OSU Medical Center Emergency Medicine

Massive Transfusion Protocol Optimization

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INTRODUCTION

Hemorrhage is a leading cause of mortality in trauma, accounting for up to 80% of intraoperative trauma mortalities and nearly half of the deaths that occur within 24 hours of traumatic injury.[1] Use of a massive transfusion protocol allows for expedient resource utilization, organized workflow, and rapid task delegation in critical scenarios.[2] Critical protocol components include ease of initiation, rapid access to blood products, clearly defined clinical roles, and easy tracking of metrics to reduce iatrogenic coagulopathy.[3]

OBJECTIVES

As a cooperative effort between the hospital medical staff, nursing staff, pharmacy staff, and blood bank, an updated protocol was developed, emphasizing current research on blood product administration, protocols of blood supply chains, and with the intention to simplify the activation and delivery of blood products in the emergency setting.

METHODS

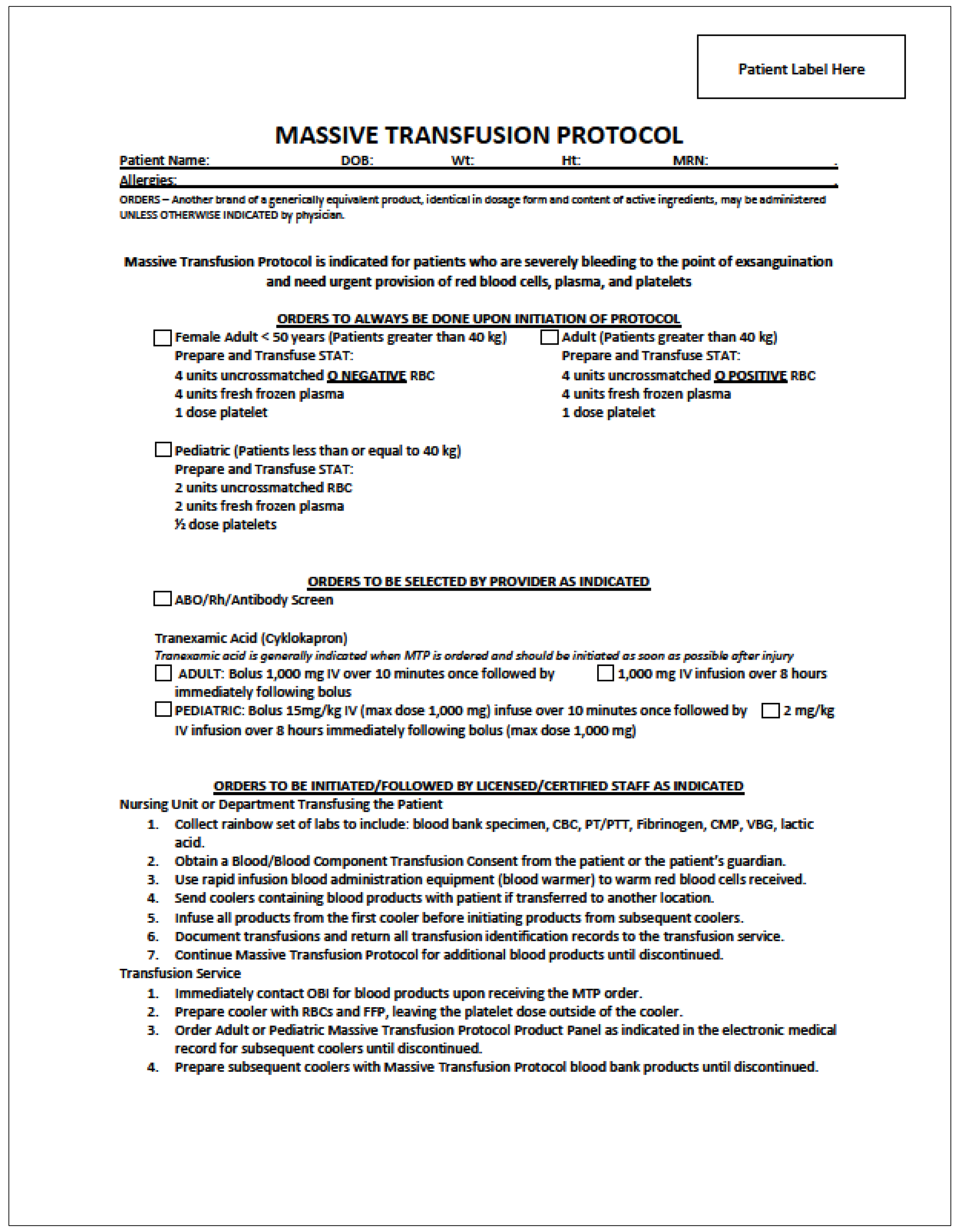
As massive transfusion is a well-researched and documented topic, a literature review was conducted to gather recommendations on blood product administration ratios and methodologies for activation of a massive transfusion protocol.[4]

The existing OSUMC Massive Transfusion Protocol was reviewed and residents, attending physicians, nurses, and blood bank personnel were surveyed for points of potential conflict or hindrance toward delivery of blood products with previous policy.

A new Massive Transfusion Protocol was drafted, emphasizing ease of activation, clarification of staff roles, and rapid delivery of products in massive transfusion. The final draft of the Massive Transfusion Protocol was submitted to the OSUMC Transfusion Committee for approval. Following approval, medical, nursing and blood bank staff were provided training on new protocol prior to initiation.

RESULTS

Massive Transfusion Protocol



Patient Label Here

MASSIVE TRANSFUSION PROTOCOL

Patient Name: DOB: Wt: Ht: MRN:

Allergies:

ORDERS – Another brand of a generically equivalent product, identical in dosage form and content of active ingredients, may be administered UNLESS OTHERWISE INDICATED by physician.

Massive Transfusion Protocol is indicated for patients who are severely bleeding to the point of exsanguination and need urgent provision of red blood cells, plasma, and platelets

ORDERS TO ALWAYS BE DONE UPON INITIATION OF PROTOCOL

☐ Female Adult < 50 years (Patients greater than 40 kg)
Prepare and Transfuse STAT:
4 units uncrossmatched O NEGATIVE RBC
4 units fresh frozen plasma
1 dose platelet

☐ Adult (Patients greater than 40 kg)
Prepare and Transfuse STAT:
4 units uncrossmatched O POSITIVE RBC
4 units fresh frozen plasma
1 dose platelet

☐ Pediatric (Patients less than or equal to 40 kg)
Prepare and Transfuse STAT:
2 units uncrossmatched RBC
2 units fresh frozen plasma
½ dose platelets

ORDERS TO BE SELECTED BY PROVIDER AS INDICATED

☐ ABO/Rh/Antibody Screen

Tranexamic Acid (Cyklokapron)
Tranexamic acid is generally indicated when MTP is ordered and should be initiated as soon as possible after injury
☐ ADULT: Bolus 1,000 mg IV over 10 minutes once followed by ☐ 1,000 mg IV infusion over 8 hours immediately following bolus
☐ PEDIATRIC: Bolus 15mg/kg IV (max dose 1,000 mg) infuse over 10 minutes once followed by ☐ 2 mg/kg IV infusion over 8 hours immediately following bolus (max dose 1,000 mg)

ORDERS TO BE INITIATED/FOLLOWED BY LICENSED/CERTIFIED STAFF AS INDICATED

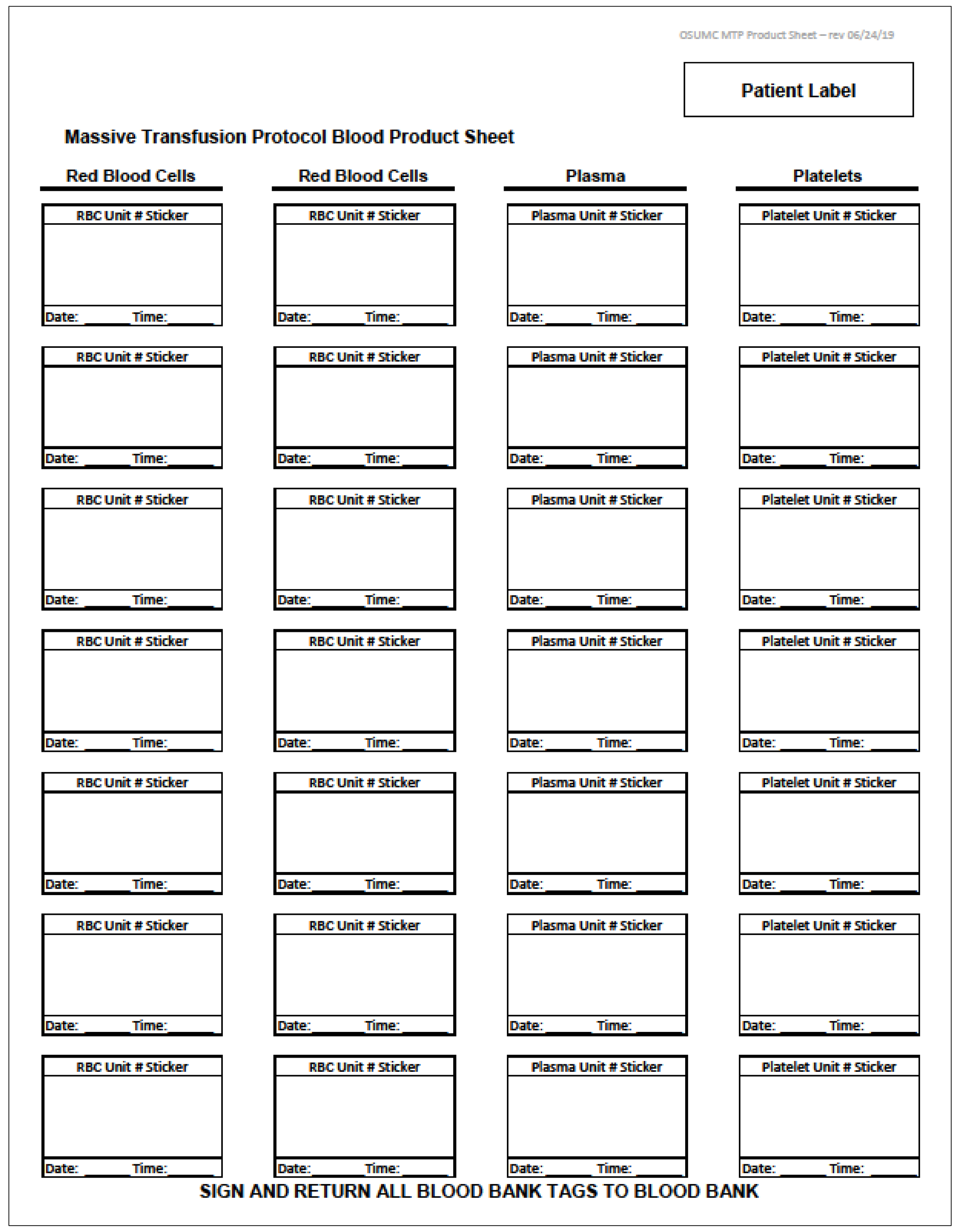
Nursing Unit or Department Transfusing the Patient

1. Collect rainbow set of labs to include: blood bank specimen, CBC, PT/PTT, Fibrinogen, CMP, VBG, lactic acid.
2. Obtain a Blood/Blood Component Transfusion Consent from the patient or the patient's guardian.
3. Use rapid infusion blood administration equipment (blood warmer) to warm red blood cells received.
4. Send coolers containing blood products with patient if transferred to another location.
5. Infuse all products from the first cooler before initiating products from subsequent coolers.
6. Document transfusions and return all transfusion identification records to the transfusion service.
7. Continue Massive Transfusion Protocol for additional blood products until discontinued.

Transfusion Service

1. Immediately contact OBI for blood products upon receiving the MTP order.
2. Prepare cooler with RBCs and FFP, leaving the platelet dose outside of the cooler.
3. Order Adult or Pediatric Massive Transfusion Protocol Product Panel as indicated in the electronic medical record for subsequent coolers until discontinued.
4. Prepare subsequent coolers with Massive Transfusion Protocol blood bank products until discontinued.

Label Sheet For Product Recording



OSUMC MTP Product Sheet – rev 06/24/19

Patient Label

Massive Transfusion Protocol Blood Product Sheet

Red Blood Cells	Red Blood Cells	Plasma	Platelets
RBC Unit # Sticker Date: ____ Time: ____	RBC Unit # Sticker Date: ____ Time: ____	Plasma Unit # Sticker Date: ____ Time: ____	Platelet Unit # Sticker Date: ____ Time: ____
RBC Unit # Sticker Date: ____ Time: ____	RBC Unit # Sticker Date: ____ Time: ____	Plasma Unit # Sticker Date: ____ Time: ____	Platelet Unit # Sticker Date: ____ Time: ____
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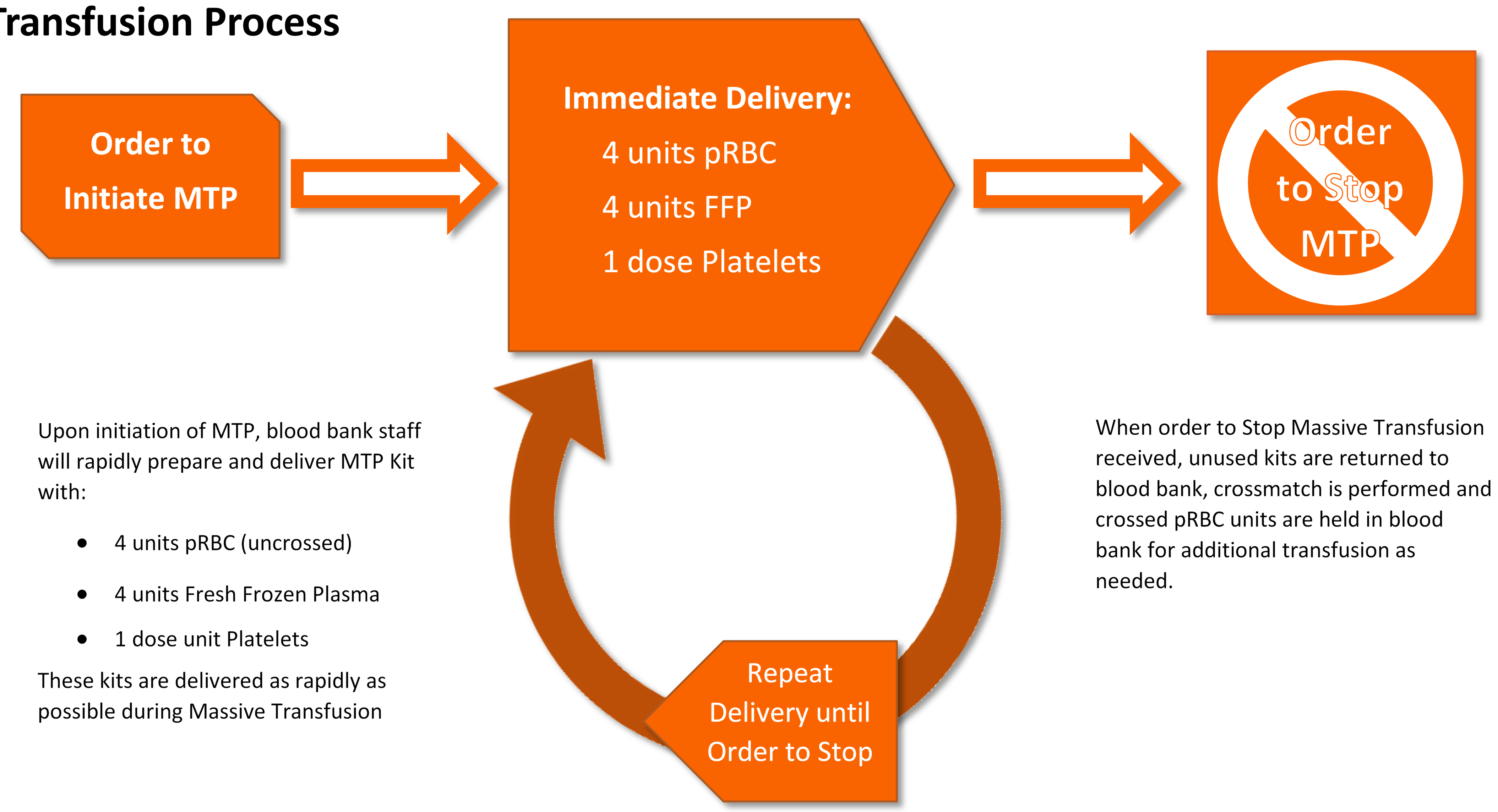
SIGN AND RETURN ALL BLOOD BANK TAGS TO BLOOD BANK

Massive Transfusion Process



Upon initiation of MTP, blood bank staff will rapidly prepare and deliver MTP Kit with:

- 4 units pRBC (uncrossed)
- 4 units Fresh Frozen Plasma
- 1 dose unit Platelets

These kits are delivered as rapidly as possible during Massive Transfusion

When order to Stop Massive Transfusion received, unused kits are returned to blood bank, crossmatch is performed and crossed pRBC units are held in blood bank for additional transfusion as needed.

CONCLUSION

Following training of staff on the new Massive Transfusion Protocol, a new MTP Initiation order was deployed in the EHR and go-live was announced.

Activation of the Massive Transfusion Protocol is now possible through single physician order and blood products are serially delivered by blood bank until order to stop Massive Transfusion is initiated. Initiation of the Massive Transfusion Protocol also provides assurance that blood products will be delivered at ratios which mimic administration of whole blood, which has been shown to improve outcomes in emergent hemorrhage.

FUTURE DIRECTIONS

To determine the effectiveness of this intervention at OSU Medical Center, ideas for future research include but are not limited to:

- Decreased time between disposition of major bleed and arrival of blood products at the bedside
- Decreased amount of crystalloid products utilized in patients with major bleed
- Utilization of tranexamic acid when appropriate
- Increasing use of more readily available O Positive blood in appropriate patients

REFERENCES

1. Young, P. P., Cotton, B. A., & Goodnough, L. T. (2011). Massive Transfusion Protocols for Patients With Substantial Hemorrhage. Transfusion Medicine Reviews,25(4), 293-303.

2. Spinella, P. C., Perkins, J. G., Grathwohl, K. W., Repine, T., Beekley, A. C., Sebesta, J., . . . Holcomb, J. B. (2007). Risks associated with fresh whole blood and red blood cell transfusions in a combat support hospital. Critical Care Medicine,35(11), 2576-2581.

3. Cotton, B. A., Dossett, L. A., Au, B. K., Nunez, T. C., Robertson, A. M., & Young, P. P. (2009). Room for (Performance) Improvement: Provider-Related Factors Associated With Poor Outcomes in Massive Transfusion. The Journal of Trauma: Injury, Infection, and Critical Care,67(5), 1004-1012.

Literature review was completed utilizing terms: Massive Transfusion, Massive Blood Product Transfusion, Massive Hemorrhage, Large Volume Transfusion, and Rapid Transfusion.