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Vojenská fakultní nemocnice
Praha

Novinky z AABB 2023

pplk. MUDr. Dominik Kutáč, Ph.D.

aabb[™]

2023
NASHVILLE
OCTOBER 14-17

AABB 2023 v číslech

- 4 dny
- 84 edukačních bloků
- 436 abstrakt – 77 přednášek, 359 posterů



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Edukační sdělení

- THOR/AABB: Prehospital Transfusion: Latest Evidence and Expert Discussion
- The Unextinct Dinosaurs, Whole Blood in Civilian Transfusion Practice
- Armed Service Blood Program: Readiness in the Present with Focus on the Future
- Civilian Walking Blood Banks: Considerations for Crisis Readiness and Settings Where Banked Blood is Unavailable
- New Insights into the Development and Consequences of RBC Alloimmunization

Edukační sdělení

- How to Build a Pre-Hospital Transfusion Program Between Emergency Medical Services and a Hospital-based Transfusion Service Versus a Blood Center
- Research and Progress – Cold Stored Platelets
- Designing and Optimizing Massive Hemorrhage Protocols



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Úvod edukačních sdělení - místní nákupní centrum



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Edukační sdělení

Prehospital LTOWB Transfusion

Whole truths but half the blood: Addressing the gap between the evidence and practice of pre-hospital and in-hospital blood product use for trauma resuscitation, DOI: 10.1111/trf.16515

- All adult trauma patients reported to the National Emergency Medical Services Information System (NEMSIS) dataset 2019.
- 3,058,804 pre-hospital trauma patients
- 313 (0.01%) received any blood transfusion;
- The proportion of ACS-verified trauma centers transfusing LTOWB increased from 16.7% (45/269) in 2015 to 24.5% (123/502) in first quarter of 2020.

Prehospital LTOWB Transfusion

- Mayo Clinic helicopters
 - LTOWB
 - Cold Stored Platelets (CSP)
 - O neg pRBCs
 - Group A thawed plasma



Key Messages

- Transfusing a balanced ratio of blood components in MTPs to treat trauma has shown improved outcomes in both pediatric and adult settings.
- LTOWB has been shown to be safe and effective in adult and pediatric studies, with some studies showing it to be superior to balanced CT
- The logistics of dispensing whole blood is appealing to transfusion service personnel; dispensed as a single component, no thawing

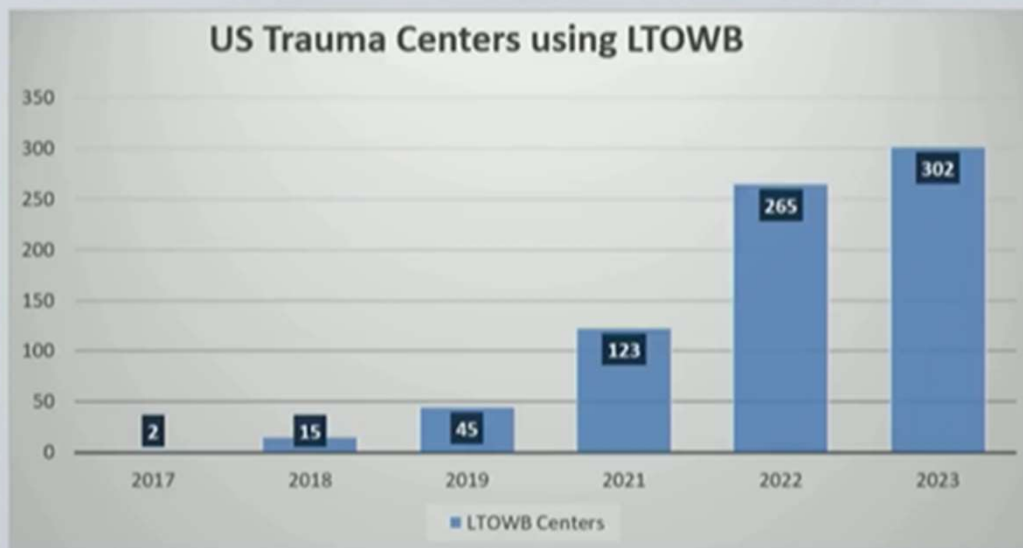


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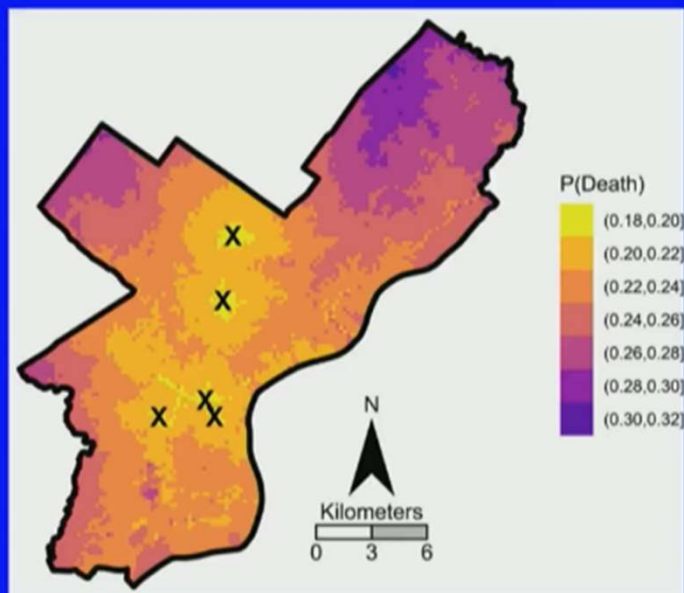
LTOWB in the US



Edukační sdělení

Distance matters

Philadelphia, Pennsylvania, USA



Circo and Wheeler. *Applied Spatial Analysis and Policy* 2021;14:379-393

Distance matters

- 8% increase in mortality for every 5-miles (8 km) away from trauma center
- Highest survival at privately owned level 1/2 center



Jarman MP et al. *JAMA Surgery* 2018;153:535-543



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Edukační sdělení

TRANSFUSION

Limitations of LTOWB

Blood COMPONENTS | Open Access | © | CC BY

Cold-stored leukoreduced CPDA-1 whole blood: in vitro quality and hemostatic properties

Bar-Sheera N, Hains-Trachten, Kupstler-Fell L, Lurie E, et al. *Transfusion*. 2019;59(10):1703-1711.

- Short shelf life: 21 days when stored in CPD.
- Can be extended to 35 days when in CPDA-1.

oddb 2023 NASHVILLE OCTOBER 14-17

Component Therapy--- Three + Donors
Can't do Platelets in EMS (5 day shelf life)

LTOWB- One Donors
Everything you need
30+ minutes sooner

Conclusions for Pediatric Trauma Patients in Hemorrhagic Shock

Prehospital	Resuscitation	Hemostatic Adjuncts/Monitoring
<p>Avoid permissive hypotension</p> <p>Consider prehospital transfusion of blood products if needed</p> <p>Employ tourniquets for exsanguinating extremity hemorrhage</p>	<p>Prioritize the use of blood products over crystalloids</p> <p>Target high plasma:PRBC and platelet:PRBC ratios</p> <p>Use LTOWB, when available, over component blood products</p>	<p>Consider the use of tranexamic acid (TXA) if within 3 hours of injury</p> <p>If available, use viscoelastic monitoring to assess resuscitation goals</p>



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Edukační sdělení

THE JOURNAL OF MATERNAL-FETAL & NEONATAL MEDICINE
<https://doi.org/10.1080/14767058.2021.1915275>

Taylor & Francis
 Taylor & Francis Group

ORIGINAL ARTICLE

Check for updates

Whole blood transfusion reduces overall component transfusion in cases of placenta accreta spectrum: a pilot program

Jessian L. Munoz^{a,b}, Alison M. Kimura^{a,b}, Elly Xenakis^{a,b}, Donald H. Jenkins^c, Maxwell A. Braverman^c, Patrick S. Ramsey^{a,b} and Kayla E. Ireland^{a,b}

- Prospective observational study of 34 patients 16 received LTOWB and 18 received CT

Table 1. Demographics of study group.

Factor	Whole blood (n = 16)	Component (n = 18)	p Value
Age	32.4 ± 5.9	31.3 ± 5.28	.57 ^a
BMI	32.1 ± 7.0	34.5 ± 3.8	.23 ^a
Gravidity	4 (3.5, 5.8)	5 (3.8, 7)	.54 ^b
Parity	3 (2, 3)	3.5 (2, 4.3)	.27 ^b
History of CD	16 (100)	16 (89)	.49 ^c
Number of prior CD	2 (2, 3)	3 (1.8, 4)	.62 ^c
Tertiary referral	14 (88)	13 (72)	.41 ^c
Gestational age at delivery	34 (31, 34)	34 (25, 34.8)	.70 ^d
PAS by ultrasound			
Placenta accreta	2 (13)	5 (28)	.41 ^c
Placenta accreta spectrum	4 (25)	12 (67)	.02 ^c
Increta	1 (6)	0	.47 ^c
Percreta	9 (56)	1 (6)	.002 ^c
Diabetes	1 (6)	1 (6)	1.0 ^e
Hypertension	2 (13)	2 (11)	1.0 ^e
Anemia	5 (31)	8 (45)	.18 ^d
Emergent delivery	7 (44)	5 (28)	.33 ^d
Public insurance	9 (56)	16 (89)	.05 ^d

BMI: body mass index; CD: cesarean delivery; PAS: placenta accreta spectrum.
 Values presented as mean ± SD, median [P25, P75] or N (column %).
 p Values: ^at-test, ^bMann-Whitney's test, ^cFisher's exact test, and ^dchi-squared.
 Bold values suggest p < .05.

- Total transfusion was less in the LTOWB vs CT group, 2607 ml vs. 4683 ml, (p=0.03)
- 2076 ml of blood not transfused transfused
- **44% relative reduction in total blood transfusion**

University of Pittsburgh
 Trauma and Transfusion
 Medicine Research Center



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Edukační sdělení

Pillar 1- Product Selection Current clinical practice

COMMENTARY

It is time to reconsider the risks of transfusing RhD negative females of childbearing potential with RhD positive red blood cells in bleeding emergencies

Mark H. Yazer^{1,2}, Meghan Delaney^{3,4}, Heidi Doughty⁵, Nancy M. Dunbar⁶, Arwa Z. Al-Riyami⁷, Darrell J. Triulzi^{1,2}, Jon F. Watchko⁸, Erica M. Wood^{9,10}, Vered Yahalom¹¹, and Stephen P. Emery¹²

TRANSFUSION 2019;59:3794-3799



Pillar 1- Product Selection Current clinical practice

TRANSFUSION MEDICINE

TRANSFUSION

Transfusion of blood components containing ABO-incompatible plasma does not lead to higher mortality in civilian trauma patients

Jansen N. Seheult^{1,2} | Nancy M. Dunbar³ | John R. Hess⁴ | Erin E. Tuott⁴ | Mohammad Bahmanyar⁵ | Jessica Campbell⁶ | Magali Fontaine⁷ | Jenna Khan³ | Ara Ko⁷ | Jian Mi³ | Michael F. Murphy⁹ | Tara Nykoluk¹⁰ | Jessica Poisson¹¹ | Jay S. Raval¹² | Andrew Shih⁸ | Jason L. Sperry^{13,14} | Julie Staves⁸ | Michelle Wong⁵ | Matthew T. S. Yan⁵ | Alyssa Ziman⁶ | Mark H. Yazer^{1,2} | The Biomedical Excellence for Safer Transfusion (BEST) collaborative

Transfusion. 2020;60:2517-2528.



- Multicenter study that attempted to assess the effect on mortality of transfusing ABO-incompatible plasma from any blood product during adult trauma resuscitation
- No difference in mortality between groups at any of the three time points in the unadjusted model



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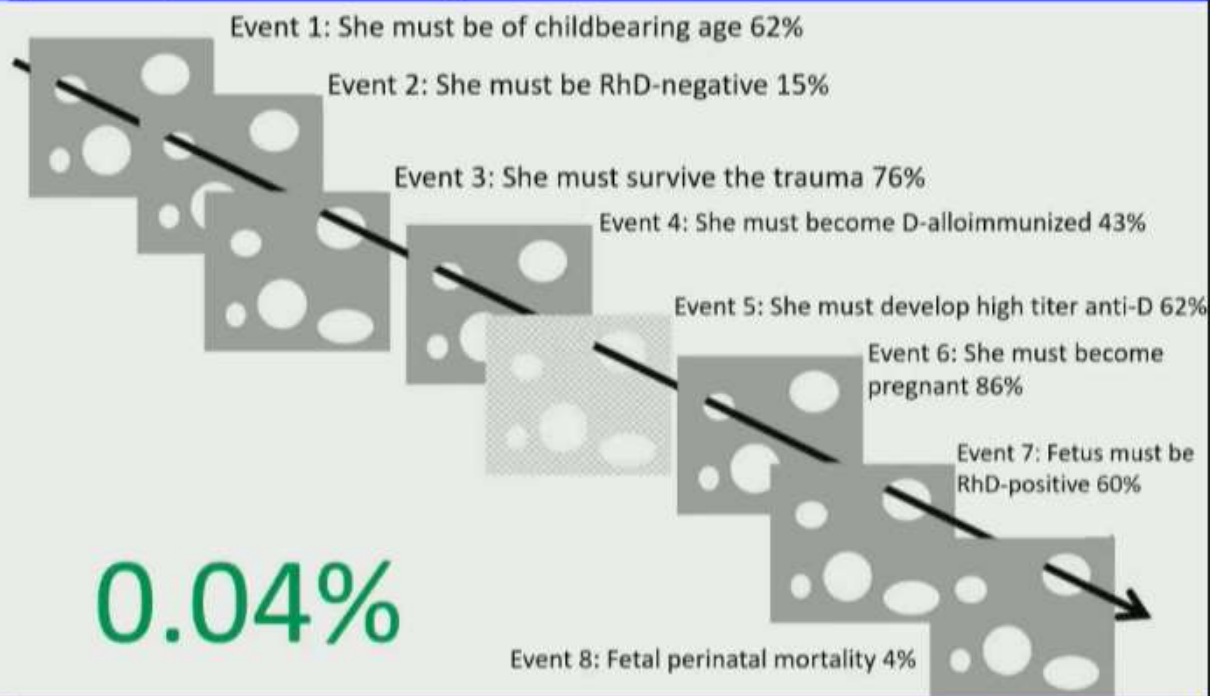
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Edukační sdělení

The whole context of HDFN risk

RhD positive RBC/LTOWB transfused during trauma resuscitation



Yazer et al. *Trauma Surg & Acute Care Open* in press



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Edukační sdělení

What My Babies Needed to Survive Severe, Early Onset HDFN

			
Expert MFMs	Close Monitoring	Proactive Treatments	Follow Up Care
Knew how to manage alloimmunized pregnancies proactively	Timely blood work and weekly MCA Doppler scans starting at 14-15 weeks	Plasmapheresis IVIg to delay onset of fetal anemia IUTs	Weekly blood tests Blood transfusions

 ALLO HOPE



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Nashville 14.10.2023



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Ústní sdělení

OA4-AM23-MN-06 | The Blood System in Ukraine: Experience in Martial Law Conditions

M. Jedrzejczak 1, Y. Chornenkyy 2, M. Malik 2, O. Serhiienko 3, D. Koval 3, R. Sumugod 4, M. Fink 2, P. Lindholm 5, G. Ramsey 6

1 Northwestern Memorial Hospital, Pathology Department

2 Northwestern University

3 Ukrainian Transplant Coordination Center

4 Northwestern Memorial Healthcare

5 Northwestern University Feinberg School of Medicine

6 Feinberg School of Medicine, Northwestern University

To address challenges, the Ministry of Health of Ukraine established the Operational Headquarters to coordinate the blood system under martial law. Institutions now report blood stocks daily and operate on a 24-h cycle to increase procurement volumes. Novel donation methods were developed to ensure donor safety, and organization partnerships and donor campaigns were started (e.g., “Your blood can fight. Become a donor”). **The process for an uninterrupted production, supply, logistics, and exchange of blood and blood components to areas of need has been centralized and codified into law, resulting in a more efficient blood bank network. To help meet emergency needs, group O Rh-negative whole blood is used, followed by single-group erythrocytes and lyophilized plasma.** Despite numerous wartime challenges, specialists of the blood system of Ukraine have met the **40% increase in demand for transfusions since the beginning of the invasion**, without resorting to importing blood.



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Ústní sdělení

OA1-AM23-ST-23 | Associations Between Platelet Aggregation in Apheresis Units, COVID-19 Vaccination, SARS-CoV-2 Infection Status, and Antibody Levels

S. Bean 1, M. Bravo 2, M. Lanteri 3, M. Busch 1, S. Marschner 1, K. Thomas1

1 Vitalant Research Institute

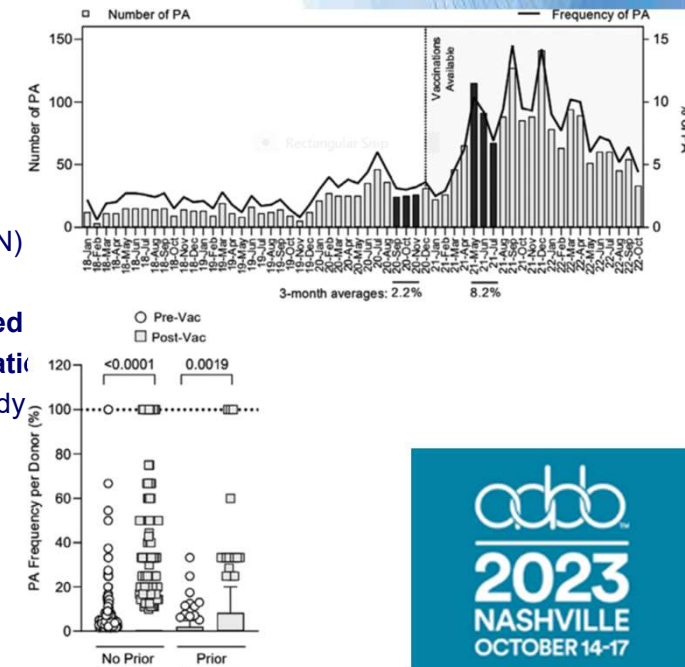
2 Vitalant

3 Creative Testing Solutions

Aim was to determine if the increase in PA was associated with donor vaccination and/or SARS-CoV-2 infection status or levels of specific antibodies in apheresis platelet products.

Using a database of repeat apheresis donors, we identified a subset of donors with repeat platelet donations from January 2018 to October 2022 for whom at least 1 unit was recorded as aggregated. Additionally, between September 2020 and July 2021, we performed universal testing on donors for anti-spike (S) and anti-nucleocapsid (N) total immunoglobulin (Ig) reactivity (units reported as signal/cutoff [S/C] ratios).

This study found increased rates of PA and anti-S Ig reactivity in vaccinated donors, and a trend of increased Ig S/C in donors with PA suggesting a potential relationship between Ab concentration and platelet aggregation in apheresis platelet products. Further assessment of PA in this cohort of repeat donors over time as vaccine antibody levels wane and breakthrough infections occur is ongoing and made possible via availability of longitudinal samples from donors in this repeat donor cohort.



Ústní sdělení

OA3-AM23-MN-36 | Implementation of 100% Pathogen-Reduced and Extension of Shelf Life of Platelet Concentrates in France: A Retrospective Study on Impact on Platelet Issuing

P. Richard 1, P. Morel 1, L. Malard 1, A. François 2, D. Kientz 3, L. Bardiaux 4, P. Tiberghien 1, J. Thibert 5

1 Etablissement Français du Sang

2 Etablissement Français du Sang Ile de France,

3 Etablissement Français du Sang Alsace

4 Etablissement Français du Sang Occitanie Pyrénées Méditerranée

5 Etablissement Français du Sang de Bretagne

Pathogen reduction (PR) technology (Intercept, Cerus corporation) was introduced for all platelet concentrates (PC) issued in France in Nov 2017. Shelf life of PC was extended from 5 to 7 days in July 2018. A number of 88,974 CP were transfused.

Shifting to 100% PR PC production in France and extending PC shelf life resulted in an increased PC issuing and retransfusion rates at 3 days in hematology pts. In view of the safety improvements (only one PC-related TTBI since 100% PR implementation, no PC shortages), this impact was not felt sufficient to reverse the policy of 100% PR for CP.



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Ústní sdělení

OA2-AM23-MN-36 | A Re-evaluation of Washing Practice in the Chronically Transfused: Clinical and Laboratory Impact

T. Huso 1 , K. Buban 2 , T. van Denakker 1 , K. Haddaway 2 , H. Smetana 2 , C. Marshall 2 , H. Rai 3 , E. Bloch 3 , A. Tobian 4 , E. Crowe 1

1 Department of Pathology, Johns Hopkins University School of Medicine

2 Johns Hopkins Hospital

3 Johns Hopkins University School of Medicine

4 Johns Hopkins University

Sixteen patients with a median age 34.5 years (interquartile range [IQR] 30–49.5 years) and a history of sickle cell disease (n = 10, 62.5%), beta thalassemia (n = 4, 25%), aplastic anemia (n = 1, 6.3%), or myelodysplastic syndrome (n = 1, 6.3%) were evaluated.

One patient (6.3%) continued to receive washed RBC due to a history of severe allergic/anaphylactic reactions. Fifteen patients (93.8%) tolerated trial transfusions with standard unwashed RBCs.

Patients had been transfused with a median of 531 washed RBC units (IQR 244-1066 units) per patient over a median period of 12 years (IQR 5–18 years), most commonly for the indication of recurrent, non-severe allergic reactions.

Findings suggest that washing of blood components may be safely reconsidered in chronically transfused patients without a history of anaphylaxis.

Washing should be implemented judiciously due to a potential lack of necessity as well as logistical and operational challenges.



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OA2-AM23-ST-13 | Implementation of Sexual Risk-Based Criteria: Impact on Safety and Adequacy of Supply

S. O'Brien¹ , A. Lewin² , S. Uzicanin³ , M. Goldman¹

¹ Canadian Blood Services

² Héma-Québec

³ Donation Policy & Studies Canadian Blood Services

In late 2022, time-based deferrals for men who have sex with men were replaced by gender neutral sexual risk-based criteria for all Canadian allogeneic whole blood, plateletpheresis, and plasmapheresis donors. All donors who have had a new sexual partner or more than one sexual partner in the last 3 months are asked about anal sex and are deferred from donations for 3 months after last anal sex or donation attempt.

We evaluated the impact of this change on HIV rates and deferral rates.

National implementation of gender-neutral sexual risk based criteria had no impact on HIV-positive rates and resulted in deferral of 0.09% of donors, considerably less than predicted by pre-implementation studies. A longer observation period as well as planned post-implementation studies to assess donor compliance will strengthen these preliminary observations.



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Ústní sdělení

OA4-AM23-SN-05 | Let's Talk About Sex: Females Experience Greater Perioperative Anemia and Higher Transfusion Rates in Major Elective Surgery

S. Arya 1 , A. Howell 2 , L. Vernich3 , Y. Lin4 , K. Pavenski 5 , J. Freedman6

1 University of Toronto

2 Unity Health Toronto

3 Dalla Lana School of Public Health, University of Toronto

4 Sunnybrook Health Sciences Centre

5 University of Toronto - St. Michael's Hospital

6 Medicine and Laboratory Medicine, University of Toronto

We conducted a retrospective study of the Ontario Transfusion Coordinators Network (ONTraC) database from 2018 to 2022. ONTraC collects data from 25 Ontario hospitals, and accounts for >70% of Ontario's provincial blood use (approximately 400,000 units per year).

From 2018 to 2022, 17,700 patients were included in the ONTraC program; 47% were females (N = 8376). Mean age was comparable between sexes.

Despite a similar Hb target amongst males and females, females experienced greater perioperative anemia and higher transfusion rates.

Historic sex-specific definitions of anemia may contribute to a greater tolerance of anemia in females; alternatively, it is possible that etiologies of anemia more common to females (e.g., iron deficiency) are not being fully addressed.



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Ústní sdělení

OA1-AM23-SN-22 | Application of Artificial Intelligence and Robotics in Blood Storage Management

C. Wang, C. Kong, A. Li, Y. Xu, J. Qiu, R. He, W. Hu

Blood Center of Zhejiang Province

We introduce artificial intelligence and robot technology into blood storage management to realize automatic control of blood storage and improve work efficiency. Blood is accurately accessed by radio frequency identification tags, and automated blood transport is carried out by robots. Key functions include: when printing the blood label, the information will be automatically written into the radio frequency identification tag, which will be used to check the blood in and out of the warehouse and accurately locate the blood.

The blood storage system of the Blood Center has realized the integrated management of printing and pasting blood label, packing, checking, bagging, warehousing, sorting and distributing blood. The mode has been changed from manual handling to fully automatic transport.

The average blood distribution time per batch was reduced by 8.12%, and the utilization of special blood group of red blood cells was improved.

Facts have proved that the application of artificial intelligence and robotics in blood management has a broad prospect, and the application will be further explored in blood preparation and other business links in the future.



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Ústní sdělení

OA2-AM23-SN-18 | Do Doctors Dream of Electric Blood Bankers? Publicly Available Artificial Intelligence Chatbots Make Transfusion Decisions with Accuracy and Precision

N. Hurley 1 , A. Hess 2

1 Department of Anesthesiology, University of Wisconsin,

2 University of Wisconsin

Many aspects of blood banking and transfusion medicine involve no direct patient care and are based on protocols or specialized knowledge. We hypothesized that large language models (LLMs) could answer consultation questions in transfusion medicine with accuracy and precision. The AUCs for Bard, GPT 3.5 and chatGPT 4.0 were 0.65, 0.90, and 0.92, respectively, with overall accuracies of 55%, 64%, and 91%. The areas under the precision-recall curve for Bard, GPT 3.5, and chatGPT 4.0 were 0.46, 0.87, and 0.88, respectively, with overall precision of 44%, 50%, and 80%. Recall rates for Bard, GPT 3.5 and chatGPT 4.0 were 94%, 100%, and 100%, that is, there were almost no missed indications for transfusion.

When presented with transfusion scenarios in natural language, publicly available generative AI LLMs made generally appropriate transfusion decisions with a moderate to high degree of accuracy and precision. **ChatGPT 4.0, the most recent iteration of its LLM, showed a degree of accuracy, precision far above what is usually reported in clinical reviews of human transfusion decisions.** The ability of LLMs to handle complex scenarios, such as undifferentiated coagulopathy in a bleeding patient, is unknown.



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OA1-AM23-MN-19 | Acute Treadmill Training of FVB Mice Leads to Improved RBC Deformability and Decreased Lipid Peroxidation After Cold Storage

V. Laurencin¹, D. Lamb², D. Gordy¹, E. Stone¹, K. Hudson¹, S. Spitalnik¹, E. Hod¹, P. Buehler², J. Kao³, T. Thomas⁴

¹ Columbia University Irving Medical Center

² University of Maryland School of Medicine

³ University Maryland School of Medicine

⁴ Columbia University Irving Medical Center

Lifestyle factors, such as diet and aerobic exercise, may affect the storage lesion. For example, endurance exercise enhances hematopoiesis and RBC antioxidant capacity. 10-week-old male and female FVB mice ($n = 6/\text{group}$) were randomly assigned to sedentary or exercise groups. Mice received Purina chow and libitum. Sedentary and exercise groups were exposed to a rodent treadmill 5 days/week for equal amounts of time over the 2-week study period. The exercise group followed a progressive overload protocol with increasing speed and duration, reaching a final speed of 18 m/min for 40 min during the final week of the study protocol.

Acute treadmill training of both male and female FVB mice results in reduced lipid peroxidation and Improved deformability of donated RBCs after cold storage. Improved deformability and reduced lipid peroxidation did not, however, correspond with improved 24-h PTR of stored RBCs. **Longer durations of exercise are potentially required to improve PTR of stored RBCs.**



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Děkuji za pozornost!



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