Table 2. Exemplar Unfolding Case 1: Prevention of Postpartum Hemorrhage

Learning Outcomes. Students Should Be Able to:

1. Assess risk factors for PPH
2. Predict labor progress in a grand multiparous woman
3. Understand the importance of intravenous access during labor when PPH risk factors are present
4. Know the components of active management of the third stage of labor
5. Initiate the use of uterotonics
6. Utilize teamwork and good communication

The Case Scenario

Stage 1: A 42-year-old woman Gravida 9 Para 8017 is admitted to the birthing unit in active labor at 39 weeks' gestation. She gave birth to all of her previous newborns in Somalia and told you that she had a lot of bleeding after the last birth and was quite weak for months afterward. Her previous labor was precipitous, despite giving birth to a 9½ pound newborn. Her contractions started one hour ago and are now strong, every 3-5 minutes. Her prenatal course was normal and all laboratory studies, including a group B Streptococcus culture, were normal except for anemia with a hematocrit of 27% in the third trimester.

Questions to Elicit Student Discussion

1. What else do you need to know? (What additional history would you want to know? What physical examination would you do? Any laboratory studies that should be obtained at this time?)
   a. Pertinent history: major medical, surgical, or obstetric complications; prenatal anemia (treated?); previous treatment PPH?; size of largest newborn; length of previous labor
   b. Physical examination: abdominal examination to determine fetal presentation and estimated fetal weight, assessment of fetal heart tones, vaginal examination for dilatation, status of membranes, station
   c. Laboratory studies: hematocrit; obtain blood for type and crossmatch
2. What risk factors does she have for PPH?
   a. Grand multipara
   b. Previous PPH
   c. Previous large newborn
   d. Anemia

After allowing enough time for students to discuss stage I, the stage II information can be presented in the classroom or online. The amount of time allotted at each stage will vary due to the complexity of the stage.

Stage II: Your vaginal examination reveals that she is at 8 centimeters dilatation, vertex presentation, and −1 station with a bulging bag of water. Fetal heart rate is 130 bpm with moderate variability, and contractions are every 2 minutes and strong.

Questions to Elicit Student Discussion

1. What actions should you take or arrange to have taken, and what is your rationale for the actions you propose?
   a. Put on gloves and alert nursing staff of the situation
   b. Establish intravenous access
   c. Prepare for birth

Stage III: Within 4 minutes of your examination, she experiences spontaneous rupture of membranes and the vertex is crowning. A large male neonate is born and you place him on his mother's abdomen. He is pink and crying with a 1-minute Apgar of 9. You initiate active management of the third stage to deliver the placenta.

Questions to Elicit Student Discussion

1. Why did you implement active management of the third stage?
2. What are the components of active management of the third stage? And what steps would you follow to deliver the placenta? Explain your rationale.
   a. Immediate administration of an oxytocic within one minute following birth of the newborn (usually 10 units of oxytocin intramuscularly); may be followed by intravenous fluid with oxytocin 20 (40 units added to 1000 mL and flow increased to 150 mL/hour)
   b. Deliver the placenta using controlled cord traction (for active management)
   c. Massage of the uterine fundus to maintain contracted state

Continued

Table 2. Exemplar Unfolding Case 1: Prevention of Postpartum Hemorrhage

d. Immediate cord clamping no longer recommended

e. Inspect the placenta for completeness and evidence of succenturiate lobe.

3. What would you be communicating to the woman?

4. What would you be communicating to and/or requesting from the nursing staff?

a. Communicating with the woman/her family: what is happening and what you are doing, how often to check the fundus, and what she can do to keep the uterus firm and minimize bleeding (void, uterine massage, nurse the newborn)

b. Communicating with the nursing staff: updates on the woman's status, including estimated blood loss, vital signs, uterotonics

5. If this woman was admitted at 3 centimeters dilatation in labor, what additional actions might you take given her risk factors for PPH?

a. Type and crossmatch for 2 units of packed red blood cells

b. Review active management and hemorrhage protocol[20–22]

Debriefing Questions

1. What happened?
2. What did you notice?
3. How do you think you handled the situation?
4. How did you decide on what action you would take?
5. What did you do well?
6. Where could your performance or knowledge be improved?
7. What, if anything, would you have done differently?
8. How did you feel?
9. What were your key learning points?

Abbreviations: bpm, beats per minute; PPH, postpartum hemorrhage.

Table 3. Exemplar Unfolding Case 2: Diagnosis and Interventions for Postpartum Hemorrhage

Learning Outcomes. Students Should Be Able to:

1. Assess the major causes of PPH, including uterine atony, cervical or vaginal lacerations, and retained placental fragments, and conduct a stepwise identification of the bleeding source by the appropriate examination
2. Verbalize the conduct of a thorough assessment of the placenta
3. Utilize the appropriate uterotonic medications for treatment of PPH in the correct doses and according to an evidence-based algorithm
4. Identify laboratory studies needed in addition to hematocrit
5. Know what blood products to order and in what amount
6. Identify the signs of shock and know the treatment for shock
7. Communicate with staff and consult appropriately
8. Understand the pathophysiology of consumptive coagulopathy and disseminated intravascular coagulation (DIC)

The Case Scenario

Stage 1: A 22-year-old Gravida 1 Para 01 P0 woman at 41 weeks' gestation, with a BMI of 36, is admitted in active labor at 4 centimeters dilatation after an uncomplicated pregnancy. Cervical dilation proceeds normally during the first stage. However, her second stage requires oxytocin augmentation, and after 5 hours she has a vacuum extraction birth of a 4700-gram newborn. The placenta is delivered using active management within 5 minutes. An intravenous infusion with 20 units of oxytocin (Pitocin) in lactated ringers is running at 125 mL/hour, and initially the uterus is firm. Twenty minutes later, the woman passed several large clots from the vagina. Her blood pressure is 120/80 mm Hg, pulse 90 bpm, temperature 99 °F (37.2 °C). The uterus is now soft and at the umbilicus.

Continued

Table 3. Exemplar Unfolding Case 2: Diagnosis and Interventions for Postpartum Hemorrhage

Questions to Elicit Student Discussion

1. How would you evaluate this woman at this point? Explain your rationale.
   a. Evaluate total blood loss
   b. Massage uterus and express any additional clots
   c. Conduct stepwise evaluation to identify the cause of the bleeding: abdominal evaluation to assess for uterine contraction and full bladder, pelvic examination to evaluate the vagina and cervix for lacerations, perineal examination, and placental evaluation
2. What else could you do to assist with uterine contractility?
   a. Have the mother void or catheterize to empty the bladder
   b. Increase the intravenous fluid/oxytocin infusion to 150 mL/hour
   c. Add more oxytocin to the intravenous infusion
   d. Have the mother nurse the newborn

Stage II. The oxytocin infusion (1000 mL lactated ringers with 20 units oxytocin) was increased to 150 mL/hour, but the bleeding did not stop. Her blood pressure is now 90/60 mm Hg, and her pulse is 130 bpm. Your examination reveals heavy bleeding continuing from the cervical os and there are no tears in the vagina or cervix. The perineum has sustained a second-degree tear that is oozing and a boggy uterus persists.

Questions to Elicit Student Discussion

1. What is your differential diagnosis at this point?
   a. Uterine atony or retained placental fragments
   b. Bleeding laceration of the perineum
2. What is your management plan at this point? Explain your rationale.
   a. Recheck placenta for completeness.
   b. Express additional clots and make sure that the bladder is empty.
   c. Administer methylergonovine (Methergine) 0.2 mg intramuscularly. (What are the contraindications and side effects of methylergonovine?)
   d. Initiate bimanual compression.
   e. Check O_2 saturation and if less than 95%, start oxygen. What rate?
   f. Continue to estimate blood loss. Discuss ways to increase accuracy such as weighing linens, pads, towels, and sponges.
   g. Order laboratory studies, including complete blood count, platelets, electrolytes, coagulation studies (including fibrinogen concentration, prothrombin time, activated partial thromboplastin time). Type and crossmatch if not done earlier.
   h. Consult with obstetrician using situation, background information, assessment, and recommendation format.
   i. Explain to the woman and her family what is happening.

Stage III. In spite of receiving 40 units of oxytocin in intravenous fluids, one dose of methylergonovine 0.2 mg intramuscularly and 15-methyl $PGF_{2\grave{\alpha}}$ (carboprost tromethamine [Hemabate]) 0.25 mg intramuscularly every 30 minutes for 4 doses, the woman is increasingly symptomatic. Her blood pressure is now 74/44 mm Hg and her pulse is 150 bpm. A second intravenous line is started, and blood products are being administered. The obstetrician has administered 800 mcg of misoprostol (Cytotec) per rectum.[20–22]

Questions to Elicit Student Discussion

1. What additional measures might be taken by the obstetrician to control uterine bleeding if uterotonics fail? What can be done to treat shock?
   a. Initiate massive transfusion protocol
   b. Bakri tamponade balloon
   c. Nonpneumatic shock garment
   d. Surgical options
2. Is the woman exhibiting any signs or symptoms of consumptive coagulopathy or DIC? What laboratory studies would be helpful in determining her status?

Debriefing Questions

1. What happened?
2. What did you notice?

Continued

Table 3. Exemplar Unfolding Case 2: Diagnosis and Interventions for Postpartum Hemorrhage
3. How do you think you handled the situation?
4. How did you decide on what action you would take?
5. What did you do well?
6. Where could your performance or knowledge be improved?
7. What, if anything, would you have done differently?
8. How did you feel?
9. What were your key learning points?

Abbreviations: bpm, beats per minute; BMI, body mass index; DIC, disseminated intravascular coagulation; PPH, postpartum hemorrhage.

scenario and discuss the actions, decisions, and feelings generated during the unfolding scenario. Debriefing also allows faculty to emphasize the important points learned and students to assimilate the experience. Faculty provide structure for the debriefing process with an open-ended question-based format.

Exemplars of unfolding case studies, including learning outcomes, the case scenario with unfolding stages or situations, questions to elicit student discussion at each stage, an outline of expected student responses, and sample debriefing questions are included in Tables 2 and 3. Table 2 focuses on the prevention of postpartum hemorrhage for a beginning level student, whereas Table 3 focuses on the differential diagnosis and interventions for postpartum hemorrhage for a more advanced level student. In the classroom, students can be presented with data from one stage, allowing time for discussion, before proceeding with the next stage. In the asynchronous online environment, it is helpful to set time parameters for each stage so that students have an adequate amount of time to respond to a scenario before the next stage is presented. Whether in the classroom or online, additional material such as a picture or video could be added to enhance the reality of the scenario.

CONCLUSION

Experiential-situated learning using unfolding case studies provides practice for students as they develop necessary competencies and clinical decision-making skills. Questions to elicit student discussion, critical analysis, and clinical decision making should relate back to the learning objectives identified for each unfolding case. Questions are designed to draw out what students know already and put the pieces together as they explore a new or increasingly complex situation. Questions are also used to cue students to the relevant issues as the person's condition changes in each stage. Students have to quickly recognize and assess what are the most important and least important factors in a given situation. In other words, they must recognize the salient features in the context in which the woman's condition is changing. Unfolding cases can also be helpful in the socialization of student midwives by embedding the hallmarks of midwifery practice into the cases, such as the promotion of woman-centered care, skillful communication, guidance and counseling, and/or the integration of cultural humility. Most importantly, the use of the unfolding case requires a transformation of the teacher's view of teaching from a focus on transmitting technical skills and facts on required subject matter to a refocus on the concepts, content, processes, and person-focused care needed for best practice in an evolving clinical situation.

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CONFLICT OF INTEREST

The author has no conflict of interest to disclose.

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