SIMULATION

Post-Termination Hemorrhage

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ABSTRACT:

Audience: This case scenario is appropriate for emergency medicine residents of all levels and senior medical students.

Introduction: There are approximately 1 million abortions performed in the United States each year.[1,2] Roughly 3% of all women will have an abortion in their lifetime.[3] Therapeutic abortions can be induced medically with several medications or via dilation and curettage or dilation and evacuation. Since the legalization of abortion in 1973 the overall morbidity and mortality of abortions has dramatically declined and is now deemed to be a relatively safe procedure.[4] Reports show minor complications occurring in 8 of every 1000 legal abortions, major complication at a rate of 0.7 per 1000 and mortality occurring in 0.7 per 100,000 legal abortions each year.[4] Infection and hemorrhage are the most common causes of abortion related mortality, with hemorrhage accounting for approximately 14% of all first trimester abortions complications and 33% to 40% of all second trimester abortions.[4]

Educational Objectives: By the end of this simulation, participants will be able to: 1) recognize post-termination hemorrhage and hemorrhagic shock; 2) demonstrate appropriate acute resuscitation for a patient with hemorrhagic shock; 3) review the differential diagnosis for a patient with post-termination hemorrhage; 4) identify the indications for massive transfusion protocol.

Educational Methods: This is a high-fidelity simulation, followed by a debriefing session. However, it could be adjusted for low- or moderate-fidelity simulation, or for an oral board case.

Research Methods: This simulation was piloted with 15 emergency medicine residents who provided verbal feedback and evaluation of the session.

Results: The reception was positive with learners appreciating the learning points of this important but rare presentation. However, they requested future simulations attempt a more realistic representation of the vaginal bleeding presentation.

Discussion: Overall, this simulation is an effective method of introducing important concepts in the evaluation and management of a patient with post-termination hemorrhage and allows for assessment of learners in the acute resuscitation of these patients.

Topics: Post-termination hemorrhage, retained products of conception, syncope, obstetrics and gynecology, Ob/gyn.

USER GUIDE

List of Resources:

Learner Audience:
Medical students, interns, junior residents, senior residents, community physicians

Time Required for Implementation:
Instructor Preparation: 30 minutes
Time for case: 10 minutes
Time for debriefing: 30 minutes

Recommended Number of Learners per Instructor:
3-4

Topics:
Post-termination hemorrhage, retained products of conception, syncope, obstetrics and gynecology, Ob/gyn.

Objectives:
By the end of this simulation session, the learner will be able to:

1. Recognize post-termination hemorrhage and hemorrhagic shock
2. Demonstrate appropriate acute resuscitation for a patient with hemorrhagic shock
3. Review the differential diagnosis for a patient with post-termination hemorrhage
4. Identify the indications for massive transfusion protocol

Linked objectives and methods:
Simulation is an appropriate method to meet these goals and objectives because it safely allows learners to identify a patient who is in shock (objective 1), actively resuscitate a patient with hemorrhage and hemorrhagic shock, allow them to consider the broad differential diagnosis of vaginal bleeding, and discuss the treatment options for hemorrhagic shock (objectives 2 and 3). Learners will also have to appropriately transfuse the patient, ideally utilizing a massive transfusion protocol (objective 4). Simulation can be speeded up to increase the difficulty for more experienced learners or slowed down to allow more junior learners to talk through the case and discuss their medical decision making. The subsequent debriefing can focus on either diagnosis and management of hemorrhage/hemorrhagic shock including massive transfusions (objective 4) or post-termination complications, or both.

Recommended pre-reading for instructor:
We recommend that instructors review literature regarding post abortion hemorrhage and massive transfusions, including:

- Their institution's massive transfusion protocol.
- Nickson C. Massive transfusion protocol. Life in the Fast Lane. https://litfl.com/massive-transfusion-protocol/ Updated April 23, 2019. Accessed June 23, 2019.
- Kerns J, Steinauer J. Management of postabortion hemorrhage. *Contraception.* 2013;87(3):331-342. doi: 10.1016/j.contraception.2012.10.024.

Learner responsible content:
While there is no specific learner responsible content, should learners wish to review literature regarding post abortion hemorrhage and massive transfusions, we recommend:

- Their institution's massive transfusion protocol.
- Nickson C. Massive transfusion protocol. Life in the Fast Lane. https://litfl.com/massive-transfusion-protocol/ Updated April 23, 2019. Accessed June 23, 2019.
- Kerns J, Steinauer J. Management of postabortion hemorrhage. *Contraception.* 2013;87(3):331-342. doi: 10.1016/j.contraception.2012.10.024.

Results and tips for successful implementation:
This case can be run using a low, medium, or high-fidelity simulator, or used as an oral boards case. Depending on the level of learner, the case can be speeded up so that the patient decompensates faster, thus inducing more stress for the learners and forcing them to commit to decisions more quickly. Alternatively, it can be slowed down allowing more novice learners time to talk through the management.

To demonstrate active hemorrhage instructors could utilize a birthing manikin that can simulate hemorrhage. If a birthing manikin is unavailable, one could set up a water pump under the gurney with red water and attach it to tubing that could be placed between the manikin's legs to simulate vaginal bleeding during the case. For a simpler, but less realistic option, instructors can simply saturate sheets or a bed pad (chuck) with red dye to simulate active bleeding and verbally explain what is seen within the vault of the simulator manikin.

This simulation was initially implemented at an emergency medicine residency program simulation conference with approximately 15 residents and medical students. We opted to verbally explain the pelvic exam to the learners. Overall response was positive and learners felt the case was a unique

twist on the classic vaginal bleed case and was valuable since many of them had never seen a case of post-termination hemorrhage. Learners did identify that the realism was low, prompting us to consider other ways to simulate vaginal bleeding.

References/suggestions for further reading:

1. Jatlaoui TC, Shah J, Mandel MG, et al. Abortion surveillance — United States, 2014. *MMWR Surveill Summ*. 2017;66(No. SS-24):1–48. doi: 10.15585/mmwr.ss6624a1.
2. Jerman J, Jones RK, Onda T. Characteristics of U.S. Abortion Patients in 2014 and Changes Since 2008. New York: Guttmacher Institute, 2016. www.guttmacher.org/report/characteristics-us-abortion-patients-2014. Published May 2016. Accessed July 8, 2019.
3. Finer LB, Zolna MR. Declines in unintended pregnancy in the United States, 2008–2011. *New Engl J Med.* 2016;374(9):843–852. doi: 10.1056/NEJMsa1506575.
4. Kerns J, Steinauer J. Management of postabortion hemorrhage. *Contraception.* 2013;87(3):331-342. doi: 10.1016/j.contraception.2012.10.024.
5. Nickson C. Massive transfusion protocol. Life in the Fast Lane. https://litfl.com/massive-transfusion-protocol/. Updated April 23, 2019. Accessed June 23, 2019.

INSTRUCTOR MATERIALS

Case Title: Post-Termination Hemorrhage

Case Description & Diagnosis (short synopsis): Ms. Johnson is a 21-year-old female, gravida 1, parity 0 status-post medically induced abortion with vaginal misoprostol earlier today. She is brought in after a syncopal episode at home. Participants must rapidly recognize the patients' hypotension and active bleeding and should rapidly resuscitate the patient. They must appropriately consult obstetrics and gynecology (Ob/gyn) for definitive management of the patient's post-termination hemorrhage.

Equipment or Props Needed:
High-fidelity adult female simulation mannequin
Infusion pumps
Normal Saline
Blood Products
Intubation/airway tray
Central Line kit
Crash cart
Blood Pressure cuff
Cardiac monitor
2 lead Electrocardiogram
Pulse Oximeter

Confederates needed:
Boyfriend

Stimulus Inventory:
#1 Point-of-care hemoglobin 1
#2 Point-of-care hemoglobin 2
#3 Point-of-care hemoglobin 3
#4 Complete blood count (CBC)
#5 ABO/Rh
#6 Beta-human chorionic gonadotropin (Beta-hCG)
#7 Basic metabolic panel (BMP)
#8 Liver function tests (LFTs)
#9 Lactic acid
#10 Urinalysis

INSTRUCTOR MATERIALS

#11 Chest X-ray
#12 Bedside Pelvic ultrasound

Background and brief information: Ms. Johnson is a 21-year-old female brought in by her boyfriend for heavy vaginal bleeding and syncope at home after a medically induced abortion.

Initial presentation: Patient presents to the emergency department with complaints of vaginal bleeding and syncope at home. She reports lightheadedness, and when sitting down to be triaged, she has another syncope episode and is immediately brought back to an emergency department (ED) bed.

How the scenario unfolds: The patient is brought to a resuscitation bay after her syncope in triage. Participants should begin an immediate resuscitation, including airway, breathing and circulation (ABCs). They should request vital signs, which will show tachycardia and hypotension. Two large-bore intravenous (IV) lines and fluids should be started. Bedside glucose will be within normal limits, and initial point-of-care hemoglobin will be 8.2g/dL. Participants should take a brief history and complete a physical exam including pelvic exam, which will reveal active heavy vaginal bleeding. Appropriate labs, including blood type and cross, should be ordered, and bedside ultrasound should be performed. Participants should repeat point-of-care hemoglobin which will show down-trending hemoglobin, and should activate massive transfusion protocol. The patient will remain persistently tachycardic and hypotensive and will require multiple fluid boluses and blood transfusions. Participants should recognize the patient is hemorrhaging from her medically induced abortion, and should call Ob/gyn for definitive management such as emergent dilation and curettage (D&C) or uterine artery embolization.

Critical actions:

1. Assess airway, breathing and circulation (ABCs).
2. Obtain vitals, adequate vascular access and place the patient on the monitor.
3. Order point-of-care hemoglobin.
4. Perform a focused history and physical exam, including pelvic exam.
5. Order appropriate blood transfusion or activate massive transfusion protocol.
6. Order appropriate labs and imaging: Complete blood count (CBC), beta-hCG, ABO/Rh, type and cross, complete metabolic panel (CMP), lactate.
7. Perform bedside pelvic ultrasound to rule out ruptured ectopic pregnancy.
8. Consult Ob/gyn for admission and definitive management.

INSTRUCTOR MATERIALS

Case title: Post-Termination Hemorrhage

Chief Complaint: Syncope

Vitals: Heart Rate (HR) 130 Blood Pressure (BP) 80/63 Respiratory Rate (RR) 20
Temperature (T) 98.6°F Oxygen Saturation (O_2Sat) 98% on room air

General Appearance: Pale

Primary Survey:

- **Airway:** patent
- **Breathing:** clear bilaterally
- **Circulation:** delayed capillary refill, weak and thready pulses

History:

- **History of present illness:** Ms. Johnson is a 21-year-old female, gravida 1, parity 0 status-post medically induced abortion with vaginal misoprostol earlier today. She is brought in by her boyfriend after having a syncopal episode at home. The patient states that a few hours after inserting the vaginal misoprostol she starting having lower abdominal cramps and vaginal bleeding which worsened, and she has soaked 2-3 overnight pads every hour for the past several hours. Shortly prior to coming to the emergency department, she stood up to go to the bathroom to change her pad again and passed out. The boyfriend states she was unconscious for about 30 seconds and then he brought her to the ED. She was being triaged and telling the triage nurse she was feeling very lightheaded when she passed out again.
- **Past medical history:** none
- **Past surgical history:** appendectomy 2 years ago
- **Patient's medications:** none
- **Allergies:** no known drug allergies
- **Social history:** no smoking, alcohol, or tobacco
- **Family history:** no family history of bleeding disorders

Secondary Survey/Physical Examination:

- **General appearance:** Pale, appears scared and frail, speaking softly
- **HEENT:**
    - **Head:** within normal limits

  - **Eyes:** lid pallor bilaterally
  - **Ears:** within normal limits
  - **Nose:** within normal limits
  - **Throat:** within normal limits
- **Neck:** within normal limits
- **Heart:** tachycardic, no murmur or rubs
- **Lungs:** clear bilaterally
- **Abdominal/GI:** Soft, non-tender. No rebound, no guarding. No peritoneal signs. Positive bowel sounds and non-distended.
- **Genitourinary**: Significant vaginal bleeding with blood covering bed pad under patient. When speculum is placed in the vagina, bright red blood flows out rapidly and pools on the bed. The participant is unable to visualize the cervical os due to active bleeding but on bimanual exam it feels open. She has no adnexal tenderness or cervical motion tenderness on bimanual exam. No cervical lacerations are felt on bimanual exam.
- **Skin/Extremities:** Capillary refill delayed, otherwise normal, cool to touch, no cyanosis and moving all extremities.
- **Neuro:** Alert and oriented x4. No focal deficits appreciated.

Results:

Point-of-care hemoglobin 1	8.2g/dL
Point-of-care hemoglobin 2	6.9g/dL
Point-of-care hemoglobin 3	6.2g/dL

Complete blood count (CBC)

White blood count (WBC)	14.0 x1000/mm^3(H)
Hemoglobin (Hgb)	8.5 g/dL
Hematocrit (HCT)	25.1%
Platelet (Plt)	170 x1000/mm^3
Segments	79%
Bands	10%

ABO/Rh	O negative

Beta hCG (human chorionic gonadotropin)
8,500 mIU/mL

Basic metabolic panel (BMP)

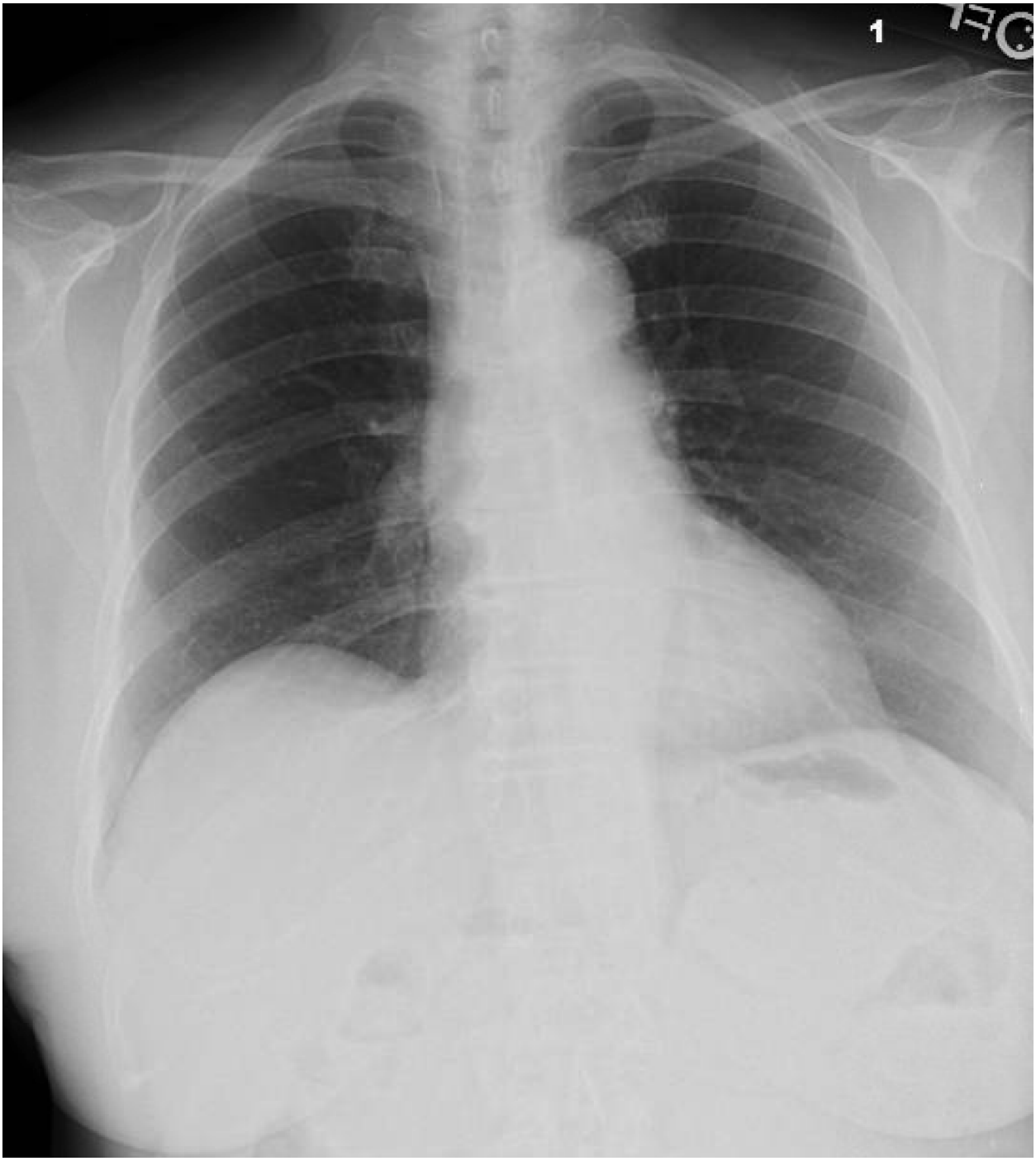
Sodium	133 mEq/L
Chloride	99 mEq/L
Potassium	4.2 mEq/L
Bicarbonate (HCO_3)	18 mEq/L
Blood Urea Nitrogen (BUN)	60 mg/dL
Creatine (Cr)	2.2 mg/dL
Glucose	85 mg/dL
Calcium	8.0 mg/dL

INSTRUCTOR MATERIALS

Liver Function Tests (LFTs)	
Total bilirubin	0.8 mg/dL
Direct bilirubin	0.2 mg/dL
Albumin	3.0 g/dL
Alkaline Phosphate	100 U/L
Total Protein	7.0 g/dL
Aspartate Aminotransferase (AST)	30 Units/L
Alanine Aminotransferase (ALT)	40 Units/L
Lactic Acid	2.2 mEq/L
Urinalysis (UA)	
Color	dark yellow
Specific gravity	1.015
Protein	negative
Glucose	negative
Ketones	negative
Hemoglobin	positive
Leukocyte esterase	negative
Nitrites	negative
Red blood cells (RBC)	>182 RBCs/ high powered field (HPF)
White blood cells (WBC)	10 WBCs/HPF
Bacteria	none
Squamous epithelial cells	0-5 cells/HPF

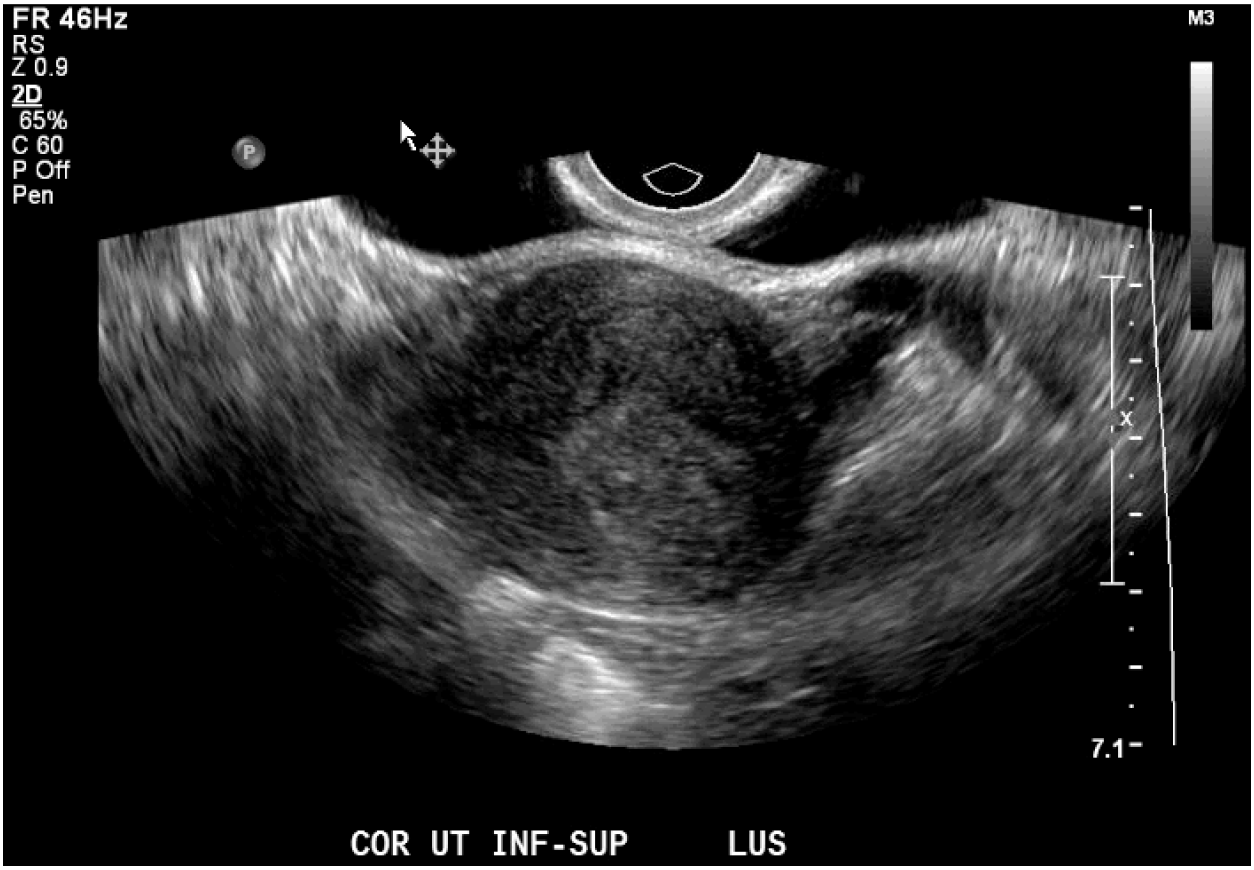
INSTRUCTOR MATERIALS

Chest Radiograph: Unremarkable
(author's own image)



INSTRUCTOR MATERIALS

Bedside Ultrasound
(author's own image)



Ultrasound shows clot and debris within the uterus and cervix. No gestational sack identified. No free fluid. No adnexal masses. Correlate clinically for retained

OPERATOR MATERIALS

SIMULATION EVENTS TABLE:

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
0:00 (Baseline)	Entering the room.	Patient on gurney, lethargic but arousable. Boyfriend available for information.	HR 130 BP 80/63 RR 20 O_2sat 100% on RA T 98.6°F
1:00	Assess ABCs. Obtain focused H&P. Start 2 large bore IVs. Place patient on monitors (cardiac and pulse ox). Point-of-care glucose and hemoglobin ordered.	Patient will state that that she feels very weak and tired and lightheaded. Patient reports that she feels like she is bleeding on the bed. She continues to have vaginal bleeding, soaking 1 bed pad during the initial few minutes of evaluation. Initial hemoglobin of 8.2mg/dL available.	HR 130 BP 80/63 RR 20 O_2sat 100% on RA T 98.6°F
2:00	Labs and imaging ordered. IV fluid bolus ordered.	Physical exam shows extensive vaginal bleeding, when speculum placed in vagina bright red blood flows out, examiner is unable to clear blood to visualize cervical os.	HR 128 BP 72/52 RR 20 O_2sat 100% on RA T 98.6°F
3:00	Participants attempt some form of treatment for hemorrhage: • Uterine massage • Packing/uterine tamponade	If participants attempt uterine massage or to pack the vaginal vault, the patient will complain of pain and will continue to bleed through the packing. If participants request Foley or balloon tamponade, one will not be available.	HR 128 BP 72/52 RR 20 O_2sat 100% on RA T 98.6°F

OPERATOR MATERIALS

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
	• Medical management	If participants order methylergonovine maleate (methergine), misoprostol, oxytocin or another uterotonic, pharmacy will state that it will need to come from labor and delivery and will likely take 5 to 10 minutes to obtain. The product will be available later in the case.	
4:00	Participants should order IV fluids and request blood products for transfusion [preferably starting with packed red blood cells (pRBCs)].	If participants do not order blood/massive transfusion at this time, typed blood will not be available until it is ordered. However, O- blood will be available if requested. Once ordered, nurse will notify learners it will be available in a couple minutes. If patient not given fluids her blood pressure will decrease and she will become more tachycardic If patient given fluid her blood pressure will increase slightly and heart rate decrease	Without fluids: HR 148 BP 62/34 RR 20 O_2sat 100% on RA T 98.6°F With fluids: HR 120 BP 83/64 RR 20 O_2sat 100% on RA T 98.6°F
5:00	Participants perform bedside ultrasound.	Ultrasound shows clot and blood in uterus, concern for retained products.	Without fluids: HR 148 BP 62/34 RR 20 O_2sat 100% on RA T 98.6°F With fluids: HR 120 BP 83/64 RR 20 O_2sat 100% on RA T 98.6°F
6:00	Order repeat point-of-care hemoglobin.	Patient continues to have brisk bright red vaginal bleeding.	Without fluids: HR 148 BP 62/34

OPERATOR MATERIALS

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
	Given continued bleeding, hypotension, tachycardia, participants should order blood products if they have not already done so.	Repeat point-of-care hemoglobin available: 5.9 mg/dL. Labs available.	RR 20 O_2sat 100% on RA T 98.6°F With fluids: HR 120 BP 83/64 RR 20 O_2sat 100% on RA T 98.6°F
8:00 8:00 (cont.)	Blood products are available and nurse starts them if ordered. The learners should order multiple units of pRBCs with frequent reassessment. If medical management ordered, it will now be available for administration.	If blood products are given, patients' blood pressure will improve and heart rate will improve after the 3rd unit of pRBCs. However, patient will continue to have extensive vaginal bleeding. If medical management with methylergonovine maleate, misoprostol, or oxytocin are given, the patient's bleeding will slightly improve but she will continue to have active bleeding.	With at least 3 units pRBCs: HR 122 BP 83/58 RR 20 O_2sat 100% on RA T 98.6°F With <3 units pRBCs: HR 148 BP 62/34 RR 20 O_2sat 100% on RA T 98.6°F
10:00	Participant should call Ob/gyn. If participants do not call Ob/gyn, nursing will ask if they should call for help.	If the participants provide an appropriate sign out and consult with appropriate concern, Ob/gyn will state that they are coming right now.	

OPERATOR MATERIALS

Minute (state)	Participant action/ trigger	Patient status (simulator response) & operator prompts	Monitor display (vital signs)
10:00	If participants do not give sufficient blood products (at least 3u PRBCs).	If patient is not given sufficient blood products, the patient will decompensate, lose consciousness, and arrest. Advanced cardiac life support (ACLS) should be initiated. The patient will have return of spontaneous circulation (ROSC) only if at least 3u pRBCs is given and appropriate ACLS is performed, including cardiopulmonary resuscitation (CPR), bagging with or without definitive airway, epinephrine. Once 3u pRBCs is completed and appropriate ACLS is performed, patient can have ROSC and return to 08:00 vitals.	HR 0 BP 0 RR 0

Diagnosis:
Post-termination hemorrhage secondary to medical abortion

Disposition:
Operating room for definitive management

DEBRIEFING AND EVALUATION PEARLS

Post-termination Hemorrhage

History:

- Since abortion was legalized in 1973, morbidity and mortality from abortion has dramatically decreased. Minor complications occur in 8 out of every 1000 abortions, major complications in 0.7 out of 1000 abortions, and death in 0.7 in 100,000 abortions.
- 1st Trimester abortion mortality is typically caused by infection (33%) and hemorrhage (14%).
- 2nd trimester abortion mortality is typically caused by hemorrhage (33%-40%).
- However, hemorrhage after abortion is rare, occurring in <1% of all abortions, but when it does occur, it is often life threatening.
- There are varying definitions of post-termination hemorrhage, ranging from 250cc of blood loss to 500cc of blood loss to patients requiring hospitalization or requiring transfusion.
- The most common causes of post-termination hemorrhages are:
    - Uterine Atony (52%)
    - Abnormal Placentation (17%)
    - Cervical Lacerations (12%)
    - Perforation (7%)
    - Coagulopathy, including bleeding disorders and disseminated intravascular coagulopathy (5%)
    - Retained tissue (0.2-2%)

Management:

- Initial assessment should include:
    - Airway, breathing, circulation.
    - IV, O2 and monitor.
    - Immediately followed by a physical exam including visual and bimanual inspection of the cervix to assess for cervical lacerations and perforation and uterine atony.
    - Ultrasound should be utilized to assess for retained products.
    - **Primary Treatment:**
        - Cervical Lacerations: small cervical lacerations can be treated with direct pressure or application of silver nitrate. Larger lacerations may require application of ferric subsulfate (Monsel's solution) or repair with sutures.
        - Uterine Atony should be treated primarily with uterine massage during bimanual exam. If the uterus doesn't clamp down or bleeding improve

following massage, uterotonic agents such as methylergonovine maleate (methergine), misoprostol, oxytocin or carboprost can be used:

- Methylergonovine maleate (methergine): 0.2mg IM or IV q5 minutes x 5 doses
- Misoprostol 800-1000mg oral or sublingual (can be give vaginally or rectally however less effective in the setting of post-termination hemorrhage)
- Oxytocin 10U IM or 10-40U IV

- **Secondary Treatment:**
  - If primary treatment has not improved the bleeding or the patient remains unstable, then the physician should place 2 large bore IVs, begin fluid resuscitation, order blood work: complete blood count, coagulation studies, type and cross for blood transfusion and consider a disseminated intravascular coagulation panel.
  - Physicians can attempt uterine packing or tamponade with a foley or uterine tamponade device such as the Bakri balloon which can be left in place for 12 to 24 hours.
    - Foley: Off label use. Foley is inserted through the cervix, and once it is proximal to the cervix, the balloon is inflated to 30-80cc with normal saline (do not use air as rupture can cause an air embolus).
    - Bakri balloon: specifically designed for uterine tamponade in the setting of post-partum hemorrhage, it is inserted through the cervix, and once it is proximal to the cervix, the balloon can be inflated with 500cc of normal saline, although in the case of post- termination hemorrhage, inflation to <250cc has been demonstrated to be successful.
  - Blood transfusion:
    - Physicians should be familiar with massive transfusion protocols as well as with their specific institution's protocol.
    - Typically massive transfusions are defined as replacement of greater than 1 blood volume in a 24 hour period or 50% of blood volume in 4 hours.
    - Physician should be able to recognize acute blood loss, hemorrhagic shock, abnormal vital signs, decreased tissue perfusion and oxygenation.

- Typical massive transfusion protocols include a 1:1:1 infusion of packed red blood cells, fresh frozen plasma and platelets.
- If possible and time permits, blood should be typed and crossed because uncrossed/O neg blood can lead to reactions and difficulty cross-matching future blood products.
- Patients should be monitored for fluid overload, over-transfusion, transfusion-related lung injury, transfusion-associated cardiac over load, hemolytic reactions, hypothermia, electrolyte abnormalities.
- ***Discussion of user's institution's massive transfusion protocol**

- **Tertiary Treatment**
  - If the above measures fail to control the bleeding, obstetrics and gynecology should be consulted for further management. Although rare, patients with post-termination hemorrhage may require a uterine artery embolization, laparoscopy, laparotomy or hysterectomy.
  - If concern for post-termination hemorrhage, Ob/gyn should be consulted early so they have time to prepare for advanced measures if needed.

References/suggestions for further reading:

1. Kerns J, Steinauer J. Management of postabortion hemorrhage. *Contraception.* 2013;87(3):331-342. doi: 10.1016/j.contraception.2012.10.024.
2. Nickson C. Massive transfusion protocol. Life in the Fast Lane. https://litfl.com/massive-transfusion-protocol/. Updated April 23, 2019. Accessed June 23, 2019.

SIMULATION ASSESSMENT

Post-Termination Hemorrhage

Learner: _____

Assessment Timeline

This timeline is to help observers assess their learners. It allows observer to make notes on when learners performed various tasks, which can help guide debriefing discussion.

Critical Actions:	0:00
1. Assess airway, breathing and circulation (ABCs). 2. Obtain vitals, adequate vascular access, and place the patient on the monitor. 3. Order point-of-care hemoglobin. 4. Perform a focused history and physical exam, including pelvic exam. 5. Order appropriate blood transfusion or activate massive transfusion protocol. 6. Order appropriate labs and imaging: Complete blood count (CBC), beta-hCG, ABO/Rh, type and cross, complete metabolic panel (CMP), lactate. 7. Perform bedside pelvic ultrasound to rule out ruptured ectopic pregnancy. 8. Consult Ob/gyn for admission and definitive management.	

SIMULATION ASSESSMENT

Post-Termination Hemorrhage

Learner: _____

Critical Actions:

☐ Assess airway, breathing and circulation (ABCs).
☐ Obtain vitals, adequate vascular access, and place the patient on the monitor.
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☐ Perform a focused history and physical exam, including pelvic exam.
☐ Order appropriate blood transfusion or activate massive transfusion protocol.
☐ Order appropriate labs and imaging: Complete blood count (CBC), beta-hCG, ABO/Rh, type and cross, complete metabolic panel (CMP), lactate.
☐ Perform bedside pelvic ultrasound to rule out ruptured ectopic pregnancy.
☐ Consult Ob/gyn for admission and definitive management.

Summative and formative comments:

Milestones assessment:

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
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SIMULATION ASSESSMENT

Post-Termination Hemorrhage

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
1	**Emergency Stabilization (PC1)**	☐ Did not achieve Level 1	☐ Recognizes abnormal vital signs	☐ Recognizes an unstable patient, requiring intervention Performs primary assessment Discerns data to formulate a diagnostic impression/plan	☐ Manages and prioritizes critical actions in a critically ill patient Reassesses after implementing a stabilizing intervention
2	**Performance of focused history and physical (PC2)**	☐ Did not achieve Level 1	☐ Performs a reliable, comprehensive history and physical exam	☐ Performs and communicates a focused history and physical exam based on chief complaint and urgent issues	☐ Prioritizes essential components of history and physical exam given dynamic circumstances
3	**Diagnostic studies (PC3)**	☐ Did not achieve Level 1	☐ Determines the necessity of diagnostic studies	☐ Orders appropriate diagnostic studies. Performs appropriate bedside diagnostic studies/procedures	☐ Prioritizes essential testing Interprets results of diagnostic studies Reviews risks, benefits, contraindications, and alternatives to a diagnostic study or procedure
4	**Diagnosis (PC4)**	☐ Did not achieve Level 1	☐ Considers a list of potential diagnoses	☐ Considers an appropriate list of potential diagnosis May or may not make correct diagnosis	☐ Makes the appropriate diagnosis Considers other potential diagnoses, avoiding premature closure
5	**Pharmacotherapy (PC5)**	☐ Did not achieve Level 1	☐ Asks patient for drug allergies	☐ Selects an medication for therapeutic intervention, consider potential adverse effects	☐ Selects the most appropriate medication and understands mechanism of action, effect, and potential side effects Considers and recognizes drug-drug interactions

Standardized assessment form for simulation cases. JETem © Developed by: Megan Osborn, MD, MHPE; Shannon Toohey, MD; Alisa Wray, MD
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SIMULATION ASSESSMENT

Post-Termination Hemorrhage

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
6	**Observation and reassessment (PC6)**	☐ Did not achieve Level 1	☐ Reevaluates patient at least one time during case	☐ Reevaluates patient after most therapeutic interventions	☐ Consistently evaluates the effectiveness of therapies at appropriate intervals
7	**Disposition (PC7)**	☐ Did not achieve Level 1	☐ Appropriately selects whether to admit or discharge the patient	☐ Appropriately selects whether to admit or discharge Involves the expertise of some of the appropriate specialists	☐ Educates the patient appropriately about their disposition Assigns patient to an appropriate level of care (ICU/Tele/Floor) Involves expertise of all appropriate specialists
9	**General Approach to Procedures (PC9)**	☐ Did not achieve Level 1	☐ Identifies pertinent anatomy and physiology for a procedure Uses appropriate Universal Precautions	☐ Obtains informed consent Knows indications, contraindications, anatomic landmarks, equipment, anesthetic and procedural technique, and potential complications for common ED procedures	☐ Determines a back-up strategy if initial attempts are unsuccessful Correctly interprets results of diagnostic procedure
20	**Professional Values (PROF1)**	☐ Did not achieve Level 1	☐ Demonstrates caring, honest behavior	☐ Exhibits compassion, respect, sensitivity and responsiveness	☐ Develops alternative care plans when patients' personal beliefs and decisions preclude standard care

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https://doi.org/10.21980/J8NW6Q

SIMULATION ASSESSMENT

Post-Termination Hemorrhage

Learner: _____

	Milestone	Did not achieve level 1	Level 1	Level 2	Level 3
22	**Patient centered communication (ICS1)**	☐ Did not achieve level 1	☐ Establishes rapport and demonstrates empathy to patient (and family) Listens effectively	☐ Elicits patient's reason for seeking health care	☐ Manages patient expectations in a manner that minimizes potential for stress, conflict, and misunderstanding. Effectively communicates with vulnerable populations, (at risk patients and families)
23	**Team management (ICS2)**	☐ Did not achieve level 1	☐ Recognizes other members of the patient care team during case (nurse, techs)	☐ Communicates pertinent information to other healthcare colleagues	☐ Communicates a clear, succinct, and appropriate handoff with specialists and other colleagues Communicates effectively with ancillary staff

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