CSTM SCMT

Canadian Society for Transfusion Medicine

Société canadienne de médecine transfusionnelle

# 2020 Abstract Booklet

Science at the forefront

à l'avant-scène

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**Abstract ID :**

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# A Frozen Plasma Discard Audit Across Three Health Authorities in British Columbia: Is There A Case For Eliminating Apheresis Plasma Units Expiring at 24 Hours Post-Thaw?

Type of abstract : Clinical


**Abstract Summary :**

**Background**

In Canada, frozen plasma (FP) either has a 5-day expiry post-thaw (FP-5d) when either collected from 1) whole blood in CPD anticoagulant or 2) through apheresis either ACD-A anticoagulant. Apheresis plasma in sodium citrate anticoagulant has a 24-hour expiry post-thaw (AFFP-1d), where its use may lead to increased wastage post-thaw. Therefore, we performed an audit to assess differences in FP discard rates across three health authorities (HAs) in British Columbia.

**Methods**

For calendar year 2019, data regarding disposition of FP was taken from each HA's respective laboratory information systems. Comparisons were between FP-5d with AFFP-1d. Discard data includes units discarded in-date (issued and returned after 30 minutes), out-dated (thawed but not issued), and frozen (including bag breakage and recall).

**Results**

In 2019, 10,164 units of FP were used at audited sites, where 1,322 (13.0%) were AFFP-1d. Overall, the units discarded were proportionally higher in AFFP-1d (12.0%) compared to FP-5d (9.2%) (p=0.001). FP-5d was mostly discarded in-date (53.3%). AFFP-1d had higher trends of out-dated units (44.7% vs 36.9%; p=0.08) and higher frozen discards (majority from bag breakage) (39.0% vs 11.8%; p=0.0001).

In HA2, the out-dated units were similar in FP-5d compared to AFFP-1d. No outdated AFFP-1d units were seen in HA3 (n=69; 1.3% of total plasma), though HA3 does not have apheresis services. In the other two HAs, AFFP-1d use accounted for 24.6% and 29.7% respectively. HA1 and HA2 had proportionally high total out-dated discards (49.9% and 59.8%) whereas HA3 had high discarded in-date units (77%).

**Conclusion**

Our audit demonstrates that higher rates of expiry post-thaw in AFFP-1d compared to FP-5d, but the majority of discards are observed in FP-5d either outdating post-thaw or being unable to be returned to inventory. Moving to FP-5d may decrease wastage due to bag breakage and outdating, however, mitigating discarded plasma units may be better with improved inventory management post-thaw, curtailing inappropriate FP orders cancelled subsequently, or ensuring thawed FP is able to be returned to inventory.



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**Abstract ID :**

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# Anti-N-Like Antibodies in the Sera of a Patient Undergoing Surgery: A Case Study

Type of abstract : Clinical


**Abstract Summary :**

**Case Study:** A 60-year-old Black multiparous female was referred to our Immunohematology Reference Laboratory (IRL) for a serological investigation prior a hysterectomy. She had never been transfused. The referring hospital had observed panreactivity in gel with LISS-suspended RBCs and negative direct antiglobulin test (DAT) and autocontrol (AT). As her phenotype results were M+ N- S- s-, an anti-U was initially suspected.

**Methods:** ABO/Rh, DAT and antibody identi cation were performed according to approved techniques. In addition to LISS-suspended RBCs and papain-treated RBCs, ID CORE XT platform (Progenika Biopharm / Grifols, Vizcaya, Spain) was used. Messenger RNA (mRNA) sequencing of *GYPA* and *GYPB* and PCR-SSP (Sequence-Speci c Primer) of *MNS6* and *MNS30* was also performed. Sibling samples were requested to conduct a family study.

**Results:** Initial serologic testing showed strongly reactive panels in gel with LISS-suspended RBCs with stronger reactions with N positive RBCs and a negative AT, leading to a probable antibody directed against a high-frequency antigen. Additional N+ S- s- U- RBCs were tested and were strongly reactive. Few RBCs identical to the patient's phenotype were tested and none were reactive. Negative results were obtained with papain-treated RBCs. The reaction's pro le obtained in gel with RBCs treated by Trypsin and DTT was identical to that obtained in gel LISS. The reactivity pro le obtained with DTT-treated sera suggested the presence of an antibody of the IgG type and of the IgM type. In the meantime, genotyping results con rmed the probable phenotype of the patient as M+ N- S- s- U- $En^a$+, He- and 'N'-. Individuals with N- S- s- U- phenotype can develop antibody that reacts with N antigen on glycophorin (GP) A and GPB and the antibody may be clinically signi cant.

**Conclusion:** This serological study showed the presence of an anti-N-Like which reacted with the N antigen on GPA and GPB. Unlike anti-N, the antibody reacted with trypsin-treated cells. Trypsin treatment typically destroyed N antigens carried on GPA. The association of serologic results combined with genotyping results served to solve this uncommon antibody and phenotype.



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**Abstract ID :**

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# Assessing the impact of platelet storage extension from 5 to 7 days: A pre-post study at a large multisite academic center

Type of abstract : Clinical


**Abstract Summary :**

**Background:** Platelets have a short storage duration, resulting in either shortages when blood donation is sparse or high outdate rates in times of low demand. In August 2017, Canadian Blood Services extended maximum platelet storage duration from 5 to 7 days, however, the impact of this practice change has not been rigorously evaluated.

**Objective:** This study assessed the impact of platelet storage extension on platelet utilization, clinical effectiveness, and safety at the Ottawa Hospital.

**Methods:** A retrospective cohort study comparing 5-day platelets (01Feb2012 to 16Aug2017) with 7-day platelets (22Aug2017 to 28Feb2019) at the Ottawa Hospital was performed. All inpatient, emergency, and outpatient hospital encounters with platelet transfusion were included. Outcomes were assessed overall and by hospital campus using descriptive statistics and interrupted time series analysis. Measures of platelet utilization were number of doses per encounter, and blood bank monthly platelet outdate rates. Effectiveness outcomes were platelet increment after a single dose, time to next platelet transfusion episode, and number of RBCs transfused per encounter. Safety was measured by reported transfusion reactions.

**Results:** The 5-day platelet period included 9,463 hospital encounters and 23,749 platelet doses, while the 7-day period included 2,933 encounters and 7,660 platelet doses. Mean platelet age at transfusion increased from 3.9 days during the 5-day period to 5.4 days during the 7-day period (mean difference = 1.5, 95% CI: 1.5, 1.6). The average monthly platelet outdate rate decreased from 11.9% during the 5-day period to 7.2% during the 7-day period (relative reduction = -39.5%, $p<0.05$). However, this decrease in outdate rate was primarily seen at our trauma and cardiac surgery campus, and not at our campus with a large hematology-oncology service. There was no significant difference in platelet utilization per encounter, time to next platelet transfusion, platelet increment, and transfusion reaction rate between the study periods. The average RBC utilization per encounter decreased by 1.3 units/encounter from the 5 to 7-day periods (95% CI: -1.9, -0.7).

**Conclusion:ti**Extending platelet storage dura on from 5 to 7 days reduced platelet outdate rates at our center without significantly affec ng platelet effec veness and safety.



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**Abstract ID :**

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# Building a Case for a Massive Hemorrhage Protocol

Type of abstract : Administrative


**Abstract Summary :**

Introduction/Objective: On September 20, 2019 Ontario's  rst recommendations for managing a massive hemorrhage were released. Given the geographical challenges and diversity of services and resources of hospitals in the province, it was recognized that a one-size- ts-all protocol would not be appropriate despite the importance of a standardized approach. To mitigate this challenge, a comprehensive toolkit will be developed to aid hospitals in implementation of the recommendations.

Design and Methods: A baseline survey was conducted to determine the proportion of Ontario hospitals with a formal massive hemorrhage protocol (MHP) and the components included. A diverse panel of experts participated in a modi ed Delphi process, the results of which were presented at a 2018 Transfusion Committee Forum and formed the basis for a provincial toolkit. The provincial toolkit will be available electronically to all Ontario hospitals via www.transfusionontario.org and launched at a 2020 Transfusion Committee Forum.

Results: Results of the baseline survey in *Injury* showed one third of Ontario hospitals did not have a formal MHP in place and those who did had marked variability in all aspects of the protocol regardless of hospital size and services. The variables included were activation criteria, lab testing, resuscitation targets, temperature monitoring, reversal of anticoagulants and blood product usage.  These variables were subjected to review by the modi ed Delphi exercise and the multidisciplinary panel voted on consensus statements in three rounds of iterative surveys. This unique approach resulted in 42 recommendations and 8 quality metrics. The toolkit is comprised of 12 sections, encompassing the 42 recommendations.  Speci c reference to pediatric patients and obstetrical bleeds will be addressed.

Conclusions:  Based on our survey, MHPs are absent in one third of hospitals with huge variability in MHPs between hospitals. By implementing the standardized provincial MHP in 150 Ontario hospitals we will strive for better patient outcomes, including faster delivery time of blood products and the monitoring of clinical and laboratory parameters. Collection of quality metrics will provide an assessment of each hospital's MHP and help to further improve patient care related to massive hemorrhage.



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**Abstract ID :**

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# Building a Community of Practice to Improve Stem Cell Donor Recruitment in Canada

Type of abstract : Administrative


**Abstract Summary :**

**Introduction:** A community of prac ce (COP) is a group of people who share a passion for something, and learn how to perform better as they interact regularly.**ti**We report the development and evalua on of a COP to improve stem cell donor recruitment outcomes in Canada.

**Methods:** In 09/2017, we launched a COP in stem cell donor recruitment in Canada. Stakeholders were invited to par cipate in e-mee ngs and a Facebook group. E-mee ng topics included running larger stem cell drives, recrui ng the most-needed donors, redirec ng non-op mal donors, reviewing drive outcomes, using pa ent stories, and reducing donor attri on. E-mee ngs included speakers and roundtable discussions. The Facebook group facilitated sharing of resources. In 01/2020, a survey was sent to COP par cipants to evaluate perceived impact of the COP. Recruitment outcomes by COP par cipants of the Canadian donor recruitment organiza on Stem Cell Club were compared before and after the COP launch.

**Results:** As of 01/2020, the COP Facebook group included 281 stakeholders in donor recruitment (266 Stem Cell Club donor-recruiters, 7 pa ents, 6 registry staff). 51 unique attendees par cipated in 7 e-mee ngs (median attendees per mee ng=14; range:11-19). 141 posts were published to the Facebook group about: pa ent/donor stories (41%); stem cell dona on resources (23%); stem cell drive outcomes (15%); donor recruitment updates (14%); ques ons by COP par cipants (5%).

44 COP par cipants completed the evalua on survey. Most agreed/strongly agreed that the Facebook group (86%) and e-mee ngs (59%) supported the community. 64-84% agreed/strongly agreed that the COP fostered collabora on, and improved their knowledge and prac ce in donor recruitment and ability to run quality drives and recruit most-needed donors. Donor recruitment outcomes improved following the launch of the COP: in 2016-2017, Stem Cell Club recruited 2918 donors (46% male; 55.9% non-Caucasian) compared to 3418 donors in 2017-2018 (52.7% male; 57.8% non-Caucasian), and 4531 donors in 2018-2019 (52.9% male; 62.7% non-Caucasian).

**Conclusion:** We describe the first COP in stem cell donor recruitment in the world, to our knowledge. The COP model can be adapted by registries and donor recruitment organiza ons worldwide to improve donor recruitment outcomes.



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**Abstract ID :**

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# Case Simulation to Audit the Rare and Specialized Products Program at Canadian Blood Services

Type of abstract : Scienti c


**Abstract Summary :**

Introduction

The Canadian Blood Services (CBS) Rare Blood program (RBP) provides coordination in the response to requests for rare and specialized blood components. Patients requiring rare blood may carry unique red blood cell antigen phenotypes not widely represented in the donor population. This study aimed to identify barriers to identifying and recruiting rare donors and to evaluate the process for evaluating expiring frozen rare inventory.

Design

This simulation study evaluated three processes and utilized quantitative and qualitative assessments.

Part one: Four scripts simulating different potentially rare blood donors evaluated the effectiveness of the National Call Center (NCC) and CBS online chat in referring appropriate donors to the RBP.

Part two: Six Canadian hospitals were surveyed to compare and evaluate the processes for passing RBP information to family members of rare phenotype patients.

Part three: Three rare frozen unit simulations completed by four sites were evaluated to assess information provided by eleven technical specialists and the impacts on decisions made by  ve RBP physicians to retain or discard the rare units from inventory.

Results

Part one: Compared to online chat, NCC phone calls were more successful in directing the caller to the RBP.

Part two: RBP information packages were variably effective depending on local hospital, awareness of rare blood and the RBP, availability of procedures and the frequency of physician communication with laboratory staff.

Part three: All rare blood physicians provided the same decision for each simulated unit. Variations in information across sites were noted, including errors in phenotype donor evaluation and supporting documents.

Conclusions

The results identi ed areas for improvement in each of the evaluated processes.  Lack of awareness and knowledge of the RBP may impact the identi cation of potential rare donors. This study highlights the importance of implementing improvements in standardization and education for both hospital blood banks and CBS staff.



Acknowledgments

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**Abstract ID :**

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# CHARACTERIZATION OF GRANULOCYTE CONCENTRATES DESTINED FOR TRANSFUSION

Type of abstract : Scienti c


**Abstract Summary :**

**Introduction**: Life-threatening infections due to neutropenia are becoming more frequent with the increased use of aggressive therapies such as chemotherapy. Mortality and morbidity due to prolonged neutropenia remains high. As a last resort, granulocyte transfusions can be used to try and save these patients' lives. Although the efficacy of granulocyte transfusions remains unknown, reported successes have warranted its use. Granulocyte concentrates (GCs) in Canada are prepared by Héma-Québec and certified for transfusion based on the quantity of granulocytes in GCs. Cell number does not, however, reflect the functional capacity of these cells.

**Objective**: To assess the viability and functional capacity of neutrophils in GCs.

**Methods**: Neutrophils were isolated from GCs of 9 healthy donors stimulated with prednisone by Ficoll-Paque gradient. The effect of apheresis and storage on GC neutrophils was assessed by determining viability (up to 48 hrs storage), the production of reactive oxygen species and phagocytosis by FACS as well as IL-8 production (ELISA) and neutrophil migration towards fMLF. The fMLF-induced cytoplasmic calcium was measured by spectrophotometry. The same assays were performed on neutrophils of non-stimulated, healthy donors. Leukocyte composition of GCs was determined by FACS.

**Results**: Prednisone stimulation generated the transfusion dose of $1.10^9$ neutrophils in GCs of 7/9 donors. The most abundant cells in GCs are neutrophils and lymphocytes. Up to 24 hrs post-apheresis, neutrophil viability is not significantly affected but necrosis increases over time. Chemotaxis and calcium mobilisation diminish significantly due to apheresis and storage time whereas PMA-induced ROS production increases. The basal level of IL-8 release by non-stimulated, GC neutrophils also increases with storage time. The effect on phagocytosis varied greatly among donors. A significant reduction in neutrophil viability and function was observed 48 hrs post-apheresis.

**Conclusion**: Our observations indicate that GC neutrophils are functional and viable up to 24 hrs post-apheresis. Storage conditions could, however, be improved to avoid a loss in chemotactic activity. The quality of this blood product is compromised 48 hrs post-apheresis. Further characterization of GC neutrophils will contribute to improving the quality of this blood product and consequently the efficacy of granulocyte transfusion therapy.



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**Abstract ID :**

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# Cold-stored leukoreduced whole blood: no impact of extended time between donation and filtration on in vitro quality

Type of abstract : Scientific


**Abstract Summary :**

**Introduction**

Cold-stored leukoreduced whole blood (LR-WB) is receiving renewed attention as an alternative to component-based transfusion therapy for actively bleeding patients. However, the only licensed platelet sparing LR filter in Canada requires that filtration be completed within 8 hr of donation. This study assessed the impact of extended hold time prior to filtration on i*n vitro* quality.

**Design and Methods**

WB was collected and held at room temperature (20-24°C) for <8hr or >8 but <24hr prior to LR. *In vitro* quality was assessed before and after filtration, and throughout three weeks of storage at 4°C. Cell count and hemoglobin levels were determined by hematology analyzer, platelet activation and responsiveness to ADP by surface expression of P-selectin, hemolysis using a HemoCue device, and metabolic parameters by blood gas analyzer. Plasma protein activities and fibrinogen levels were determined by coagulation analyzer, and hemostatic properties were assessed by rotational thromboelastometry.

**Results**

rWBC counts were reduced upon filtration to $<1x10^6$/unit. Although delayed filtration showed a statistically significant higher rWBC count, it was still below the current CSA requirement for LR components. Platelet yield decreased about 20% with LR, and dropped to 40% by day 21. Hemoglobin levels dropped by about 10% with filtration, but were maintained throughout storage. All other parameters were not significantly affected by filtration. Platelet activation increased from 19±5 to 72±6% during cold storage, but ADP still triggered a degranulation response of 11±4%. Red blood cell hemolysis was not affected by filtration and increased as part of storage lesion development to 0.25±0.07% by day 21. Supernatant potassium levels increased from 3.3±0.3 to 21±3 mM throughout storage. While thrombin and fibrinogen levels were not affected by storage, FV and FVIII activity dropped significantly to about 50% and 40%, respectively. The clot formation kinetic (alpha angle) showed a slight decrease of 12% over 21 days of storage, with the clotting time increasing from 66±2 to 84±5 sec and maximum clot firmness decreasing by about 37%.

**Conclusions**

A delay of LR filtration had no materially significant impact on quality attributes, potentially providing blood operators greater operational flexibility and enabling production of LR-WB in Canada.



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**Abstract ID :**

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# Directed Donation Utilization and Donor Health Trends at Canadian Blood Services

Type of abstract : Clinical


**Abstract Summary :**

**Background**:

Directed donation (DD) is a program at Canadian Blood Services (CBS) where parents can donate blood to their children under 18 years old. DD utilization recommendations have not recently changed. The purpose of this review is to analyze DD utilization and donor health trends.

**Methods:**

DD data from 2015-2019 was extracted from the CBS database. Data elements included donor sex, pre-donation hemoglobin, and co-component disposition. DD requisitions were also reviewed for indications from 2017-2019.

**Results:**

**Utilization:** DD collections decreased from 51 donations/30 donors in 2015, to 12 donations/12 donors in 2018. No donations were collected in 2019.

**Indications:** Between 2017-2019, 10 out of 18 collections had requisitions available for review. Four requests for DD were for NICU patients and six were for pediatric surgical patients. One plasma and 16 RBC co-components were requested on these forms.

**Discards:** 55% of all collected co-components (115/211) from 2015-2019 were distributed to the hospital. 45% (41/91) of co-components with a known disposition were transfused (39 RBC and 2 plasma). 21% (24/115) were disposition unknown. The total discard rate (hospital and CBS) for all collected and processed co-components between 2015-2019 was 78% (146/187).

**Donor and recipient health:** DD donors may be phlebotomized with hemoglobin as low as 110 g/L on first donation and 105 g/L on subsequent donations. Allogeneic whole blood donors must have a hemoglobin above 130g/L or 125 g/L for males and females respectively. 18% of all DD donors had a hemoglobin value lower than the allogeneic donor hemoglobin criterion on at least one donation; 13.9% (6/43) of males and 25% (6/23) females. One donor had a positive hepatitis B core antibody test.

**Conclusion:**

A recent shift in guidance for perioperative autologous donation (PAD) (reserving its use for rare phenotypes only) has resulted in steady PAD decline. Our data demonstrate a substantial decline in DD collections since 2015, perhaps as a beneficiary to PAD guideline changes. Given donor health, recipient safety, and system resource considerations, there is an opportunity to further evaluate the value of a DD program in today's context especially considering high discard rates.



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**Abstract ID :**

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# Eliminating the Satellite Fridge from an Emergency Department: A Quality Improvement Initiative

Type of abstract : Clinical

**Abstract Summary :**

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**Background**: Satellite fridges are used in hospitals to store blood products outside of the transfusion medicine laboratory (TML). At St. Pauls Hospital in Vancouver BC, Canada the emergency department (ED) had one satellite fridge in which four units of unmatched RBCs were maintained for use in emergent situa ons. Data collected over a six month period showed that seventeen pa ents were transfused with blood from the satellite fridge and after analysis it was determined that in only five cases was the use of unmatched RBCs jus fied (based on pa ent acuity, me in ED and group and screen collec on me). Addi onally, a recent Health Canada audit revealed poor adherence to standards surrounding traceability and satellite fridge maintenance for said fridge.

**Methods:** Several experiments were carried out to determine the length of me it took to transport unmatched RBCs units from TML to the ED under various condi ons. That data along with unmatched RBC usage and informa on on satellite fridge regulatory requirements was used for an academic detailing session with key stakeholders from the ED and the TML.

**Results**: A new workflow was implemented in which ED obtains all unmatched RBCs from the TML. In the six months after implementa on ten pa ents received unmatched RBCs in the ED with all cases being assessed as appropriate. There were no safety events or near miss events reported related to the elimina on of the satellite fridge in ED. Addi onally pa ents were switched from unmatched to matched RBCs sooner and the total number of unmatched RBCs that were issued to ED from TML was reduced.

**Conclusion**: It is feasible to eliminate the satellite fridge in an ED department providing alternate workflows can be established. Poten al workflow limita ons include ability to physically transport unmatched RBCs from TML to ED in a safe amount of me.

**Abstract ID :**

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# Engaging gay, bisexual, and other men who have sex with men (MSM) to register as stem cell donors in Canada: a pilot campaign

Type of abstract : Administrative


**Abstract Summary :**

**Aim**: Since 2009, gay, bisexual, and other men who have sex with men (MSM) have been eligible to register as stem cell donors in Canada and donate to a pa ent in need. Targeted recruitment of MSM could augment efforts to recruit the most needed stem cell donors (young and ethnically-diverse males). We describe a strategy for targeted recruitment of MSM as stem cell donors and outcomes of a pilot campaign spearheaded by the Canadian donor recruitment organiza on Stem Cell Club (stemcellclub.ca).
**Methods**: Experienced donor recruiters from Stem Cell Club were invited to run stem cell drives at Pride events. Prior to these drives, par cipa ng recruiters completed a 90-minute workshop on blood and stem cell dona on for MSM in Canada. The workshop coached recruiters to answer common ques ons about dona on policies regarding MSM. Recruiters were also taught to share the story of Ashby-Hall, a gay man who donated stem cells to an unrelated Montreal-based pa ent Susan Doherty (CBC News, 2019). A survey was employed to evaluate learning outcomes. At Pride stem cell drives, recruiters canvassed Pride attendees and guided eligible and interested attendees to register as donors with the Canadian Blood Services Stem Cell Registry.
**Results**: Since 2018, recruiters from Stem Cell Club ran 7 drives at 5 Pride fes vals in 4 ci es. 14 club leaders completed the training workshop, with 8 comple ng the post-workshop survey. Survey par cipants unanimously agreed or strongly agreed that the workshop improved their knowledge, prepara on, and skills to run drives targe ng recruitment of MSM. Overall, these drives recruited 354 stem cell donors (141 male, 42% of which self-reported as non-Caucasian). Recruiters from all drives shared their perspec ves that efforts to engage MSM as stem cell donors were well-received by the community.
**Conclusion**: We outline a strategy to engage MSM as poten al stem cell donors. Our work is relevant to donor recruitment organiza ons and registries who seek to recruit this unique donor popula on. Based on the strong outcomes to date, Stem Cell Club will con nue to run campaigns to engage MSM as stem cell donors.
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**Abstract ID :**

118

# Evaluating the Impact of Transition from Cryoprecipitate (Cryo) to Fibrinogen Concentrate (FC) in Ontario

Type of abstract : Administrative


**Abstract Summary :**

**Introduction:** In December 2018, as a result of a cryoprecipitate (cryo) shortage, several Ontario hospitals elected to switch to the use of Fibrinogen Concentrate (FC) as a source of fibrinogen replacement. In addi on to this, there was an cipa on that the release of the FIBRES (FIBrinogen REplenishment in Surgery) study results comparing cryo to FC in cardiac surgery pa ents would result in many other hospitals transi oning to FC. ORBCoN was asked to undertake a project to forecast the Ontario demand for both cryo and FC to determine the poten al cost implica ons of the transi on and the transi on melines for Ontario hospitals.

**DesigntiandtiMethods:ti**An electronic survey was sent to the top 10 cryo users in the province to obtain informa on on poten al transi on plans from cryo to FC. Cost es mates for this poten al transi on were then calculated using the 2018/19 cryo u liza on data from each hospital and the costs of an equivalent dose of FC (adult cryo dose of 10 units equivalent to 4 gram dose of FC). The current component and product price lists from Canadian Blood Services (CBS) were used to calculate the cost for each.

**Results:ti**The survey response rate was 100%. Eight of the 10 (80%) hospitals planned to transi on to FC as their primary source of fibrinogen within 6 months of the survey. Fifty-seven percent (4 out of 7) stated that they would s ll maintain a limited supply of cryo at their site for certain pa ent groups.

The es mated total cost of the transi on from cryo to FC for the top 10 users was a net increased cost of $1,917,968. However, as the cost of cryo is included within the funding formula used for fresh components, if all Ontario hospitals were to transi on from cryo to FC, the incremental cost for the province would be $7,712,433.79.

**tiConclusions:titi**By performing this forecast, both cost and me to transi on were determined which informed both the Ministry of Health (MOH) and CBS on the implica ons of each.

**Acknowledgements:ti**Thank you to the hospitals that par cipated in the survey, the MOH for con nued funding support and CBS for data.



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**Abstract ID :**

133

# Evaluation of a Provincial Plasma Protein Product Redistribution Program

Type of abstract : Administrative


**Abstract Summary :**

**Introduction:** The Plasma Protein Product (PPP) portion of the provincial redistribution program is a partnership between Ontario Regional Blood Coordinating Network (ORBCoN), Factor Concentrate Redistribution Program (FCRP) and the hospitals within Ontario. Participating hospitals are able to identify products near to expiration and the program will facilitate the redistribution to a site more likely to utilize in order to minimize wastage and ensure the sustainability of expensive PPPs.

**Objective:** The PPP Redistribution Process Evaluation project was implemented to identify areas in which the process could be made more efficient for both ORBCoN and hospital Transfusion Medicine laboratories.

**Method:** An ORBCoN working group was created to assess the current process. A survey was created in LimeSurvey™ and sent to both users and non-users of the PPP redistribution program to gain a better understanding of the successes and challenges to determine potential strategies to increase efficiencies.

**Results:** Responses were received from 83 hospitals and 100% indicated they see value in the program as it reduces waste and saves money. Challenges identified included: Laboratory Information Services (LIS) limitations and a time-consuming manual process. Forty-five percent of respondents answered that they report disposition of PPP to both Canadian Blood Services (CBS) and ORBCoN. The removal of this duplication and the need for an online reporting system was identified by many respondents as opportunities for process improvement. The working group formulated recommendations for improvements to the current PPP redistribution process based on the survey feedback from stakeholders.

**Conclusion:** The implementation of an online reporting system using the Research Electronic Data Capture (REDCap) program is in development. This application will help facilitate the entry of potential PPPs for redistribution in a user-friendly format. This solution will be an inexpensive way to maintain and streamline the process for both Transfusion Medicine laboratories and ORBCoN users. This should increase the efficiency of the process and save valuable time and resources while maintaining the cost savings to the province in preventing the unnecessary wastage of often expensive and limited PPPs.



**Acknowledgements:** Sarah Crymble FCRP, Transfusion Medicine Staff, participating Ontario hospitals, MOH, funding support



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**Abstract ID :**

177

# Exploring factors that impact Massive Hemorrhage Transfusion Protocol Universal Blood Product Utilization (MTP-UBPU Study)

Type of abstract : Clinical


**Abstract Summary :**

**Introduction:** Massive transfusion is defined as replacement or anticipated loss of more than 10 units of packed red blood cells (RBCs) within 24 hours. A massive transfusion protocol (MTP) is an institution specific process that helps ensure timely delivery of blood products to critically injured or massively hemorrhaging patients. Since its first implementation, in 2013, the MTP has undergone adaptations to meet ongoing clinical need and reflect evidence-based practice.

**Objectives:** The objective of this quality improvement study is to implement Lean principles and value-stream mapping to identify and minimize non-value-added time within Hamilton MTPs.

**Methods:** We performed a retrospective chart review of all MTP activations at Hamilton Health Sciences and St. Joseph's Healthcare, during the 2017 calendar year. Key time points were recorded and mapped for each step of the protocol. The McMaster Centre for Transfusion Research's Transfusion Research Utilization Surveillance and Tracking (TRUST) database was also utilized to gather additional information not available from the chart review.

**Results:** There were 71 MTP activations on 69 patients in 2017. The median time for blood blank to issue the first cooler was 5 minutes, IQR (3.00, 6.75). The majority of MTP activations ceased after 2 coolers. The median time to receive a group and screen sample was 14 minutes, IQR (7.00, 40.00), while the median sample turn-around-time was 11 minutes, IQR (6.00, 17.25). 48% of patients received ≥6 units of RBCs. In total, 365 RBCs, 207 frozen plasma, and 51 platelet units were issued as part of MTPs in 2017.

**Conclusions:** Based on recently published massive transfusion quality metrics, Hamilton MTPs performed well in 2017. Our transfusion medicine services completed group and screen testing rapidly, and issued the first cooler of blood products much faster than the recommended benchmark of 15 minutes. However most MTP protocols end before the lab is able to transition to group specific products. This initial study reviewed our laboratory practices, however, further investigation into other elements of the MTP are required, including product utilization.



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**Abstract ID :**

137

# Exploring frequency and reasons for high demand days in hospital blood component utilization: a 10-year retrospective study at a large multisite academic centre

Type of abstract : Clinical


**Abstract Summary :**

**Background:** While studies have evaluated the impact of trauma and mass casualty events on hospital blood utilization, there is little evidence on other factors that can cause surges in demand.

**Objective:** The aims of this study were, first, to characterize peak days in red blood cell (RBC) utilization over the past 10 years at a large academic centre, and second, to compare RBC peaks with peaks in platelet, plasma, and cryoprecipitate utilization.

**Methods:** This was a retrospective cohort study of all inpatient and emergency department (ED) transfusions of RBCs, platelet, plasma, and cryoprecipitate between May 2009 and April 2019 at the Ottawa Hospital. For each blood component, a peak in utilization was defined as a day with a ≥50% increase in the number of units transfused compared to the previous 90-day average. Consecutive peak days were grouped into a single peak. A descriptive analysis was performed to characterize peaks in blood utilization.

**Results:** There were on average 20,501 RBCs transfused per year and 56 RBCs transfused per day over the 10-year study period. There were 134 peaks in RBC utilization over the study period, with an average of 13.7 peaks per year. Most peaks (90.3%) were 1 day in duration, while the rest lasted 2-4 days. One-third of the RBC peaks (31.3%) were caused by a single patient, whereas 68.7% were caused by ≥2 patients. RBC peaks occurred most often on Fridays and least often on weekends ($p<0.0001$). 76.9% of peaks had surgical bleeding as a cause, 33.6% had trauma as a cause, and other causes were less frequent. RBC peak days required on average 38 more RBC units than nonpeak days ($p<0.0001$). Over the study period, there were 292, 467, and 579 peaks in platelet, plasma, and cryoprecipitate utilization, respectively. RBC peak days coincided often with plasma peak days, but less frequently with platelet and cryoprecipitate peaks.

**Conclusion:** This study brings novel insight on the timing and causes of peak days in RBC utilization. With further analyses and exploration, this may be of value to hospital blood banks for emergency planning and blood inventory management.



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**Abstract ID :**

175

# Freon-exposed red cell concentrates: determination of residual refrigerant by mass-spectrometry

Type of abstract : Scientific


**Abstract Summary :**

**Introduction**

There have been rare occasions where a cooling system failure has resulted in leakage of refrigerant into fridges holding red cell concentrates (RCC), leading to product discard. An inves ga on was undertaken to determine if refrigerants could be detected in RCCs after such exposure, and if so, determine what strategies might be used to handle such incidents should they occur.

**DesigntiandtiMethods**

The study was designed to: detect and quan fy refrigerants in RCCs; determine if refrigerants are dispersed or found in preferen al sites; determine if refrigerants diffuse out of RCCs once removed from a refrigerant-contaminated environment. Standard curves were generated using gas chromatography – mass spectrometry by spiking known amounts of specific refrigerants into RCC supernatants (SNs). Level of detec on was calculated to 0.6 ppm. 30 refrigerant-exposed RCCs and 20 control RCCs were analyzed. Diffusion experiments were done by spiking refrigerant into RCCs and storing them in a refrigerant-free environment. RCCs were washed using an ACP-215 automated cell processor.

**Results**

Based on standard curves, the refrigerant level in units exposed to refrigerant in a fridge was between 2 to 30 ppm dependent on storage loca on. Refrigerant exposure had no no ceable impact on hemolysis. Diffusion of refrigerant out of storage containers did not occur, even after 5 weeks storage in a refrigerant free environment; similar results were found when the RCCs were moved to room temperature storage. No refrigerant was detectable in the red blood cell por on of refrigerant exposed RCCs, sugges ng preferen al loca on in the SN. When refrigerant exposed SN was held overnight in open-top glass vials, no refrigerant was detectable in the SN upon reanalysis.. Following washing, even high ini al refrigerant concentra ons were reduced to an undetectable level.

**Conclusions**

The presence of refrigerants in RCC units exposed to a refrigerant contaminated environment was detectable and quan fiable. Study data show that the refrigerant, preferen ally located within the SN, did not diffuse out of the unit if moved to a refrigerant free environment. However, washing refrigerant-exposed units did result in refrigerant removal and could be an op on to prevent discard of valuable RCCs if exposed to such refrigerants.



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**Abstract ID :**

152

# Improvement in Provincial Red Blood Cell Utilization Following Implementation of the Ontario Transfusion Quality Improvement Plan

Type of abstract : Administrative


**Abstract Summary :**

Introduction: In 2014, a provincial quality forum was organized by the Ontario Regional Blood Coordinating Network (ORBCoN) to review existing quality improvement initiatives in transfusion medicine within Canada and internationally. A provincial committee was created to develop a quality improvement plan (QIP) for transfusion in Ontario. Based on results of a 2013 provincial red blood cell (RBC) audit it was decided to focus on improving RBC utilization at Ontario hospitals.

Method: Using a template created by Health Quality Ontario, the Ontario Transfusion Quality Improvement Plan (OTQIP) Committee developed a roadmap to improve utilization of RBC. An accompanying toolkit was launched in 2016 in partnership with Choosing Wisely Canada to aid hospitals in implementing a QIP to improve RBC utilization. Two key performance measures were recommended based on published evidence to monitor improvement over time.

Results: Hospitals were asked to report their RBC QIP performance indicators using an online tool. For hospitals entering "inpatient only" data (21 hospitals) into the tool, the average per cent of RBC transfusions given to stable inpatients with a hemoglobin < 80g/L at baseline was 72% and the average per cent of RBC transfusions ordered as a single unit was 35%. Averages for repeat audits for pre-transfusion hemoglobin <80 g/L and single unit transfusions was 78% and 59% respectively. Twenty-four additional hospitals in Ontario collected both quality metrics with the average of pre-transfusion hemoglobin <80 g/L and single unit transfusions at 77% and 55% respectively. Comparing baseline to repeat audit for both metrics yielded an 8% improvement in pre-transfusion hemoglobin <80 g/L and a 69% improvement in single unit transfusions.

Conclusion: The development and launch of a provincial transfusion QIP toolkit to encourage hospitals to improve the use of RBC in Ontario has resulted in a standardized approach to quality improvement, standardized metrics to track progress and demonstrated improvement in transfusion practice with over one third of hospitals in the province participating. The OTQIP Committee is now considering adding another component to the provincial transfusion QIP.



Acknowledgements: OTQIP committee, Ontario hospital personnel and the Ministry of Health which provides funding for ORBCoN



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**Abstract ID :**

171

# Infusion Pump Related Hemolysis

Type of abstract : Scienti c


**Abstract Summary :**

**Introduction / Objective**

Mechanical stress on red blood cells and the resulting hemolysis is a concern associated with using infusion pumps for administration of red cell concentrate (RCC). There is currently no standard protocol for evaluating infusion pumps entering Canadian hospitals.

This study investigates RCC quality after passage through four infusion pumps (one peristaltic, two linear peristaltic and one piston-type pump) used across Canada. Useful lab measurements for the evaluation of pump safety and the significance of age/condition of RCC for such evaluations were assessed.

**Design and Methods**

RCCs were pumped on (a) d22 (22 days after collection), (b) d40, (c) d28 after gamma irradiation on d14, and (d) d22 after irradiation on d21. For each experiment, 3 ABO-matched RCC units were pooled and split among four bags, each used for a pump. Samples were collected at gravity (no pump) and after pumping at 50, 150 and 300 mL/h. Hemolysis%, mechanical fragility index (MFI), LDH, potassium and microvesicle levels were measured. Data were analyzed by repeated measures ANOVA and Tukey's multiple comparison tests (n=4 or 5).

**Results**

For all study arms, hemolysis levels were significantly higher in peristaltic pump samples compared to the other pump mechanisms ($p<0.05$). The increase in hemolysis% due to infusion pumps in RCC irradiated on d21 ($\Delta$ hemolysis% = 0.069± 0.05) was significantly higher than all other tested RCC conditions ($p<0.0001$). d40 RCC also had significantly higher increases in hemolysis due to pumps compared to d21 RCC ($p<0.01$). Although some significant differences among the potassium levels and MFI were observed, these two markers as well as microvesicles were not identified as sensitive measures of pump effects. LDH measurements, however, reflected hemolysis level measurements. The slowest rate (50 mL/h) consistently yielded higher hemolysis and LDH levels compared to gravity and other rates, although not statistically significant.

**Conclusion**

Pump mechanism affects the level of increase in hemolysis. However, for all tested pumps and RCC conditions, this increase was deemed minimal and clinically insignificant. Hemolysis% and LDH measurement on d40 and irradiated red cells on d21 were concluded to be appropriate criteria for pump evaluation.



**Acknowledgements**

We would like to thank blood donors, ICU Medical, CareFusion, BBraun, Becton Dickinson, Royal Jubilee Hospital, Nursing Resource Group at PBCO in BC, Robert Romans and Burroughs Wellcome Fund.



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**Abstract ID :**

157

# Intravenous Immunoglobulin IgPro10 and the Risk of Haemolytic Anaemia: A US Cohort Study

Type of abstract : Clinical


**Abstract Summary :**

**Introduction:ti**Haemoly c anaemia (HA) has been reported in associa on with intravenous immunoglobulins such as IgPro10 (Privigen®, CSL Behring) and is mediated by the passive transfer of isoagglu nins. T o mi gate the risk of HA, two isoagglu nin reduc on measures were implemented during IgPro10 produc on (screening/exclusion of donors with high an -A tres subsequently replaced by immunoaffinity chromatography).

**DesigntiandtiMethods:ti**Study cohorts of pa ents treated with IgPro10 in three calendar periods were derived from the US Premier Healthcare Database: Period 1 (01/2008-12/2012; no reduc on measures, reference), Period 2 (10/2013-12/2015; donor screening) and Period 3 (10/2016-04/2019, immunoaffinity chromatography). The study outcome consisted of the incidence of HA, defined from an algorithm and a manual pa ent records review. During the three periods, risk of HA within 10 days following IgPro10 administra ons was compared using incidence rate ra os adjusted for in-/outpa ent setting, age, sex, indica on and dose.

**Results:** Three study cohorts consisted of 9439 IgPro10 users in Period 1, 7710 in Period 2 and 7759 in Period 3. Crude incidence rates of HA were 1.49 (95% CI: 1.06-2.05) per 10,000 person-days in Period 1 (38 events), 1.01 (0.62-1.57) in Period 2 (20 events) and 0.14 (0.03-0.41) in Period 3 (threeevents). In Period 1, crude incidence rates were highest in the following subgroups: in-pa ent hospital setting, age <18 years, immune thrombocytopenia indica on, IgPro10 dose ≥0.75 g/kg body weight and first ever IgPro10 use. Reduc on in HA incidence was seen with immunoaffinity chromatography in these subgroups; crude incidence rate ra os of HA for Period 3 versus Period 1 were 0.11 (0.01-0.42), 0.07 (0.00-0.51), 0.11 (0.00-0.70), 0.08 (0.01-0.31) and 0.14 (0.03-0.45), respec vely. Overall, adjusted incidence rate ra o for HA was 0.72 (0.41-1.24) in Period 2 and 0.10 (0.03-0.33) in Period 3 compared with Period 1, reflec ng 28% and 90% reduc ons in HA incidence from Period 1 to 2 and from Period 1 to 3, respec vely.

**Conclusions:** The risk of HA in associa on with IgPro10 has substan ally decreased due to the implementa on of isoagglu nin reduc on measures during IgPro10 produc on. As a result, HA has become a rare event in associa on with IgPro10 use.



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**Abstract ID :**

143

# Is 120ug Rh Immune Globulin sufficient for prophylactic treatment of postpartum Rh(D) negative women delivering an Rh(D) positive neonate?

Type of abstract : Clinical


**Abstract Summary :**

**Introduction**

Postpartum administration of Rh Immune Globulin (RhIG) to Rh(D) negative women who deliver Rh(D) positive babies prevents anti-D alloimmunization. Depending on institutional policies, a standard dose of either 120 or 300 µg RhIG is given, with subsequent doses prescribed on the basis of screening for Fetal Maternal Hemorrhage (FMH). At our institution, 300 µg is the standard dose. The Rh Program of Nova Scotia and the Blood Authority of Australia guidelines recommend a standard dose of 120 µg RhIG, which is sufficient to prevent alloimmunization against up to 6 mL of fetal red blood cells (RBCs). A 120 µg dose is also recommended by the Society of Obstetricians and Gynaecologists of Canada, as well as our supplier of RhIG, Saol Therapeutics. Implementation of a smaller standard dose combined with screening for FMH can reduce unnecessary use and expenses.

**Objective**

To determine the proportion of Rh(D) negative women for whom a 120 µg dose of RhIG would be adequate prophylaxis against anti-D alloimmunization. .

**Design and Methods**

We conducted a retrospective audit over a two-year interval (2018-2019) of Rh(D) negative women who delivered Rh(D) positive neonates. The Rosette test was used for screening and if positive, FMH was confirmed using Kleihauer-Betke (KB) and quantified using Flow Cytometry.

**Results**

1078 Rh(D) negative women were analyzed. The Rosette test was done on 92% of samples. 8% of samples went directly to KB testing due to the depletion of Rosette test reagent (6.1%) and known weak D genotype (1.9%). 99.4% of samples had a FMH of <6 mL of RBCs as determined by a negative Rosette test (90.4%), negative KB (8.0%) or Flow Cytometry (1.0%). 0.6% of samples had a FMH of >6mL.

**Conclusions**

A 120µg dose of RhIG would be adequate for 99.4% of the women in our study, whereas a 300 µg dose would be indicated for 0.6% of women. A standard postpartum dose of 120 µg for all Rh(D) negative women who deliver Rh(D) positive babies with screening for FMH would, therefore, be adequate prophylaxis against anti-D alloimmunization and would be more cost-effective.



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**Abstract ID :**

159

# RBC immunisation model identi es antigen density as a driver of IgM to IgG class switching

Type of abstract : Scienti c

**Abstract Summary :**

**Introduction:** Exposure to foreign antigens on red blood cells (RBCs) can lead to RBC alloimmunisation and the generation of alloantibodies. These can cause significant morbidity and mortality through haemolytic transfusion reactions and haemolytic disease of the foetus and newborn. Thus, understanding the factors underlying RBC alloimmunisation is critical. In addition to donor and recipient characteristics, intrinsic RBC antigen factors have been shown to play an important role in immunogenicity. However, it has been difficult to differentiate between the impact of the structural variability of different RBC antigens versus the density of RBC surface antigens. Consequently, we developed a mouse model that examines the effect of antigen density on the immune response following RBC immunisation. *We hypothesise that low antigen densities below an antibody production threshold will fail to induce immune responses while high antigen densities will lead to increased immune responses.*

**Methods:** The model antigen hen egg lysozyme (HEL) was coupled to $^{C57BL/6}$RBCs to achieve different surface HEL-antigen densities. These $^{HEL}$RBCs were used to challenge (Day 0) and re-challenge (Day 28) C57BL/6 mice and their IgM and IgG responses were analysed via ELISA.

**Results:** The RBCs showed consistent expression of low, medium or high HEL concentrations without any cell toxicity. Consistent with our hypothesis low $^{HEL}$RBCs failed to generate an antibody response, whereas medium and high $^{HEL}$RBCs led to increased immune responses. Interestingly, low and medium $^{HEL}$RBCs led to increased IgM responses compared to high $^{HEL}$RBCs at day 7. This could be due a faster or skipped IgM response which would need to be evaluated with earlier time points. Re-challenge of the mice with $^{HEL}$RBCs of the same antigen density led to lower IgM responses but higher IgG responses when compared to the initial responses.

**Conclusions**: We generated a mouse model that examines the effect of antigen density on RBC immunisation. The model showed that antigen density is a potent driver of immune responses to RBC antigens and hints at the existence of an antigen threshold for antibody responses. In the future, it can be used to evaluate the effect of the density of various other RBC antigens on immunogenicity.

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**Abstract ID :**

184

# Red Blood Cell Transfusion Practice Patterns in Myelodysplastic Syndrome

Type of abstract : Clinical


**Abstract Summary :**

**Introduction**

Red blood cell transfusions are an important aspect of supportive care in myelodysplastic syndrome (MDS) that aim to alleviate symptoms of anemia. However, chronic transfusion therapy is associated with several complications, including iron overload, alloimmunization and transfusion reactions. Real world transfusion practice and its resulting harms and benefits have not been thoroughly described.

Our retrospective cohort study will describe current transfusion practice patterns in MDS patients at The Ottawa Hospital, a tertiary care and regional referral centre for MDS patients, between January 2009 and March 2019. We hope that in better characterizing our clinical practice and the prevalence of acute and long-term complications of chronic transfusion therapy, we will identify opportunities to optimize the care of chronically transfused patients with MDS.

**Methods**

Data regarding patient demographics and transfusion reactions or complications was obtained through several sources including centralized databases and individual chart review. Additional variables such as MDS risk category, concurrent treatments and number/volume of transfusions were also collected. The primary outcome will be a composite of death, hospitalization, rates of ICU admission, iron overload, transfusion reactions and cost.

**Results**

Initial review shows that 251 patients met our inclusion criteria. The median age was 79; almost 40% (n=87) had pre-existing cardiopulmonary disease. Each patient underwent, on average, 14.7±25.2 transfusion episodes for a total of 27.7±48 PRBC over the study period. Patients visited the ED 2±3 times and had 1.3±1.8 admissions lasting, on average, 14.84±32.2 days. 22 patients developed new congestive heart failure over this time period.

Individual chart review is ongoing. Multivariate analysis will identify patient and disease characteristics associated with higher transfusion burden and resulting complications.

**Conclusion**

Our chronically transfused MDS patient population is elderly and highly comorbid. These patients also incur a significant transfusion burden and often experience prolonged hospitalizations. By further stratifying patients according to disease risk category and concurrent therapies, including hypomethylating agents, our study will provide important insight into transfusion practice patterns and associated outcomes in the large, heterogenous MDS patient population treated at our centre. It will also enable us to identify areas for optimizing our transfusion practice.



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**Abstract ID :**

151

# Reducing Unnecessary Duplicate Group and Screen Collections: Creating a Hard Stop

Type of abstract : Clinical

**Abstract Summary :**

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**Background**: Group and screens (G&S) are required to safely transfuse blood products however over sampling can result in iatrogenic anemia and is not in line with established principles of patient blood management and choosing wisely. Through the patient safety learning system (PSLS) at Providence Health Care it was identified that 10% of transfusion medicine related safety events reported over an eight-month period were due to duplicate G&S sampling (N=18). After several failed education attempts it was decided to develop a hard stop in the electronic ordering of G&S samples.

**Methods**: In collaboration with the IT department a hard stop was created in the electronic ordering system such that if a valid G&S already existed a second dialogue box would appear requiring the user to either cancel the duplicate order or processed by selecting an approved indication for duplicate collection.

**Results:** In the six months following the introduction of the electronic hard stop only two inappropriate collections occurred, representing less than 1% of reported transfusion medicine PSLS events. One was entered as sample expiring within 24 hours when it was not, and one was collected during a computer downtime, so no electronic order entry was utilized.

**Conclusion**: Implementing an electronic hard stop to prevent duplicate G&S collection is superior over education alone. This is dependent on the utilization of electronic order entry and thus duplicate samples can still be collected during periods of downtime. Although not specifically studied the reduction in duplicate collections also resulted in reduced phlebotomy time, sample processing time and associated cost savings.

**Abstract ID :**

121

# TACO-BEL-3: A feasibility study and a retrospective audit of diuretics for patients receiving blood transfusion at ten hospitals

Type of abstract : Clinical


**Abstract Summary :**

**Background:** Transfusion-associated circulatory overload (TACO) is the leading cause of transfusion related morbidity and mortality. A recently completed pilot trial that randomized patients 65 years and older to pre-transfusion furosemide versus placebo had a slower than expected enrollment rate. We sought to determine whether the lack of recruitment was due to a paucity of eligible patients or excessively restrictive eligibility criteria.

**Methods:** At 10 sites, eligible patients were retrospectively identified by first screening blood bank databases over 1 month for all transfusion episodes meeting trial inclusion criteria, defined as non-surgical inpatients receiving single RBC unit transfusions. The lower age limit was decreased from 65 to 50 years. The first 10 patients meeting inclusion criteria then underwent detailed chart review for exclusion criteria (bleeding, hypokalemia, hyponatremia, severe renal dysfunction, hypotension and scheduled surgical procedures within 24 hours). The proportion of patients undergoing chart review who had no exclusion criteria was then applied to the total number meeting inclusion criteria to approximate the number of eligible patients. Chart review also included an assessment for both incidence and risk factors for TACO, and physician practice patterns for pre-transfusion furosemide use.

**Results:** At the 10 participating sites, 11 969 red cell units were transfused over 1 month and 1356 met the inclusion criteria. Of the 100 charts, 60 (60%) had no exclusion criteria. Active bleeding was the most common reason for ineligibility. There were therefore approximately 814 eligible transfusion episodes at the 10 participating sites. Of the eligible patients, 17 (28.3%) had evidence of congestive heart failure, and peri-transfusion furosemide was prescribed in 16 (26.7%). The median furosemide dose was 40 mg. Three cases of TACO were detected on chart review for an incidence rate of 3%.

**Conclusion:** A large number of transfusion episodes at the 10 participating meet eligibility criteria for a randomized controlled trial of pre-transfusion furosemide for the prevention of TACO. With a baseline 3% incidence of TACO, a presumed 50% decrease through the use pre-transfusion furosemide, and a 30% consent rate, a definitive trial of approximately 3000 patients could be completed within one year.



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**Abstract ID :**

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# Testing and management of fetal and neonatal alloimmune thrombocytopenia

Type of abstract : Clinical


**Abstract Summary :**

**Introduction/Objective**

Fetal and neonatal alloimmune thrombocytopenia (FNAIT) is an immune-mediated cause of thrombocytopenia in neonates due to maternal anti-human platelet antigen (HPA) antibodies. It affects 1 in 1500 live births and may result in severe bleeding, including intracranial hemorrhage, leading to fetal/neonatal demise or long-term disability. Appropriate diagnostic testing is required to guide management. The paucity of evidence related to FNAIT complicates management, however new practice recommendations are now available to guide medical decisions. This study aimed to highlight the diagnostic testing strategy and blood product treatment recommendations in the context of Canadian practice.

**Design and Methods**

The diagnostic testing algorithm for FNAIT investigations in Canada was reviewed. Recent publications recommending antenatal and postnatal management of FNAIT, and the availability and ordering mechanism for platelets of specific HPA types were identified. The number of FNAIT cases diagnosed and the number of HPA matched platelets issued for treatment of neonatal thrombocytopenia in Canada were reviewed.

**Results**

When FNAIT is suspected, diagnostic testing is available from the Canadian Blood Services (CBS) National Platelet Immunology Reference Laboratory (NPIRL). Testing methods include anti-HPA antibody screening of maternal serum, HPA genotyping of maternal, paternal and/or neonatal samples, and confirmation of antibody reactivity and specificity using the monoclonal antibody immobilization of platelet antigens (MAIPA) assay. In 2018, the NPIRL performed 292 patient HPA genotypes, 390 HPA antibody screens/identifications and 1918 donor HPA genotypes. Antenatal management for FNAIT includes intravenous immunoglobulin (IVIg) therapy, while platelet transfusion is used postnatally to prevent and mitigate bleeding in the neonate. The platelet transfusion threshold is 30-50 $x10^9$/l. HPA-matched platelets provide a better platelet increment; however unmatched platelets also help achieve hemostasis. HPA typing is provided on all apheresis platelet units. Additional HPA-matched platelets may be requested from CBS, which maintains a national database of all registered apheresis platelet donors and their HPA genotypes.

**Conclusions**

Testing for FNAIT ensures appropriate HPA-matched platelet units are chosen for the neonate. HPA-matched platelets are preferred if immediately available, however unmatched units should be provided in the interim.



**Acknowledgements**

Thank you to Tricia Abe at CBS for her advice and editing.



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**Abstract ID :**

115

# The Impact of Red Blood Cell Transfusion on Mortality and Treatment Efficacy in Oncology Patients Treated with Radiation: A Systematic Review of the Literature

Type of abstract : Clinical

**Abstract Summary :**

**Introduction:** Red blood cell (RBC) transfusion practices for patients undergoing radiotherapy (RT) vary due to low-quality retrospective data suggesting that anemic patients may respond sub-optimally to RT. No high quality evidence exists to guide transfusion practices and establish thresholds for this patient population. Our systematic review aimed to investigate whether maintaining higher hemoglobin (Hb) levels using RBC transfusions in radiation oncology patients leads to improved outcomes.

**Design and Methods:** We performed a systematic review based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines, using the PubMed (Medline), EMBASE and Cochrane Library databases queried from database inception until January 2019. We included randomized controlled trials, cohort studies and large case series comparing RBC transfusion thresholds in radiation oncology patients. Included studies needed to compare transfusion at lower versus higher Hb thresholds. The primary outcome was overall survival. Secondary outcomes were locoregional disease control, number of transfusions and transfusion-related adverse events.

**Results:** Our search yielded 6172 titles. Only one study met the pre-specified inclusion criteria; therefore, a meta-analysis was not performed. The included study pooled results from two randomized controlled trials that stratified patients with head and neck squamous cell carcinoma with low pre-radiation Hb levels (females <130 g/L and males <145 g/L) to RBC transfusion versus no transfusion. The study found no statistically significant differences between groups in overall survival or locoregional disease control after five years of follow up, despite increased Hb levels in the transfused group. We expanded the review to extract data from relevant trials not meeting inclusion criteria (n=10) to conduct a narrative review. These studies examined retrospective cohorts and had inconsistent results regarding the effect of anemia and transfusion on survival and disease control.

**Conclusions:** Optimal transfusion practice in radiation oncology is controversial with no available high quality evidence or guidelines. Our review found a single interventional trial in head and neck cancer comparing Hb transfusion thresholds, which found that a higher Hb target conferred no benefit. Well-designed prospective studies are urgently needed given the unique radiobiology of different cancer histologies and potential variability in Hb targets.

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**Abstract ID :**

125

# The PASSeS 3D Study Interim Results: What is the value of keeping inpatient group and screens in-date?

Type of abstract : Clinical


**Abstract Summary :**

**Introduction/Objective**

Regulations in North America require pre-transfusion compatibility testing within 96 hours of a transfusion if a patient has a sensitizing event, where pragmatically a 3 day specimen life is adopted for inpatients regardless. Our hospital allows ordering of serial group and screens (G&Ss) every 3 days to keep it in-date. To determine the value of this policy, we performed a retrospective review of patients with this order, hypothesizing the low value-add of this policy to detect clinically signi cant antibodies notably in the absence of a sensitizing event.

**Design and Methods**

This study assessed adult (≥18) inpatients from calendar year 2018 in a tertiary care centre, admitted for at least 10 days with serial G&Ss. Our primary outcome was alloimmunization with a clinically signi cant antibody, strati ed by transfusion during admission. Data abstraction included demographics, G&S results, immunocompromise from disease or medications, and transfusion history. Logistic regression was used to calculate adjusted odds ratio risks of alloimmunization.

**Results**

Our cohort included 974 patients, consisting of hematology/oncology patients (39.3%), followed by surgical (26.7%), and medical (22.2%) patients; of which the majority were transfused in-hospital (84.3%), had a documented history of transfusion (62.2%), and/or had risk factors for immunocompromise (70.1%). 25 (2.6%) had a newly positive G&S, 19 (2.0%) being clinically signi cant alloantibodies, all linked to in-hospital transfusion. One patient had a warm autoantibody on rst G&S without in-hospital transfusion. Multivariate logistic regression demonstrated trends of increased risk with RBCs transfused (median of >5; OR 2.90, 95% CI 0.85-13.0) or number of G&Ss (median of >9; OR 4.46, 95% CI 0.92-30.72); but not with immunocompromise, admitting service, length of stay, gender, age, or documented history of transfusion.

**Conclusions**

In our inpatient cohort at high risk for transfusion with minimal information bias, alloimmunization rates were low and all associated with inpatient sensitizing events. This warrants re-evaluation of our policy to allow G&Ss to be kept in-date automatically, to reduce iatrogenic anemia and unnecessary testing. Our interim results may suggest inpatients under certain circumstances, without sensitizing events, could have G&Ss extended without signi cant risk, though larger studies are needed for con rmation.



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**Abstract ID :**

116

# Trends in Maternal Age in Ontario from 2013 to 2019

Type of abstract : Clinical


**Abstract Summary :**

**Introduction**: Female children and women of "child-bearing potential" should receive type O negative red cells if emergency transfusion is required, but this blood type is often in short supply. The maximum age used to define child-bearing potential varies between hospitals throughout Ontario. Although it has been shown previously that age 45 is a safe "cut-off" for defining child-bearing potential in Ontario, some clinicians have expressed a concern that maternal ages may be trending upward, and that an age cut-off of 45 years may be too low. This study was performed to define a safe "cut-off" age for defining child-bearing potential and to look for trends in maternal age over time.

**Methods**: The Canadian Institute for Health Information (CIHI) was contracted by the Ontario Regional Blood Coordinating Network to provide maternal age data for Ontario women. Data for the fiscal years (FY) 2013-2014 to 2018-2019 were used.

**Results**: There were a total of 787,761 in-hospital live births in Ontario in fiscal years FY2013-2014 to FY2018-2019. Of these, 786,403 (99.8%) were to women age 45 years and younger. Although there is a slight upward trend in maternal ages 40 and 41, the trendlines for maternal ages above that are essentially flat.

**Maternal age trends in Ontario 2013-2014 to 2018-2019**

| | FY13-14 | FY14-15 | FY15-16 | FY16-17 | FY17-18 | FY18-19 |
|---|---|---|---|---|---|---|
| **age 40** | 2012 | 2037 | 2124 | 2045 | 2164 | 2221 |
| **age 41** | 1416 | 1334 | 1394 | 1414 | 1487 | 1567 |
| **age 42** | 916 | 875 | 834 | 882 | 886 | 952 |
| **age 43** | 536 | 538 | 587 | 561 | 581 | 607 |
| **age 44** | 268 | 294 | 304 | 306 | 313 | 293 |
| **age 45** | 141 | 156 | 160 | 131 | 170 | 169 |

**Conclusions**: The maximum age at which Ontario women should be considered to be of child-bearing potential, and thus eligible for receipt of O negative red cells in an emergency situation, may be defined as 45 years. No significant upward trending of maternal age was identified.



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CSTM SCMT

Canadian Society for Transfusion Medicine

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