



**GUJTRANSCON  
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Embrace Good Health

# Manage Platelet Shortage

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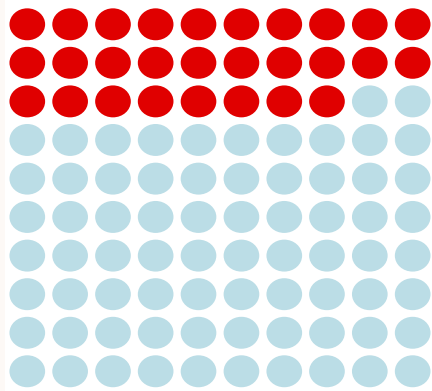
# Learning Outcome

- Drivers of Inventory challenged by routine and extraordinary negative events
- Develop best practices to implement when experiencing a severe blood product shortage,
- Ensuring optimized access to available resources and existing inventory

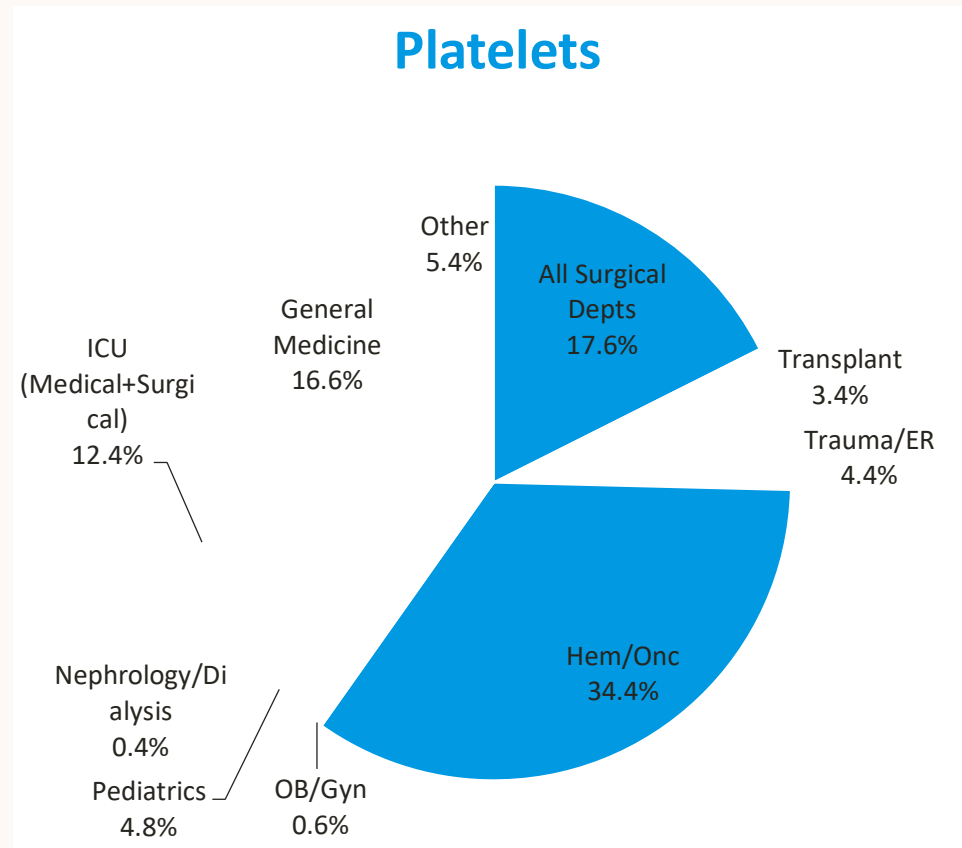
# Problem with platelet inventory?

- Platelet inventory management are characterized:
  - Product perishability
  - Supply uncertainty
  - Demand Stochasticity
  - High shortage cost
- Maintaining adequate PLT supply hindered by the short shelf life and life span.
- Leads to a supply-demand mismatch: “retain more PLTs for transfusions, leading to increased PLT discard rates.”

# Platelet usage



**23%** cancel demands on one or more days as a result of blood inventory shortages.



# Products on the shelf

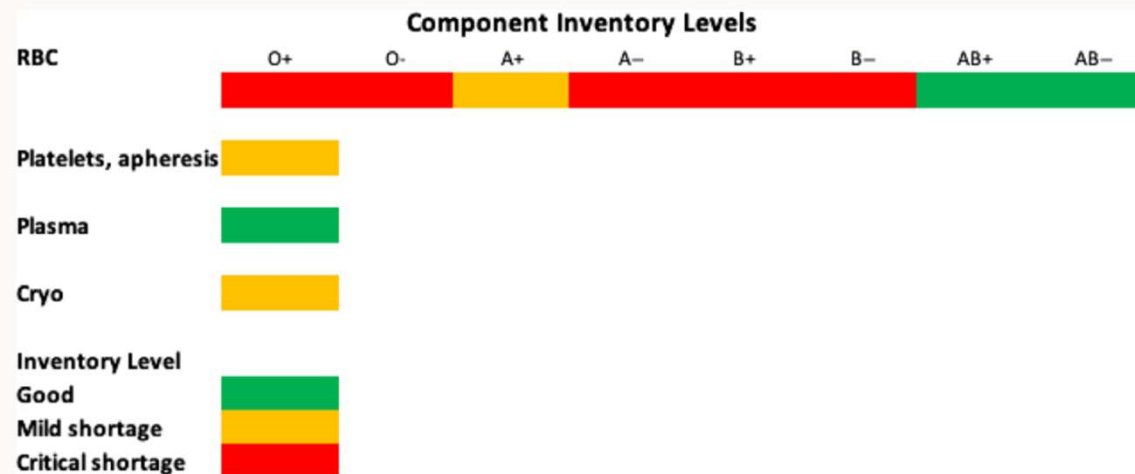
- Whole blood derived
  - RDPC
  - Pooled platelets
- Collected by apheresis
  - SDPC
  - PAS SDPC
- Whole Blood Automation
  - Interim Platelet unit

# Platelet shortage: issuing a warning

- Defining a Shortage
- Assessment / revisiting transfusion requirements
- Predict requirement
- Planning

# I. Defining a Shortage

- Blood Bank has < [determine your critical level], Unable to supply platelet units in a timely manner.
- mild shortage < 25 % lower than usual
- moderate shortage < 50% lower than usual
- severe shortage <75% lower than usual



Issue leading to shortage of platelets



# 1. Blood Supply Disruptions

## ■ Common issues that create challenges for shortage

- Seasonal shortages due to holidays and school schedules
- Acute spot shortages due to severe weather
- Product related shortages
- Hardware, consumable, (e.g., filters, bags, etc.)

# 1. Blood Supply Disruptions

## ■ Extreme Product Shortages

- Unprecedented challenges: (Covid 19 like situation, Dengue epidemic)
- Long-duration product shortages caused by COVID-19 lockdowns
- Unpredictable transfusion volumes (disaster)
- Cancellation of donation drives
- Product availability disruptions due to issues in blood bank.

## A: Patient

- screening and management of platelet orders
- use of ABO and/or Rh mismatched platelets
- downward revision of platelet transfusion thresholds
- dosing adjustments

## II. revisiting requirements

- Triage patients based on volume issued
- Immediately assess:
  - Available inventory
  - Platelet orders
  - On-going surgeries
  - On-going transfusion
  - Transplants
  - Upcoming request
- revisit
  - Provide 1/2 unit for all BMT/Hemeonc inpatients
  - Provide 1/2 for all ICU
  - Provide 1/4 unit for refractory patients
  - Postpone non-emergent/ elective surgeries

# 1. Appropriateness of Transfusion

Indication	Threshold PI count (x10 <sup>9</sup> /L)	Cases	% requested outside threshold
Prophylaxis in BMF	10	17	53%
Prophylaxis in BMF + risk	20	15	73%
Prophylaxis for invasive procedures	50	8	35%
Massive transfusion	75	3	50%
DIC		5	-
Donor: NAIT**	30	15	73%

## 2. ABO mismatched

- Transfusion of cellular-incompatible platelets may lead to a decreased post- transfusion platelet count increment
  - cumulative after multiple transfusions
  - may also lead to a positive direct antiglobulin test (DAT)
  - carries the risk of hemolysis (group O platelets to a non-group O recipient)
- Measure
  - Limit the volume of incompatible plasma transfused per 24 hour period e.g. 15 mL for neonate, 350 - 600 mL for adults
  - Volume reduced component: 20% reduction in the post transfusion PCI
  - Use of Platelet Additive Solution.

## 2. Rh no identical

- platelets do not express Rh antigens, the component contains red cells (about 0.5 mL in a buffy coat pool and less than 0.001 mL in an apheresis donation)
- One 300 µg dose of RHIG will protect against exposure to 15 mL of red cells. Based on the RHIG half-life of 3 weeks, one dose should cover multiple Rh positive platelet transfusions for 4 weeks

# III. revising dosage/triggers

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DOI: 10.1111/trf.15857

ORIGINAL ARTICLE

TRANSFUSION WILEY

How do I manage long-term blood component shortages  
in a hospital transfusion service?

- Transfuse one unit for platelet with count  $<10,000/\mu\text{l}$
- Transfuse one unit for platelet for a procedure with count  $\leq 50,000/\mu\text{l}$
- Transfuse one unit for platelet for a neuro ophthalmologic procedure with count  $\leq 100,000/\mu\text{l}$
- Transfuse one unit of platelets for actively bleeding
- Refractory patients shall be restricted to one unit/day unless actively bleeding.



# 1. Revised Platelet Transfusion thresholds

- lowering the threshold for prophylactic platelet transfusion in patients with bone marrow suppression/failure from  $10 \times 10^9/L$  to  $5 \times 10^9/L$  or switching to a therapeutic transfusion strategy (only for days with bleeding)

## 2. Splitting platelet dosage

- Platelet units containing greater than  $4.8 \times 10^{11}$  platelets are split and used as a full-dose unit for bleeding patients;
- units containing less than  $4.8 \times 10^{11}$  are split and then released as low-dose units for non-bleeding patients.



## IV. predict requirement

- Surgery wise
- Diagnosis wise
- Beds wise
- Critical patients
- How many platelet collection need to be done?
- What would be minimal inventory
- Daily plan.

## V. Planning

## B: blood centre

- Flexible as possible regarding eligibility of to accept donor
- Anticipate blood products in advance of event: Dengue
- Active multi-source supply
- Extending shelf life

### PLATELET DONATIONS

The ASBBC's main mission in platelet collection is to provide units to the NICU (Neonatal Intensive Care Unit) to support babies and mothers who may be in need during/after delivery. Units are also provided for any traumas that may occur. We are the sole source of FDA approved platelets on island and **our platelet supply is dangerously low.**

**How do I know if I can donate?**

- Donors cannot take aspirin or aspirin containing products within 24 hours of donation
- Women who are pregnant or have been pregnant cannot donate.
- Other factors that could prevent you from donating are your medical history, travel history, medications, vaccines, etc.

**Before your appointment:**

- Get a good night's sleep
- Eat a healthy meal
- Drink lots of water

**After your appointment:**

- Hydrate more
- Avoid heavy lifting
- Have a light snack

**What are platelets?**

Platelets help stop or prevent bleeding by clotting the blood. They are essentially the body's "bandages"

**How long does it take?**

Donating a unit of platelets takes on average 1 to 2 hours depending on your weight and how many platelets are in your blood

**How often can I donate?**

Platelets can be donated every two weeks

**YOUR DONATIONS SAVE LIVES**

To schedule an appointment, call the USPACOM ASBBC at  
DSN: 646-9939 / Comm: 098-971-9939

# 1.Donor Base

- Appeal to the voluntary blood donor organizers (VBDOs)
- Organization of platelet awareness drives
- Conversion of the whole blood donors to plateletpheresis
- Motivating the patient's attendants for plateletpheresis
- Steps to increase donor safety and confidence-building measures for the donors
- Implementation of a modified donor health questionnaire
- Education for Blood centre staff members
- Advice and instructions for the VBDOs and individual SDAP donors

## 2. Inventory Management

### ■ **1. Monitoring inventory patterns**

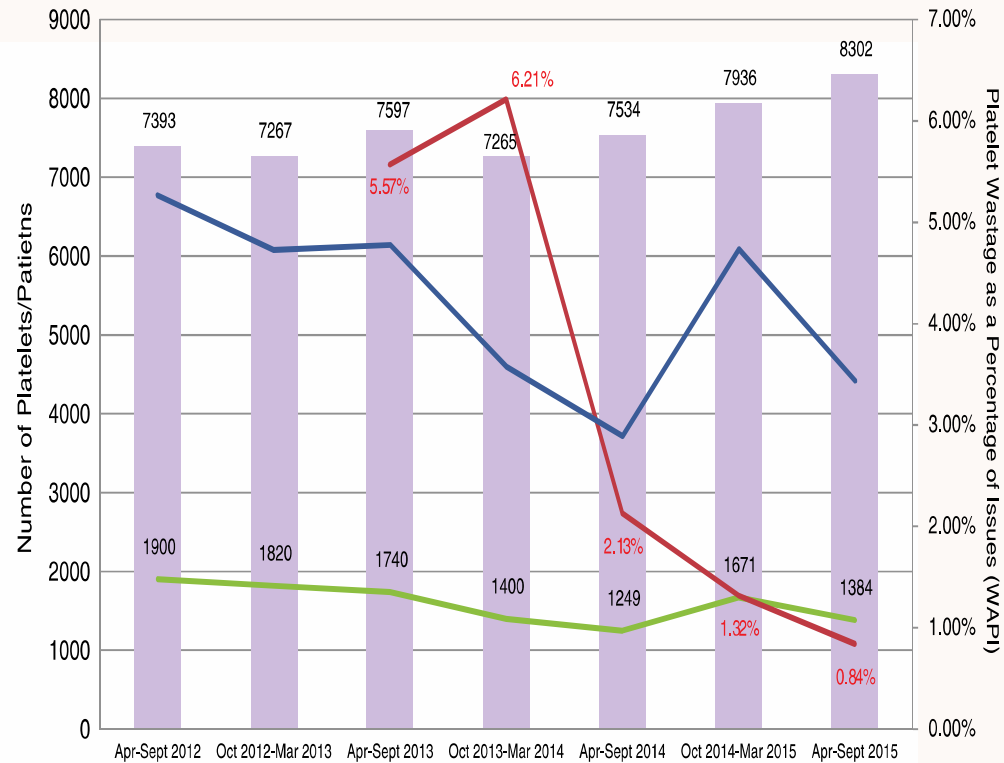
- Product Availability: Planning of inventory levels held, timing of deliveries and order volume;
- Product Integrity: Physical and process control of product , to ensure efficient and effective handling to maintain availability and minimise wastage.

### ■ **2. Set appropriate Inventory level are based on**

- daily usage rates
- supply patterns
- discards as a percentage of issues (dapi)

# 3. PBM

## Effective implementation of a patient blood management programme for platelets



Wastage as a % of Issues (WAPI) (p = 0.005)	0	0	5.57%	6.21%	2.13%	1.32%	0.84%
Total Units Supplied from NHSBT	1900	1820	1740	1400	1249	1671	1384
Patient activity – Total (p = 0.02)	7393	7267	7597	7265	7534	7936	8302
£ Spend on Platelet Products	£448,985.72	£407,882.39	£411,811.55	£320,329.10	£268,268.99	£408,727.48	£309,957.03



## 4 Logistics

- Apheresis Kit and related disposables inventory management
- Troubleshooting and technical support for the apheresis equipment
- SDAP inventory management
- Preparedness plan for epidemics/pandemics

# Alternatives strategies

- Reversal of anti platelet drugs.
- Thrombopoietin mimetics
- Antifibrinolytic agents
- Treatment of anemia
- DDAVP
- Targeting fibrinogen
- Recombinant FVIIa

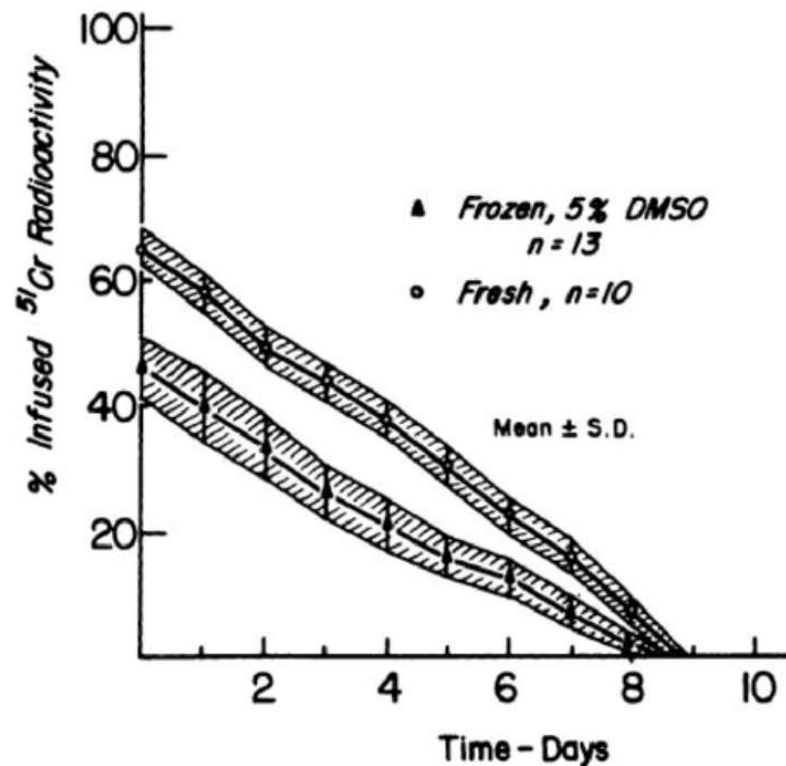
# Alternative platelet storage methods

- Refrigerated platelets ( 15 days)
- Cryopreserved platelets (5 -15 years)
- Lyophilized platelets
- Artificial platelets
  - Hemostatic platelet bridging particles
  - Liposomes
  - Engineered nano particles
  - Infused platelet membranes
- Platelet generated through stem cells

# Frozen/cryopreserved platelets

Recovery of 70% of the platelets compared to fresh platelets

Lifespan  $8.9 \pm 0.3$  days vs  $8.8 \pm 0.3$  days



# Frozen/cryopreserved platelets

**Vox Sanguinis**

The International Journal of Transfusion Medicine

**ISBT** International Society  
of Blood Transfusion

Original Article

**A pilot randomized clinical trial of cryopreserved versus liquid-stored platelet transfusion for bleeding in cardiac surgery: The cryopreserved versus liquid platelet-New Zealand pilot trial**

## Results

Over 13 months, 89 patients were randomized, 23 (25.8%) of whom received a platelet transfusion. There were no differences in median blood loss up to 48 h between study groups, or in the quantities of study platelets or other blood components transfused. The median platelet concentration on the day after surgery was lower in the cryopreserved platelet group ( $122 \times 10^3/\mu\text{l}$  vs.  $157 \times 10^3/\mu\text{l}$ , median difference  $39.5 \times 10^3/\mu\text{l}$ ,  $p = 0.03$ ). There were no differences in any of the recorded safety outcomes, and no adverse events were reported on any patient. Multivariable adjustment for imbalances in baseline patient characteristics did not find study group to be a predictor of 24-h blood loss, red cell transfusion or a composite bleeding outcome.

# Take home message

- Platelets (PLTs) have a short life span and shelf life leads to a supply-demand mismatch
- Devised critical levels
- Dedicated donor pool
- understanding of the role of alternative agents to platelet transfusion
- cryopreserved platelets
- Platelet audits