

Whole Blood

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WHOLE BLOOD

May 18, 2022

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Disclosure

- No disclosures



Historical to Current

- Iraq/ Afghanistan conflicts swung pendulum back - Reconstituted 1:1:2/ 1:1:1 And FWB
- Before 2005 mostly reignited by poor supply of PLT availability/ease of storage in deconstructed ratios, shift of WB use from “rescue” therapy to early strategy for mitigation and resuscitation of life-threatening hemorrhagic shock.
- 2004- 2006 “Damage Control Resuscitation” solidifying into bundles of care with Hemostatic Resuscitation as centerpiece



Misconceptions

- WB must be ABO specific/high inventory +\$\$\$ /high waste
- No leukoreduction is possible-if so loose PLT in the process making it a no PLT tx
- At 4° C PLT becomes spherical with loss of function and agreeability or non-viable
- Cost of upfront purchase vs benefit



Facts

- At 4° C PLT function improved-stronger aggregability and stability of the clot
- Leukoreduction is possible-FDA approved filter WB specific (BMH:leuko-reduce prior to releasing)
- Risk for administration low titer WB=0-RBC
- Risk of ABO incompatibility & associated hemolytic reaction 1:120,000
- Costs of MTP higher (fractionation, PLT less functional and cost of bacterial testing if stored at 22° C, packaging issues/waste for plasma upon thawing) may argue in favor of WB



Inferred Benefits

- Less dilute vs component tx
- Dual effect-targets shock along with coagulopathy with less volume
- At 4° C storage, PLT activity is increased vs pheresis with 22° C storage
- Storage up to 21 Days in CPD (Citrate Phosphate Dextrose), 35 Days in CPDA1 (Citrate Phosphate Dextrose Adenine)
- Faster correction of physiologic (TEG/PLT mapping) coagulative endpoints



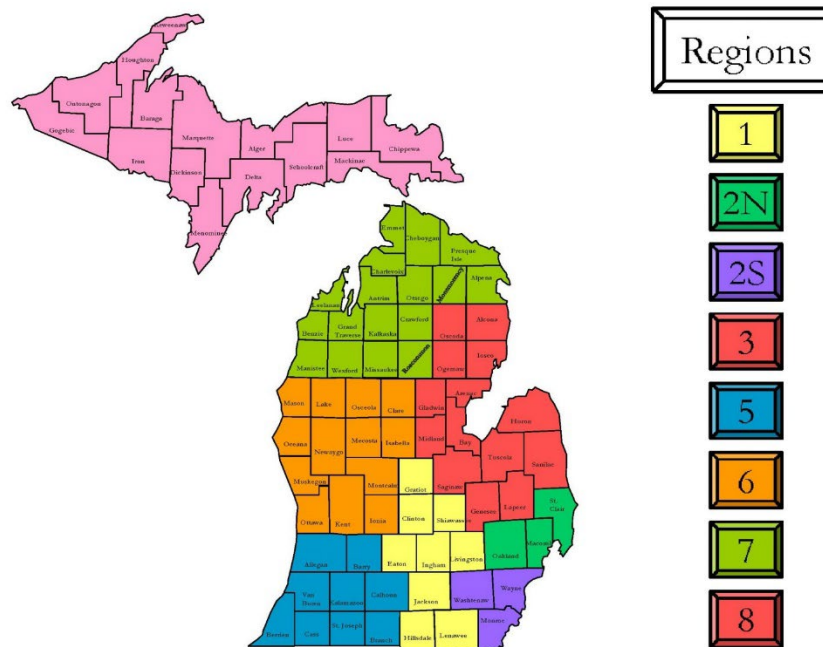
Logistical Benefits: Pre-Hospital

- Prehospital logistics/portability and packaging of multiple products in single release-exported use in prehospital setting for Region 5 to Air Medical Transport (WMAC) only. Unit ~500g vs plasma only ~400g with weight benefit ratio



Bronson Methodist Hospital

- Level I ACS Verified Trauma Center located in Southwest Michigan
- Region 5
- 52 bed ED with ~ 90,000 visits a year
- 350 inpatient beds





Why Whole Blood

- Timeliness of release of blood products for MTP
- Early pro-coagulable effect compared to component therapy
- Literature review pointing to benefits of whole blood therapy
- New logistics of lab/blood bank move



Steps to Success

Involvement and
determination of blood
bank manager
and supervisor

Supportive
hematology
medical director

Multiple
meetings to
develop a plan

Changes to MTP
policy



Planning

- In July 2018 corporate decision due to increase in needs to move lab and blood bank off site to their own individual facility.
- Literature review in 2019
- Met monthly to develop a plan
- Find a distributor for Whole Blood
- Blood & Blood Transfusion Policies updated
- SW for ED refrigerator updated
- Mass Transfusion Policy updated



Whole Blood Supplier

- Versiti Blood Center does not carry WB
- Bloodbuy out of South Texas Blood & Tissue Center
- Started with 4 units total at BMH
- 2 units WB in ED refrigerator
- 2 units in blood bank
- Standing order 2 units delivered every Thursday
- Request additional supplies if ran out



Cost

- **Whole Blood-\$500**
- **Packed Red Blood Cells-\$203**
- **Fresh Frozen Plasma-\$48**
- **Liquid Plasma-\$93**
- **Platelets-\$695**
- **Cryoprecipitate-\$278**



Blood & Blood Product Transfusion

- Added a section to include Whole Blood
 - Low titer type O-positive whole blood may be stocked in the ED Trauma Refrigerator based upon availability
 1. Indications
 - a. Used in cases of severe life-threatening hemorrhagic shock as a bridge to massive transfusion
 - b. Available for males \geq 15 years old and females $>$ 50 years old
 - c. Risks: Hemolysis from anti-A and/or anti-B in a patient with the A or B red blood cell type


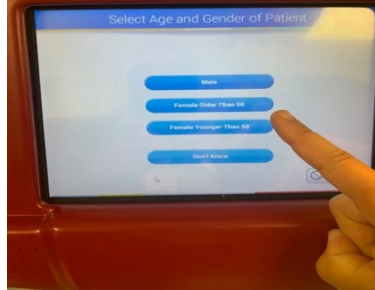



ED Standard of Work




- Update the Priority Blood Standard of Work for the ED
- Educate Red Team nurses
- Check off for nurses on removing WB



Frontline Standard Work

Frontline Standard Work			
Removing Priority Blood from Fridge			Area: BMH T&ED Date & Version: March 2021 Who worked on it:
#	Major Step	Key Point (Why?)	Diagrams etc.
6	Select "Taking Out" on the touch screen		
7	Select "Red Cells", "Plasma", or "Whole Blood"	<ul style="list-style-type: none"> ▪ Criteria for Whole Blood: Only Traumas; Males 15 yrs and older; Women 50 years and older (non childbearing age) ; or per Trauma physician's discretion • Get clear orders from Trauma physician of what blood products he or she wants 	7 
8	Scan the barcoded patient label sticker on the Emergency Release flowsheet	<ul style="list-style-type: none"> • Obtain CSN from Registration if barcoded patient sticker not available during EPIC downtime. Will need to manually type in CSN during downtime. • Verify correct patient with Last Name, First Name, Birthdate, and Gender. The Medical Record Number will display the patient's CSN. • MRN=CSN. 	9 
9	If RBCs are requested, the screen will prompt you to answer the age/sex of the patient.	<ul style="list-style-type: none"> • Rh Positive units will be selected for Males and Women 50 and older (non childbearing age). Rh Negative units will be selected for women under 50 and when sex is unknown. 	
10	If selecting to remove "Whole Blood" or "Plasma" then select that option	<ul style="list-style-type: none"> ▪ Whole blood will have more volume in the bag compared to PRBCs ▪ It will not ask you the age or gender of patient for whole blood or plasma ▪ Whole Blood=1 PRBCs and 1 Plasma 	10 

Frontline Standard Work

		Removing Priority Blood from Fridge		Area: BMH T&ED Date & Version: March 2021 Who worked on it:	
#	Major Step	Key Point (Why?)		Diagrams etc.	
20	If whole blood is not available in the fridge a sign will be placed on the kiosk	<ul style="list-style-type: none"> ▪ Blood bank will call charge nurse to notify him or her to place the sign on the kiosk ▪ Communicate with trauma physician that it's not available, but can pull PRBCs and plasma if not available 		20	
21	When Blood Bank is able to refill the fridge with whole blood they will remove the sign and place it back in the folder hanging			21	
22	In Epic, document how many units given of each product	<ul style="list-style-type: none"> • This includes whole blood as well 		22	



Initial ED Blood Refrigerator

- 2 units of whole blood-low titer type O+
- 6 units of RBC type O+
- 6 units of RBC type O-
- 6 units of liquid plasma or FFP
- Sign to indicate when whole blood is out
- Sign removed when restocked



Mass Transfusion Policy

- System Wide Policy
- Needed to include Whole Blood Definition
- Whole Blood use for trauma's only
- Whole Blood stocked in ED refrigerator



Communication & Education

- Discussed for 6 months at Trauma PI
- Final Go-Live date March 26, 2021
- **Whole blood would be given to...**
 - Male Patients ≥ 15
 - Female patients >50 or non-childbearing
 - Trauma attendings discretion

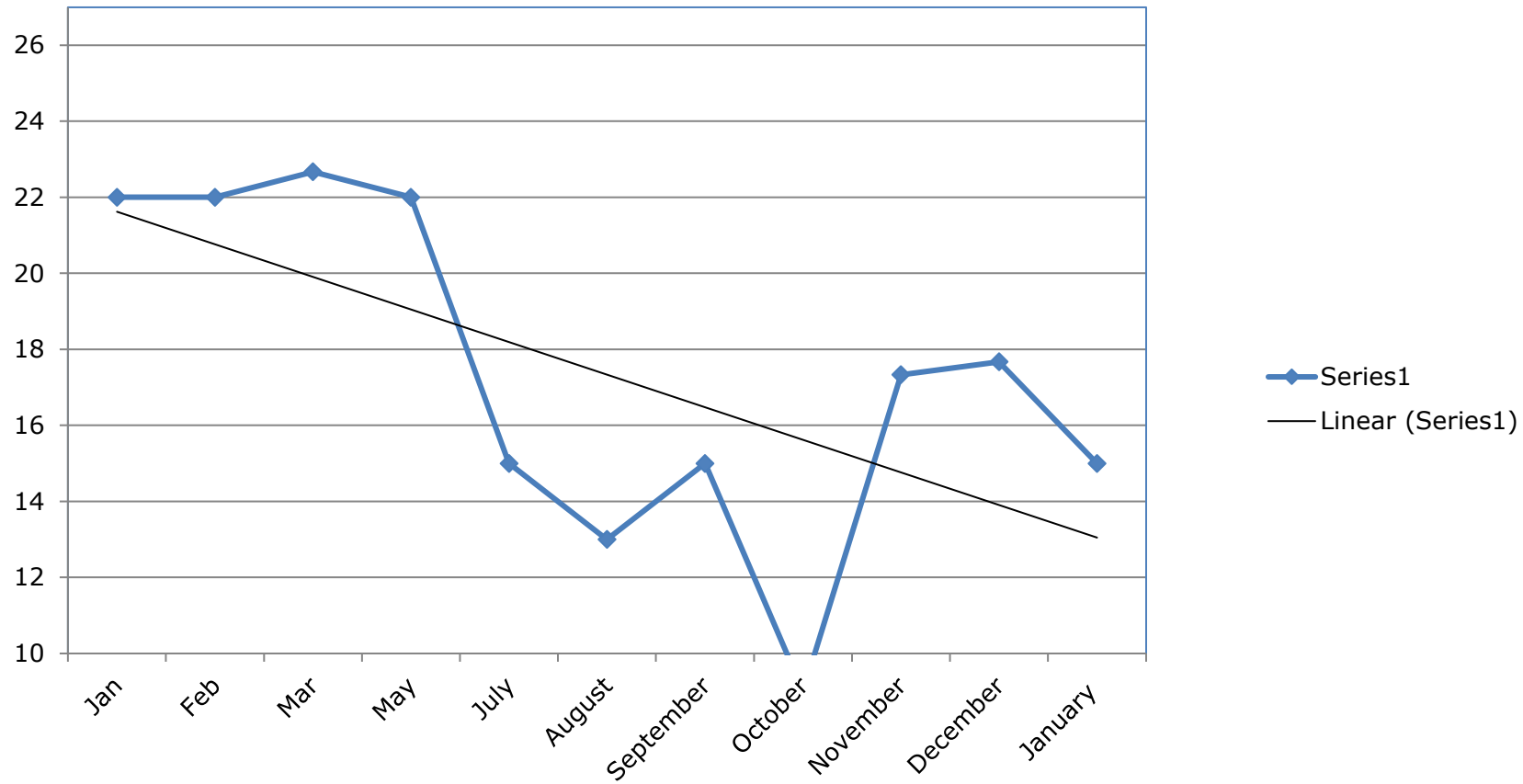


Go-Live

- Live 3/26/2021 at 00:01
- First whole blood use XX/XX/2021 @ XX:XX from ED fridge
- ED fridge restocked XX/XX/2021 at XX:XX



MTP PI Graph





Example of BB Feedback

- Patient Arrived
 - Units were transfused from the ED fridge (2 WB, 3 RBC and 1 plasma)
 - MTP Initiated
 - Cooler #1 left BB
 - Cooler #2 left BB
 - MTP Discontinued
-
- Cooler 2 was returned with unused products, **NO PRODUCTS WASTED**
Great job with communication and documentation



2020

2035 patients

- 8.2% Penetrating
- 86.2% Blunt
- 4.4% Burn
- 1.1% Other

51 MTP's
Initiated

- 40 with at least 1 unit from first cooler



2021

2352 patients

- 11.5% Penetrating
- 84.4 % Blunt
- 3.3% Burn
- .9% Other

27-MTP's
Initiated

- All 27 had at least one unit given from 1st cooler

57 patients
received whole
blood



First Quarter 2022

499 patients

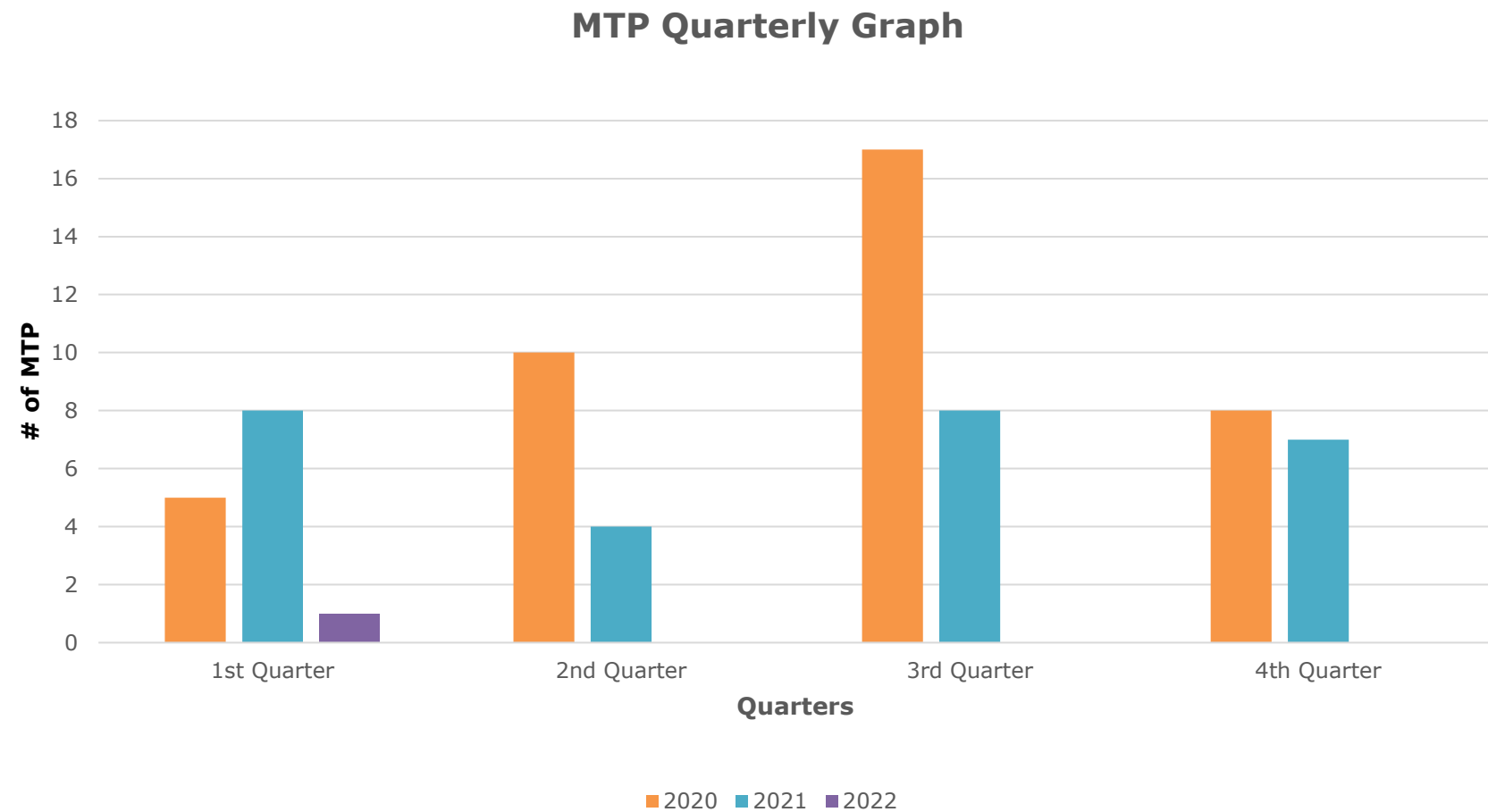
- 12.2% Penetrating
- 83.4 % Blunt
- 1.8% Burn
- 2.6% Other

1-MTP

12 patients
received whole
blood



MTP Quarterly Graph





AirCare

- Implemented December 1, 2021
- Protocol specific to AirCare
- Given to four patients
- No additional products required for the two patients transported to Bronson
- Currently only program giving whole blood pre-hospital in Michigan



Updated Inventory

- 4 units of whole blood-low titer type O+
- 6 units of RBC type O+
- 6 units of RBC type O-
- 6 units of liquid plasma or FFP
- Sign to indicate when whole blood is out
- Sign removed when restocked



Challenges

- COVID-19
- Blood bank moved 2 blocks from main campus July 2020
- Availability of whole blood from supplier
 - National Shortage
 - Hurricane in Texas



What Helped

- 18 months pre-planning
- Collaboration/Communication
- Timed trials in obtaining blood products from blood bank using ED refrigerator blood as a bridge for MTP
- Feedback from blood bank directly to trauma surgeons for all MTP
- Ongoing PI Process-monthly report out from blood bank at Trauma PI



Conclusion

- Collaborative Team Approach
- Lower amount of products expenditure in MTP
- During the first year 69 patients have received WB at BMH
- Strong PI monthly & quarterly reviews



Thank you!

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