

Platelet Transfusion

Transfusion Medicine Boot Camp for Nurses

Donna Berta RN, BScN
Clinical Project Coordinator – Nursing
Ontario Regional Blood Coordinating Network (ORBCoN)

November 24, 2021

Disclosures

- No commercial product conflicts of interest to declare
- Member of Transfusion Transmitted Injuries Surveillance System Education Committee
- Using Blood Wisely initiative, member nursing education development



Objectives

After this session participants will be able to:

- Describe platelet basics and manufacturing processes for platelets
- Understand platelet transfusion and compatibility
- Define nursing care specific to administering platelet transfusion
- Recognize signs & symptoms and management of a serious reaction particular to platelet transfusion



Platelet Basics



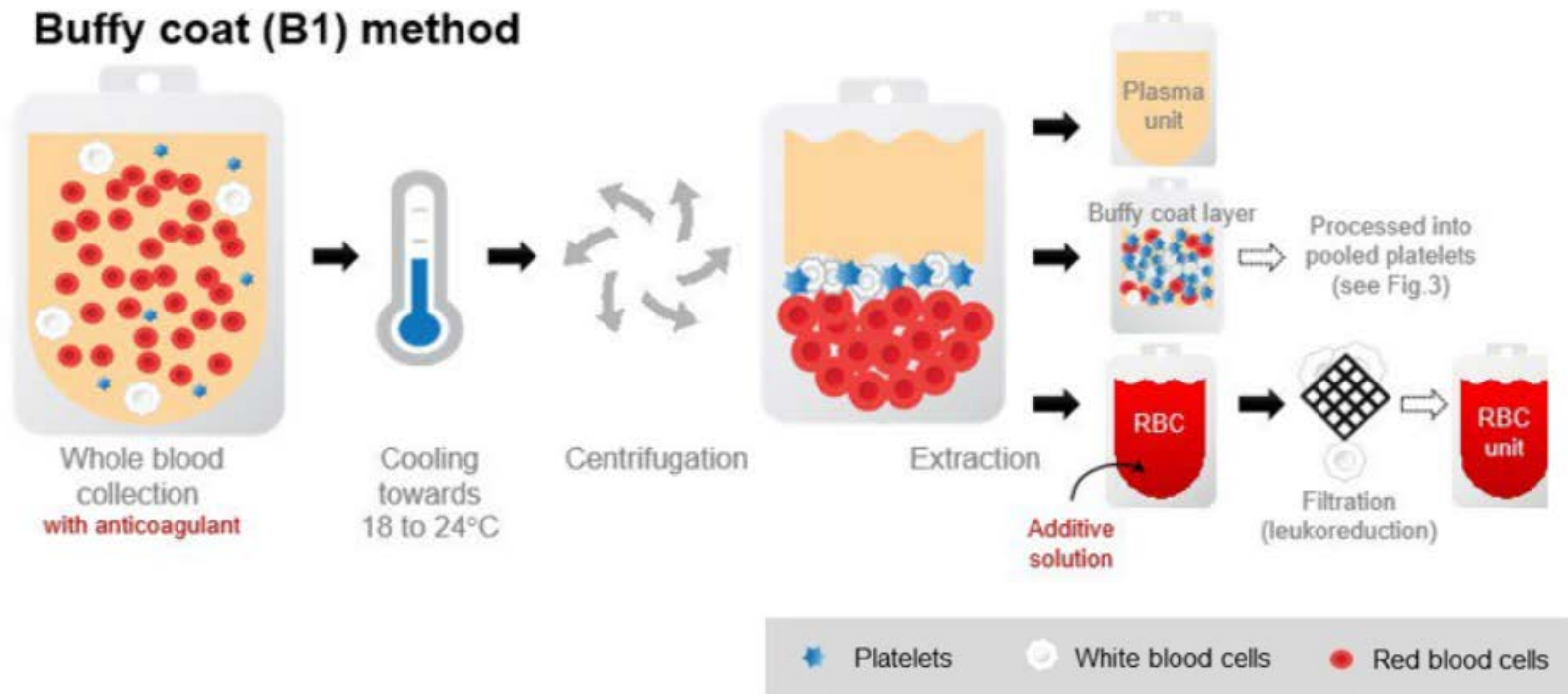
Platelets:

- Smallest of the blood cells; sticky cells, first responders in the clotting process
- Main function is to bind to the site of blood vessel injury and bind to each other to form the platelet plug
- This initiates activation of the plasma clotting factors to stop bleeding
- Also, role in primary immunity, tumour progression and inflammation
- Platelet life cycle is about 10 days
- Normal platelet count is 150–400 x10⁹/L



Platelet Manufacturing (1)

Whole blood manufacturing

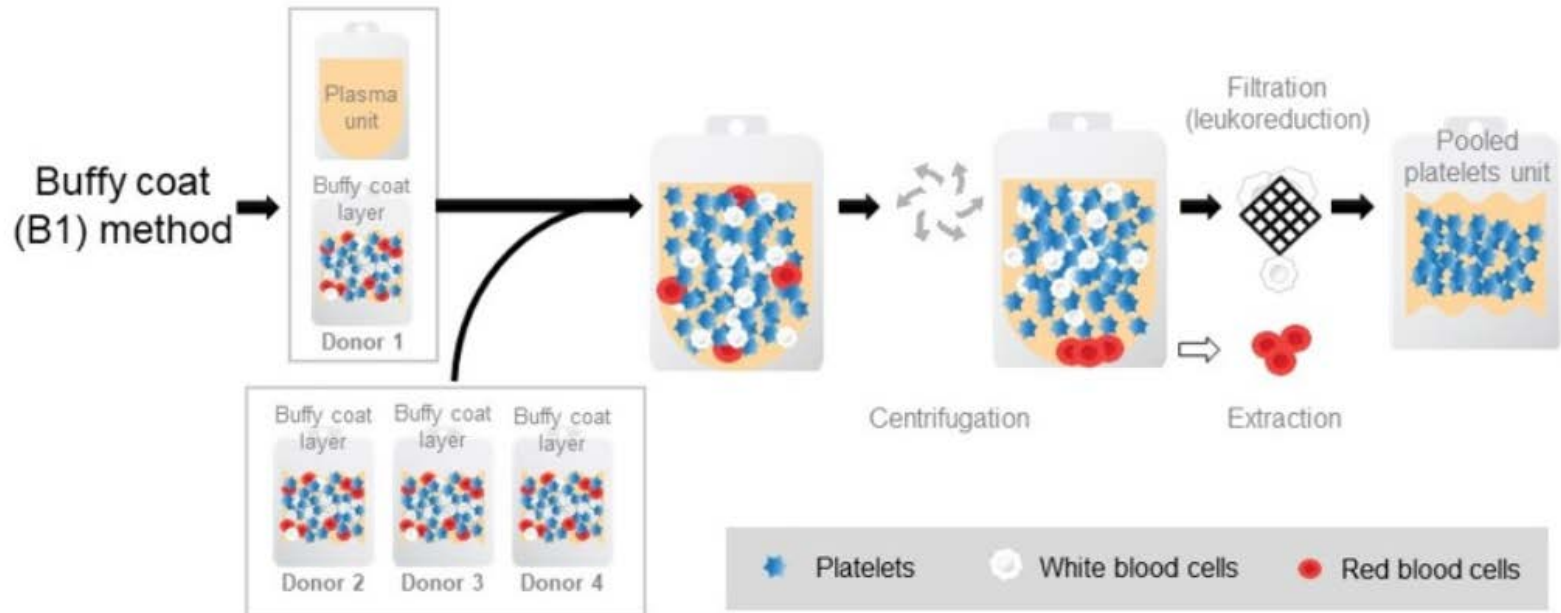


Canadian Blood Services <https://professionaleducation.blood.ca/en/transfusion/clinical-guide/blood-components>



Platelet Manufacturing (2)

Producing pooled platelets



Canadian Blood Services <https://professionaleducation.blood.ca/en/transfusion/clinical-guide/blood-components>

Canadian Blood Services (CBS) also produces apheresis platelets (apheresis machine separates & removes platelets from 1 donor; platelets are suspended in that donor's plasma)



Patient Case

- Flo is a 62-year-old female, receiving a course of chemotherapy for acute leukemia
- She has received transfusions [both RBC (red blood cell) and platelet] uneventfully previously
- Unfortunately, she slipped on a patch of ice and has fractured her hip
- She is admitted to hospital, awaiting surgery
- Flo's hemoglobin is 92 g/L; platelet count is $15 \times 10^9/L$



Patient Case, Question 1

Pre-operatively, 1 dose platelet transfusion is ordered
Flo's group & screen result: blood group A, Rh negative
antibody screen negative

The blood group of platelets of greatest benefit for Flo is:

- a) Group O, Rh negative
- b) Group AB, Rh positive
- c) Group A, Rh negative
- d) Group A, Rh positive



Platelet Transfusion & Compatibility (1)

- Platelets have A and B antigens on their cell surface but do not express Rh antigens
- Platelet products:
 - Are suspended in plasma
 - Contain small amounts of red blood cells
- Ideally, transfuse ABO & Rh blood group identical platelets
- Often not possible due to limited supply (platelets shelf-life is 7 days; only 15 % of population is Rh negative)
- If transfusion is non-urgent, Transfusion Medicine Lab (TML) will check with CBS for availability of group identical platelets (CBS to TML delivery time is also a consideration)



Platelet Transfusion & Compatibility (2)

- If patient is Rh negative & Rh negative platelets are not available, TML will issue Rh positive platelets for transfusion
 - Immunization risk (formation of anti-D antibody) from platelets is low ($\approx 1\%$)
 - For Rh negative females, age 45 years and under with childbearing potential, if transfused Rh positive platelets require Rh immunoglobulin (RhIG) to avoid formation of anti-D antibody
- If ABO group identical platelets are not available, TML will issue ABO plasma compatible platelets
- If ABO plasma compatible platelets are not available, ABO plasma incompatible platelets may be transfused. TML will notify prescriber to ensure patient is monitored for hemolysis.
- [ORBCoN Platelet Transfusion Toolkit](#)



Patient Case, Question 2

Flo is scheduled for surgery at 1800 hours today

Flo's platelet transfusion should be administered at

- a) 0600 hours today
- b) 1630 hours today
- c) In the operating room, at the time of skin incision
- d) Anytime (maximum within 7 days prior to surgery)



Patient Case, Question 3

Flo's surgeon has ordered a platelet count re-check post-transfusion, prior to surgery

Flo's re-check CBC (complete blood count) should be drawn

- a) 15 minutes post-transfusion
- b) 2 hours post-transfusion
- c) 6 hours post-transfusion
- d) is not indicated



Patient Case, Question 4

Best practice to administer Flo's platelet transfusion includes use new/fresh blood tubing/filter and

- a) Prime tubing with 0.9% sodium chloride, infuse as quickly as possible (over 5 to 10 minutes)
- b) Prime tubing with 5% dextrose in water, infuse as quickly as possible (over 5 to 10 minutes)
- c) Prime tubing with 5% dextrose in water, infuse at 50 mL/hour for first 15 minutes, re-assess patient, if stable then infuse platelets over 45 to 60 minutes
- d) Prime tubing with 0.9% sodium chloride, infuse at 50 mL/hour for first 15 minutes, re-assess patient, if stable then infuse platelets over 45 to 60 minutes



Platelet Transfusion Summary (1)

- If pre-procedure transfusion, transfuse platelets just prior to procedure (within 6 hours of procedure)
- Re-check platelet count 10 to 60 minutes post transfusion
- 1 dose = 15-25 $\times 10^9$ /L increase in platelet count at 10 to 60 minutes post transfusion
- Transfuse over 60 minutes, slower if Transfusion Associated Circulatory Overload (TACO) risk [maximum 4 hours from issue]
- Rate of Infusion:
 - For the first 15 minutes, suggested rate is 50 mL/hour
 - Assess patient & re-check vital signs after 15 minutes of infusion
 - If no signs/symptoms of adverse reaction, increase to rate ordered



Platelet Transfusion Summary (2)

Tubing/Filter

- Transfuse with new/fresh blood tubing/filter (170-260 micron)
- If filter was previously used, the platelets will adhere to fibrin that has been captured in the filter

IV Fluid

- Compatible with 0.9% sodium chloride

IV Access

- Any gauge IV is appropriate

Infusion Devices

- May use infusion pumps that are Health Canada Medical Device Regulations approved
- Do NOT use blood warmers/rapid infusers for platelet transfusion



Patient Case Postoperatively (1)

- Flo's hip surgery procedure was uneventful
- Twelve hours post-op, her hemoglobin is 78 g/L and platelet count is $8 \times 10^9/L$
- Her hip dressing is oozing serosanguinous fluid and has been reinforced twice
- Order for 1 dose platelet transfusion, to be infused over 60 minutes



Patient Case Postoperatively (2)

After 15 minutes, Flo is experiencing rigors

Flo's vital signs	Temperature (°C)	BP (mmHg, millimeters of mercury)	Pulse (per minute)	Respirations (per minute)	Oxygen Saturation (%)
Pre-transfusion	36.8	110/68	80	20	96
After 15 minutes	38.9	94/60	96	24	92

Flo's nurse:

- Stops the platelet transfusion
- Infuses 0.9% sodium chloride TKVO
- Verifies patient identifiers on Flo's armband & platelet bag transfusion label match
- Calls the prescriber
- Calls TML



Patient Case Question 5

Patient care orders should include:

- a) Administer 500 mL 0.9% sodium chloride IV; Draw patient blood culture, administer broad spectrum antibiotic IV STAT
- b) Administer epinephrine 1:1000 0.5 mL IM
- c) Additional tests: group & screen, direct antiglobulin test (DAT), hemolysis work up, urinalysis (first void post reaction) and return remainder of the platelets to TML for culture
- d) Both a) and c)



Platelet Transfusion Adverse Reactions

- Potential for range of adverse transfusion reactions
- [TTISS-ON Acute Transfusion Reaction Chart](#) (p. 124-131)
- Platelets are stored at room temperature (20-24°C) – increases risk for possible bacterial contamination and patient bacterial sepsis

Event:	Symptomatic bacterial sepsis	Death from bacterial sepsis
Per pool of platelets	1 in 10,000	1 in 200,000
Per unit of RBCs	1 in 250,000	1 in 500,000

- Reaction confirmed by same organism cultured from patient & platelet
- Closely monitor patients receiving platelets for fever, chills & rigors, hypotension (signs/symptoms of transfusion reaction)
- Platelets are cultured during the CBS manufacturing process, however with platelets 7-day shelf-life, delivery of platelets to hospitals occurs when the preliminary culture is negative, with final culture result pending
- 2022: CBS will introduce pathogen-reduced platelets



Platelet Transfusion

Transfusion Knowledge Questions Post



Acknowledgements

- The Ontario Regional Blood Coordinating Network (ORBCoN) gratefully acknowledges funding support provided by the Ontario Ministry of Health. The views expressed in this presentation are those of the authors and of ORBCoN and do not necessarily reflect those of the Ontario Ministry of Health or the Government of Ontario.
- Many thanks to my ORBCoN and Transfusion Medicine family and friends for their ongoing mentorship and support.



References

Callum JL, Pinkerton PH, Lima A, Lin Y, Karkouti K, Lieberman L, Pendergrast JM, Robitaille N, Tinmouth AT, Weibert KE. Bloody easy 4 blood transfusions, blood alternatives and transfusion reactions a guide to transfusion medicine. 4th ed. Toronto: Ontario Regional Blood Coordinating Network; 2016 [cited 2021 Nov 19]. 161p. Available from: <https://transfusionontario.org/en/category/bloody-easy-e-tools-publications/bloody-easy-for-healthcare-professionals/>

Canadian Blood Services (CBS). Circular of information [Internet]. Ottawa (CA); CBS; 2020 [cited 2021 Nov 19]. Available from: <https://www.blood.ca/en/hospital-services/products/component-types/circular-information>

Canadian Blood Services (CBS). Clinical Guide to Transfusion Chapter 2 [Internet]. Ottawa (CA); CBS; 2020 [cited 2021 Nov 19]. Available from: <https://professionaleducation.blood.ca/en/transfusion/clinical-guide/blood-components>

Canadian Blood Services (CBS). Clinical Guide to Transfusion Chapter 18 [Internet]. Ottawa (CA); CBS; 2020 [cited 2021 Nov 19]. Available from: <https://professionaleducation.blood.ca/en/platelet-transfusion-alloimmunization-and-management-platelet-refractoriness>

Canadian Society for Transfusion Medicine (CA) Standards for hospital transfusion services. Markham ON; 2017 Apr 1; cited 2021 Nov 19. 102 p. Report No.: Version 4. Available from: <http://www.transfusion.ca/Resources/Standards>

Issitt PD, Anstee DJ. Applied blood group serology 4th edition. Durham (North Carolina USA): Montgomery Scientific Publications; 1998. 1232p.

National Standard of Canada Canadian Standards Association (CA) Blood and blood components. Toronto ON; 2020 Mar 24; cited 2021 Nov 19. 162 p. Report No.: CAN/CSA-902:20. Available from: <https://community.csagroup.org/docs/DOC-126295>

Ontario Regional Blood Coordinating Network. Bloody easy blood administration. version 3. Toronto: Ontario Regional Blood Coordinating Network; 2020 [cited 2021 Nov 19]. 146p. Available from: <https://transfusionontario.org/en/category/bloody-easy-e-tools-publications/bloody-easy-blood-administration/>

Ontario Regional Blood Coordinating Network. Platelet transfusion toolkit [Internet]. Toronto ON; Ontario Regional Blood Coordinating Network; 2016 Mar [cited 2021 Nov 19]. Available from: https://transfusionontario.org/wp-content/uploads/2021/09/PlateletTransToolkit_final-1.pdf

Ontario Transfusion Transmitted Injuries Surveillance System (TTISS-ON). Home page [Internet]. Hamilton (CA); TTISS-ON: 2020 [cited 2021 Nov 19]. Available from: <https://ttiss.mcmaster.ca/>



Questions



bertad@mcmaster.ca

