

## Massive Transfusion, Transfusion Reaction, +/- Amniotic Fluid Embolism

### **I. Title: Post-partum hemorrhage requiring massive transfusion**

**II. Target Audience:** EM residents / faculty, OB residents / faculty, FP residents / faculty. Can also be run as an Interprofessional Simulation Case, to include physicians, nurses, anesthesiologists / cRNAs, and other ancillary healthcare providers involved in this type of case.

### **III. Learning Objectives or Assessment Objectives**

- A. Primary
  1. Develop an approach to identifying hemorrhagic shock and appropriately instituting the massive transfusion protocol
  2. Identify and manage post partum hemorrhage
  3. Identify and manage a transfusion reaction
  4. (Optional) Demonstrate the ability to identify and manage amniotic fluid embolism
  5. Perform closed loop communication
- B. Critical actions checklist
  1. Place 2 large bore IVs
  2. Starts 2 L crystalloid
  3. Uses pressure bags or level 1 infuser
  4. Obtains laboratory studies
    - a. Hemoglobin
    - b. Type and screen to laboratory
    - c. Coagulation studies & platelets
  6. Calls blood bank to institute massive transfusion protocol
    - a. Discusses FFP & platelets
  7. Requests O negative blood (female, of child bearing age)
  8. (OPTIONAL) Identifies the patient's medical alert bracelet
  9. Requests calcium or checks ionized calcium after 6 units of PRBCs
  10. Asks where the newborn infant is
  11. Identifies & attempts to control post-partum hemorrhage
    - a. Administers oxytocin
    - b. Performs bimanual fundal massage
    - c. Performs vaginal examination
    - d. Examines for retained products of conception
    - e. Places uterine hemostatic device
    - f. Consults OB for potential surgical intervention (+/- IR for embolization)
  12. Identifies transfusion reaction & stops blood transfusion
  13. Starts NS infusion after transfusion reaction (not LR or D5)
  14. Informs blood bank and requests new units of O negative blood
  15. Rechecks potassium after hemolytic transfusion reaction
  16. Talks to the patient throughout the case while she is conscious and alert, keeping her informed about the situation and plan of care,

including obtaining (at least) verbal informed consent for the transfusion and other procedures

17. Starts CPR for PEA arrest
18. Identifies PEA arrest as secondary to hypovolemia, and continues with volume resuscitation
19. (Optional) Identifies amniotic fluid embolus as cause for DIC
20. Transfer to OR or IR with OB/Gyn

#### **IV. Environment**

- A. Lab Set Up – Could be run in the simulation center, set up as an ED or Labor and Delivery (L&D) Suite. Could also be run in-situ, in an actual ED critical care bay or in an actual L&D suite.
- B. Manikin Set Up
  1. High Fidelity Simulator – SimMom or Noelle
    - a. Alternative: This case can be run with a regular SimMan or other non-OB mannequin or an actor – learners can then do all components of the case except the actual PPH procedures. For EM residents, they can call an OB consultant who is a confederate and simulates doing the PPH procedures under a drape.
  2. Moulage: Blood on sheet
  3. Lines: 20g, 18g, 16g, 14g PIVs, cordis or trauma catheter, triple lumen catheter, arterial line
  4. IVFs: Crystalloid (NS or LR), PRBCs, FFP, Platelets, Cryoprecipitate
  5. Drugs Needed
    - a. Calcium
    - b. Routine ACLS medications
    - c. Pitocin
  6. Airway Equipment Needed
    - a. Routine airway equipment
- C. Props
  1. EKGs – Sinus tachycardia
  2. XRays – CXR – normal upon arrival (Optional – if doing amniotic fluid embolus, 2<sup>nd</sup> CXR with cardiogenic pulmonary edema)
  3. US images – FAST US – negative; Cardiac US – good contractility; IVC US – small, collapsed IVC.

(Optional – if doing amniotic fluid embolus, have 2<sup>nd</sup> cardiac US with dilated RV and RV failure)

4. CT scans - none
5. Labs – Hgb, CBC, BMP, PT/INR, PTT, fibrinogen  
Hgb: 4.3      Hct 16.9      Plts 26      INR 5.8      PTT > 100  
fibrinogen 120  
BMP unremarkable
6. Other Props: Mechanism to create ongoing bleeding from vagina

7. Other Props: Pressure bags for IVFs
8. Other Props: Level 1 rapid infuser or similar device (if available)
9. Other Props: Foley bag with pink / red liquid
10. Other Props: Medic alert bracelet noting anti-Kell antibody

**D. Distractors**

1. (Optional) Patient's spouse (baby's father) can arrive to the room mid-scenario. Based on the competency of the learners, he can act different ways. If the learners are novices, he can act apologetic that he was such a "jerk" earlier and appear genuinely concerned about his wife, politely asking questions about what is going on, and standing with her in a supportive manner. If the learners are more advanced or expert and managing the case very well, then the husband/father can continue to be obnoxious, pushing the learners out of the way to get to his wife and yelling at the healthcare providers, using statements such as "she looks terrible" and "why aren't you doing anything for her" and "isn't this supposed to be a hospital, why can't you take better care of her."

**V. Actors**

**A. Roles**

1. Nurse – ED nurse, present for entire scenario
2. Consultants
  - a. Blood bank staff – by phone
  - b. OB/Gyn consultant – by phone
3. Husband / father (optional)

**B. Who may play them**

1. Nurse – best if played by an ED RN, but can also be played by a trained actor such as simulation center personnel or students
2. Consultants
  - a. Blood bank staff – can be played by student, resident, faculty, or actual blood bank staff
  - b. Ob/Gyn consultant – should be played by faculty physician or senior resident
3. Husband / father (optional) – any well trained actor

**C. Action Role**

1. Nurse – ED nurse, new nurse, doesn't know much, pleasant, cooperative, has never been involved in a massive transfusion protocol before. Gives report to residents upon patient arrival.
2. Consultants
  - a. Blood bank staff – can be helpful or not helpful depending on the level of learners in the simulation exercise
  - b. OB/Gyn consultant – will agree to take the patient to IR or OR when requested. If the participants call to ask what to do about post partum hemorrhage in general, the level of advice will depend on the level of learners in the simulation exercise (the better the learners are performing, the less advice they will get)

from the OB consultant). The OB/Gyn doc will be scrubbed into another case when called, so is unable to come to the ED immediately.

3. Husband / father (optional) – can be pleasant and cooperative for more novice learners and obnoxious / disruptive for more advanced learners, as detailed above in *IV.D. Distractors*.

## VI. Case Narrative

### A. Scenario Background Given to Participants (specify if given freely or must be asked for)

1. Chief complaint: Dizziness, recent delivery of newborn en route, continued bleeding from vagina
2. Nursing report: “This lady just came in after having a baby in the back of her 1974 buick. Her husband dropped her off saying something about how much blood was all over the back seat, and then left with the car. She is complaining of dizziness and feels like she’s still having bleeding.
3. Past medical history – G6P5005, Gestational DM
4. Past surgical history – Caesarean section
5. Medications – None
6. Allergies – None
7. Family/social history – None

### B. Scenario conditions initially

1. History patient gives: “I felt like I was going into labor, but the Vikings-Packers game was on and I couldn’t get him to break away. Only when the Vikings were down by two touchdowns and I was bleeding on the white carpet would he agree to start driving me here. The baby just started coming out when I was in the backseat, and I couldn’t keep it in until we got here. I think I’m still bleeding or something, it feels like there’s still stuff coming out... and all he’s doing is complaining about the blood on the ‘premium’ leather seats in his car, because he’s supposed to be in a car show or something.”
2. Patients initial exam
  - a. VS: BP 70/40 HR 160 RR 24 SpO2 97% T 37.1
  - b. General: Appears uncomfortable
  - c. Neuro: symm MAE, GCS 14 (eyes closed)
  - d. HENT: pale conjunctiva
  - e. Eyes: PERRL
  - f. Chest/Pulm: CTA B
  - g. CV: sinus tachycardia, no murmur
  - h. Abd: soft, boggy uterus
  - i. Back: no lesions
  - j. Ext: no rashes
  - k. Skin: diaphoretic

3. Patient's physiology – 29 y/o F presents after having a precipitous delivery in the backseat of a 1974 buick. The patient had approximately a 2L blood loss in the car with ongoing bleeding at the time of arrival. She has post-partum hemorrhage, and is in hemorrhagic shock. Her Hgb is 5, and requires massive transfusion and maneuvers to stop the post-partum hemorrhage. The first unit of blood is unfortunately mislabeled, leading to a hemolytic transfusion reaction from ABO incompatibility. (This is noted by the participants because the patient develops fever / chills and pink / red urine is noted when the foley is inserted.) Due to the delay in giving any significant volume of PRBCs, the patient has a PEA arrest from hypovolemia. Once the appropriate O negative units are sent and started, the patient regains a pulse. Patient is stabilized after control of post-partum hemorrhage with balloon tamponade and massive transfusion. (Optional: *for advanced learners* – patient also develops amniotic fluid embolism, which is then manifested as cardiogenic shock, hypoxemia and respiratory failure, and DIC.)

C. Scenario branch points

1. Hemorrhagic Shock

- IF participants place 2 large bore IVs and start 2L NS on pressure bags or in level 1 infuser, THEN patient's BP improves slightly to 75/44
- IF participants do not do all of these things (2 large bore IVs, 2L NS, and use of pressure bags or level 1 infuser) in the first 2 minutes of the case, THEN the patient's BP declines to 60 / 32 and HR increases to 170s.
- IF participants do not request blood within the first 1-2 minutes of the case, which results in the blood arriving at approximately 5 minutes into the case, THEN at 5 minutes into the case, the patient's BP declines to 50s/30s and HR increases to 180s.
- IF participants do not do any of the above measures by 5 minutes into the case, THEN the patient has a PEA arrest secondary to hypovolemia / hemorrhage, and does not recover until crystalloid and blood is administered.
- IF participants do not talk to the patient and obtain at least a verbal informed consent about the blood transfusion, THEN when the patient hears the learner order blood, she says "Doctor, do I need a blood transfusion? Is that dangerous?"

2. Massive Transfusion

- IF the participants do not request the massive transfusion protocol or order > 2U PRBCs, THEN the patient becomes progressively hypotensive and tachycardic after the first 2U of PRBCs are transfused.

- IF the participants request the massive transfusion protocol, THEN the person answering the phone at the blood bank says that the usual guy had to go home sick, and he doesn't know what the massive transfusion protocol entails at this hospital. He usually works elsewhere. He asks if the resident knows what he should start getting ready. He states that he can look it up, but "has to figure out where that protocol is."
- IF the resident asks for only PRBCs, THEN he asks if they want any FFP right away, and if yes, in what ratio.
- IF the resident asks for PRBCs and FFP THEN he asks how many units of FFP he wants and in what ratio to PRBCs

### 3. Post Partum Hemorrhage

- The participants will need to go through the algorithm for controlling post partum hemorrhage. They will do various procedures. They should go through 1) oxytocin, 2) bimanual fundal massage, 3) vaginal examination, 4) exam for retained POCs, 5) balloon tamponade when none of the above works, 6) ask OB about IR versus OR for definitive control.
- IF the participants are struggling or are novice learners, not knowing what to do for this, THEN the ob/gyn consultant can be more helpful.
- IF they do not address hemorrhage control at all, THEN the patient will continue to deteriorate hemodynamically. IF nothing is done by 5 minutes into the case, THEN the patient will have a PEA arrest. Resuscitation will be accomplished when the source of the bleeding is controlled.
- IF they ask for the coags, THEN they are: (Her PT is 27, INR 5.8, PTT is >100 and plts are 26K). The patient needs emergent FFP replacement and possibly platelets.
- IF the learners do not explain to the patient what they will be doing to stop her bleeding and she is still conscious, THEN the patient will yell out in pain when they do the exam for retained POCs and yell "What are you doing down there doctor?"

### 4. Transfusion Reaction

- (Option): IF Medic alert bracelet with anti-Kell antibody was placed on patient and found by the participants, and blood was ordered appropriately, then you can elect to defer the transfusion reaction. If medic alert not found, then proceed with incompatible blood. IF you want transfusion reaction to be part of the case regardless, THEN continue with ABO incompatibility due to mislabeled blood.
- IF patient is still able to talk THEN allow patient to almost immediately say, "I'm really hot. I think something is wrong, I feel like I'm going to die" (Patients during acute ABO mismatch transfusion often have the sense of impending doom). Red / pink urine is noted.

- IF team stops transfusion and sends of transfusion reaction workup THEN allow new unit to be sent.
  - IF team fails to stop transfusion or fails to monitor vital signs during first 15 minutes of transfusion, THEN PEA arrest
5. PEA Arrest
- IF PEA arrest has not occurred thus far in the case, THEN this occurs after the transfusion reaction while the participants are waiting for new O negative blood to be sent. The etiology of this is hypovolemic shock, and the patient is resuscitated successfully after the PRBCs arrive and are transfused.
6. (Optional) Neonatal Care
- This will not be performed as part of this case, but can be added. In this case, the participants need to ask where the child is.
  - IF they ask where the child is, THEN the nurse says that the triage nurse took care of it and it is being cared for
  - IF they don't ask where the child is, THEN the nurse says at some point during the case, "Do you guys know what happened to that baby?"
7. Case conclusion
- IF not continuing to amniotic fluid embolism, THEN the case ends after resuscitation of the mother is done with the massive transfusion protocol and bleeding is temporized / controlled with balloon tamponade
  - IF the participants do not ask the OB/GYN consultant for IR / OR, then the nurse asks, "so how long do we leave this balloon thing in there?" with progressively stronger prompts until the nurse asks "do you want to call OB/GYN?"
  - IF the patient is conscious at the end of the case, participants should talk to her about the situation and the plan of care. IF the participants do not do this, THEN the patient asks "what is going on, am I going to be ok?"
8. (Optional) Amniotic Fluid Embolism with deterioration
- Patient becomes hypoxemic and hypotensive secondary to cardiogenic shock (LV and RV failure) and pulmonary edema
  - Repeat US, if performed, reveals enlarged RV & poor LV function
  - DIC is present
  - IF participants give more IVF for hypotension THEN pulmonary edema worsens
  - IF participants start dobutamine alone THEN hypotension worsens
  - IF participants give NE or DA, THEN BP improves
- END of Case

## VII. Instructors Notes

- A. Tips to keep scenario flowing – if the participants are struggling, the nurse may need to give the participants more prompts to keep the scenario moving.
- B. Tips to direct actors – see above
- C. Scenario programming
  - 1. Optimal management path – Identification of hemorrhagic shock, 2 large bore IVs, rapid initiation of 2L crystalloid and massive transfusion protocol, sending blood for Hgb, CBC, BMP, coags, control of postpartum hemorrhage by going through algorithm, but ultimately controlling this with balloon tamponade, and consulting OB & IR for definitive control, recognizing transfusion reaction via fever and pink urine, stopping transfusion, giving NS, getting correct O negative PRBCs, managing PEA arrest from hypovolemia while waiting for O neg PRBCs with CPR, epi, and NS / PRBCs resulting in successful resuscitation, asking about where the baby is at some point in the case, transfer to OR / IR with OB/gyn. IF doing amniotic fluid embolus, establishing diagnosis, intubation for respiratory failure, establishing arterial line and central line, pressors for cardiogenic shock, identifying DIC and treating accordingly.
  - 2. Potential complications path(s) – see above
  - 3. Potential errors path(s)
    - A. Not addressing vaginal hemorrhage
    - B. Not knowing steps to control post partum hemorrhage
    - C. Not requesting massive transfusion protocol
    - D. Not knowing what massive transfusion protocol encompasses
    - E. Not recognizing transfusion reaction



## VIII. Debriefing Plan

- A. Method of debriefing – individual or group with or without video
- B. Actual debriefing materials – see below
- C. Rules for the debriefing

### How to Create a Good Learning Environment

The Basic Assumption: Assuming competence and good intention

Theory: Mistakes made in the sim lab are viewed as puzzles / mysteries, not mistakes

### Debriefing: Theory & How It's Done. "Debriefing with Good Judgment"

Goals: Identify knowledge gaps, discover the learner's frames, and match teaching points

- Frames: assumptions, feelings, goals, knowledge, situational awareness, context. Frames are what drive our actions (why the learners did what they did).
- FOCUS on changing trainee's frames, not just their actions

Phases of Debriefing

- Reactions Phase: Clear the air and can guide discussion (immediately after case – listen to the participants as they are walking out of the room). Ask "How do you feel about the case" to prompt this discussion.
- Understanding Phase: Understand what happened and explore deeper meaning
- Summary: Review what was learned and apply this to a larger context

Structure: Lead debriefer and Associate debriefer

The debriefers

- **Share** observations, opinions, & **judgments**
- Have a stance of **curiosity**, mutuality and respect
- Are respectful and honest; you don't have to be nice

The DOs:

- **ADVOCACY / INQUIRY**
  - Advocacy: "I noticed \_\_\_\_\_"...
  - Inquiry: "What did you think about that?"
  - Example: "I noticed \_\_\_\_\_, I'm concerned that \_\_\_\_\_, and am wondering why \_\_\_\_\_. I was hoping we could explore this more."
  - Why do it: Increases participation - people are more willing to share their thoughts if you share yours first
- Ask questions to invite the learners to participate and share their thoughts
- Use **normalization** "many people have trouble with this" or "this is a difficult case, we don't expect you to manage it perfectly"
- Try to get everyone to participate – pull in the quiet ones
- Use group silence to your advantage – someone will eventually talk
- Use the **think aloud strategy** – have the leader(s) go through their thought processes for a certain part of the case
- Have 1-2 short riffs (2-3 minutes) for clinical content you want to teach
- If using the + / Delta Debriefing technique, use it sparingly
  - What went well and what could be done better
  - Superficial debriefing style – focuses on actions (not frames)

The DON'Ts:

- Don't use the omniscient voice – use first person instead (they may have done something you didn't notice), "I didn't notice \_\_\_\_..."
- Don't use "you" (this can be interpreted as accusatory); instead of saying "why didn't you do CPR?", state "I noticed that CPR wasn't performed..." – this keeps the learners from becoming defensive and promotes discussion
- Don't try to be "nonjudgmental" – This is interpreted as "read my mind" or "guess what I'm thinking" by the learners. (ie. Don't ask how they think the case went – they know that you know how the case went. This also takes longer, and the learning outcome is the same if you state the areas / actions that need discussion. A better question is "that was a difficult case, how do you feel about it?")
- Don't tell them "great job" - they may disagree and then not trust you
- Don't bring up the game, ie. "we tried to get you to do \_\_\_\_, but you did \_\_\_\_ instead"
- Don't let the participants get sidetracked with technical difficulties or limitations of the simulator. Acknowledge these and move towards your learning points, or relate such things to clinical practice (ie. Referred breath sounds with PTX)

My General Debriefing Molecule

- 1) Listen to and discuss the Reactions Phase, participants feelings & thoughts.
  - a. Ask, "How do you feel about that case?"
- 2) Quick 1 sentence recap of the case / pathology so that everyone is on the same page when discussing MDM
- 3) Discuss behavioral objective first and MDM objective(s) second
  - a. Positive feedback
  - b. Give tips (simple things on how to improve performance next time)
  - c. Understanding Phase: Working feedback (advocacy / inquiry, use of think aloud strategy, exploring frames, etc). The goal here is to identify why the learners did what they did, not focus on whether the action was "right" or "wrong."
  - d. Your 2-3 minute riff on important clinical content if not covered above
- 4) Summary: take home points (you can do this or have learners do this) & apply learning points to a larger context

D. Questions to facilitate the debriefing

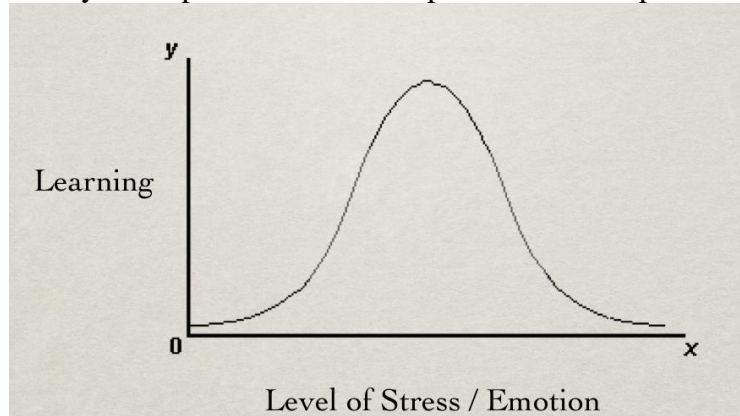
1. So, how do you feel about this case? (Reactions Phase)
2. When the patient arrived with continued hemorrhage, what was going through your mind? (Understanding Phase)
3. How do you decide when to initiate the massive transfusion protocol? (Understanding Phase)
4. Do you have an algorithm that you use to approach post-partum hemorrhage? (Understanding Phase)
5. What was going through your mind when the patient developed a fever and pink urine during the transfusion? (Understanding Phase)
6. What main learning points will you take away from this case and apply to your clinical practice in the future? (Summary Phase)

E. Other items to facilitate the debriefing

1. Consider reviewing your own institution's massive transfusion protocol, either before, after, or before and after the simulation case.

## IX. Pilot Testing and Revisions

- A. Numbers of participants: 2-6
- B. Performance expectations – see critical actions
- C. Anticipated management mistakes – see above
- D. Evaluation form for participants – Attached
- E. Prior Experience and Revisions
  - 1. This case has been run for the following groups of learners over the past 2 years, and has been very well received and reviewed.
    - a. EM residents (~40)
    - b. EM and FM faculty from various institutions (~30)
    - c. OB residents
  - 2. The following revisions have been made to the case based on prior experience and learner feedback
    - a. Prior to having an OB mannequin, we ran this as described above in the ‘alternative section’ with a non-OB mannequin. Once acquiring this mannequin, we added it for the realism of being able to perform the PPH procedures as well as all other aspects of the case.
    - b. We try to keep the learners on top of this bell shaped curve:



Therefore, we have refined the amount of prompting we do to be dependent on how the learners are performing and how stressed they seem. For example, if the learners are performing poorly, we will have a confederate (who is frequently the nurse) give more prompts throughout the case (while remaining in character and acting / speaking in a manner consistent with how an experienced nurse would behave in a clinical arena) to keep the case progressing as intended. If the learners are progressing through the case well, the nurse is less helpful (and more of the complicated optional parts of the case occur). The competence of the nurse becomes inversely proportional to the competence of the learners. We have found that this keeps the case progressing well, and keeps the learners in state where they continue to be engaged and learning, instead of becoming overwhelmed or bored.

- i. We do not let the patient remain dead at the end of the case, even if the patient did have a PEA arrest during the case. If the PEA arrest occurs and the participants are not reversing the condition, the nurse will give a prompt like “why do we think this patient arrested” with subsequently more directive prompts like “wow, she really lost a lot of blood, huh?”, and finally, “do you want me to hang fluid or call for blood?” until they perform the desired action. We have found that if the patient remains dead at the end of the case, the debriefing sometimes can get derailed by the fatality, making it more difficult to get to the planned areas for debriefing.
- ii. We have been using similarly increasingly directive prompts by the nurse for any action we want the participants to do that they are not performing. The initial prompt that is less directive has worked well because this gives the participants time to think about the problem and come up with the answer on their own instead of immediately being given the answer to a critical part of the case that they missed or are missing. We are very meticulous about not letting the nurse come out of character though.
- iii. If we need the learners to get to an action that it would be unrealistic for an experienced nurse to prompt, then we have started using a consultant to prompt that action, as to not blow the realism of the case. For example, when we run this for EM residents, and the residents do not know the algorithm to treat PPH, the nurse may ask if they want to page to OB team. When the OB team calls back, they talk the participants through the algorithm. Or, the OB team just happens to call down to the ED or show up and state “Hi, we heard that there was a delivery out front, what’s going on?” Then the OB team can help prompt the learners on the next step or help them through an unfamiliar algorithm.

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## Massive Transfusion and Transfusion Reactions

### I) Massive Transfusion

- A) Transfusion of only RBCs leads to a dilutional coagulopathy (thrombocytopenia followed by low coag factors)
- B) It is very difficult to correct a dilutional coagulopathy since after many RBC units volume generally adequate and it is not possible to add 10-15ml/kg of FFP, platelets
- C) While the Department of defense originally found transfusion of fresh whole blood in the field improved survival, rates were identical with component therapy, i.e. RBC+ FFP + platelet. Therefore they advocated a 1:1:1 ratio- Subsequent historical studies suggest that a 2 or 3 RBC: FFP ratio may yield similar or better survival and less pulmonary toxicity.
- D) Iterative coagulation tests allow correction for missing factors that may not be alleviated by blind adherence to a fixed ratio, such as needing to transfuse cryoprecipitate for a low fibrinogen
- E) Sending a type and screen/cross as early in a massive allows 2 critical interventions:
  - 1) Screening for unexpected antibodies. Patients with previous pregnancy or transfusion may have already formed antibodies to red cell antigens resulting in a risk of a hemolytic transfusion reaction following transfusion of antigen positive units. By screening for antibodies and only providing the corresponding antigen negative units, the risk of this reaction may be reduced.
  - 2) Typing the patient allows HCMC to provide type specific units as soon as possible.  
This helps prevent exhausting the regions supply of group O + and O negative units.
- F) HCMC policy is to provide group O + units for males or females no longer of child bearing age when time does not allow obtaining a blood type. O negative units are ideally reserved for females of current or future child bearing potential, in order to prevent hemolytic disease of the newborn.

### II) Transfusion reactions

- A) Fall into the following major categories
  - 1) Allergic
  - 2) Febrile
  - 3) Hemolytic
  - 4) Pulmonary
- B) Only type where completion of transfusion is allowed is minor allergic (minor hives, itching)  
In all other cases product should be returned to the transfusion service with a transfusion reaction form.
- C) In the event of transfusion reaction:
  - 1) Stop the transfusion- contact ordering MD
  - 2) Call the transfusion service x 3-3027
  - 3) Complete reaction form
  - 4) If febrile or hemolytic send all products back to blood bank, send a UA, and, if temp rise >1oC send a blood culture.

## Post-Partum Hemorrhage

### Statistics:

Most common complication of L&D

DN: Hemorrhage > 500 cc

Immediate: Within 24 hours

Delayed: 24 hours – 6 weeks

### PPH Etiologies (4 T's – tone, trauma, tissue, thrombin):

- Uterine Atony (80%): Diagnosis of exclusion
  - Even if atony is present, it may be secondary to another problem
  - Treatment
    - Fundal massage (bimanual)
    - Oxytocin (40-80U / 1L), increase to 500mL/hr
    - Methylergonovine: 0.2mg IM
    - Misoprostol (PGE1): 600-1000 mg (PO, PR, SL)
    - Carboprost (hemabate, PGF2a): 250ug IM, q15'
- Uterine Inversion
  - Treatment = put it back!
- Maternal Birth Trauma
  - Look for expanding hematomas and / or lacerations
    - Hand posterior vagina, ring forceps on anterior aspect cervix
    - Simpson / Heaney retractors
    - Can just clamp lacerations, no need for repair right away
- Retained POC
  - Use 4x4 gauze, reach in and sweep around uterus
  - If healthy tissue, this should come off easily
- Placenta Accreta, Increta, Percreta
  - Abnormal implantation of placental tissue – won't come off easily
  - Will need to use tamponade to stop bleeding (300-600 mL in balloon)
    - Bakri is designed for this
    - You can improvise with many others (rusch, sengstaken-blakemore, multiple foleys with 30cc balloons)
  - Definitive treatment
    - Pelvic vessel embolization
    - Laparotomy (vessel ligation, compression sutures)
    - Hysterectomy
- Coagulopathy – treat accordingly
- (Uterine Rupture – this often gives you bleeding & pain during delivery)

## Simulation Module Evaluation – PostPartum Hemorrhage, Massive Transfusion

Faculty: \_\_\_\_\_

Date: \_\_\_\_\_

Your Level of Training: \_\_\_\_\_

1 Strongly Disagree	2 Disagree	3 Agree	4 Strongly Agree
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1. This teaching module met the stated clinical objectives (Develop an approach to hemorrhagic shock, instituting the massive transfusion protocol, the use of FFP, platelets, etc. in massive transfusion, & post partum hemorrhage).

1	2	3	4
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2. The presented case scenario was appropriate for my level of training.

1	2	3	4
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3. It was easy to suspend disbelief and buy into the fiction contract.

1	2	3	4
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4. The overall utility of this simulated case was very useful.

1	2	3	4
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5. The overall quality and utility of the debriefing was good.

1	2	3	4
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6. Your debriefers effectively moderated the debriefing and successfully promoted a meaningful group discussion (versus the debriefing becoming a didactic style learning session).

1	2	3	4
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7. This teaching module will better prepare me to manage this type of critically ill patient.

1	2	3	4
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8. If you were LEADING in the scenario, this experience was more useful than reading the chapter.

1	2	3	4
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9. If you were LEADING in the scenario, this experience was more useful than attending a didactic lecture.

1	2	3	4
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10. If you were ASSISTING in the scenario, this experience was more useful than reading the chapter.

1	2	3	4
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11. If you were ASSISTING in the scenario, this experience was more useful than attending a didactic lecture.

1	2	3	4
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What would you change about this teaching module? Other comments?

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## Critical Actions Checklist - Massive Transfusion & PPH

- Y  N  2 large bore IVs placed
- Y  N  2L crystalloid started
- Y  N  Pressure bags or Level 1 requested
- Y  N  Obtains laboratory studies
- Y  N  Hgb
  - Y  N  Type & screen
  - Y  N  Coags & Platelets
- Y  N  Initiates massive transfusion protocol
- Y  N  Discusses FFP & Platelets
- Y  N  Requests O negative blood for young female
- Y  N  (Optional) Identifies pt's medic alert bracelet
- Y  N  Requests or checks calcium after 6 U
- Y  N  Asks where newborn infant is
- Y  N  Identifies & controls PPH
- Y  N  Fundal massage
  - Y  N  Pitocin
  - Y  N  Misoprostol, methergonivine, etc
  - Y  N  Performs vaginal examination
  - Y  N  Examines for retained POCs
  - Y  N  Places uterine balloon for hemostasis
  - Y  N  Consults OB +/- IR
- Y  N  Identifies transfusion reaction, stops blood, starts NS
- Y  N  Informs blood bank & requests new blood
- Y  N  Rechecks K after transfusion reaction
- Y  N  Talks to the patient throughout the case while she is conscious and alert, keeping her informed about the situation and plan of care, including obtaining (at least) verbal informed consent for the transfusion and other procedures
- Y  N  Manages PEA with ACLS & volume resuscitation
- Y  N  (Optional) Treats amniotic fl embolism / cardiac shock
- Y  N  Transfers pt to IR / OR with OB

Other Comments