

Simulation Patient Design (April, 2020) Postpartum Hemorrhage in L+D

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Introduction

Postpartum hemorrhage (PPH) can complicate any pregnancy. Uterine atony is the most common cause of PPH, especially in protracted augmented labor.⁽¹⁾ Hemorrhage is the commonest cause of maternal death in the developing world, however it is also an important cause of maternal morbidity and mortality in the developed world. Effective management of obstetric hemorrhage is a multidisciplinary team effort.

Educational Rationale: This multidisciplinary team simulation is designed to give learners the opportunity to apply their knowledge of team skills and implementation of the PPH bundle, in managing obstetric hemorrhage.⁽²⁾

Target Audiences: Nursing, OB, Anesthesiology, and L+D support staff

Learning Objectives: As per Accreditation council for graduate medical education (ACGME) Core Competencies

Upon completion of this simulation (including the debrief) learners will be able to:

- *Medical knowledge:* Describe the pathophysiology of PPH
- *Patient care:* Resuscitate a patient with PPH
- *Practice-based learning and improvement:* Utilize the PPH bundle in the management of massive obstetric hemorrhage
- *Interpersonal and communication skills:* Effectively communicate within teams, lab and blood bank for successful resuscitation of the mother. Team members will be able to effectively communicate with family and allay their anxiety.
- *Professionalism:* Demonstrate mutual respect for each other's expertise
- *Systems-based practice:* Identify existing barriers within the system (such as shortages of equipment, personnel, knowledge gaps, institution specific protocols) that need to be developed or modified in order to improve patient outcome

Scenario-specific learning objectives:

- Identify the 4 stages of PPH as described by the American College of Obstetricians and Gynecologists (ACOG)
- Initiate PPH management bundle
- Describe techniques to quantify blood loss
- Initiate a massive transfusion protocol (MTP)

Guided Questions:

- Which factors increase the risk of PPH?
- What is the pharmacological basis of uterotonic drugs used in the treatment of PPH?
- What contents should be included in the hemorrhage cart?
- Which factors should be considered for a PPH bundle specific for your facility?

Assessment Instruments:

1. Learner Knowledge Assessment form (Appendix1)
2. Simulation Activity Evaluation form (Appendix 2)

Simulation set-up and equipment needed:**Mannequin set-up:**

- Mannequin set-up in L+D suite
- 20g IV in hand with normal saline (should contain an access port)
- Epidural catheter taped
- Atonic uterus simulated with a water-filled balloon secured to the mannequin's abdomen
- Red dye-stained pad placed under mannequin; red stained liquid on floor beside the bed
- Mannequin should be covered with blankets so the apparent bleeding is concealed

Monitors Required:

x	Non-invasive BP cuff
x	Arterial line, set up
x	5 lead EKG
x	Temperature probe
x	Pulse oximeter

Other equipment required:

- 1) IVs: 22, 20, 18, 16, 14g
- 2) Fluids: Crystalloids, colloids, blood, FFP, platelets, cryoprecipitate (mock packs, which need to have the same appearance as normal packs from blood bank as the learners need to verify the patient's name, MRN, and other institution-specific standard checks prior to administration)
- 3) Medications: Oxytocin, methylergonovine (Methergine), prostaglandin f2 alpha (Hemabate), misoprostol (Cytotec), TXA
- 4) Airway equipment: Nasal cannula, face masks, oral airways, LMAs, ETT, laryngoscopes, suction
- 5) Hemorrhage cart
- 6) Crash cart

Other supporting documents:

Patient's history and physical exam

Lab investigations

Family member (actor)

A-V equipment

Participants

2-3 anesthesiologists (faculty/trainees of varying competencies)

2-3 obstetricians (faculty/trainees of varying competencies)

2-3 nurses/nurse midwives

Time Duration

Set-up	20 min
Pre brief/consent	10 min
Simulation	20 min
Debrief	15-20 min

Case Stem

Patient is a 35-year-old G5P5, who has had a protracted labor that was augmented with oxytocin and culminated in the delivery of a 3.9 kg male infant. She had an epidural for labor analgesia, which functioned well. Her 4 prior deliveries were vaginal.

After delivery, oxytocin was administered and the patient's quantified blood loss was 500 mL. The 3rd stage of labor was uncomplicated.

1 hour after delivery she is still in the L+D suite, and a large amount of blood has been noted on the floor by the patient's family member who has called for the nurse.

The patient is previously healthy with no past surgical history.

Current medications and allergies:

NKDA

Pre-natal vitamins

Physical examination:

General: Ill appearing female

Weight, height: 110 Kg, 5'3" (BMI 42)

Vital signs: HR 82/min, BP 110/74 mm Hg, Sat 99%, RR 18/min

Airway: MP I

Lungs: Clear

Heart: Normal

Laboratory, radiology, and other relevant studies:

HB 8 mg/dL

Blood group is O positive

Scenario

Trigger	Patient's condition	Action	Done	Time	Comments
Stage I	<p>Call by the patient's family member that there is blood on the floor</p> <p>Confederate verbalizes QBL of 1000 mL</p> <p>Patient's VS: HR 110 bpm BP 100/70 mm Hg Sat 98% RR 18 bpm</p>	<ol style="list-style-type: none"> 1. Recognize and assess ongoing risk for PPH, quantify blood loss/assess stage of hemorrhage 2. Call for help/designate leader/delineate work 3. Repeat fundal massage, increase oxytocin rate 4. Vital signs measuring frequency? 5. Obtain 2nd large-bore IV access, fluid resuscitation, place Foley catheter 6. 2nd-line uterotonic(s) 7. Send labs – which tests? 8. Bring in hemorrhage cart 9. Use PPH checklist 10. Communicate with blood bank 11. Communicate and reassure family members 			
Stage II Hypotension and tachycardia	<p>Confederate verbalizes further blood loss (500 mL)</p> <p>Patient's VS: HR 115 bpm BP 80/40 mm Hg Sat 95% RR 18 bpm</p>	<ol style="list-style-type: none"> 1. Recognize worsening PPH Stage II 2. 100% oxygen via face mask 3. Multidisciplinary team discussion - differential diagnosis of etiology of PPH, surgical bleed, DIC 4. Repeat labs - which tests (role of lactate)? 5. Additional uterotonic(s), tranexamic acid 6. Order MTP 7. Consider moving to the OR 8. Active patient warming – monitor temperature 9. Assess urine output 			
Stage III Worsening hypotension	<p>Confederate verbalizes further blood loss (500 mL)</p> <p>Patient's VS: HR 120 bpm, faint pulse BP 60/23 mm Hg</p>	<ol style="list-style-type: none"> 1. MTP arrived? 2. Invasive monitors, cell saver, rapid transfusion set-up 3. Transfuse and optimize ratio of blood products 4. Fibrinogen replacement (human-derived fibrinogen concentrate or cryoprecipitate) 			

	<p>Sat 90% RR 22 bpm</p> <p>Patient unresponsive</p> <p>HB 6.0 g/dL HCT 26% Platelets 150K (verbalized by facilitator)</p> <p>Patient should be transported to OR/hybrid room</p>	<ol style="list-style-type: none"> 5. Order 2nd/3rd MTP? 6. Repeat labs – which tests? 7. Evaluate acid-base balance and electrolytes (e.g. calcium) 8. Consider calling Gyn-onc, vascular, interventional radiology, ICU 9. List treatment options: packing, repair of lacs, D&C, Bakri balloon, B-Lynch suture, uterine hypogastric artery ligation/embolization, hysterectomy 10. Consideration for general anesthesia or dose the epidural catheter? 			
Resolution	<p>Patient's VS: HR 95 bpm BP 98/60 mm Hg Sat 95% RR 20 bpm</p> <p>Patient responsive</p>	<ol style="list-style-type: none"> 1. Importance of continuing uterotonics 2. Monitoring bleeding 3. Concern of progression to DIC 4. When to remove epidural catheter? 5. Disposition - where to? 			

Appendix 1

Obstetric Interdisciplinary Team Simulation

Name of simulation: _____

Date: _____

OB Nursing Anes

Consult PG Yr 1234 Med st staff

Each item has two components. The “Before the simulation” column (left side) examines your perspective at the beginning of the simulation. The “End of Simulation” column (right side) is to evaluate your perspective at the completion of the simulation. Think carefully about your responses and mark them accordingly.

1. How would you rate your knowledge of the clinical stages of PPH?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none					Knowledgeable		Little/none					Knowledgeable	

2. How would you rate your knowledge of the uterotonic pharmacology?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none					Knowledgeable		Little/none					Knowledgeable	

3. How would you rate your ability to access emergency resuscitation equipment and hemorrhage carts during a PPH?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Poor			Excellent				Poor			Excellent			

4. How would you rate your knowledge of labs that need to be ordered in a PPH?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none					Knowledgeable		Little/none					Knowledgeable	

5. How would you rate your knowledge of the massive transfusion protocol used in obstetrics?

BEFORE THE SIMULATION							END OF SIMULATION						
1	2	3	4	5	6	7	1	2	3	4	5	6	7
Little/none					Knowledgeable		Little/none					Knowledgeable	

Appendix 2

SIMULATION ACTIVITY EVALUATION FORM

DATE OF SIMULATION: _____

YOUR OCCUPATION: Consultant PG Yr1234 STUDENT NURSE MIDWIFE OTHER

SPECIALTY: _____ YEARS IN PRACTICE: _____

Please rate the following aspects of this training program using the scale listed below:

1 = poor 2 = suboptimal 3 = adequate 4 = good 5 = excellent

Use "N/A" if you did not experience or otherwise cannot rate an item.

INTRODUCTORY MATERIALS

Orientation to the simulation	1	2	3	4	5	N/A
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PHYSICAL SPACE

Realism of the simulation space	1	2	3	4	5	N/A
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EQUIPMENT

Satisfaction with the mannequin	1	2	3	4	5	N/A
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SCENARIOS

Realism of the scenarios	1	2	3	4	5	N/A
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Ability of the scenarios to test technical skills	1	2	3	4	5	N/A
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Ability of the scenarios to test behavioral skills	1	2	3	4	5	N/A
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Overall quality of the debriefings	1	2	3	4	5	N/A
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FACULTY

Quality of instructors	1	2	3	4	5	N/A
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Simulation as a teaching method	1	2	3	4	5	N/A
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COMMENTS

References

1. Bateman BT, Berman MF, Riley LE, Leffert LR. The epidemiology of postpartum hemorrhage in a large, nationwide sample of deliveries. *Anesth Analg.* 2010;110:1368-73
2. Main EK, Goffman D, Scavone BM, Low LK, Bingham D, Fontaine PL, et al. National Partnership for Maternal Safety: Consensus bundle on obstetric hemorrhage. *J Obstet Gynecol Neonatal Nurs.* 2015;44:462-70