction: Here we define a novel application for the essential blood protein, coagulation factor Va (FVa). Obstructive blood clots (i.e. thrombi) is a leading cause of death worldwide. These clots contain a stabilizing dense matrix of fibrin. The preferred therapeutic to dissolve thrombi is a recombinant form of the naturally occurring protein, tissue plasminogen activator (tPA), which activates circulating plasminogen (Pg) to plasmin. Plasmin then cleaves and dissolves fibrin to restore blood flow. However, tPA is an active enzyme that must be given exogenously at high doses and can cause life-threatening bleeding. Our work uncovers a novel mechanism whereby FVa is proteolytically modulated by plasmin and converted into a cofactor that may accelerate endogenous tPA. Avoiding high concentrations of therapeutic tPA to dissolve clots via this non-enzymatic cofactor-based approach may be a safer thrombolytic alternative.

Methods: Intact or plasmin pre-cleaved FVa was incubated with tPA and Pg and sampled over time to simultaneously follow: a) fragmentation of FVa by polyacrylamide gel electrophoresis; and b) plasmin generation by chromogenic substrate cleavage. The specificity of FVa cleavage by plasmin was assessed through inhibition by aprotinin. Autoradiography was used to probe for binding sites on FVa fragment(s) to 125I-radiolabelled Pg. A purified clot dissolution assay was developed to assess the effect on FVa fragment(s) on dissolving pre-formed clots.

Results: FVa accelerated plasmin generation, which was further enhanced when pre-cleaved by plasmin. Aprotinin abrogated any enhancement of intact FVa, demonstrating that proteolytic modulation by plasmin confers tPA cofactor activity. Out of 16 main cleavage fragments, a ~50 kDa fragment bound to 125I-radiolabelled Pg. While the position of this fragment has not yet been confirmed by sequencing, it is likely derived from the FVa light subunit (FVaL). Moreover, a mixture containing plasmin-cleaved FVa enhanced clot dissolution when overlayed on top of a purified fibrin clot.

Conclusions: Our work identifies the application of plasmin-modulated FVa in thrombotic disease where thrombolysis is required to restore blood flow. Since FVaL has an intrinsic high-affinity binding site for anionic phospholipid present exclusively at the clot site, the fibrinolytic fragment of FVaL may localize plasmin generation to the site of thrombosis.
Characterization of Maternal Antibodies in Nova Scotia Prenatal Specimens

Jennifer Duncan 1 *
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Abstract Description:

Introduction: During pregnancy, antibody screens are used to detect unexpected maternal antibodies which have the potential to cause Hemolytic Disease of the Fetus/Newborn (HDFN). In Nova Scotia, the predominance of maternal antibody screens and investigations are performed at the IWK Health Center. Local data for prenatal investigations was reviewed to characterize the number, nature and titre of the antibodies being identified in prenatal testing.

Methods: The Laboratory Information System (LIS) was used to retrospectively obtain data on prenatal specimens tested from 2013 to 2018. This data included the number of prenatal tests, number of patients tested, as well as the results of antibody identification and antibody titre, if performed. If prenatal testing was repeated due to the presence of an antibody, this antibody was only counted once.

Results: From 2013 to 2018, the IWK performed an average of 10119 prenatal tests per year. Positive antibody screens were identified in 3.2% of these specimens. Significant antibodies, defined as those capable of causing HDFN, were detected in 0.47% of specimens tested. After patients with passive anti-D from Rh immune globulin (RhIg) were excluded, the most common antibodies identified were anti-E, anti-K, anti-c, anti-D and anti-JKa. Multiple antibodies were found in 1.9% of patients investigated. Critical antibody titres were identified in 4 patients per year on average. Antibodies within the Rh and Kell blood groups accounted for 90% of critical titre antibodies. The most common antibody associated with a critical titre was anti-D, which accounted for 65% of patients with a critical antibody titre.

Conclusions: A minority of prenatal specimens contain unexpected antibodies and an even smaller number of specimens contain clinically significant antibodies that are capable of causing HDFN. Of these significant antibodies, Rh and Kell antibodies are the most frequently identified antibodies and are the most likely to reach a critical titre level. Anti-D continues to be identified in prenatal testing and is the most common antibody associated with a critical titre, despite the availability of RhIg to prevent alloimmunization to the D antigen. Further investigation with local data would be helpful to further elucidate factors contributing to this finding.
Seasonal influence on Anti-M Detection in Routine Prenatal Testing

Type Of Abstract: Scientific

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IWK Health Center PhD FCACB

Abstract Description:

Introduction: Anti-M is a commonly identified, but usually clinically insignificant antibody directed towards the M antigen within the MNS blood group. Like other antibodies, anti-M may be produced after pregnancy or transfusion. However, anti-M may also be naturally occurring and has been noted to be associated with bacterial infections. Local experience had subjectively noted seasonal fluctuations in anti-M detection. The frequency of anti-M identification in a large outpatient population was reviewed over an extended time period to further evaluate this observation.

Methods: The Laboratory Information System was searched to retrospectively obtain data for prenatal specimens tested from 2008 to 2018 in a provincial reference laboratory for routine prenatal screening. Data included the number of anti-M antibodies identified, the month the antibody was first identified, as well as the total number of prenatal specimens tested on a monthly basis.

Results: From 2008 to 2018, anti-M was identified in 146 patients (0.13% of tested specimens). A seasonal variation was noted with 34% of the anti-M being first detected in the winter (January to March), 18% in spring (April to June), 19% in summer (July through September) and 29% in fall (October to December). After accounting for variations in the number of tested specimens, anti-M was detected in 0.17% of winter specimens, 0.10% of spring specimens, 0.10% of summer specimens and 0.16% of fall specimens. A statistically significant difference (p=0.0387) existed between the number of anti-M antibodies identified in the winter/fall seasons and the number identified in summer/spring.

Conclusions: Anti-M is more prevalent in routine prenatal screens during winter and fall. This seasonal fluctuation coincides with recognized seasonal patterns of infectious disease occurrence and suggests that anti-M production may be triggered by mild viral infections and/or other seasonal pathogens in addition to bacterial infections.
Assessing red blood cell deformability using a microfluidic device

Type Of Abstract: Scientific

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Hema-Quebec

Tatsuro Yoshida 2
Hemanext

Michael Wolf 3
Hemanext

Danny Brouard 4
Héma-Québec PhD

Abstract Description:

Background/Case Study: A high capacity for deformability allows red blood cells (RBC) to flow through capillaries in vivo. RBC storage-related deformability impairment is known; however, the lack of designated tools to measure deformability is a major barrier to its use in blood banking. A capillary-like microfluidic channels array was developed and used as a convenient bulk measurement method to interpret RBC storage-related deformability impairment in a proof-of-concept study.

Study Design/Method: RBC flow rate through single-use PDMS microfluidic device (MD) was measured as an index of RBC deformability. A microsphere solution of stable viscosity was developed and used aside RBC (HTC = 40 ± 1%, diluted in PBS) as a flow rate reference. Six leukoreduced red cell concentrates (RCC) dispersed in SAGM additive were stored at T = [2-8°C] over six weeks. Deformability measurements (MD flow rate and filterability) and other RCC in vitro quality markers (e.g., [ATP], [glucose], [lactate], hemolysis and phosphatidylserine exposure) were assessed weekly.

Results/Findings: The flow rate reference analysis reduced MD-to-MD signal variation from 10% to < 2%. The Wald test revealed a significant RBC relative flow rate decrease for week 0-1 (P <0.006), week 1-2 (P <0.0286), week 4-5 (P <0.0099) and week 5-6 (P <0.0001), with no significant differences between weeks 2 to 4. Over the storage period, flow rate impairment rises up to an average of 22 ± 6%. Hemolysis correlated most strongly with deformability impairment, followed to a lesser extent by filterability, [ATP], [glucose] and [lactate].

Conclusion: The microsphere solution was successfully used as a flow rate reference. Deformability results challenge the idea of using the “21 days of storage” mark to define young and old blood, and rather suggest a two-phase impairment. These results suggest that seemingly contradictory deformability studies that report deformability impairments at various storage times could be complementary, detecting either the early- or late-storage impairment. This methodology will be applied to study RBC deformability from donors showing signs of moderate iron deficiency or iron deficiency anemia to estimate the quality range of blood donations from iron-depleted frequent donor.
Leveraging Donor Phenotyping Results to Improve Inventory Management and Decrease Hospital Testing

Type Of Abstract: Scientific

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Abbotsford Regional Hospital MLT

Kelly Bizovie 2 *

Jeanine Durack 3
Royal Columbian Hospital MLT

Abstract Description:

Background

In 2017, CBS started to print antigen information on the eye readable portion of the end label as well as embed this information into a barcode. While the end label lists all of the negative antigens, the bar code also includes any positive antigens.

At the same time, Fraser Health upgraded their Meditech laboratory information system (LIS) to a version that was able to scan the barcode and place this information directly into the donor unit record. Because Fraser Health includes thirteen acute care hospitals serving 1.8 million people in BC and transfuses over 38,000 RBC units annually, there was a potential to decrease workload when obtaining antigen specific RBCs.

Methods

Edits to the Meditech antigen dictionary were required to align with ISBT and ICCBA standard nomenclature. Extensive testing was done to ensure that information being recorded into Meditech was accurate. Standard Operating Procedures (SOP) for inventory entry were edited to include the scanning of the antigen barcode, and staff were retrained to the updated SOP. Post implementation, a report was created in Meditech to allow searching for antigen negative donor units across all thirteen facilities.

Results

The ability to use a report to search for specific antigen negative units helped technologists adopt this new product entry process which was initially met with some resistance. Because technologists are now consistently scanning in the antigen barcode of every RBC unit upon receipt, the report is working as intended. As expected, manual phenotype testing decreased by as much as 70% as can be seen by comparing one site's data from 2017 to 2018.

Conclusion

The ability to scan in the antigen testing performed by CBS reduces clerical errors by technologists. It also decreased the amount of manual phenotyping performed by the hospitals. Less orders for antigen specific RBCs are being placed at CBS as well as reduced interhospital shipments of red cells. Our review has provided evidence that we have decreased our workload, and with this process firmly in place, the implementation of providing K negative units to women of child bearing age will be relatively simple.
Investigation of the Direct Antiglobulin Test (DAT) Strength in Determining the Degree of Hemolysis in Hemolytic Disease of the Newborn (HDN)

Type Of Abstract : Scientific

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MLT Student

Brenda Lunty 3
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Hanan Gerges 6

Abstract Description :

INTRODUCTION/OBJECTIVE

It is important that babies born with a risk of anemia and hyperbilirubinemia receive proper diagnostic care. The direct antiglobulin test (DAT) is one of the tests used to determine whether there is immune-mediated hemolysis occurring in the neonate. However, it is known that a positive DAT result does not conclusively mean that the neonate is hemolyzing. Hence, in this research project, the aim is to add to the credibility of the cord blood DAT results in its predictive value of hemolysis in the neonates. The major purpose of this study is to see the association of the DAT strength to the markers of hemolysis, such as, neonatal hemoglobin, bilirubin, and antibody specificity.

DESIGN AND METHODS

The ARECCI guidelines determined this study to be a Quality Improvement research. Retrospective analysis was done on the DAT-positive cord blood samples and maternal antibody titer results from January 2017 to July 2018 from the Sunquest Laboratory Information System (LIS) and Netcare. Hemoglobin and neonatal bilirubin results were collected for the DAT results in two groups, DAT ≥2+ and DAT <2+. The maternal antibody titer results were separated in to DAT-negative and DAT-positive results to determine significance.

RESULTS

Statistical analysis was done on the IBM SPSS V25 software. Binary Logistics Regression was done for DAT strengths and markers of hemolysis, and the Chi-Square test was done for DAT result and antibody specificity. For the binary logistics regressions test, the full model containing all variables was statistically significant χ² (5, N = 129) = 19.88, p < .001. Only hemoglobin was statistically significant in the model (p = 0.009). For the chi-square test, there was no statistical significance (p = 0.527).

CONCLUSIONS

From the findings of this study, there is further research required to determine the significance in the correlation of neonatal DAT strengths to the markers of hemolysis and antibody specificity. Major limitation was that most DAT positive neonates did not have lactate dehydrogenase and haptoglobin tests done.

ACKNOWLEDGEMENTS

A. VanSpronsen
Daudi Stroma to eliminate anti-CD38 related interference in pre-transfusion testing

Type Of Abstract : Scientific

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Hema-Quebec PhD

Tony Tremblay 2
Hema-Québec

Don Branch 3
University of Toronto

Abstract Description :

Background: Immunotherapeutic strategies are emerging as novel therapeutic approaches in multiple myeloma, with several mAbs being in advanced stages of clinical development. Among these, Daratumumab, an antibody currently used in the treatment of patients with refractory multiple myeloma, is very promising. Blood samples from patients being treated with Daratumumab (Dara) demonstrated panreactivity in red blood cell (RBC) panel testing, which complicates the selection of compatible RBCs for transfusion. It has been shown that treatment of RBCs with dithiothreitol (DTT) allows the elimination of CD38. However, this treatment damages other antigens, some of which are of clinical importance. Thus, treatment with DTT is an imperfect solution to a problem whose incidence is increasing.

Aims: To evaluate the potential use of Daudi cell stroma to deplete Dara from plasma samples.

Methods: Daudi cells were centrifuged and suspended in a sonication buffer (0.2 M Tris-HCl; pH7.4 + proteases inhibitors) and sonication was carried out for 6 x 5 seconds at 30% amplitude to achieve complete cell lysis. Prior to Dara depletion, the stroma preparation was centrifuged at 20 000 g for 30 min at 20°C. The supernatant was discarded and 240 µL of Dara-plasma was added to the stroma, mixed, and incubated for 10 min. After the first round of depletion, the tube was once again centrifuged at 20 000 g for 15 min (20°C) and the plasma was transferred into a new stroma suspension tube. This step was repeated four more times (five depletions rounds total) after which Dara-depleted plasmas were collected and tested by LISS IAT.

Results: The expression of CD38 on the Daudi cell line was confirmed by flow cytometry using commercial anti-human CD38. LISS IAT analysis showed that the incubation of plasma from Dara-treated patients with Daudi cells stroma resulted in a significant depletion of Dara with concomitant preservation of other alloantibodies of interest such as anti-Kell.

Conclusions: Incubation of plasma from Dara-treated patients with Daudi cell stroma can efficiently overcome the Dara interference in serological testing.
Thermoregulation container for blood component logistics operations – A shelf life and performance study

Type Of Abstract : Scientific

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Abstract Description :

Background: Blood product logistics represent a major challenge and sustained efforts are dedicated to the development of thermoregulation containers for blood product transport over long distances in extreme temperature conditions. The current system successfully achieves whole blood (WB) cooling down to 10°C in \( t < 8 \)h, while maintaining internal temperature at 1-10°C for 24h. To extend long-term temperature hold, the thermoregulation stability of a modified vacuum insulated panel (VIP) structure was evaluated through simulation studies, i.e., repeated handling and exposure to real-life conditions.

Methods: The container VIP inner core was solidified using plastic wrap and adhesive tape. Repeated packaging, unpackaging and handling operations, including drop tests, were carried out in the laboratory. At every 25 uses, the box component was inspected and its thermoregulation properties were measured using an in-house developed thermoresistometer. The core temperature of 555-mL saline units preconditioned at 30°C was monitored during container storage under extreme external temperatures (\( T = 40°C \) for \( t = 24h \), \( n = 3 \)). A maximal load of six units were packed using a combination of cold (\( T = -11°C \)) and hot (\( T = 20-24°C \)) T = 5°C phase change materials.

Results: After 200 simulated uses, most (99%) VIP structures maintained their physical integrity. Overall, containers showed a 58 ± 9 % reduction in insulated capacity compared to their initial state. The insulation and thermoregulation properties of the system helped to keep the core temperature of six units within an acceptable temperature range for \( t > 24h \) when exposed to extreme conditions (\( T = 40°C \)). After 200 uses, unit temperature reached \( T \leq 10°C \) in \( \Delta t = 4.2 ± 0.3 \)h and was \( T = 6.8 ± 0.1°C \) after \( \Delta t = 24h \), which was found not to be significantly different than initial performances (i.e. \( \Delta t = 4.7 ± 0.4 \)h and \( T = 6.4 ± 0.2°C \), respectively).

Conclusions: Wrapping VIPs in plastic wrap and adhesive tape extends the container shelf life and limits the decline in the thermoregulation system properties, while retaining the cost-effective option of replacing VIP individually if needed.
Processing red blood cell products obtained from sickle-cell trait donors with the ACP 215

Type Of Abstract: Scientific

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Abstract Description:

Introduction / Objective: Units collected from sickle-cell trait donors are difficult to leukoreduce by filtration and are known to create a dark gelatin-like mass during the deglycerolization process, leading to poor recovery and hemolysis. A pregnant woman with rare blood, red blood cells (RBC) antibodies (anti-sec, anti-e) and sickle cell trait was scheduled for autologous donations as no allogeneic donor could be found. The fetus has a transposition of the great arteries and a cardiac surgery with extracorporeal circulation is planned within the first days of life. Therefore, maternal washed and cryopreserved RBC units are going to be needed for the intervention if passive maternal antibodies are detected. The primary objective of this study was to evaluate the quality of sickle-cell trait donors' RBC components washed and cryopreserved with the ACP 215, with the aim of determining an optimal RBC preparation process for neonatal transfusion.

Design and Methods: Whole blood (WB) (450 mL) was collected from eight sickle cell trait donors. After collection, WB units were either leukoreduced or non-leukoreduced. RBCs were suspended in AS-3 and stored at 4 ± 2 °C before processing with the ACP 215. Four RBC units were glycerolized / deglycerolized and four were washed. Half of RBCs from each protocol were non-leukoreduced (n=2 for all four combinations). Assays for in vitro quality parameters were performed seven days after washing or deglycerolization (hematocrit, hemoglobin, RBC recovery, hemolysis, sterility, leucocyte count).

Results: Hemoglobin, hematocrit and hemolysis met CSA-Z902-15 and AABB standards after the first wash. Deglycerolization led to variable results for hemoglobin, hemolysis and RBC recovery, with only half of the products meeting the criteria. The two RBCs with hemolysis higher than 0.8% formed a gelatin-like mass in the centrifugation bowl during the deglycerolization process, hence the low RBC recovery.
Conclusions: Fresh washed leukoreduced RBC units met the standards and are safe for transfusion. However, cryopreserved RBCs will be required to support the transfusion needs during surgery. Whether hemolysis in these units will be acceptable is unknown. Therefore, the deglycerolization process should be optimized to meet the standards in case this situation occurs again.
**Two Birds, One Stone: Salvianolic Acid B Inhibits Platelet Aggregation and Blood Coagulation**

**Type Of Abstract:** Scientific

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**Abstract Description:**

**Introduction/Objective:** *Salvia miltiorrhiza* root (danshen) extracts have been used for centuries to control cardiovascular diseases in Chinese medicine. Danshen depside salts are currently approved in China to treat coronary heart disease and angina; and are under evaluation in the USA in phase II clinical trials. Salvianolic acids have been identified as the active components of danshen. Salvianolic acid B (SAB), the most abundant salvianolic acid, has been previously shown to exhibit anti-platelet and anti-thrombotic properties in animal models. However, the mechanism of action has not been adequately explored.

**Design and Methods:** Our aims are to uncover the anti-platelet and anti-coagulant mechanisms of SAB. A wide array of methods will be utilized including; In vitro platelet/coagulation assays and in vivo intravital thrombosis models combined with biochemical kinetic and biophysical calorimetry assays, and in silico molecular modelling.

**Results:** We demonstrate that SAB attenuated ADP, collagen, and thrombin receptor activating peptide (TRAP)-induced human platelet aggregation. Interestingly, SAB inhibited thrombin- induced platelet aggregation far more potently than other agonists. Furthermore, using our intravital microscopy thrombosis models, we demonstrated that SAB significantly decreased thrombus growth in vivo. Using a series of in vitro coagulation assays, we found that SAB significantly reduced clot weight in human whole blood, and delayed coagulation in human cell-free blood plasma using thromboelastography. In addition, SAB significantly reduced the fibrin network density in cell-free blood plasma. Through structural analysis, we found that SAB contains structural similarities to the trisubstituted benzimidazole class of thrombin inhibitors, such as dabigatran. In silico molecular modeling predicts that SAB binds within the thrombin active site - interacting with similar residues as dabigatran. Using isothermal titration calorimetry and kinetic thrombin inhibition assays, we corroborate these findings and reveal SAB as a direct competitive thrombin inhibitor.
Conclusions: These data establish a novel mechanism of SAB in the inhibition of both platelet aggregation and blood coagulation. These unique characteristics position salvianolic acids as safe and potent herb-derived anti-thrombotic and anti-coagulant agents.
Identification of proteins released by osteoblasts that promote the growth of hematopoietic progenitors

Type Of Abstract: Scientific

Nicolas Pineault ¹
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Owen Hovey ² *

Alice Moreau ³

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Canadian Blood Services

Abstract Description:

Introduction/Objectives: Expansion of cord blood (CB) stem and progenitor cells (HSPC) can overcome the limitation of low cell numbers associated with CB units. Serum-free medium (SFM) conditioned with MSC-derived osteoblasts was previously shown to increase the growth of HSPC in culture up to 3-fold over that achieved in SFM or MSC conditioned media (MCM). This study aimed to identify proteins released by osteoblasts that could be responsible for this growth promoting activity.

Design and Methods: Mass spectrometry (MS) was carried out on osteoblast conditioned media (OCM) and MCM from 4 independent MSCs. CB CD34+ HSPCs were expanded in cultures and cell expansion and phenotypic analysis were assessed by flow cytometry on day 6.

Results: A total of 319 proteins were identified by MS in OCM and MCM. Principal component analysis revealed a significant separation between the OCM and MCM (p=0.0055), with MCM and OCM clustering among themselves. From the filtered targets, 39 were found upregulated in OCM, while 8 were down-regulated (q<0.05, S₀>1). Eleven candidate proteins were selected for confirmation; changes in the expression of their transcripts was confirmed for 10 of the 11 genes tested (n=4). Eight proteins identified in OCM belonged to the classical and alternative complement pathways. The implication of those on OCM was tested with two inhibitors; inhibition of complement protein 1 (p>0.05, n=3) or of the C3a-receptor (n=2, p>0.05) had no impact on OCM-mediated cell growth suggesting that the growth promoting activity of OCM is likely independent of the complement pathways. SPARC and LGALS3 were two proteins identified in the MS data that had previously been implicated in hematopoiesis, though their function remained controversial. Their impact on the growth of CB CD34+ cells was tested in SFM; while neither protein affected overall cell growth, SPARC significantly increased the production of CB cells within the multipotent stem and progenitor compartment (p<0.05), while LGALS3 had the opposite effects (p<0.05).

Conclusions: Over 40 proteins have been identified as potential modulator of HSPC growth. We are currently investigating whether complement proteins present in OCM can modulate the adhesion and homing activity of progenitors.
Overcoming the low viability of CD45+ cells in thawed cord blood unit segments

Type Of Abstract: Scientific

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Canadian Blood Services

Abstract Description:

Introduction/Objectives: There are no standard methodology for postthaw sample preparation for viability analysis of umbilical cord blood units (CBU). A common challenge faced by CB bank is for their product to meet the postthaw cell viability threshold for CD45+ cells set at 40% by NetCord-FACT. The objective of this work was to improve the postthaw staining method to maximize CD45+ cell viability so that clinically valuable samples meet the NetCord-FACT threshold criteria for CD45+ and CD34+ cell viabilities.

Design and Methods: Samples of CBU buffy coats and CBU segments were thawed and taken for staining. Various parameters were evaluated on CD45+ and CD34+ cell viability as measured by 7-actinomycin D (7-AAD) staining.

Results: The results revealed that initiating the staining at 20 mins postthaw instead of 30, shortening the red cell lysis treatment, or performing lysis on ice and removing this step all together, all improved the viability of CD45+ cells. Using CBU segments it was shown that the most effective approach in increasing the viability of CD45+ cells was the complete omission of red cell lysis step. However, removal of the lysis step can create technical artifacts during flow cytometry acquisition that results in an underestimation of the viability of CD34+ cells. This can be avoided and CD34+ cell viability restored with additional thresholding on CD45 signal.

Conclusions: CB CD45+ cells are sensitive to red cell lysis treatment postthaw; omission of this step provides the best viability and ultimately better reflects the quality of cells used for transplantation.
Challenging the 30-minute Rule for Thawed Plasma

Type Of Abstract: Scientific

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William Sheffield 12

Abstract Description:

Background/Objective Frozen plasma (FP) is manufactured within 24 hours of phlebotomy and stored at ≤-18°C for ≤12 months. Prior to transfusion, FP is thawed and may then be stored refrigerated for 5 days. The ‘30-minute rule’ for red blood cells (RBC) requires the discard of units exposed to uncontrolled temperature for >30 minutes during storage. The 30-minute rule is applied to thawed plasma leading to product wastage. This study determined the effect of temperature excursions on the quality and safety of thawed plasma.

Methods A multi-center study was conducted with quality and sterility arms performed at NHS Blood and Transplant, Héma-Québec, and Canadian Blood Services. Groups of four ABO-matched plasma units were pooled, split, and stored at ≤-18°C for ≤90 days. Each group comprised: test units T30 and T60, which were exposed to room temperature (RT) for 30 or 60 minutes, respectively, on days 0 and 2 of storage; a negative control (NC) unit (remained refrigerated for 5 days); and, a positive control (PC) unit, which was stored at RT for 5 days. On day 5, the T30 and T60 units were exposed to RT for 5 hours. Stability of coagulation factors FV, FVII, FVIII, fibrinogen, and prothrombin time was measured. Safety assays were
performed in units inoculated with *Serratia marcescens*, *Serratia liquefaciens*, *Pseudomonas putida* or *Staphylococcus epidermidis*. Samples were taken prior to each exposure in both arms.

**Results.** Quality assays did not show significant differences between T30 and T60 units for any of the coagulation tests in samples taken after the 5-hour exposure on day 5. Bacterial proliferation was observed in the PC units, except units inoculated with *Pseudomonas putida* tested at Héma-Québec. No bacterial growth was observed in NC, T30 and T60 units. There was no difference in bacterial concentration between T30 and T60 units.

**Summary/Conclusions.** Multiple RT exposures for either 30 or 60 minutes do not affect the stability of coagulation factors or promote bacterial growth in thawed plasma stored for 5 days. It is safe to expose thawed plasma to uncontrolled temperatures for periods of 60 minutes as recently implemented for RBC.
Rare Donors Identified through Selective Genotype Testing using Voluntary Ethnic Donor Information

Abstract Description:

Introduction

In May, 2018, selective donor red cell genotype testing was implemented using the voluntary ethnic information provided by donors at the time of donation. In the electronic donor questionnaire, an optional question regarding donor ethnicity is asked at the permanent donor center sites. The question does not reoccur once answered by a donor and will not appear on a subsequent donation medical questionnaire. The question reads as follows:

“This is an optional question about your ethnic background that will be used to help us identify rare blood groups. Are you willing to provide this information?” 97% of the donors choose “yes” to answer the question.

A Business Intelligence Warehouse report was developed to gather the data from the responses and is used in selecting donors for licensed genotype testing. Donor ethnic information will support the selective testing of donor samples for red cell genotyping to identify rare blood groups to improve the rare red cell inventory.

Design and Methods

Based on the current rare red cell inventory and demand requests for rare red cell units received through the Rare Blood Program, a genotype algorithm was developed to selectively test donor samples based on ethnicity. Donors who identified themselves as the following ethnicities, Black, Latin American and Aboriginal, were selected and donor samples genotype tested.

Results

A total of 783 donors (1% of collections) were genotyped from May 28, 2018 to March 1, 2019. Fifteen new rare donors were identified with this algorithm. The rare donors identified were negative for the following antigens, two U-, four Yt(a)-, two D(i)b-, three k-, one Co(a)-, one Lu(b)-, one hrB-, and one RzRz donor. In addition, eight rare donors previously identified by serology testing were confirmed with licensed genotyping; five U-, two Yt(a)- and one Jk(a-b-) donor. The genotype testing added seven donors to the donor base antigen negative for Jk(b)- V-VS-Fy(a-b-) and ninety-five Do(b)- donors.

Conclusions

Genotyping donors through the voluntary responses to the ethnicity question was a successful and efficient strategy to identify donors with rare blood group phenotypes.
Patient Education on Preoperative Anemia: Promoting patient activation using character-driven animation

Type Of Abstract: Scientific

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Abstract Description: Preoperative anemia affects up to 76% of the surgical population. One of the strongest predictors of allogenic blood transfusions (ABT), preoperative anemia is associated with worse patient outcomes, including post-operative morbidity and mortality. Patient blood management (PBM) is a multidisciplinary program developed to address preoperative anemia, as well as preventing unnecessary transfusions. Though PBM has been shown to reduce ABT and improve patient outcomes, many barriers to PBM implementation still exist. Among others are the lack of awareness among patients, and insufficient patient-centered educational resources that improve patient activation. Previous studies suggest that character-driven stories are especially effective in sign-posting access to health resources among different demographics. However, due to production limitations and adherence to current motion graphic trends (e.g., whiteboard animation, text animation), character-driven stories tend to be neglected in patient education. We propose to develop a patient education animation focused on three representative preoperative anemia patients. The narrative follows the characters’ health journeys from diagnose to treatment, as we use a combination of 2D and 3D character animation, motion graphics, and data visualization to clarify some of the most common misconceptions and knowledge gaps around pre-operative anemia. We hope the animation to achieve two main communication goals: 1) to educate all preoperative patients on the risk and benefits of blood transfusion; and 2) to improve public awareness of the Patient Blood Management Program (PBM), and thereby increasing patient activation and enhancing preoperative care outcomes. Upon completion, this project will be the first character-driven educational animation addressing PBM. Evaluation of this project will provide further evidence on the effectiveness of character-driven storytelling in inspiring patient activation, which will enable more biomedical communicators to produce better patient-education resources.
Factor concentrate switches: the real cost to patients, clinicians, and laboratories.

Type Of Abstract: Scientific

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Abstract Description:

Introduction: In 2018, a National Canadian Blood Services tender decision necessitated a population switch between different extended half-life (EHL) products. Decisions to make such factor switches are complex and consider various product and patient-related factors on a population level, including price-per-unit of factor concentrate. While savings are generated for the Blood Services Branch of the Ministry of Health, there is no direct financial support for patients or the clinic/laboratory services to conduct the switches. The magnitude and nature of these costs is not well understood nor previously examined. We undertook a cost impact study to identify and quantify the costs associated with EHL factor concentrate transitions in an adult population.

Methods: Patients transitioning between EHL products due to the tender between April 2018 and February 2019 were identified. All patients were asked by clinic staff about time and financial costs incurred due to the factor switch (e.g., transportation costs; meals). Using a standardized form, clinic staff documented additional work time spent as a result of the transitions (e.g., counselling; pharmacokinetic studies; ongoing management). Laboratory staff tracked work time and resources reallocated to the factor transition (e.g., inventory management; new assays; inhibitor screens).

Results: Thirteen patients were identified; collectively, these patients incurred a total of $2046 out-of-pocket expenses, averaging $157 per patient (95% CI;$14-$263). Clinicians spent a total of 73.4 additional work hours related to the transition, averaging 5.6 hours per patient transion (95% CI;3.7-7.6 hours). Blood bank and laboratories reallocated resources and staff time valuing $9442, averaging $726 per patient transition (95% CI;$572-$881). Overall, the transition resulted in a blended health and human resource cost of $1367 per patient.

Conclusion: Patient transitions between EHL products are associated with significant costs in terms of patient out-of-pocket expenses, clinician and staff time and resources. While factor tenders save money for provincial blood budgets, this fails to take into account the impact to patients and health system human resources. By better understanding the true cost of these factor concentrate transitions, we hope to inform a realistic understanding of the interaction between savings and costs generated within the healthcare system, particularly if extrapolated to a larger population switch.
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