Platelets:

From Donor to Bedside;
The Production and the Dispensing

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Objectives

- Describe how platelets for transfusion are collected and processed at Canadian Blood Services
- Understand how collection and processing of platelets makes inventory management of this component more complex
- Identify signs and symptoms of transfusion reactions associated with platelet transfusions

Disclosure

- Nothing to disclose

Regulations and Standards

Health Canada

- Regulates blood collection, testing, processing and distribution
- Requires adherence to national standards

Health Canada Santé Canada

Regulations and Standards

Canadian Standards Association (CSA)

- CAN/CSA-Z902-15
- National standard for all aspects of blood

Canadian Society for Transfusion Medicine (CSTM)

- Publishes standards for Hospital Transfusion Services

CSTM SCMT
Canadian Society for Transfusion Medicine
Société canadienne de médecine transfusionnelle

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Canadian Blood Services (CBS)

- In all provinces and territories except Québec
- Provincial and territorial funding
- 119,955 total platelets
  - 34,335 apheresis
  - 85,620 buffy coat
- 35 permanent donor centres
- 4000 mobile donor centres

Canadian Blood Services
BLOOD PLASMA STEM CELLS ORGANS & TISSUES

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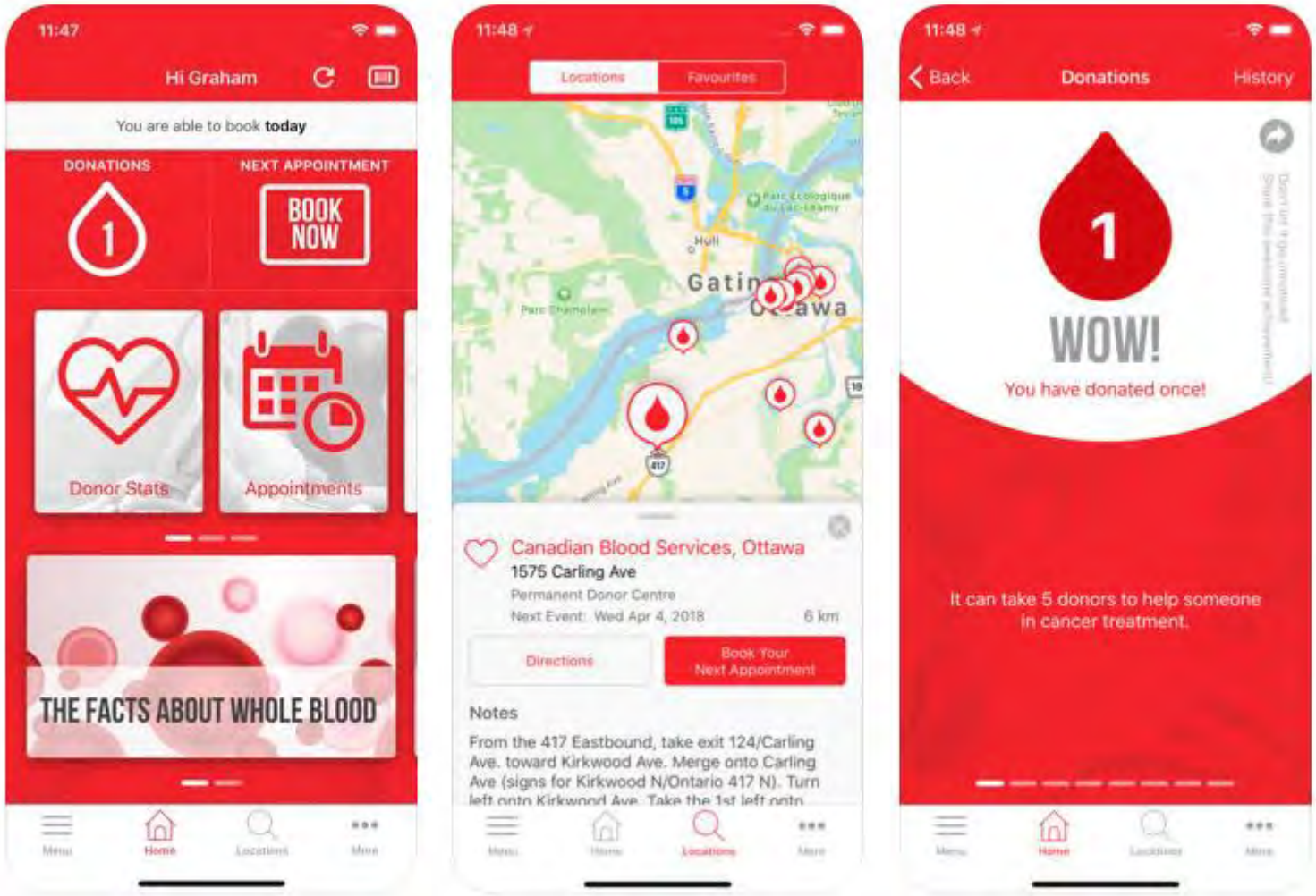
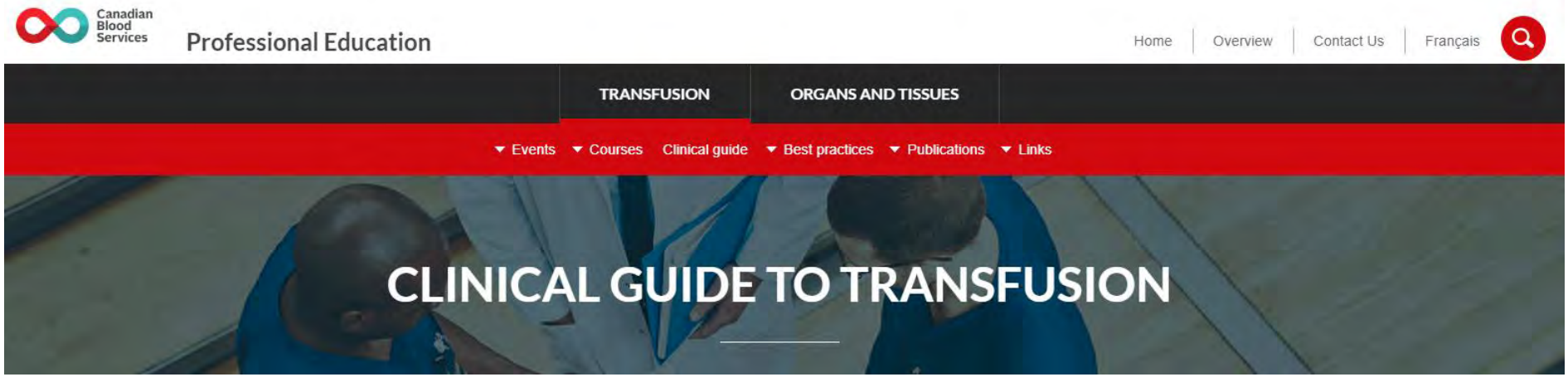

11:47
Hi Graham
You are able to book today
DONATIONS
NEXT APPOINTMENT
1
BOOK NOW
Donor Stats
Appointments
THE FACTS ABOUT WHOLE BLOOD
Menu
Home
Locations
More
11:48
Locations
Favourites
Hull
Canadian Blood Services, Ottawa
1575 Carling Ave
Permanent Donor Centre
Next Event: Wed Apr 4, 2018
6 km
Directions
Book Your Next Appointment
Notes
From the 417 Eastbound, take exit 124/Carling Ave. toward Kirkwood Ave. Merge onto Carling Ave (signs for Kirkwood N/Ontario 417 N). Turn
11:48
Back
Donations
History
1
WOW!
You have donated once!
It can take 5 donors to help someone in cancer treatment.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CLINICAL GUIDE TO TRANSFUSION

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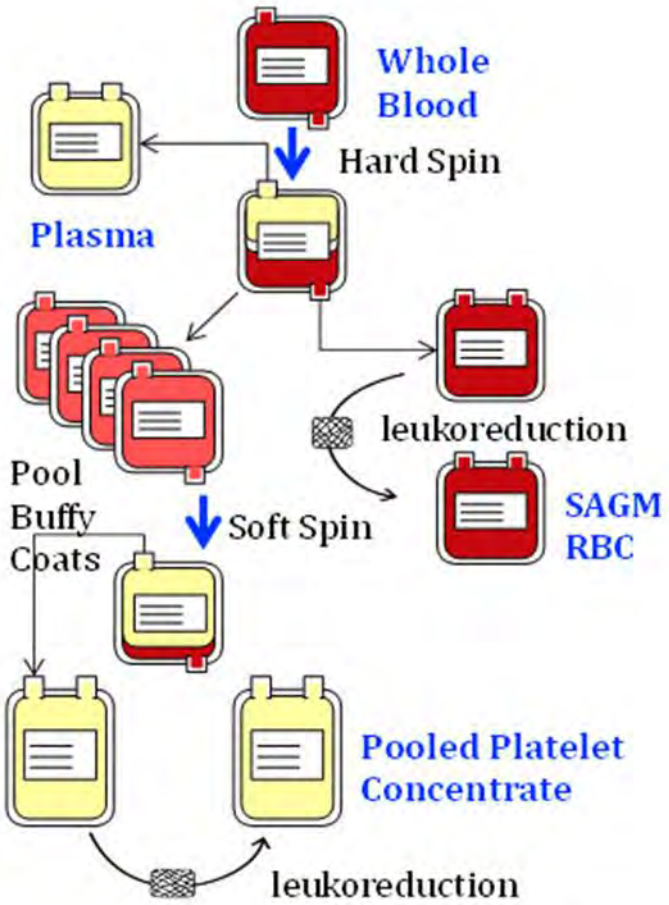
Platelet Components

Pooled Platelets LR CPD

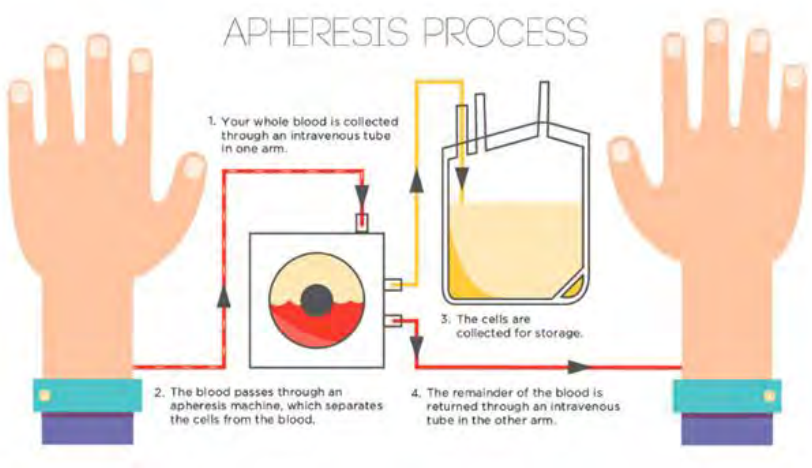
- Separation of the buffy coat layer from whole blood
- Four ABO matched platelet concentrates pooled in plasma from one of the donations
- The pool is leukocyte reduced by filtration



https://professionaleducation.blood.ca/en/transfusion/guide-clinique/platelet-transfusion-alloimmunization-and-management-platelet

Apheresis Platelets

- Collected from a single donor using an apheresis machine
- Whole blood collected, spun to separate the platelets
- Rest of the blood components are returned back to the circulating blood of the donor



http://www.fbbb.org.in/aphaeresis_donors.html

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Platelet Components

- Shelf life: 7days
- Storage:
  - Room temperature (20-24°C)
  - Consistent gentle agitation
  - Gas permeable storage bag

- Storage conditions supports platelet metabolism by ensuring effective exchange of gases
- All platelet components are tested for bacterial contamination

Question #2

Apheresis platelets should be the preferred platelet product for my patients:

1. TRUE
2. FALSE

Pool vs Apheresis Platelets

Both products are equivalent

- Leukoreduced (<5x10^6 leukocytes)
- Contain <2ml residual RBC
- Should increase platelet count by 15-25 x 10^9/L
- Only indication for apheresis platelets are to collect matched platelets for patients with anti-HLA/HPA

http://transfusionontario.org/en/documents/?cat=bloody_easy

Question #2

In the platelet inventory below, what would you select for a Group A Rh negative male patient requiring a non-urgent platelet transfusion?

1. Group A neg apheresis expiring tomorrow
2. Group O pos apheresis expiring at midnight
3. Group AB neg pool expiring in two days
4. Order group A neg from CBS

ABO Mismatch Platelet Transfusions

ABH antigen on platelet membrane

- Clinically no impact on efficacy
- i.e.: group A plt to group O patient

Anti-ABO isoagglutinins in platelet plasma

- Risk of hemolysis from minor incompatibility
- i.e.: group O plt to group A patient
- Determine anti-A/B titre: transfuse low titre
- Remove incompatible plasma

Rh Mismatch Platelet Transfusions

- i.e. Rh pos plt to Rh neg patient
- Platelets do not express Rh antigen
- But may contain small amount of RBC
  - Less in apheresis collected platelet
- Low rate of immunization
- Issue RHIG to women of child bearing potential only

Question #3

The most commonly seen adverse reaction due to platelet infusion is:

1. Transmission of viral infections
2. Febrile non-hemolytic
3. Transfusion-associated circulatory overload
4. Red cell sensitization

Adverse Reactions

Risk of Event	Event
1 in 13	Red cell sensitization, increasing risk of hemolytic transfusion reaction and hemolytic disease of the fetus and newborn[70]
1 in 20	Febrile non-hemolytic transfusion reaction per pool of platelets[71]
1 in 100	Transfusion-associated circulatory overload per transfusion episode[72]
1 in 100	Minor allergic reactions (urticaria)
1 in 300	Febrile non-hemolytic transfusion reaction per unit of RBC (1 'donor exposure')
1 in 7,000	Delayed hemolytic transfusion reaction
1 in 10,000	Transfusion-related acute lung injury (TRALI)
1 in 10,000	Symptomatic bacterial sepsis per pool of platelets
1 in 40,000	ABO-incompatible transfusion per RBC transfusion episode
1 in 40,000	Serious allergic reaction per unit of component
1 in 100,000	Post-transfusion purpura
1 in 200,000	Death from bacterial sepsis per pool of platelets
1 in 250,000	Symptomatic bacterial sepsis per unit of RBC
1 in 500,000	Death from bacterial sepsis per unit of RBC
<1 in 1,000,000	Transmission of West Nile Virus
1 in 4,000,000	Transmission of Chagas disease per unit of component
1 in 7,500,000	Transmission of hepatitis B virus per unit of component
1 in 7,600,000	Transmission of HTLV per unit of component
1 in 13,000,000	Transmission of hepatitis C virus per unit of component
1 in 21,000,000	Transmission of human immunodeficiency virus (HIV) per unit of component

http://transfusionontario.org/en/documents/?cat=bloody_easy

Febrile Non-Hemolytic Transfusion Reactions (FNHTRs)

- 1 in 20 per pool of platelets
- Rise in body temp > 1°C and >38 °C
  - Chills, rigors, nausea
- Recipient antibodies to donor WBC
  - Reduction in incidence since leukoreduction?
- Rule out bacterial contamination of product
  - Return bag to lab for culture

Febrile Non-Hemolytic Transfusion Reactions (FNHTRs)

- Treat with acetaminophen
- Premedication?

Am J Hematol. 2002 Jul;70(3):191-4.

Acetaminophen and diphenhydramine as premedication for platelet transfusions: a prospective randomized double-blind placebo-controlled trial.

Wang SE[1], Lara PN Jr, Lee-Ow A, Reed J, Wang LR, Palmer P, Tuscano JM, Richman CM, Beckett L, Wun T.

Author information

Transfusion. 2008 Nov;48(11):2285-91. doi: 10.1111/j.1537-2995.2008.01858.x. Epub 2008 Jul 30.

A prospective, randomized, double-blind controlled trial of acetaminophen and diphenhydramine pretransfusion medication versus placebo for the prevention of transfusion reactions.

Kennedy LD[1], Case LD, Hurd DD, Cruz JM, Pomper GJ.

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Minor Allergic Reactions

- 1 in 100 transfusions
- Urticaria, brochoconstriction, hypotensive
- Possibly due to IgE/IgG antibodies in recipient against donor plasma proteins
- Treat with diphenhydramine (Benadryl)
- Plasma reduce?

Bacterial Transmission

- 1 in 10,000: symptomatic bacterial sepsis per pool
- Rigors, fever, tachycardia, hypotension, nausea and vomiting
- Stop transfusion
- Report to Transfusion Medicine
  - Collect peripheral blood specimen for culture
  - Return residual blood bag for culture
  - Provide aggressive supportive therapy including broad spectrum antibiotics

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Bacterial Transmission

	Bacterial Contamination	Symptomatic Septic Reactions	Fatal Bacterial Sepsis
Platelet pool	1 in 1,000	1 in 10,000	1 in 200,000
RBC	1 in 50,000	1 in 250,000	1 in 500,000

- Storage at 20-24 °C
- Blood components may be contaminated by:
  - Skin contaminates from the donor
  - Unrecognized bacteremia in the donor
  - Handling of the product

http://transfusionontario.org/en/documents/?cat=bloody_easy

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Bacterial Transmission

Prevention

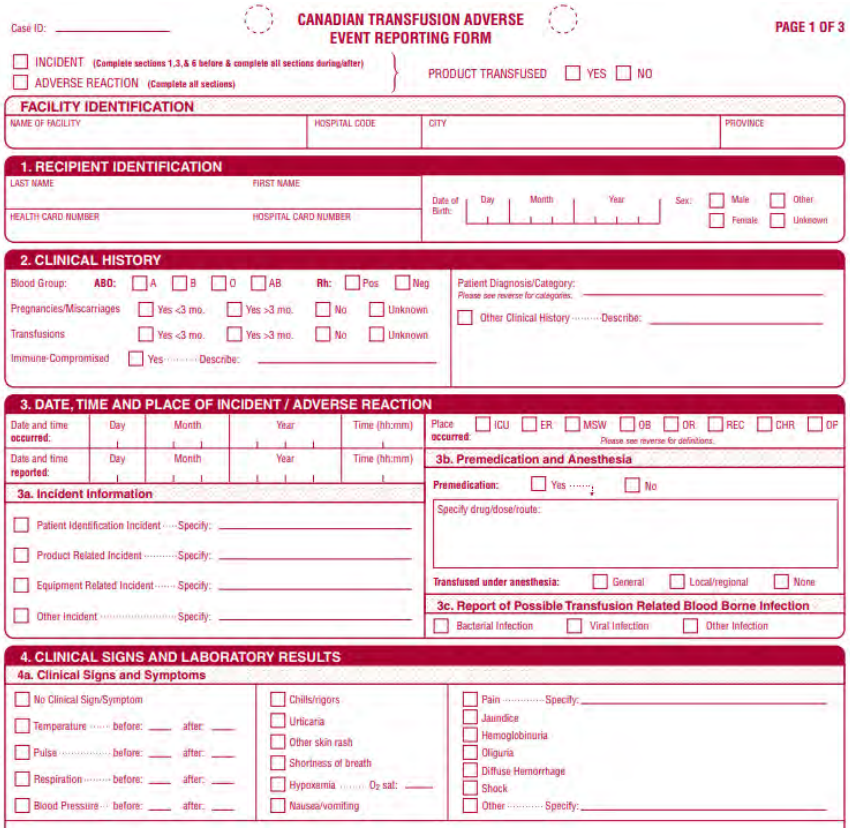
- Skin disinfected at time of donation to reduce contamination by skin flora
- First 40mL of blood collect diverted
- All platelets cultured at CBS prior to issue

Reporting reactions

TTISS ON

Ontario Transfusion Transmitted Injuries Surveillance System

Transforming transfusion one unit at a time...



Case ID: _____

CANADIAN TRANSFUSION ADVERSE EVENT REPORTING FORM

PAGE 1 OF 3

☐ INCIDENT (Complete sections 1,3,& 6 before & complete all sections during/after)
☐ ADVERSE REACTION (Complete all sections)

PRODUCT TRANSFUSED ☐ YES ☐ NO

FACILITY IDENTIFICATION

NAME OF FACILITY	HOSPITAL CODE	CITY	PROVINCE

1. RECIPIENT IDENTIFICATION

LAST NAME | FIRST NAME

HEALTH CARD NUMBER | HOSPITAL CARD NUMBER

Date of Birth: Day / Month / Year

Sex: ☐ Male ☐ Female ☐ Other ☐ Unknown

2. CLINICAL HISTORY

Blood Group: ABO: ☐ A ☐ B ☐ O ☐ AB Rh: ☐ Pos ☐ Neg

Pregnancies/Miscarriages ☐ Yes <3 mo. ☐ Yes >3 mo. ☐ No ☐ Unknown

Transfusions ☐ Yes <3 mo. ☐ Yes >3 mo. ☐ No ☐ Unknown

Immune-Compromised ☐ Yes ····· Describe: _____

Patient Diagnosis/Category: _____
Please see reverse for categories.

☐ Other Clinical History ····· Describe: _____

3. DATE, TIME AND PLACE OF INCIDENT / ADVERSE REACTION

	Day	Month	Year	Time (hh:mm)
Date and time occurred:				
Date and time reported:				

Place occurred: ☐ ICU ☐ ER ☐ MSW ☐ OB ☐ OR ☐ REC ☐ CHR ☐ OP
Please see reverse for definitions.

3a. Incident Information

☐ Patient Identification Incident ····· Specify: _____
☐ Product Related Incident ····· Specify: _____
☐ Equipment Related Incident ····· Specify: _____
☐ Other Incident ····· Specify: _____

3b. Premedication and Anesthesia

Premedication: ☐ Yes ····· ☐ No

Specify drug/dose/route:

Transfused under anesthesia: ☐ General ☐ Local/regional ☐ None

3c. Report of Possible Transfusion Related Blood Borne Infection

☐ Bacterial Infection ☐ Viral Infection ☐ Other Infection

4. CLINICAL SIGNS AND LABORATORY RESULTS

4a. Clinical Signs and Symptoms

☐ No Clinical Sign/Symptom
☐ Temperature ····· before: ___ after: ___
☐ Pulse ····· before: ___ after: ___
☐ Respiration ····· before: ___ after: ___
☐ Blood Pressure ····· before: ___ after: ___

☐ Chills/rigors
☐ Urticaria
☐ Other skin rash
☐ Shortness of breath
☐ Hypoxemia ····· O_2 sat: ___
☐ Nausea/vomiting

☐ Pain ····· Specify: _____
☐ Jaundice
☐ Hemoglobinuria
☐ Oliguria
☐ Diffuse Hemorrhage
☐ Shock
☐ Other ····· Specify: _____

How do I know if a transfusion reaction needs to be reported to Canadian Blood Services or Health Canada?

Answer these **easy questions** to quickly find out whether you need to report an ATE to the Canada Vigilance Program, Health Canada, Marketed Products, Canadian Blood Services or the manufacturer of the Plasma Derivative. Refer to the full guide, TTISS "Ontario Guide for Reporting Transfusion Reactions" for more detailed explanations.

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Conclusion

- Platelets are supplied by CBS as pooled platelets or apheresis collected
  - Both are equivalent to each other
- Prevention of outdating of platelets is a challenge for Transfusion Medicine
  - Short shelf life: 7 days
- Bacterial sepsis occurs most frequently with platelets
  - Storage at room temperature

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