Institutional Handbook of Operating Procedures Policy 09.13.47	
Section: Clinical	Responsible Vice President: EVP & CEO Health System
Subject: General Clinical Procedures and Care	Responsible Entity: Trauma Services & Transfusion Services

I. Title

Massive Transfusion Protocol-Adult and Obstetric

II. Policy

A. The Massive Transfusion Protocol (MTP) is a multidisciplinary process whereby blood and blood products can be rapidly obtained for an exsanguinating patient. The need for rapid response time places a premium on rapid and effective communication.

B. This protocol applies to conditions warranting massive transfusion. Such conditions include hemorrhage following significant trauma, GI bleeds, postpartum bleeding, significant intraoperative blood loss and other similar clinical scenarios.

C. MTP activation criteria includes but is not limited to the following:

1. Assessment of Blood Consumption (ABC) score of two or more of the following:
    a) Systolic blood pressure ≤ 90 mmHg (0 = No, 1 = Yes)
    b) Heart Rate ≥ 120 bpm (0 = No, 1 = Yes)
    c) Penetrating mechanism (0 = No, 1 = Yes)
    d) Positive fluid on abdominal ultrasound – FAST Exam (0 = No, 1 = Yes)
2. Substantial blood loss (>1500 mLs or 6 units of PRBCs) with anticipated ongoing hemorrhage in a short period of time (minutes to hours).
3. Greater than 50% loss of blood volume in 3 hours.
4. Transfusion of greater than 3 units of packed red blood cells within 1 hour – defined as the critical administration threshold.
5. Persistent hemodynamic instability in the setting of uncontrolled bleeding.
6. Active bleeding requiring operation or another procedure to stop the bleeding.
7. Heart rate to systolic blood pressure greater than 1.4 – known as the Shock Index

D. Goals for patients at risk for ongoing bleeding is to achieve a core temp temperature of >35.9, pH >7.3 and achieve hemostasis.

E. The decision to activate MTP can only be made by a Faculty physician. A resident or any other staff member can be delegated to make the notification call to the Transfusion Service provided that the authorizing faculty physician's name is stated.

F. In the event blood is needed prior to completion of testing, the ordering physician must sign the Emergency Release of Blood Products waiver found on the Blood Bank Division Primary Request form (Form BB10) for uncrossmatched blood to be dispensed. This signature can be obtained after the emergency release of products.

G. UTMB has two protocols with component ratios based on type of activation and campus.
1. Adult Activation
2. Obstetric Activation

H. Blood Product Availability
1. 4 uncrossmatched O negative and 4 uncrossmatched O positive packed red blood cell units are available for immediate use in the Galveston Campus Emergency Department. Notify the Transfusion Service immediately when blood is removed from the trauma bay refrigerator. The units will be restocked from the Blood Bank inventory by the Transfusion Service staff.
2. The Transfusion Service department at each campus has pre-tagged universally compatible group O packed red blood cell units and pre-thawed group A plasma units available for immediate issue of Round 1 products.
3. Components are issued by the Transfusion Service in an established packed red blood cells (pRBCs) to plasma ratio, 1:1, on each round according to campus for adult and obstetric MTP activations.

Adult and Obstetric MTP Activation				
Each Round	**Galveston**	**League City**	**Angleton-Danbury**	**Clear Lake**
pRBCs	**6**	**3**	**3**	**3**
Plasma	**6**	**3**	**3**	**3**

4. At each campus, 1 apheresis platelet dose (PLT) is issued on Round 1 and 1 cryoprecipitate dose (Cryo) is issued on Round 2 for adult MTP activations. Rounds repeat as necessary with platelets on odd numbered rounds and cryo on even numbered rounds. Products are continuously prepared until deactivation notice.

Adult MTP Activation		
Each Campus	**Round 1**	**Round 2**
Platelets	**1 dose**	**---------**
Cryoprecipitate	**---------**	**1 dose**

5. At each campus, 1 cryoprecipitate dose is issued on every round for obstetric MTP activations. The first cryo dose may be issued after all other Round 1 products are issued to allow component processing time to thaw the product. Rounds repeat as necessary with platelets on odd numbered rounds.
Note: The next round of MTP is prepared once the previous round is picked up. Products are prepared until deactivation notice or after 1 hr of no request for blood products.

Obstetric MTP Activation		
Each Campus	**Round 1**	**Round 2**
Platelets	**1 dose**	**---------**
Cryoprecipitate	**1 dose**	**1 dose**

I. Potential Therapeutic Adjuncts to consider in MTP

1. Tranexamic Acid (TXA): Tranexamic acid (TXA) is a potential adjunct therapy during MTP cases.
    a. Tranexamic acid should not be mixed with blood transfusion or solutions containing mannitol or penicillin
    b. Trauma patients:
        i. TXA must be given as early as possible (within 1-3 hours of injury) and is ineffective if given three (3) hours after injury
        ii. Loading dose of 1 gram of TXA should be given intravenously over 10 minutes (started within 3 hours of injury), followed by 1 gram over the next 8 hours as a continuous infusion
    c. Obstetric patients: clinically diagnosed post-partum hemorrhage patients should receive:
        i. 1 g in 10 ml (100 mg/ml) TXA intravenously as soon as possible and no more than 3 hours after childbirth
        ii. A second dose of 1 gm should be given intravenously if bleeding continues after 30 minutes or restarts within 24 hours of the first dose

III. Procedures

A. Initiating the Massive Transfusion Protocol

1. Faculty physician declares the need to activate MTP and calls the Transfusion Service or delegates a team member to make the notification call. Residents or any other staff members can make the activation call provided that the authorizing faculty physician's name is stated.
2. Provide the Transfusion Service with the following information:
    a. Patient's name and MRN
    b. Current location
    c. Activating physician's name (not a resident's name)
    d. Contact person's name and phone extension
    e. Patient's age and gender
    f. Case type (Trauma, Obstetric, GI bleed, other)
    g. Pediatric Weight (if pediatric)
3. A patient care team delegate notifies the Clinical Operations Administrator (COA).

B. Blood Product Dispensing Process

1. The unit will delegate a runner to send for pick up blood from the Transfusion Service department with a Blood Bank Dispensing Request (Form BB20) and a patient label that includes the patient's full name and MRN at a minimum. Blood cannot be issued if the patient's full name and MRN are not provided. A blank dispensing request can be provided by Blood Bank at the time of pickup if the runner does not have the form.
2. If unable to send a runner to pick up blood, notify the COA to assist with blood transport

and provide the patient's name, MRN, current location, and a contact phone number.

3. Runner will complete blood read-back verification process with Blood Bank team member. Continuous rounds of blood components will be prepared by Blood Bank and will be picked up by a blood runner until deactivation notice is received.
4. The goal of the Transfusion Service is to have at least 1 MTP cooler ahead for the duration of the MTP activation.

C. **Transportation of Blood Products**

1. Each product round will be issued and transported in an MTP specific cooler on wheels.
2. MTP coolers should be delivered immediately and directly to the bedside clinician. A cooler shoulder strap is available upon request if needed to aid in transport via stairs.
3. Only remove products from the cooler when ready to verify and/or transfuse and be certain to close the lid. MTP coolers are valid for 4 hours if the lid is not open.
4. If transferring an active MTP patient to another care area, the MTP cooler must accompany the patient to the next location.
5. Communicate any patient location change to the Transfusion Service and provide a contact person's name and phone number in the receiving patient care area.

D. **Compatibility Testing Specimen**

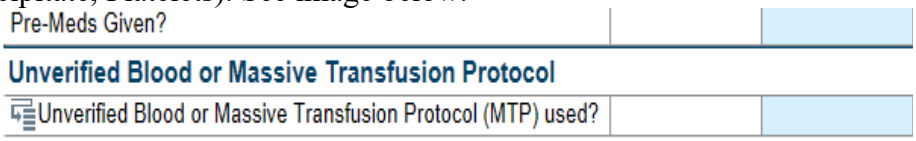
1. Collect a Type and Screen sample if one has not already been sent to Blood Bank.
    a. Send specimen in a 4 mL lavender top EDTA vacutainer tube.
    b. Send with the Epic test requisition if available or with a downtime test requisition Blood Bank Division Primary Request form (Form BB10).
    c. Specimen label must include patient's full name and medical record number. No Epic Beaker labels are acceptable for Blood Bank samples.
    d. Collection information must be documented on the test requisition or on the specimen label. The collector's identification along with the date and time of collection are required.
2. A second specimen will be required if the patient has no blood type history on file. This specimen must be drawn at a different time to ensure that patient identification was performed twice. If a second sample is needed, the Blood Bank will notify the patient care team and provide the pink top collection tube.
    a. Send specimen in the 2 mL pink top EDTA vacutainer tube provided by Blood Bank.
    b. Send with a reprinted Epic Type and Screen test requisition if available or with a downtime test requisition Blood Bank Division Primary Request form (Form BB10).
    c. Specimen label must include patient's full name and medical record number. No Epic Beaker labels are acceptable for Blood Bank samples.
    d. Collection information must be documented on the test requisition or on the specimen label. The collector's identification along with the date and time of collection are required.

IV. Documentation of Blood Product Transfusion During MTP

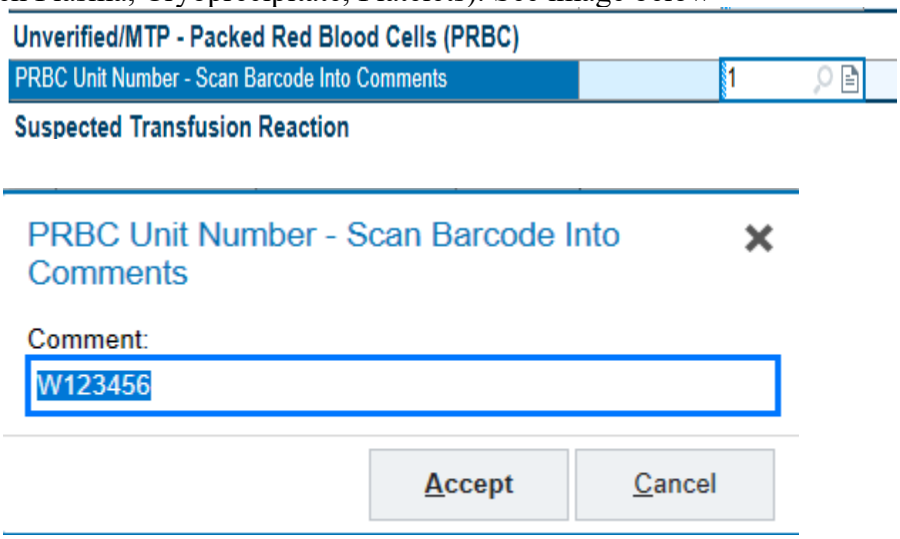
A. **Emergency Room Workflow**

1. The transfusionist and a second verifier must complete the dual sign off, date, and time on the Blood Transfusion Record Tag of each unit to be transfused.
2. Transfused components should be entered in the Epic ED or Trauma narrator.
    a. In the Epic ED or Trauma narrator, select Procedures, then Blood-Unverified/MTP.

b. Under Unverified Blood or Massive Transfusion Protocol, select the button for the component to be transfused (Packed Red Blood Cells, Fresh Frozen Plasma, Cryoprecipitate, Platelets). See image below.



c. Click the comment box next to "Unit Number - Scan Barcode into Comments" in the **section for the correct component to be scanned** (Packed Red Blood Cells, Fresh Frozen Plasma, Cryoprecipitate, Platelets). See image below



d. Scan the component barcode on the product to be transfused.
e. Verify that information entered in the comment field matches the donor unit barcode number on the blood bag.
f. Accept the comment by clicking the green check.
g. Select "1" in the same section to document the 1 unit to be given.
h. No stop time is recorded because products are rapidly transfused.
i. Indicate if there are signs/symptoms consistent with a possible transfusion reaction by answering the suspected reaction question either Yes or No.
j. Repeat for each transfused component

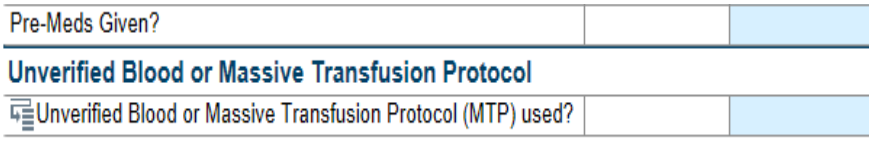
3. If there is a software workflow issue, do not delay the transfusion but complete all documentation on the Blood Transfusion Record Tag (Downtime Form).
4. The Blood Transfusion Record Tag (Downtime Form) must always be placed in the patient's paper chart as a permanent record.
5. Enter vitals as necessary per transfusion policy IHOP 9.13.29.
6. The blood product volume is printed on the transfusion record tag.
7. **Use of the Level 1 Rapid Infusor**
    a. https://www.youtube.com/watch?v=Ldzajt2OugY
    Single use tubing comes pre-packaged in sterile container
        i. Types of products that can be used in the Level I rapid infuser
            - Crystalloids
            - Colloids
            - Packed Red Blood Cells

ii. Do **NOT** use the level I to warm and transfuse the following:
- Platelets
- ii.cryo-precipitates
- Granulocyte suspensions

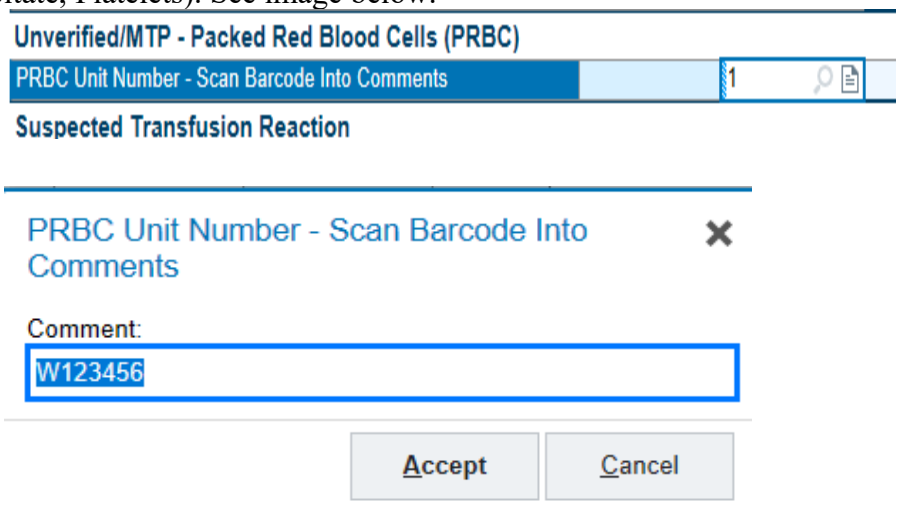
iii. Do **NOT** mix the following with blood products:
- Lactated Ringers solution
- Dextrose in water
- Hypotonic sodium chloride solutions

8. **Operational Safety Checklist**
   a. RN **MUST** remove all air from fluid bags before spiking fluid lines and connecting to the patient. Failure can result in infusion of air to the patient.
   b. Replace the gas vent/filter assembly every 3 hours or if filter becomes clogged or when air is slowly vented. Gas vent/filter must be fully primed before continuing infusion. Failure to prime adequately can result in infusion of air to the patient.
   c. Do **NOT** use in high-energy fields such as: MRI, X-RAY, portable and mobile RF communications equipment. The fluid warmer may act as a projectile in a strong magnetic field, causing artifacts or not function as intended.
   d. Do **NOT** bend heat exchanger-this can cause damage between recirculating solution and IV fluid path resulting in the inappropriate delivery of fluids.
   e. Do **NOT** reuse partially full fluid bags as these could contain air causing an infusion of air to the patients. Use only new fluid bags after the air has been removed aseptically.
   f. An activation of the over temperature warning signal indicates that warming has stopped and ***immediate*** intervention is required. Failure to do so can result in harm to the patient.
   g. Ensure the tubing is properly placed in the air detector/clamp slot. Failure to do so correctly may result in air infusion.
   h. Alarm for the air detector/clamp signals that fluid has stopped, and ***immediate*** intervention is required. Disconnect tubing from patient, remove air. Failure to do so can result in injury to patient.
   i. Ensure the functional test of the air detector/clamp accessory before each use. Failure of any visual indicator that does not illuminate or no audible sound is noted-**DO NOT USE** the fluid warmer. Tag equipment and notify CES 2-4040

B. **Inpatient Workflow**
1. The transfusionist and a second verifier must complete the dual sign off, date, and time on the Blood Transfusion Record Tag of each unit to be transfused.
2. Transfused components should be entered into the Blood Administration **Flowsheet in Epic**
   a. Go to the Blood Administration flowsheet.
   b. Select Add Column, then select the row titled Unverified Blood or Massive Transfusion Protocol. See image below.



c. Select the component type (Packed Red Blood Cells, Fresh Frozen Plasma, Cryoprecipitate, Platelets). See image below.



d. Select "Unit Number - Scan Barcode Into Comments" in the **row name for the component to be scanned** (Packed Red Blood Cells, Fresh Frozen Plasma, Cryoprecipitate, Platelets).
e. Place the cursor in the "comment (F6)" box.
f. Scan the component barcode on the product to be transfused.
g. Verify that information entered in the comment field matches the donor unit barcode number on the blood bag.
h. Select "1" in the row details box to document the 1 unit to be given.
i. No stop time is recorded because products are rapidly transfused.
j. Indicate if there are signs/symptoms consistent with a possible transfusion reaction by answering the suspected reaction question either Yes or No.
k. Repeat for each transfused unit

3. If there is a software workflow issue, do not delay the transfusion but complete all documentation on the Blood Transfusion Record Tag (Downtime Form).
4. The Blood Transfusion Record Tag must always be placed in the patient's paper chart as a permanent record.
5. Enter vitals as necessary per IHOP 9.13.29 Transfusion policy.
6. The blood product volume is printed on the transfusion record tag.
7. **Use of the Level 1 Rapid Infusor**
   a. https://www.youtube.com/watch?v=Ldzajt2OugY
   Single use tubing comes pre-packaged in sterile container
      i. Types of products that can be used in the Level I rapid infuser:
         - Crystalloids
         - Colloids
         - Packed Red Blood Cells

      ii. Do **NOT** use the level I to warm and transfuse the following:
         - Platelets
         - cryo-precipitates
         - Granulocyte suspensions

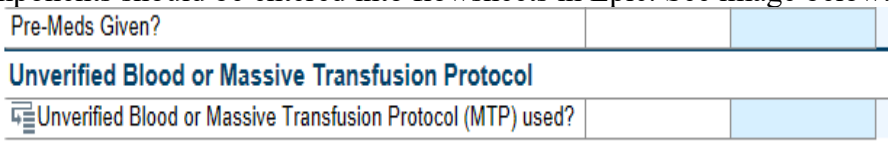
      iii. Do **NOT** mix the following with blood products:
         - Lactated Ringers solution
         - Dextrose in water

- Hypotonic sodium chloride solutions

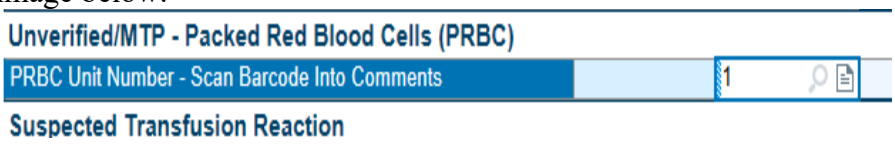
8. **Operational Safety Checklist**
    a. RN **MUST** remove all air from fluid bags before spiking fluid lines and connecting to the patient. Failure can result in infusion of air to the patient.
    b. Replace the gas vent/filter assembly every 3 hours or if filter becomes clogged or when air is slowly vented. Gas vent/filter must be fully primed before continuing infusion. Failure to prime adequately can result in infusion of air to the patient.
    c. Do **NOT** use in high-energy fields such as: MRI, X-RAY, portable and mobile RF communications equipment. The fluid warmer may act as a projectile in a strong magnetic field, causing artifacts or not function as intended.
    d. Do **NOT** bend heat exchanger-this can cause damage between recirculating solution and IV fluid path resulting in the inappropriate delivery of fluids.
    e. Do **NOT** reuse partially full fluid bags as these could contain air causing an infusion of air to the patients. Use only new fluid bags after the air has been removed aseptically.
    f. An activation of the over temperature warning signal indicates that warming has stopped and ***immediate*** intervention is required. Failure to do so can result in harm to the patient.
    g. Ensure the tubing is properly placed in the air detector/clamp slot. Failure to do so correctly may result in air infusion.
    h. Alarm for the air detector/clamp signals that fluid has stopped, and ***immediate*** intervention is required. Disconnect tubing from patient, remove air. Failure to do so can result in injury to patient.
    i. Ensure the functional test of the air detector/clamp accessory before each use. Failure of any visual indicator that does not illuminate or no audible sound is noted-**DO NOT USE** the fluid warmer. Tag equipment and notify CES 2-4040

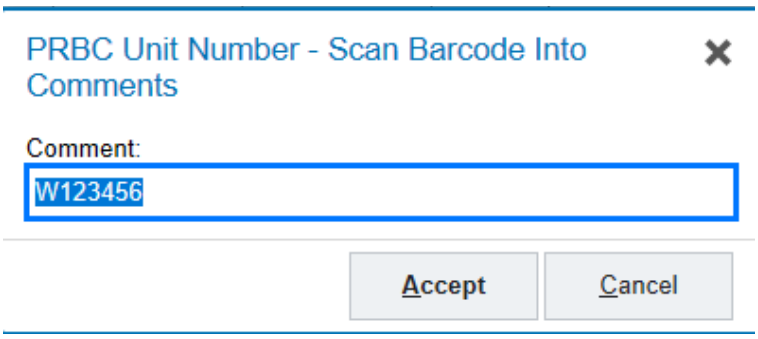
C. **Operating Room Workflow**

1. The transfusionist and a second verifier must complete the dual sign off, date, and time on the Blood Transfusion Record Tag.
    a. Verification time is recognized as the unit start time.
2. Transfused components should be entered into flowsheets in Epic. See image below.



3. Click the I/O button
4. Select the component type (Packed Red Blood Cells, Fresh Frozen Plasma, Cryoprecipitate, Platelets). See image below.





   a. No stop time is recorded because products are rapidly transfused.
   b. The blood product volume is printed on the transfusion record tag.
5. Indicate if there are signs/symptoms consistent with a possible transfusion reaction by answering the suspected reaction question either Yes or No.
   a. If there is a software workflow issue, do not delay the transfusion but complete all documentation on the Blood Transfusion Record Tag (Downtime Form).
   b. The Blood Transfusion Record Tag (Downtime Form) must always be placed in the patient's paper chart as a permanent record.

6. **Use of the Belmont Rapid Infuser**
   a. https://www.youtube.com/watch?v=A6jn4X4BvHs
      Single patient use disposable comes preassembled in a Sterile container and is color coded for easy installation.

      i. The system should not be used to warm:
         - Platelets
         - Cryoprecipitate
         - Granulocyte suspensions

      ii. Do not mix the following with blood products:
         - Lactated Ringers solution
         - Dextrose in water
         - Hypotonic sodium chloride solutions

      iii. Operational Safety Checklist:
         - Do not use solutions containing calcium or other additives that would compromise the anticoagulants in the blood products. Clots in blood products may block the flow and cause overheating.
         - Do not use the device if temperature probes or disposable set windows are wet, dirty, or blocked as they can compromise the accuracy of the temperature probes and cause the unit to call for an increase of output temperature.
         - Do not use fluids stored in overly high temperature fluid warming cabinets. The use of prewarmed fluid is not necessary. Prewarmed fluids that exceed the temperature limit will trigger an over-temperature alarm.
         - In the event that the unit has displayed an overheat or over-temperature indication, discard and replace the disposable and blood product.

- Assure an optimal infusion site with sufficient flow capability and appropriate cannula bore size to avoid over-pressure indication.
- Assure that bags have fluid in them.

V. MTP Overview

A. Nursing Responsibilities

1. Verify that an authorization is completed for MTP by ordering faculty.
    a. If using non-crossmatched blood-verify that the ordering faculty has completed the emergency release of blood products waiver.
2. Document and monitor vital signs in accordance with IHOP policy 9.13.29
3. Document and monitor urine output
4. Ensure the patient has at least 2 working large bore intravenous catheters (IV) catheters for use with the MTP protocol and use with the rapid infuser.

    a. Ensure a dedicated intravenous line for use with each type of blood product.
    b. Types of products that can be used in the Level I rapid infuser:
        i. Crystalloids
        ii. Colloids
        iii. Packed Red Blood Cells

    c. Allotted operation time per blood product for tubing usage:
        i. Up to 4 hours or 4 units of the same blood product or whichever comes first.
        ii. No allowance for use of piggyback IV administration
        iii. Platelets should **NOT** be run through a Y set previously used for RBC transfusion - The platelets will get trapped in the filter.

5. **Activating MTP**
    a. Notify transfusion services that MTP has been ordered and activated and provide the following information to the transfusionist
        i. Ordering faculty's name
        ii. Patient name and MRN
        iii. Current location
        iv. Patient's age and gender
        v. Case type (Examples: trauma, obstetric, GI bleed)
        vi. Pediatric weight (for pediatric cases)
            - Notify the COA of the MTP activation.
        vii. Perform an ongoing assessment to monitor for signs of a transfusion reaction. See IHOP policy 9.13.29.
        viii. Monitor for signs and symptoms of fluid overload
        ix. Monitor and assess for pain
        x. Provide education to patient and family members related to current plan of care for the patient receiving MTP

B. Epic Downtime Workflow

1. The Blood Transfusion Record Tag must be completed for each unit transfused and placed in the patient's chart.
2. The following must be recorded:
    a. Dual signature verification
    b. Vitals

c. Start time
d. Volume transfused
e. Any signs or symptoms consistent with a possible transfusion reaction

C. MTP Labs Order Set

1. Order stat pack labs to be collected after the infusion of each cooler shipment.
   a. Hemogram- (CBC without differential)
   b. Prothrombin time/ INR- (PT)
   c. Activated Partial Thromboplastin Time- (aPTT)
   d. Fibrinogen
   e. Ionized calcium
2. Vacutainer tubes are provided with each product shipment inside a clear zippered pouch attached to the cooler. A red instruction card is also included.
3. Collect the labs after the infusion of each round. Label the tubes appropriately and send to the Lab with the red card for stat processing.
4. Transfusion Medicine physicians monitor these lab values during the case and may modify the component quantities given based on the results.

D. Terminating the Massive Transfusion Protocol

i. Faculty physician declares the need to terminate MTP and calls the Transfusion Service or delegates a team member to make the deactivation call.
ii. This call should be made immediately so the Transfusion Service can cease component preparation and prevent excessive product wastage.
iii. MTP will automatically be deactivated if last round picked up is >1hr.

E. Blood Product and Cooler Return Process

i. Heavily soiled coolers need to be wiped clean with a facility approved disinfectant prior to being returned to the Transfusion Service.
ii. Send a runner to return any remaining coolers and any unused blood products to the Transfusion Service.
iii. If any units were taken from the cooler and not transfused, do not place back in cooler and do not discard in the room. Unit(s) must be returned to the Transfusion Service for final status update and proper disposal.

F. Performance Improvement Monitoring

i. Each MTP activation is reviewed, and a post MTP utilization meeting is held to discuss any issues encountered during the case.
ii. Invitees include the activating physician, Transfusion Medicine physicians, and representatives from Transfusion, Trauma, and Nursing Services.
iii. The intent of the meeting is educational with goals to identify opportunities for process improvement, increase the awareness of goal-directed transfusion therapy, and to improve the appropriateness of MTP activations.

VI. Related UTMB Policies and Procedures

IHOP - 09.13.24 - Patient Identifiers
IHOP - 09.13.29 - Transfusion of Blood Components
IHOP - 09.03.17 - Consent - Overview and Basic Requirements

VII. Additional References

BLOOD AND FLUID PRESSURE INFUSERS
BLOOD PRODUCT ADMINISTRATION MASSIVE TRANSFUSION
Massive Transfusion Protocol- Galveston
Massive Transfusion Protocol- Angleton-Danbury
Massive Transfusion Protocol- Clear Lake
Massive Transfusion Protocol- League City
ACS TQIP Massive Transfusion in Trauma Guidelines
Dever, C. M. (2017). Use of a massive infusion device and a pressure infusor bag. In D. L. Weigand (Eds.), AACN Procedure manual for high acuity, progressive, and critical care (7th ed., pp. 1088-1099). Elsevier

VIII. Dates Approved or Amended

Originated: 02/27/2023	
Reviewed with Changes	*Reviewed without Changes*

IX. Contact Information

Galveston Campus	League City Campus	Angleton-Danbury Campus	Clear Lake Campus
Transfusion Services (409) 772-8284	Transfusion Services (832) 505-3114	Transfusion Services (979) 864-8149	Transfusion Services (832) 632-7014
Trauma Services (409) 747-0152	Trauma Services (832) 505-9785	Trauma Services (979) 849-7721	Trauma Services 832-635-7496