Simulation: Postpartum Hemorrhage (Uterine Atony)

1.0 Example Case Scenarios

**CLINICAL SCENARIO #1**

Mrs. Blynch is a 30y/o G3P3003 who just delivered a 4210 gram male infant by spontaneous vaginal delivery. The placenta delivered spontaneously but your nurse is concerned with the amount of bleeding she is seeing. The patient did not have an episiotomy and she does have an IV in place with oxytocin running at this time. The estimated blood loss at the time of delivery was 350cc.

**CLINICAL SCENARIO #2**

Mrs. Anna Tony is a 26y/o G1P1001 who was delivered by forceps approximately 1 hour ago for a non-reassuring FHRT. She was in labor for over 20 hours and pushed for an hour before having forceps placed. Her prenatal course was uncomplicated and has no significant medical history. After delivery, a second degree laceration was repaired and you are told that the placenta delivered spontaneously and appeared intact. Her estimated blood loss at the time of delivery was 450cc. Over the past 10 minutes, the nurse says she has soaked an entire pad and she would like you to come and evaluate the patient.
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2.0 Pre-Simulation Briefing/Orientation:

- Do a brief orientation to the room, equipment and simulator. This should take approximately 5 minutes.

- Explain that if you are using staff as actors for the patient’s partner/family or nurses, that they will respond to requests but will not initiate actions.

- Set the stage for the simulation by doing the following:
  - Discuss what the learning objectives are for the day i.e. care of patients with obstetric emergencies, communication, and leadership in a crisis.
  - Review the Postpartum Hemorrhage Clinical Checklist.

- Read these basic instructions to all participants:
  - You will be briefed by the simulation staff and then come to the room when requested.
  - You may ask questions if you have them, and please remember to:
    1. Treat the scenario as real as possible.
    2. Use personal protection equipment (gloves, etc.) as needed.
    3. Request assistance if needed.
    4. Ask for medications if you feel that you need them.
    5. You may request to move the patient to the OR if you feel this is necessary.
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3.0 Simulation Setup

Simulators to be used: The simulator that will be utilized for this will be a birthing mannequin with the ability to simulate a postpartum hemorrhage. There are several simulators that may be used to accomplish this. Some common simulators used for this are listed below, though there are others available as well:

- NOELLE birthing simulator (Gaumard Scientific)
- SimMom birthing simulator (Limbs & Things/Laerdal)
- Mama Natalie (Laerdal)

All of these simulators will require you to fill the blood reservoirs with a simulated blood product and then begin the bleeding during the simulation.

Some of these simulators also have software that will provide maternal vital signs during the simulation scenario.*

*Note: The flow diagram provided does not require the operator to change maternal vital signs in response to the actions of the trainees, but rather at specific time intervals. If you want to add more realism or increase the difficulty of the training exercise, you can manipulate other variables as desired.

Room Setup:

- The room should be set up similar to a delivery room.

- The simulator is on an examination table, gurney, or bed with the lower torso draped depending on the scenario chosen. (If you use scenario #1, the patient should be in low lithotomy as if she had just delivered. For scenario #2, the patient can be lying in bed with the sheet covering her lower half.) In order to fit with the scenario, pour some of the simulated blood onto the perineum/pads so they will see this when they do an initial examination.

- A delivery table may be available with the basic equipment available at your institution if desired.
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Birthing Simulators:

NOELLE birthing mannequin (Gaumard Scientific, FL)

Mama Natalie (Laerdal)

SimMom (Laerdal)
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Additional Equipment needed:

- IV tubing and IV fluids: You should have an IV taped in place before the simulation begins.

- Vital signs: If the simulator has a way to show the maternal vital signs, then you may use that screen to do this. If it does not, then consider making placards with the desired vital signs (see flow diagram of the simulation in Section 5.0).

- Consider placing an infant simulator either in the mother’s arms or on a warmer. It is not uncommon for trainees to focus solely in on the mother and forget to consider the infant during the scenario, even if it is only to take the baby to the warmer in order to better assess and care for the mother.

Optional Equipment:

- Placenta: If you have a simulated placenta, you may place this in a delivery basin and then put some simulated blood on it for the scenario.

Personnel needed:

- Staff to control the maternal mannequin (1)

- Staff to play role of the Nurse (1-2) (if there are not any in the class)

- Staff to provide vital sign changes to the trainees (if you do not have software to do this)
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Optional Personnel:

- Staff to play role of patient’s family (mother, sister or husband) (1-2)
- Staff to play role of anesthesia if called

4.0 Basic Scenario Tips

- Put blood on the perineum and sheets underneath the simulator so there is no question about the presence of bleeding.

- Make sure to have the simulator bleeding when the initial provider walks into the room so they see active bleeding during their initial evaluation.

- If the trainee asks about lacerations (which they should inspect for), you can tell them that there are no lacerations visible.

- The initial EBLs are stated in the Clinical Scenarios

- The patient’s initial Hct was 33% prior to delivery

- You will not get the patient’s laboratory work back during the scenario. If asked for results, simply tell the provider that the lab is still running the sample.

- The staff playing the nurse or family member role can help to increase the realism of the scenario by making comments like “the patient feels very dizzy” or “that looks like a lot of blood, is that normal?”

- Depending on the simulator, you may have to provide feedback about the status of the uterine tone (boggy vs firm).

- If the simulator does not allow you to do a manual sweep of the uterine cavity, you need a staff to tell the trainee that there were no membranes or retained POC noted on their exam.

5.0 Case Flow/Algorithm with branch point and completion criteria:

1) Setup the delivery simulator as described above

2) Brief the initial provider on the clinical scenario
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Nurse/Provider enters room

The assistant playing the role of the spouse/family informs the provider that the patient is feeling dizzy and/or lightheaded (Initial vital signs: HR = 110 bpm, BP = 100/70)

Provider should recognize the situation as a postpartum hemorrhage and begin treatment

60 seconds after the initial vital signs are given, the maternal vital signs should change to the following: HR = 120 bpm, BP = 80/50)

120 seconds after the initial vital signs (total of 2 minutes into the simulation), the maternal vital signs should change to the following: (HR = 140 bpm, BP = 60/30)

The simulation ends when either of the following occurs:

1) The provider(s) have done all of the following
   - Performs fundal massage
   - Inspects the cervix/vagina for lacerations
   - Administers two medications correctly (dose and route)*

   (*If the medications are given incorrectly, either dose or route, then the uterus does not become firm and the bleeding continues)

2) A total of 5-7 minutes has elapsed

At either of the endpoints above, clearly state that the uterine tone and maternal vital signs have improved, the bleeding has decreased and the simulation is over

6.0 Post-Simulation:

- Gather the provider and/or team together to debrief and review performance
- Use the Postpartum Hemorrhage Evaluation Form
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7.0 Postpartum Hemorrhage (Uterine Atony) Evaluation Form

Post Partum Hemorrhage (PPH) Checklist

**Initial Actions**
- Call for assistance
- Respond to the bedside
  - Delivering attending, MID/CNM
  - Primary RN
  - Anesthesiologist
- Brief appraisal leader, recorder, nursing roles
- Identify, hemorrhage stage, and document EBL & interventions

**Normal vital signs and lab values:**
- Blood loss > 500 mL, vaginal
- Blood loss > 1000 mL cesarean
- Monitor cumulative blood loss
- Insert Foley catheter
- Ensure IV access 16 gauge if possible
- Insert IV fluid (crystalloid, estimated blood loss in 2.1 ml/kg body weight)

**Medications for Uterine Atony**
- Oxytocin (Pitocin) 10-40 International units/5 minutes
- Metyrosin (Methergine) 0.2-0.5 mg intramuscularly (may be repeated every 2-4 hours)
- 15-methyl PGF2α (Hemabate, Carbetocin) 250 micrograms intramuscularly (may be repeated every 15 minutes, maximum of 4 doses)
- Misoprostol (Cytotec) 800-1000 micrograms rectally

**Normal vital signs and lab values:**
Continued bleeding EBL up to 1500 mL or any patient requiring >2 uterotonics
- Obtain 2nd IV access (10 gauge if possible)
- Vital signs, with oxygen & monitors
- Medications: Continue medications from Stage 1
- Transfer to OR/ICU/Julie's symptoms
- Notify blood bank of OIH hemorrhage, bring 2 units PBBs to bedside, two units PRBCs
  - DO NOT wait for labs
- For uterine arrest
  - Consider uterine balloon or packing, possible surgical interventions
- Consider moving patient to OR (better exposure, potential DMC)
- Mobilize additional team members as necessary
- Warm/cool blanket

**Abnormal vital signs/labs/oliguria:**
Continued bleeding > 1500 mL, OR >2 units PRBCs given
- Outline management plan
- Serial re-evaluation
- Communicate plans with hemorrhage team
- Transfusion
  - RBC PRBC-Transfer in a 6:1 ratio (activate Blasore to 2.5)
  - FFP (fresh frozen plasma) 1 to 2 units
- Consider consultation for alternative agents
- Notify obstetrician for bleeding if still uncontrolled
- Rho (D) immune globulin (Rho(IgG), anti-D)
- Achieve hemostasis immediately. Interventions based on atrophy
- Adopt additional measures if poor response

**Cardiovascular Collapse:**
For patients with cardiovascular collapse in setting of massive hemorrhage consider the following etiologies:
- Refractory hypovolemic (blood loss not replaced)
- ATE (afterload collapse) followed by heavy uterine bleeding from uterine relaxation and associated coagulopathy
- Revascularization

- Immediate surgical intervention to ensure hemostasis (hysterectomy) may be necessary.
- Simultaneous aggressive blood and factor replacement & medical interventions initiated regardless of the patient's coagulation status.
- Expeditious hemostasis is the only step that will maximize survival rates for these critical patients.

**Post-Hemorrhage Management**
- Debrief with entire care team
- Document after team debrief
- Discuss interventions with patient/family members

Adapted from: ACOG-Donate: ADEC Hemorrhage Checklist
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DEBRIEFING INSTRUCTIONS

- After the simulation is completed, clearly state that it is over and gather all team members together for a debriefing
- Review Basic Assumption and go through the evaluation form
- At the end of debriefing, ask the team if there are any additional comments
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8.0 Debriefing / Feedback:

- Instructors should meet after the scenario before the debrief to discuss what deficits (if any) were noted that need to be emphasized in the debrief/performance review. It may help to make a short list of the most important teaching points that you want to cover.

For Postpartum Hemorrhage, critical teaching points that should be emphasized include the following:

1) Communication/Teamwork

   - Verbalizing that there is a postpartum hemorrhage and calling for help in a timely manner
   - Directed communication with Check-backs, especially with regards to medication dosing
   - Appropriate use of assistants
   - Keeping the patient/family informed of what is going on in a calm and appropriate manner

2) Medical Care/Technique/Documentation

   - Knowledge of risk factors and standard interventions for postpartum hemorrhage
   - Appropriate progression through medications if initial ones do not result in clinical improvement
   - Understands contraindications for each medication
   - Able to describe the correct dose, route of administration, and the appropriate dosing intervals for each uterotonics medication
   - Calling for anesthesia early in the simulation so they can assist should operative intervention be required
   - What the indications are for moving to the operating room and proceeding with operative intervention
   - Complete and accurate documentation after the event
   - How would you discuss this complication with the patient and what are the risks for subsequent pregnancies.

3) Debriefing/Providing Feedback

- Start by asking for a quick summary from the participants, allowing them to vent about the simulation (they will often note their own deficits at this time).

- Add factual/didactic information as needed but make sure to include a discussion of teamwork and communication
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- Utilize the Postpartum Hemorrhage Debrief/Evaluation Form (Section 7.0) as a guide to discuss the technical parts of the procedure and performance.
- For this station, make every attempt to run through two simulations.