Ontario Regional Blood Coordinating Network

Inspiring and facilitating best transfusion practices in Ontario.

PLATELET TRANSFUSION: A STICKY PROCESS

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Speaker Disclosure

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

Pre Transfusion Knowledge Question 1

For adult patients, transfusion of platelets (PLTS) is indicated:

a) For bleeding patients taking anti-platelet medications (e.g., aspirin, clopidogrel), regardless of platelet count.
b) Only if the patient is actively bleeding.
c) Only if the patient's platelet count is less than 100 x 10^9/L.
d) Pre-neurosurgery, if the patient's platelet count is less than 200 x 10^9/L.

Pre Transfusion Knowledge Question 2

When administering platelet transfusion, it is important to:

a) Concurrently infuse 0.9 % sodium chloride at 25 mL/hour.
b) Monitor the patient's temperature q 20 minutes.
c) Use a new blood tubing/filter set.
d) Complete the transfusion within 30 minutes.

Platelet Transfusion: A Sticky Process

Objectives:

- To understand the role of platelets, Canadian Blood Services (CBS) production steps, & indications for platelet transfusion.
- To define nursing actions to safely administer platelets (tubing & filter, infusion rate, patient monitoring, possible adverse reactions).

Outline:

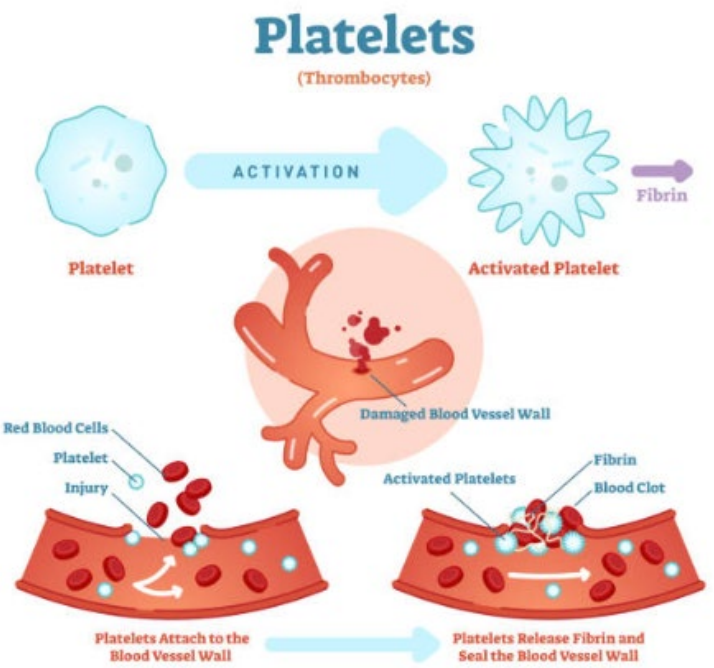
- What do platelets do?
- CBS platelet production and implications
- Indications/Transfusion Guidelines, Dose & Details
- Transfusing platelets
- Platelet transfusion reaction

What Do Platelets Do?

Platelets

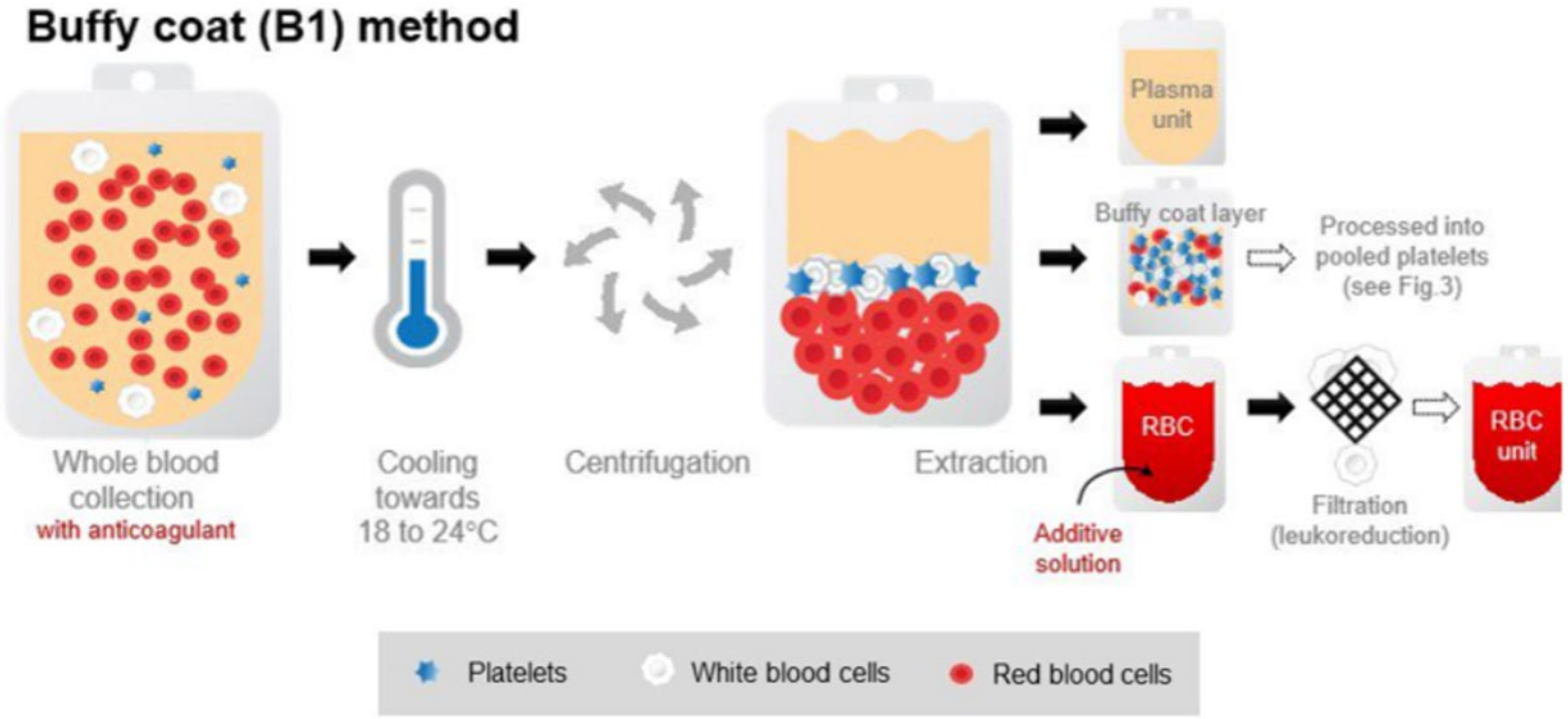
- Smallest of blood cells; first responders in the clotting process; “sticky cells”.
- Main function is to bind to the site of blood vessel injury and bind to each other to form the platelet plug.
- This initiates activation of the plasma clotting factors to stop bleeding.
- Also, have a role in primary immunity, tumour progression and inflammation.

- Platelet life cycle: about 10 days.
- Normal platelet count: 150 - 400 x10^9/L.



CBS Platelet Production (1)

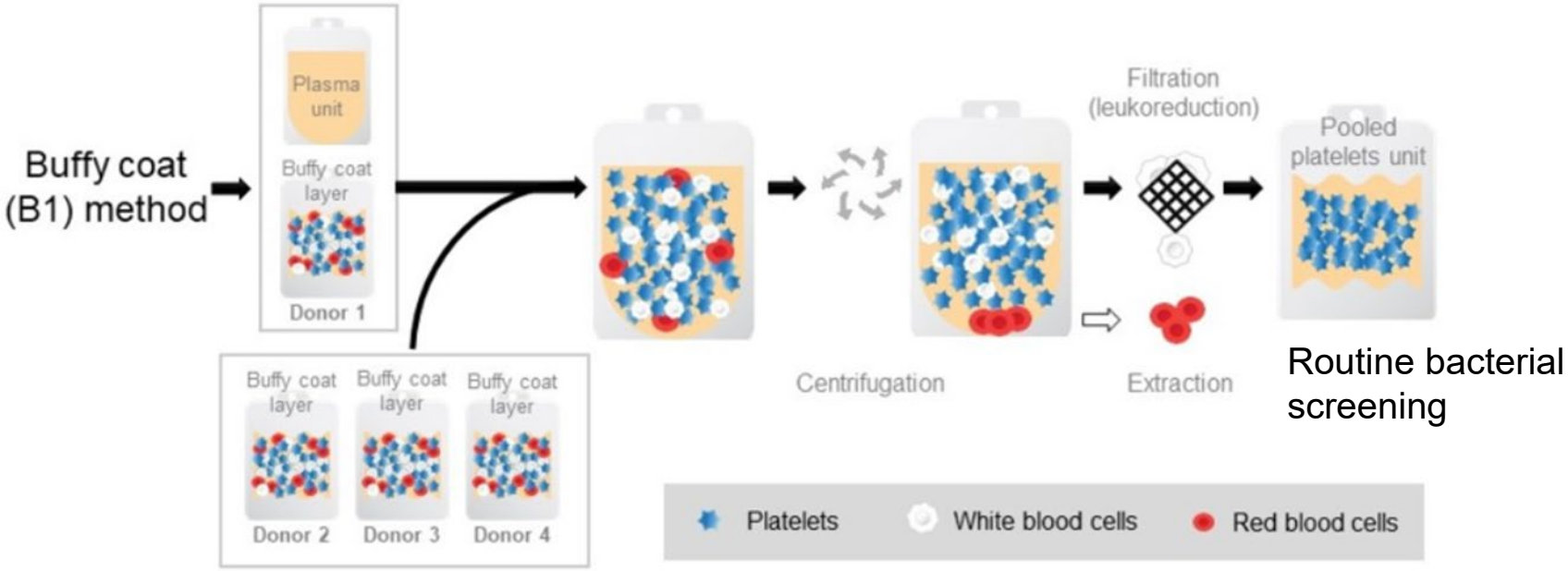
Whole blood collection



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

CBS Platelet Production (2)

1. Pooled Platelets



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

2. Apheresis Platelets

Apheresis machine separates & removes platelets and some plasma from donor; platelets suspended in donor's plasma; routine bacterial screening.

CBS Platelet Production (3)

2022 CBS introduced Pathogen Reduced Platelets

Used for the same indications.

Transfused following the same procedures.

- Also called INTERCEPT platelets, pathogen reduction technology platelets, psoralen-treated platelets, pathogen inactivated platelets.

- Platelet Additive Solution (PAS-E): crystalloid nutrient media is used to suspend platelets (replaces part of plasma within platelet units; ratio of PAS-E:Plasma is about 60:40).
- Cerus INTERCEPT Pathogen Inactivation Technology: Amatosalen, a psoralen compound, and UV light are used to inactivate viruses, bacteria, protozoan parasites & white cells.

CBS Platelet Production (4)

2022 CBS introduced Pathogen Reduced Platelets

Benefits:

- Decreased risk bacterial transmission (bacterial sepsis),
- Lower risk of non-bacterial transfusion-transmitted infections,
- Fewer allergic reactions (less plasma),
- Irradiation is unnecessary (white blood cells are inactivated),
- Bacterial testing not required (issued to hospitals earlier in shelf life).

Downside:

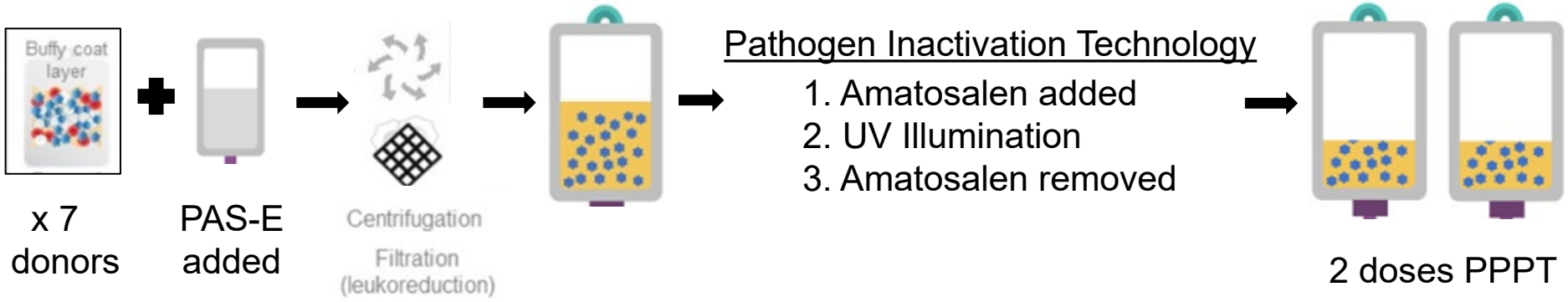
- Post transfusion platelet count increment is mildly reduced, though studies shown no differences in bleeding outcomes.

Note - Pathogen Reduced Platelets:

- Not indicated if patient history of hypersensitivity reactions to amotosalen or other psoralen products.
- No information on use in intra-uterine transfusion

CBS Platelet Production (5)

3. Pooled Platelets Psoralen Treated (PPPT)



4. Apheresis Platelets Psoralen Treated (APPT)

Apheresis machine separates & removes platelets and some plasma from donor; PAS-E added for 60:40 PAS-E:Plasma ratio; Pathogen Inactivation Technology.

5. Apheresis Platelets in PAS-E

Apheresis machine separates & removes platelets and some plasma from donor; PAS-E added for 60:40 PAS-E:Plasma ratio; Routine bacterial screening; available on request.

CBS Platelet Production (6)

1. Pooled Platelets

2. Apheresis Platelets

CBS Platelet Production (7)

3. Pooled Platelets Psoralen Treated (PPPT)

4. Apheresis Platelets Psoralen Treated (APPT)

5. Apheresis Platelets in PAS-E (on request)

CBS Platelet Production (8)

Characteristic	1. Pooled Platelets	2. Apheresis Platelets	3. Pooled Platelets Psoralen Treated (PPPT)	4. Apheresis Platelets Psoralen Treated (APPT)	5. Apheresis Platelets in PAS-E (on request)
Mean unit volume (mL)	317	223	184	277	269
Mean plasma volume (mL)	317	223	75	116	113
Suspended in:	Plasma	Plasma	About 60% PAS-E & 40% Plasma	About 60% PAS-E & 40% Plasma	About 60% PAS-E & 40% Plasma
Approximate platelet yield ($x10^9$ platelets per unit)	339	333	251	252	279
Number of donors in component	4	1	7	1	1
Routine Bacterial Screening by CBS	Yes	Yes	Not required	Not required	Yes
Viable lymphocytes present? (for patients requiring irradiated blood, is irradiation needed)	Yes If a patient requirement, irradiation needed	Yes If a patient requirement, irradiation needed	No Irradiation not necessary	No Irradiation not necessary	Yes If a patient requirement, irradiation needed

Patient Case

- Patient A Epic II Jhpf, a 33-year-old female, previously well (episodically taking aspirin for chronic back pain) was admitted and diagnosed with leukemia.

- She is now on Day 4 of her treatment regimen (induction chemotherapy). Her clinical course is proceeding as anticipated.

- Today's labs: Hb 84 g/L; Platelet count 8 $x10^9$/L

Patient Case: Question 1

In this patient case, the appropriate indication for platelet transfusion is:

a) The patient's diagnosis of leukemia.
b) The patient feels weak and fatigued.
c) For the past month, the patient had been taking aspirin 650 mg daily for back pain.
d) Prophylactic transfusion, platelet count less than 10×10^9/L.

Platelet Transfusion: Indications (Adults)

ADULTS Consider if clinical situation	Platelet count x 10^9/L
Non-immune thrombocytopenia, prophylactic transfusion	Less than 10
Pre procedures not associated with blood loss (low risk, e.g., paracentesis, central line insertion)	Less than 20
Patient taking anticoagulants that should not be stopped	Less than 30
Patient with cirrhosis pre high risk procedures	Less than 30
Pre procedures associated with blood loss or major surgery (greater than 500 mL expected blood loss) Significant bleeding	Less than 50
Pre epidural anesthesia	50 to 80
Pre neurosurgery or head trauma (exception: transfusing platelets in patients with intracranial hemorrhage, not requiring surgery, on antiplatelet agents leads to increased morbidity)	Less than 100
Platelet dysfunction (e.g., medications: aspirin, clopidogrel therapy; post cardiopulmonary bypass) and significant bleeding	Any platelet count
NOTE: Immune thrombocytopenia (ITP) with life threatening bleeding, clinical situation specific with hematology consultation	

Platelet Transfusion: Dose & Details

Adults:

- 1 dose (1 unit)
- Platelets shelf-life: 7 days, on an approved, monitored agitator stored at 20-24°C
  (Inadvertently "chilled" platelets are hemostatically active however, will be cleared quickly by hepatic macrophages).

- Transfuse over 60 minutes, slower if TACO risk.
- If pre-procedure, transfuse just prior to procedure.
- Re-check platelet count 10 to 60 minutes after platelet is transfused.
- 1 dose = 15-25 x10^9/L increase in platelet count at 10 to 60 minutes post transfusion.

Neonate/Pediatric Dose

- 8 mL/kg for PPPT, APPT; 10 mL/kg all other PLTS (to maximum 1 unit).

Platelet Transfusion: Neonate Notes & Pearls

Bloody Easy 5 p. 33

Pediatrics – Platelet Transfusion Guidelines for Neonates

Platelet Count (x 10⁹/L)	Clinical Indication	Dose
<25	Stable, non-bleeding[35,61,62]	8 mL/kg up to a maximum of 1 pool of pathogen reduced buffy-coat platelets (10 mL/kg for all other platelet products).
<30	Neonatal Alloimmune Thrombocytopenia without severe bleeding[63]	8 mL/kg up to a maximum of 1 pool of pathogen reduced buffy-coat platelets (10 mL/kg for all other platelet products).
<50	Bleeding, pre-surgery, coagulopathy[35]	8 mL/kg up to a maximum of 1 pool of pathogen reduced buffy-coat platelets (10 mL/kg for all other platelet products).
<50	Neonatal allo-immune thrombocytopenia with intracranial hemorrhage and/or previously affected sibling with ICH[63]	8 mL/kg up to a maximum of 1 pool of pathogen reduced buffy-coat platelets (10 mL/kg for all other platelet products) (raise to 100 and maintain over 50).
<100	Major bleeding, neuraxial or ocular surgery[35]	8 mL/kg up to a maximum of 1 pool of pathogen reduced buffy-coat platelets (10 mL/kg for all other platelet products).

CHOOSE WISELY

Don't transfuse platelets in the following situations:

- Platelet count above 10 x 10^9/L with no bleeding in anticipation of a drop to less than 10 x 10^9/L
- For patients with ITP without major hemorrhage, even when platelet count <10 x 10^9/L
- For patients undergoing procedures more than 6 hours later (give as close to procedure as feasible)
- For minor procedures with platelet counts >20 x 10^9/L (e.g., paracentesis or thoracentesis)

CHOOSE WISELY

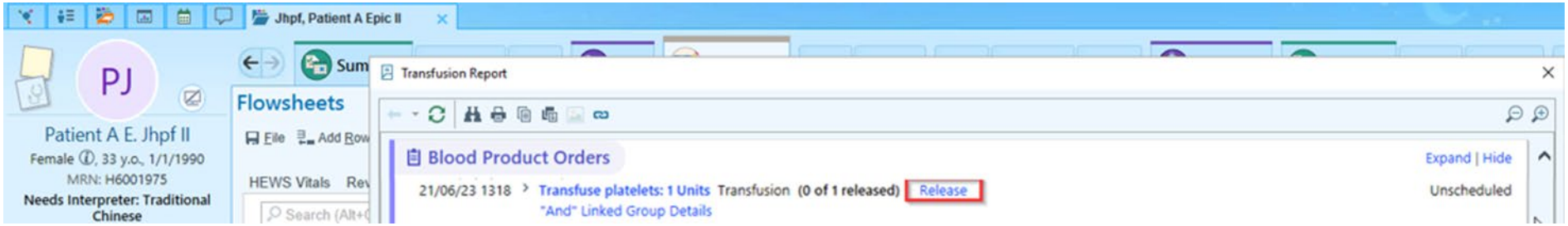
ASH-ASPO 2019 CWC Pediatrics*

Don't transfuse platelets in an asymptomatic (i.e., non-bleeding) pediatric patient (e.g., aplastic anemia, leukemia, etc.), with a platelet count > 10x10^9/L unless other signs and/or symptoms for bleeding are present, or if the patient is to undergo an invasive procedure.

*American Society of Hematology - American Society of Pediatric Hematology/Oncology https://www.choosingwisely.org/clinician-lists/ash-aspho-avoid-packed-red-blood-cell-transfusions-for-anemia-in-asymptomatic-children/

Patient Case: Question 2

The physician's order:



As it appears, this platelet transfusion order is incomplete. Select the required/mandatory additional information:

a) The patient's diagnosis.

b) The rate or duration of infusion.

c) The patient's platelet count.

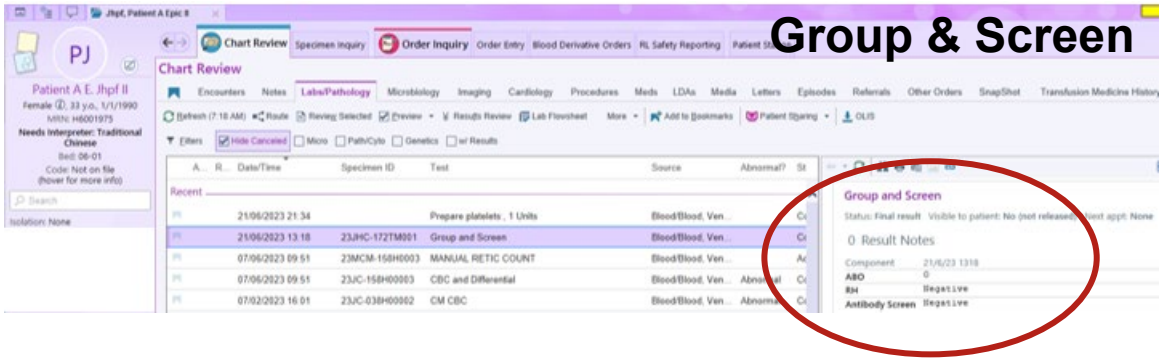
d) Prophylactic antipyretic medication.

Transfusing Platelets: Order Requirements

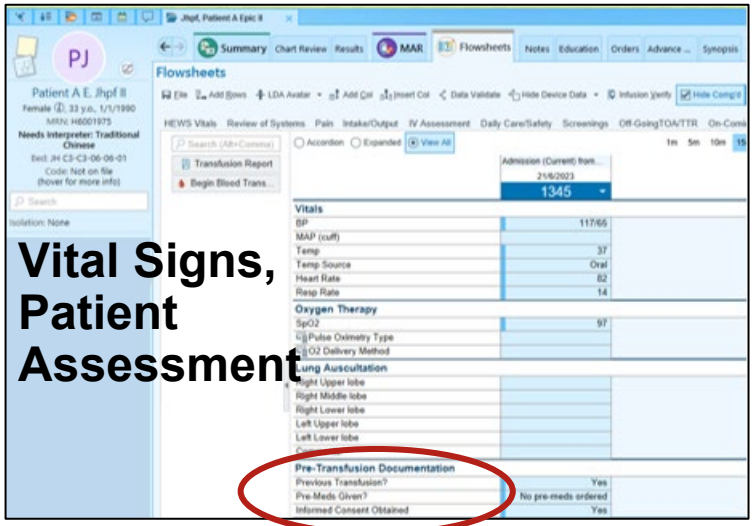
Order must include:

- Patient's surname, first name, unique hospital identification number
- Date to be given
- Blood component/blood product
- Number of units/doses
- Rate or duration of infusion, e.g., 150 mL/hour or over 2 hours (or per hospital standard protocol)
- Medication orders, if any (premedication or diuretic)
- Special modifications or requirements, if any (washed/irradiated)
- Blood warmer/rapid infusion device, if needed (or per hospital protocol)
- Sequence for transfusion of multiple components/products

Transfusing Platelets: Pre-transfusion



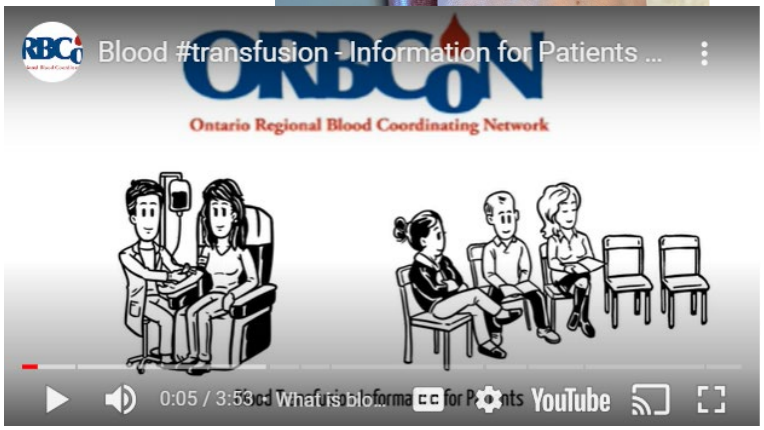
Dedicated IV, Patent
Gauge: Routine: 20-22
Rapid: 14-18
Neonate/Pediatric: 22-25



Vital Signs, Patient Assessment

TACO Risks **Informed Consent**

Patient education



Transfusion Associated Circulatory Overload: TACO

- Leading cause of transfusion related deaths; Prevention is imperative!
- Occurs secondary to transfusion at a rapid rate and/or the specific patient's cardiac capacity is unable to tolerate transfusion volume.
- Signs: acute/worsening respiratory distress, decreased oxygen saturation, tachycardia, increased blood pressure, acute pulmonary edema.

TACO Risk Factors

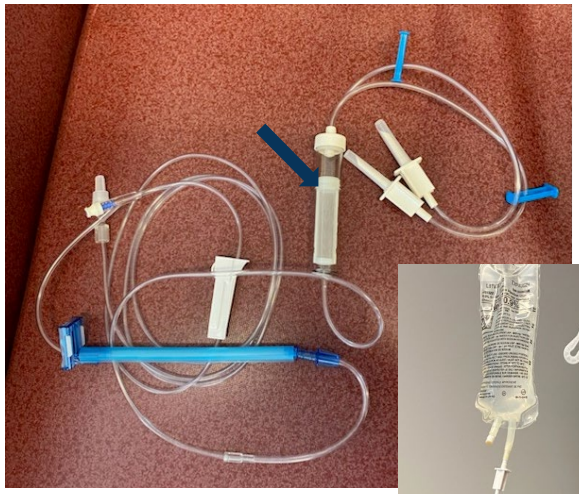
- Advanced age
- History of heart failure
- History of myocardial infarction
- Left ventricular dysfunction
- Renal dysfunction
- Positive fluid balance

If risk, review with prescriber for prevention strategies

TACO Prevention Strategies

- Transfuse only 1 unit at a time
- Transfuse slowly over longer time period (maximum 4 hours)
- **Pre-transfusion diuretic** (PO – 30 minutes prior; IV – just prior)
- TML to divide unit (if equipment available, then transfuse each part over maximum 4 hours)

Transfusing Platelets: Tubing & Filter, Devices



Devices: must be Health Canada approved

- Alaris pump
- Baxter pump
- Do not use blood warmers /rapid infusers

- Blood tubing with 170-260 micron filter
- Always NEW blood tubing/filter set (If filter was previously used, the platelets will adhere to fibrin captured in the filter; platelets are sticky!).
- IV fluid only 0.9 % NaCl (sodium chloride)
- NO medications are compatible
- Prime tubing with 0.9 % NaCl or the platelets
- IV setup to allow for stopping abruptly & maintain IV access:
  - 0.9% NaCl flush syringes + any IV fluid line
    or
  - 0.9% NaCl IV line

Transfusing Platelets: Checking Blood

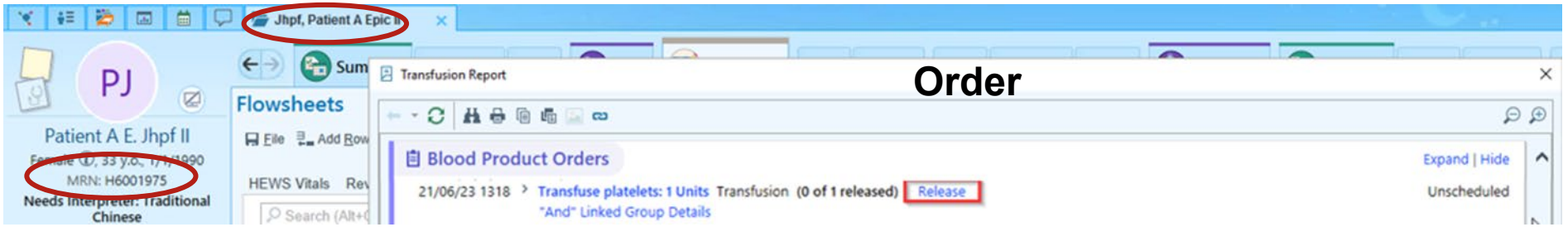
- Blood received from TML aligns with the order.
- Unequivocal (unmistakable) identification of the patient is mandatory.
- Patient must be wearing a patient identification armband.
- Patient identification information must remain attached to blood during transfusion.

- For safety, at the bedside in the presence of the patient, follow 4 steps

    1. Patient Identification
    2. ABO, Rh Blood Groups
    3. Unit number
    4. Expiry & Visual Inspection

Transfusing Platelets: Checking Blood
1. Patient Identification

Check surname, first name, and unique identification number are identical.



Order

Armband

Transfusion Label

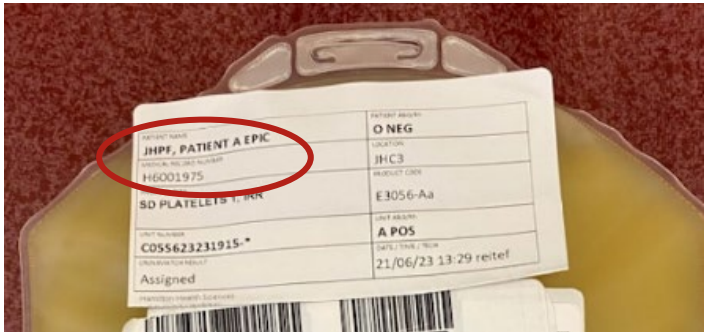
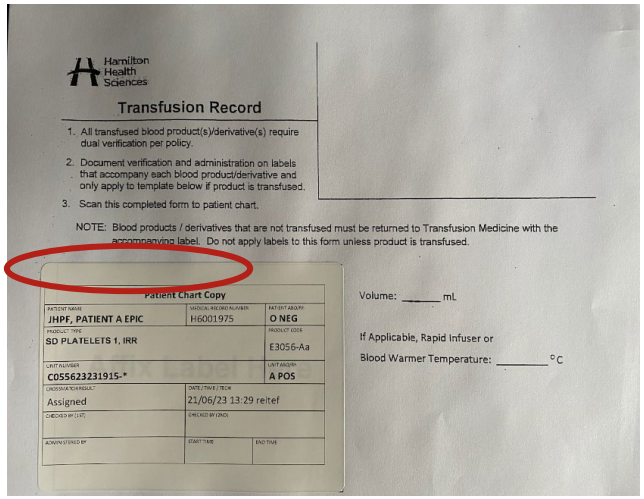


Chart Label/Issue form



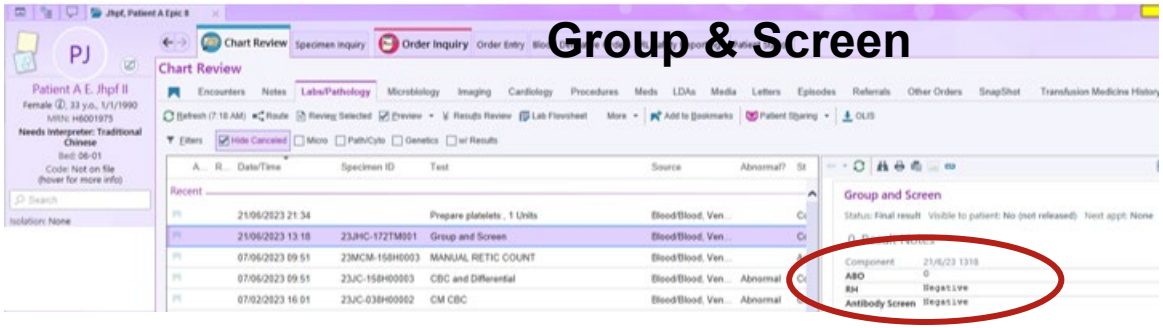
Transfusing Platelets: Checking Blood
2. ABO, Rh Blood Groups

Check ABO, Rh blood groups are *identical/compatible (as feasible for platelets)*.

Transfusion Label

CBS Label

Group & Screen



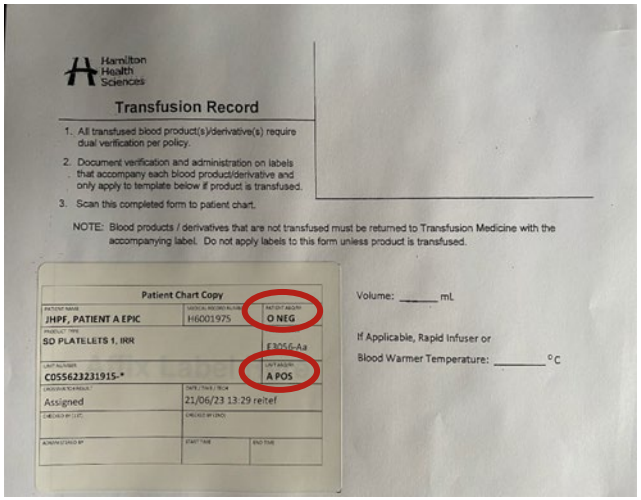


Chart Label/Issue form

Patient Case: Question 3

Something seems wrong here !!!

- Patient group & screen test results:
  blood group O, Rh negative
- Platelet unit issued by TML:
  blood group A, Rh positive

The patient's nurse should (select all that apply):

a) Transfuse the platelets, TML issued this unit for this patient.
b) Check the compatibility table.
c) Monitor the patient q 15 minutes during the transfusion.
d) Call TML.

Transfusing Platelets: Checking Blood
2. ABO, Rh Blood Groups (2)

If the ABO and Rh blood groups are not identical, then check the Compatibility Chart to confirm blood component ABO/Rh blood groups are compatible with the patient's ABO and Rh blood groups.

Patient ABO/Rh(D) Blood Group	Compatible Blood Group for Transfusion			
	RBC	Platelets	Plasma	Cryoprecipitate
O Positive	O Rh(D) positive or negative	O preferred** Rh(D) positive or negative	O, A, B, AB	Any Group
O Negative	O Rh(D) negative*	O preferred** Rh(D) negative*	O, A, B, AB	
A Positive	A, O Rh(D) positive or negative	A preferred** Rh(D) positive or negative	A, AB	
A Negative	A, O Rh(D) negative*	A preferred** Rh(D) negative*	A, AB	
B Positive	B, O Rh(D) positive or negative	B preferred** Rh(D) positive or negative	B, AB	
B Negative	B, O Rh(D) negative*	B preferred** Rh(D) negative*	B, AB	
AB Positive	AB, A, B, O Rh(D) positive or negative	AB preferred** Rh(D) positive or negative	AB	
AB Negative	AB, A, B, O Rh(D) negative*	AB preferred** Rh(D) negative*	AB	

Note:
Very infrequently used component. Cryoprecipitate is interchangeable with Fibrinogen Concentrate for fibrinogen replacement.

* In urgent bleeding patient situations or during times of short supply, Rh(D) negative patients may need to receive Rh(D) positive RBC and platelets

** Platelets should be ABO compatible with patient's red blood cells (donor platelets are suspended in plasma).
In urgent bleeding patient situations or during times of short supply, TML will follow established policies for ABO group substitution for platelets.

Transfusing Platelets: Checking Blood 2. ABO, Rh Blood Groups (3)

- Platelets have A and B antigens on their surface but do not express Rh antigens.
- Platelets for transfusion:
  - 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, TML will check with CBS for availability of group identical platelets (CBS to TML delivery time is also a consideration).

Transfusing Platelets: Checking Blood
2. ABO, Rh Blood Groups (4)

- 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 (≈ 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

Transfusing Platelets: Checking Blood
3. Unit number

Check the unit number is identical.

Transfusion Label

CBS Label

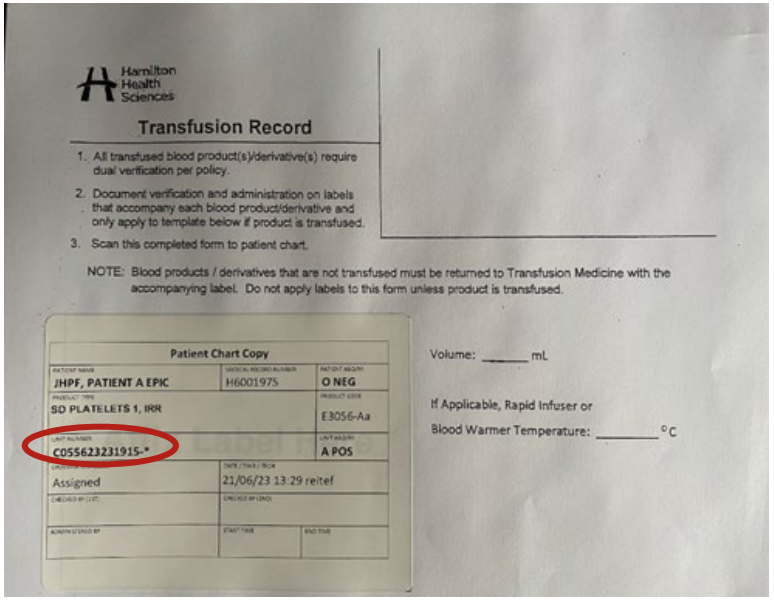


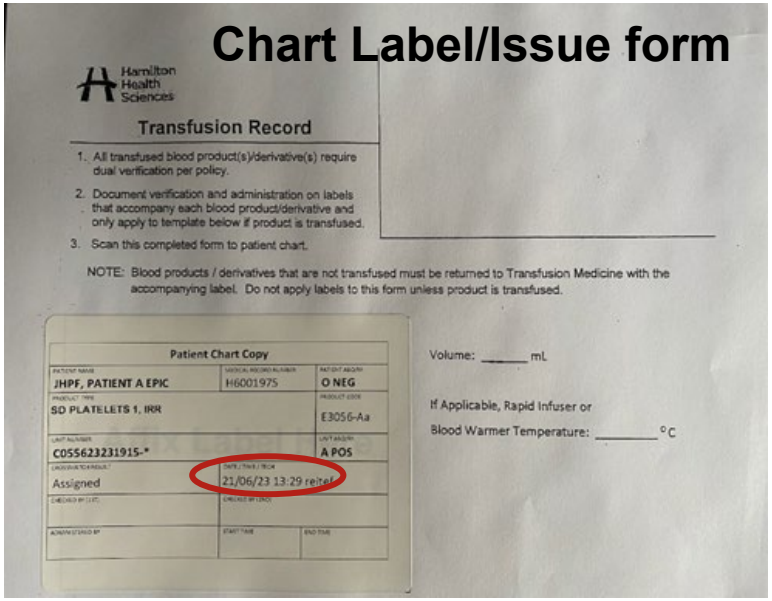
Chart Label/Issue form

Transfusing Platelets: Checking Blood
4. Expiry & Visual Inspection

Expiry

- Check **time of issue** (i.e., removal from temperature-controlled environment) on chart label/issue form.
- Blood expires 4 hours from time of issue, transfusion must be completed or any remainder discarded.

Note: In this example, the issue time is 1329 hours 21/06/23. The unit expires 4 hours later at 1739 hours 21/06/23.
By 1739 hours the transfusion must be completed or any remainder discarded.



Visual Inspection

Check the **blood bag** for

- Any clots or fibrin strands
- Unusual colour
- Ports are intact, no leaking

Click to review the CBS Visual Assessment Guide

Transfusing Platelets: Infusion Rate

- If patient's clinical status permits (i.e., patient stable, not bleeding; transfusion not urgent) initiate transfusion cautiously and slowly.
- For the first 15 minutes,

<u>Adults</u>

50 mL/hour

<u>Neonate/Pediatric</u>

1 mL/kg/hour,
up to 50 mL/hour

Note: If tubing/filter was primed with 0.9% sodium chloride, then re-prime tubing with the platelets to ensure initial slow infusion rate is actually infusing platelets *(Blood tubing volume: Alaris 33 mL; Baxter ≈ 15 mL)*

- After 15 minutes, assess patient and re-check vital signs.
- If no signs/symptoms of transfusion reaction, increase to rate ordered.
- Platelets usual rate is over 60 minutes; slower if TACO risk; maximum is 4 hours from time of issue from TML.

Transfusing Platelets: Patient Monitoring Assessments & Vital Signs

- **Baseline assessment:** recent fevers, rashes, oxygen required, laboured respiration, chest auscultation if TACO risk.
- **Vital signs parameters:** temperature, blood pressure, pulse, respiratory rate, oxygen saturation.
- **Minimum frequency**
  - Baseline within 30 minutes prior to starting transfusion.
  - 15 minutes after start of transfusion.
  - After transfusion is completed.
  - If a transfusion reaction is suspected.
  - Periodically post-transfusion (reactions may occur up to 4 hours after transfusion; for dyspnea reactions, up to 24 hours after transfusion).

Patient Case: Question 4

After the platelet transfusion has been completed, as the nurse is disconnecting the tubing, hives are observed on the patient's forearm. The patient indicates they are quite itchy. On physical assessment, no other hives are found.

Vital Signs	Temperature (°C)	BP (mmHg)	Pulse (per minute)	Respirations (per minute)	Oxygen Saturation (%)
Baseline (1345)	37.2	116/70	80	16	97
Now	36.9	120/68	76	16	97

The patient's nurse should (select all that apply):

a) Call the patient's physician.

b) Verify the patient identifiers on the armband & on the platelet bag transfusion label match.

c) Administer Benadryl 50 mg IV as per the patient's prn medications.

d) Call TML.

Transfusing Platelets: Transfusion Reactions

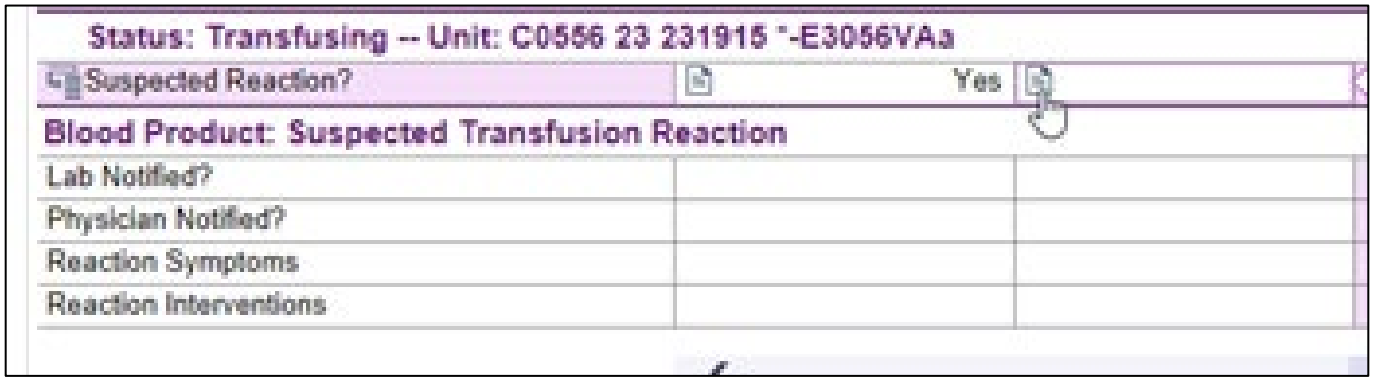
- If a possible acute transfusion reaction is suspected:
  - 

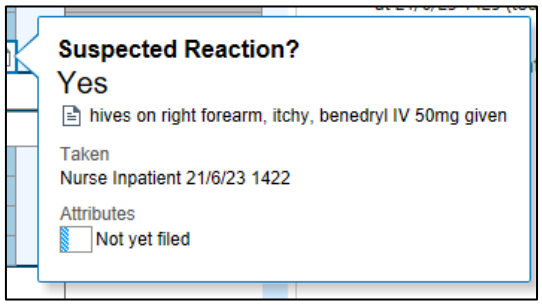
Stop the transfusion
  - Maintain IV access
  - Check vital signs
  - Verify patient armband identification matches with transfusion label
  - Notify prescriber
  - Patient care as per order
  - Report reaction to TML
  - Document all details

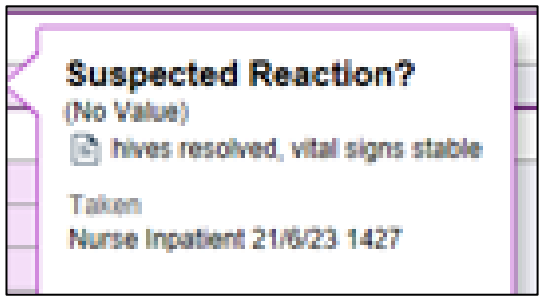
- All unexpected, unusual or serious symptom(s) must be identified, managed and reported to TML for investigation.
- TML must report certain reactions to CBS/Health Canada.

Transfusing Platelets: Transfusion Reactions

- Computer documentation example:







Transfusing Platelets: Acute Reaction Chart

IMMEDIATE ACTIONS!

1. **STOP** the transfusion
2. Maintain **IV access**
3. Check **vital signs**
4. Verify **patient ID matches** transfusion label/tag
5. **Notify physician**
6. **Patient care** per order, **report every reaction to Transfusion Medicine Lab (TML), document** per policy

TTISS-ON
Acute Transfusion Reaction Chart

SIGNS AND SYMPTOMS

FEVER, URTICARIA, DYSPNEA, HYPOTENSION

Airway or Facial Edema, Anxiety, Coughing, Diffuse bleeding/oozing, Hemoglobinuria, Hypertension, Itching, Nausea/Vomiting, Pain (Back, Headache, IV site), Rash, Shaking Chills/Rigors, Subjective chills, Tachycardia, Urine colour– dark/red, Wheezing

Consider Recommended Investigations and Suggested Treatment and Actions in the context of each patient's specific clinical scenario and blood component/product transfused.
The initial presenting sign/symptom may evolve, if so re-contact TML. Close patient monitoring is essential.
For additional assistance, call TML at extension: _____

SIGNS & SYMPTOMS		TIMING	POSSIBLE ETIOLOGY	RECOMMENDED INVESTIGATIONS	SUGGESTED TREATMENT AND ACTIONS
FEVER: Temperature of at least 38° C and an increase of at least 1° C from pre-transfusion **and/or** Shaking Chills/Rigors NOTE: Isolated symptom subjective chills, may consider as Low Risk	**Low Risk:** 38° C to 38.9° C but **NO** other symptoms	During or up to 4 hours post transfusion.	Febrile non-hemolytic transfusion reaction	No testing required	• Antipyretic • With physician order and if blood still viable, may resume transfusion with close patient assessment • If recurrent reactions, possible trial of antipyretic premedication
	High Risk: a) at least 38° C but **with** other symptoms **or** b) 39° C or greater **or** c) Shaking Chills/ Rigors	Often within first 15 minutes. During or up to 4 hours post transfusion.	Febrile non-hemolytic transfusion reaction Bacterial contamination Acute hemolytic transfusion reaction	• TML: Group & Screen, DAT • TML: Blood component culture • Patient blood culture (from a different peripheral site) • Urinalysis (first void post-reaction) • Hemolysis work-up: CBC, bilirubin, LDH, AST, haptoglobin, reticulocyte count, blood film • If indicated, assess for - AKI {Acute Kidney Injury} (electrolytes, creatinine) - DIC {Disseminated Intravascular Coagulation} (INR, PTT, fibrinogen, D-dimer)	**DO NOT restart transfusion** • Return blood to TML for clerical check & culture • Broad spectrum IV antibiotics; DO NOT wait for culture results • Aggressive hydration; maintain good urine output • Supportive care per physician's discretion: IV fluid, vasopressors, oxygen, respiratory support • Monitor for hypotension, renal dysfunction, DIC {Disseminated Intravascular Coagulation} • If severe rigors, consider meperidine (if no patient contraindications) • **Serious reaction, call TML immediately**
URTICARIA (Hives) Rash **or** Itching	Less than 2/3 body surface but **NO** other symptoms	During or up to 4 hours post transfusion.	Minor allergic	No testing required	• Antihistamine • With physician order and if blood still viable, may resume transfusion with close patient assessment • If recurrent/severe reactions, possible trial of antihistamine premedication
	2/3 body surface or more but **NO** other symptoms	Often early in transfusion. During or up to 4 hours post transfusion.	Minor allergic (Extensive)	No testing required	**DO NOT restart transfusion** • Antihistamine; may require steroid if symptoms slow to resolve • If recurrent/severe reactions, possible trial of antihistamine /steroid premedication • If continued reactions with premedication, possible trial of washed/plasma depleted components
	With other symptoms, i.e., Airway or Facial Edema, DYSPNEA, HYPOTENSION	Often early in transfusion. During or up to 4 hours post transfusion.	Anaphylactoid reaction /Anaphylaxis	• If also DYSPNEA: chest X-ray, • If also hypoxia: blood gases • Suggest consult Transfusion Medicine physician: explore if indication for - TML: Group & Screen, DAT - Haptoglobin - IgA level (if pre-transfusion sample available) - Anti-IgA testing (performed via Canadian Blood Services, TML will assist in sending samples)	**DO NOT restart transfusion** • **Epinephrine;** consider steroid, antihistamine • Return blood to TML for clerical check • Supportive care per physician's discretion: oxygen, respiratory support, vasopressors • Pending outcome of investigations, washed/plasma depleted components • **Serious reaction, call TML immediately**

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Transfusing Platelets: Acute Reaction Chart

cont'd

SIGNS & SYMPTOMS		TIMING	POSSIBLE ETIOLOGY	RECOMMENDED INVESTIGATIONS	SUGGESTED TREATMENT AND ACTIONS
DYSPNEA **or** SpO_2 (oxygen saturation) of 90 % or less and a decrease of at least 5 % from pre-transfusion **or** intervention required to maintain SpO_2 (oxygen saturation)	With **Hypertension,** tachycardia, +/- FEVER	During or up to **12 hours** post transfusion	TACO* (Transfusion Associated Circulatory Overload)	• TML: Group & Screen, DAT • Consider chest x-ray: Findings - pulmonary edema, Kerley B lines, peri bronchial cuffing; may be pleural fluid • Cardiac biomarkers (as available)	**DO NOT restart transfusion** • Oxygen, high fowler's position, diuretics (document fluid balance) • **Future transfusion:** Slow transfusion rate Pre-transfusion diuretics ** Consider TML to divide unit (as available)
	ACUTE DYSPNEA With **HYPOTENSION,** tachycardia, +/- FEVER	During or up to **6 hours** post transfusion	TRALI (Transfusion Related Acute Lung Injury)	• TML: Group & Screen, DAT • Chest x-ray: Findings – bilateral interstitial /alveolar infiltrates without elevated pulmonary pressures • If also hypoxia: blood gases • Canadian Blood Services requires follow up information & patient blood tests, contact TML, will assist in sending samples	**DO NOT restart transfusion** • Supportive care per physician's discretion: oxygen, respiratory support, vasopressors (benefit uncertain for diuretics (document fluid balance), steroids, and bronchodilators) • **Serious reaction, call TML immediately**
	With FEVER +/- HYPOTENSION	Possible Etiology: Bacterial contamination, Acute hemolytic transfusion reaction **Consider/Follow FEVER, High Risk:** Timing, Recommended Investigations, Suggested Treatment and Actions			
	With URTICARIA, Airway or Facial Edema, HYPOTENSION	Possible Etiology: Anaphylactoid Reaction / Anaphylaxis **Consider/Follow URTICARIA, With other symptoms:** Timing, Recommended Investigations, Suggested Treatment and Actions			
	Mild respiratory symptoms that do not align with TACO or TRALI	During or up to **24 hours** post transfusion	TAD (Transfusion Associated Dyspnea)	• Consider chest x-ray: Findings - normal/unchanged, no pulmonary edema, No bilateral interstitial/alveolar infiltrates	**DO NOT restart transfusion** • Supportive care per physician's discretion: oxygen, respiratory support
HYPOTENSION SBP (Systolic blood pressure) 80 mmHg or lower **AND** from pre-transfusion SBP: - 30 mmHg or greater absolute decrease **or** - 15 to 25 % or greater relative decrease **or** - intervention required to maintain SBP	Alone or with facial flushing	During or up to 4 hours post transfusion	***Bradykinin mediated hypotension	No testing required	**DO NOT restart transfusion** • Supportive care per physician's discretion: IV fluids • If taking ACE (angiotensin converting enzyme) inhibitor medication, consider an alternative anti-hypertensive agent prior to additional transfusion
	With FEVER, +/- DYSPNEA	Possible Etiology: Bacterial contamination, Acute hemolytic transfusion reaction **Consider/Follow FEVER, High Risk:** Timing, Recommended Investigations, Suggested Treatment and Actions			
	With URTICARIA, Airway or Facial Edema, DYSPNEA	Possible Etiology: Anaphylactoid Reaction / Anaphylaxis **Consider/Follow URTICARIA, With other symptoms:** Timing, Recommended Investigations, Suggested Treatment and Actions			
	With ACUTE DYSPNEA, tachycardia +/- FEVER	Possible Etiology: TRALI **Consider/Follow ACUTE DYSPNEA:** Timing, Recommended Investigations, Suggested Treatment and Actions			

*** TACO: Pre-transfusion assess patients for TACO risk factors:** advanced age, history heart failure, history myocardial infarction, left ventricular dysfunction, renal dysfunction, positive fluid balance

**** Pre-transfusion diuretics:** Furosemide PO: onset 30 to 60 minutes, maximal effect 1-2 hours, effect persists about 6-8 hours
Furosemide IV: onset 5 minutes, maximal effect 20-60 minutes, effect persists about 2 hours

***** Bradykinin mediated hypotension**
Bradykinin is believed to have a major role in producing hypotension. Patients taking ACE (angiotensin converting enzyme) inhibitor medication - decreased bradykinin degradation related to increased angiotensin converting enzyme. Also, some individuals have genetic polymorphism leading to decreased bradykinin degradation.

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Transfusing Platelets: Transfusion Checklist

TRANSFUSION CHECKLIST

For references, refer to Bloody Easy Blood Administration Version 3, Summary: Transfusionist's Accountability: Transfusion Checklist (page 80-89).

Unequivocal (unmistakeable) identification of the patient is mandatory.

Patient must be wearing a patient identification armband. Patient identification information must remain attached to the blood for the duration of the transfusion.

PRE-TRANSFUSION

✓ **Informed Consent**
- Per policy/procedure, questions addressed
- Exception: emergent, life-threatening bleed

✓ **Transfusion Order**
- Indication supported: labs, signs, symptoms
- Complete, required information included

✓ **Group & Screen Testing**
- Required for compatible blood components
- ABO, Rh(D) blood groups, antibody screen (clinically significant antibodies)
- Label tube of blood at patient's bedside

✓ **Prepare the Patient**
- Educate: symptoms indicative of reaction
- Assess for transfusion history and TACO risk factors; follow up if indicated

✓ **Prepare the Equipment**
- Dedicated, patent IV (peripheral or central)
- Compatible IV fluid (only 0.9 % NaCl [sodium chloride] for blood components)
- Blood components – tubing/filter (170-260 microns); change after 4 units or 4 hours
- Platelets – always NEW/FRESH tubing/filter
- Prime tubing/filter: blood or compatible IV fluid
- IV setup to stop abruptly & maintain TKVO: 0.9% NaCl flush syringes + any fluid IV line or 0.9% NaCl IV line
- Infusion Devices: if Health Canada approved

✓ **Pick Up Blood from TML** (Transfusion Medicine Lab)
- Patient identification (surname, first name, unique identification number) and order

TRANSFUSION

✓ **Checking Blood Components/Blood Products**
- Blood received matches transfusion order
- At bedside, in physical presence of patient
- **1. Patient Identification:** surname, first name, unique identification number **identical** on armband, order, transfusion & chart label/tag
- **2. ABO, Rh(D) Blood Groups (only for Components): identical/compatible** on Group & screen test, CBS (Canadian Blood Services) label, transfusion & chart label/tag
- **3. Unit (Components) / Lot (Products) Number: identical on** CBS label (Components) / manufacturer label (Products), transfusion & chart label/tag
- **4. Visual Inspection & Expiry Components:** no clots, usual colour, ports intact, expires 4 hours after issue from TML **Products:** packaging/seal intact, colour as per manufacturer, vials/glass bottles – once entered/spiked, expires after 4 hours

✓ **Patient Assessment and Vital Signs** (for each unit)
- Close monitoring/observation required
- Minimum: within 30 minutes of starting, 15 minutes after starting, upon completion
- Temp, BP, pulse, respiratory rate, oxygen saturation; if TACO risk - chest auscultation

✓ **Infusion Rate** (for each unit)
- 50 mL/hour for first 15 minutes; can be deferred if acute bleeding
- Re-check after 15 minutes, if no indication of reaction then increase to rate as ordered

✓ **Possible Transfusion Reaction**
- If any adverse/unexpected/serious symptoms, **STOP** transfusion; refer to TTISS Reaction Chart

POST-TRANSFUSION

✓ **Completing the Transfusion**
- Comply with expiry time specific for blood component/blood product
  Outside the expiry time, discard remainder
- Component tubing: flush with 0.9 % NaCl
- Products given IV: flush (tubing/IV site) with compatible IV fluid
- Some hospitals require returning the empty blood bag to TML
  Otherwise dispose of blood tubing/bags in biohazardous waste
- Re-assess patient and re-check vital signs:
  - at end of transfusion
  - periodically post-transfusion (reactions may occur 4 hours post-transfusion; for dyspnea reactions up to 24 hours post transfusion)

✓ **Documentation**
- File completed chart label/tag for each component or product transfused on patient's health record (include start and stop times)
- Some hospitals require a completed "transfusion record" form returned to TML
- Record volume transfused, vital signs and patient assessments
- If a transfusion reaction is suspected: report to TML, document signs and symptoms, patient care

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Post Transfusion Knowledge Question 1

For adult patients, transfusion of platelet (PLTS) is indicated:

a) For bleeding patients taking anti-platelet medications (e.g., aspirin, clopidogrel), regardless of platelet count.
b) Only if the patient is actively bleeding.
c) Only if the patient's platelet count is less than 100 x 10^9/L.
d) Pre-neurosurgery, if the patient's platelet count is less than 200 x 10^9/L.

Post Transfusion Knowledge Question 2

When administering platelet transfusion, it is important to:

a) Concurrently infuse 0.9 % sodium chloride at 25 mL/hour.
b) Monitor the patient's temperature q 20 minutes.
c) Use new a blood tubing/filter set.
d) Complete the transfusion within 30 minutes.

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Platelet Transfusion: A Sticky Process

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