



A Blueprint for Medium-Fidelity Postpartum Hemorrhage Simulations

Acquenette Jackson & LaShea Haynes

ABSTRACT: Many pregnancy-related deaths remain preventable, particularly those associated with postpartum hemorrhage (PPH). The use of bundles for care of women during the perinatal period has been shown to improve maternal and neonatal outcomes. Drills or simulation-based learning are an integral part of a broader implementation of postpartum hemorrhage bundles. In addition, The Joint Commission has cited drills as one of the required performance elements of accreditation. It is therefore incumbent upon perinatal clinical teams to conduct PPH simulations as a readiness tool. This article is intended to help nurses and other clinicians enhance the realism of low- and medium-fidelity PPH simulations.

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Approximately 700 women across the United States die each year as a result of pregnancy or pregnancy-related complications (Petersen et al., 2019). Maternal morbidity and mortality continue to be of concern in the United States and particularly in Georgia, where we practice. Review in Action's *Report From Nine Maternal Morbidity and Mortality Review Committees* estimated that 63.2% of pregnancy-related

deaths were preventable (Building U.S. Capacity to Review and Prevent Maternal Deaths, 2018). For example, many women die of emergencies such as placental abruption or postpartum hemorrhage (PPH). Although cardiovascular and coronary events are the primary empirical cause of maternal mortality and morbidity, obstetric hemorrhage ranks highest as the most preventable cause of pregnancy-related mortality. At the time of

CLINICAL IMPLICATIONS

- Preparation for postpartum hemorrhage along with didactic and team training are essential for meeting performance goals related to accreditation by the Joint Commission.
- An educational needs assessment with a gap analysis and planning are fundamental first steps to planning a facility-based or outreach simulation event.
- Quality simulation can be achieved in low-resource facilities/ environments.
- Creativity and attention to realism can enhance low- and medium-fidelity simulations.
- Mimicking the clinical environment can enhance a participant's ability to become more fully immersed in a simulation.

this writing, the latest Georgia Maternal Mortality Report was from 2014, and it indicated a total of 13 pregnancy-related deaths from 2012 to 2014. Eleven (85%) of the 13 deaths were determined to be preventable, with PPH among the identified causes. The gravity of preventable maternal mortality necessitates a muscular response from health care teams to improve outcomes.

Patient Safety in Maternity Care

Standardized hospital protocols, policies, and checklists are examples of practical safety measures that can be taken to affect this crisis at a grassroots level (Spiegelman et al., 2019). In addition, evidence-based perinatal bundles, designed to package the aforementioned safety tools, are readily available for use by perinatal clinicians. For example, the Council on Patient Safety in Women's Health Care has instituted an "Obstetric Hemorrhage" bundle. This multidisciplinary council seeks to reduce harm to patients through programs such as The Alliance for Innovation in Maternal Health (AIM), its patient safety bundles, and various educational resources. Readiness, recognition, response, and reporting are the four critical performance elements of the hemorrhage bundle. Unit-based drills fall into the readiness domain of bundle implementation (Council on Patient Safety in Women's Health Care, 2018).

The Obstetric Patient Safety (OPS) Program of the Association of Women's Health, Obstetric and Neonatal Nurses

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(AWHONN) is also aimed at reducing maternal morbidity and mortality. In 2014, AWHONN launched its PPH Project (Bingham et al., 2018; Chagolla et al., 2018; Scheich, 2018; Seacrist et al., 2018). Georgia was among three states invited to participate in the project. The AWHONN OPS Program is the contemporary educational outgrowth of the PPH Project. AWHONN refined and adapted the education and tools provided during PPH Project to avail a more extensive use of these resources beyond the quality improvement endeavor. The OPS Program course is an educational alternative that provides a full day of concentrated didactic and simulation PPH content.

Experiential Learning

Among the myriad priorities for perinatal units is the responsibility to provide didactic and experiential learning opportunities for maternity care teams. Experiential practice includes obstetric drills and simulations that will become an essential performance element for Joint Commission-accredited hospitals. In 2020, The Joint Commission will require that hospitals design procedures to respond to obstetric emergencies (including PPH) and train providers and staff to respond accordingly. In conjunction to the role-specific educational expectation, there will be an annual drills requisite, with in situ simulations encouraged every 2 years. Therefore, preparation for PPH along with didactic and team training are essential components of meeting maternal safety accreditation requirements for The Joint Commission.

However, many real and perceived barriers may exist to achieving such requirements, including lack of knowledge of simulation implementation, modalities, and resources (Chichester et al., 2015; Sawyer et al., 2019). The purpose of this article is to address some of these barriers and to describe key elements of the curriculum we used in an outreach effort using the AWHONN OPS Program, as well as to outline some key processes we use for PPH simulation training. We hope to demystify the components of the planning and implementation process and provide a template to inform or augment others' simulation experiences.

Educational Needs Assessment

Assessment Fundamentals

Conducting a preliminary educational needs assessment and gap analysis is a fundamental first step to introducing new education at an individual unit level or for hospital systems with multiple birthing facilities. Moreover, this may be even more essential with the detailed orientation required to execute simulation-based learning.

Although some perinatal outreach educational programs have survived in the form of collaboratives and remain viable in some areas, "original state education programs put in place to improve care have tended to atrophy," (March of Dimes, 2011, p.15). Therefore, outreach endeavors can still be useful in these areas.

Teams at hospitals with little or no history of conducting PPH simulations may require additional support with knowledge or skills to successfully implement a PPH simulation program. Ensuring the availability of clinicians with appropriate expertise can be instrumental to executing a successful course. The authors are both skilled clinical educators who were selected to participate in the inaugural OPS Program instructor cohort, and we partnered to lend additional differential expertise to the effort. One of us was able to bring her experience being the lead on the AWHONN PPH Project in Georgia to the new OPS Program, and the other of us had knowledge of simulation development and implementation that helped shape the simulation and active learning design innovations that are discussed in the article. This concept is in line with the Georgia Perinatal Quality Care Collaborative's (GaPQC) vision of clinicians and facilities teaming up for improved perinatal outcomes. This cooperative forum facilitated opportunities to collaborate across the state during its statewide execution of the AIM Obstetrical Hemorrhage Bundle (Georgia PQC, 2018). Health care systems may also want to consider collaboration and professional alignment with local university nursing programs (Peterson & Morris, 2019), independent simulation centers, or agencies providing educational opportunities for nurses.

A local example of an educational collaborative in which we participated is the Atlanta Perinatal and Neonatal Educational Consortium (APNEC). As program speakers and coordinators, we worked with the APNEC team to provide education to new and experienced labor and delivery and NICU nurses. Additionally, under the direction of this consortium, and in answer to a call from the region's outreach educators, local educators devoted time (as representatives of their hospitals) to present or update select topics to nurses throughout the region, including at their respective facilities. Hospitals not only benefitted from having their staff nurses updated but also from having their educators mentored by the outreach educator and perinatal peers. This is an illustration of an additional viable option for collaboration in areas that self-identify as lacking the necessary resources to implement these types of educational opportunities.

Closing the Gap in the Outreach Facility's Assets and Needs

Before moving forward with implementing the OPS Program curriculum for the requesting Labor and Delivery unit, we analyzed the current state of its nurses' knowledge of PPH management and its educational assets (Lioce et al., 2015). Ideally, this would be an interprofessional vetting, should

there be readiness for joint training with nurses and clinicians from other disciplines. The information gathered at this stage allowed us identify gaps in knowledge and supplies and thereby customize the education. For example, we were able to glean that additional discussion time would need to be devoted to the tenets of active management in the third stage of labor. By contrast, we could engage in more of a knowledge check of PPH risk assessment proficiency because this was a point of emphasis for this facility during its participation in the AWHONN PPH Project. This, in turn, yielded a more seamless development of a personalized blueprint to build on the host facility's experience with PPH education and simulation.

Box 1 contains an excerpt of the components of the educational needs assessment that were used in conjunction with the OPS equipment and supply checklist. Combining these assessment methodologies primed our educational needs assessment and gap analysis, which, in turn, fueled the development of alternate medium- and low-fidelity strategies for our simulation design. According to Rosman et al. (2019), "There are a number of studies of simulation curricula showing improved care delivery skills among physicians, nurses, and allied health professionals in low-resource set-

tings" (p. 2). Therefore, simulation resource disparity need not be a barrier to simulation training; quality simulation can indeed be achieved in low-resource environments.

Planning

Choosing a Curriculum

When implementing one of the first AWHONN OPS courses in the nation, our goal was to stay true to the vision of the roots of the program—the AWHONN PPH Project. This AWHONN quality improvement endeavor provided support to improve recognition, readiness, and response to PPH over an 18-month period. This was a targeted effort for hospitals spanning three states, including Georgia. For more information on this project and available resources, see AWHONN (2020).

The host facility for the OPS course took part in AWHONN's PPH Project and subsequently participated in the first initiative for GaPQC entitled "Obstetric Hemorrhage." Adding the OPS curriculum to the AIM and GaPQC initiatives provides a three-pronged approach to satisfy current PPH bundle and impending Joint Commission accreditation requirements. Standardized evidence-based programs such as the AWHONN OPS Program provide comprehensive training for PPH. The creators of the OPS Program packaged the education and tools provided during PPH Project to avail a more extensive use of these resources beyond the quality improvement

Our hope is that teams in even low-resource environments can apply the practical tips discussed here and use them directly or apply them as a foundation for other creative approaches to enhance the realism of low- and medium-fidelity PPH simulations

BOX 1 EDUCATIONAL NEEDS ASSESSMENT CHECKLIST

1. What is the total number of participants to be trained?
2. What will be the skill-set mix of the participants to be trained—for example, registered nurses, obstetricians, midwives, nurses, nurse practitioners, anesthesiologists, nurse anesthetists, ancillary personnel?
3. What is the maximum number of participants to be trained in a single offering (as the simulation and staffing permit)?
4. Amount of equipment on hand.^a
5. Is there sufficient equipment to run simulations simultaneously?
6. What are the simulation capabilities?
 - ☐ High fidelity—that is, female birth simulator
 - ☐ Medium fidelity—for example, use of patient actor with use of pelvic model
 - ☐ Low fidelity—for example, mannequin pieces, entire body, half-body parts
 - ☐ In situ access versus simulation center capabilities
7. Have facilitators been identified?
 - ☐ Are they seasoned educators?
 - ☐ Do they have any experience in simulation?
 - ☐ Utilizing simulation equipment
 - ☐ Facilitating
 - ☐ Debriefing
 - ☐ Development
8. What audiovisual capabilities are available for didactic sessions, simulation, and debriefing?
9. What evidence-based components of PPH management have been implemented at the facility? What is the staff's level of engagement with tools, that is, introductory exposure versus hardwiring into processes?
 - ☐ Quantified blood loss^b
 - ☐ PPH risk assessment^b
 - ☐ PPH policies with integrated staging orders or algorithm^b

Clinical Pearl

- Ascertaining the number of participants, amount of equipment, and skilled facilitators will yield a formula for optimizing educator and facility efficiency.

Note. This is not an exhaustive list. PPH = postpartum hemorrhage

^aThe Association of Women's Health, Obstetric and Neonatal Nurses Obstetric Patient Safety Program curriculum provides a comprehensive list of equipment used a guide for supplies.

^bThe Association of Women's Health, Obstetric and Neonatal Nurses Obstetric Patient Safety Program incorporates the use of these tools.

endeavor. It is a PPH educational alternative that provides a full day of concentrated didactic and simulation content for PPH emergencies. The simulation scenarios can be tailored to meet a facility's fidelity capabilities.

The Advanced Life Support in Obstetrics Program from the American Academy of Family Physicians and *The Obstetric Drill Program Manual: Postpartum Hemorrhage* from the American College of Obstetricians and Gynecologists (ACOG) are examples of other evidence-based programs that can be adapted for high- and low-fidelity PPH simulations. The Advanced Life Support in Obstetrics Program provides modular PPH content and simulations. The ACOG manual provides PPH simulation scenarios and addresses strategies for executing in situ drills, conducting team debriefing, and selecting the degree of fidelity and mannequins. It would be

incumbent upon each facility to choose the appropriate program to meet its identified needs and simulation capabilities.

Gathering Simulation Supplies

We selected in situ simulation as the methodology for providing simulation at the host institution because most of the equipment needed for our PPH simulation was available for this use. However, this was not necessarily true for supplies. Because supplies are generally chargeable to women admitted to a unit (as was the case in this instance), they were not readily available for use during the course. Therefore, we had to be mindful of not consuming supplies that were designated for an individual's use while also considering budgetary constraints because there was no designated budget for course supplies.

FIGURE 1 CRANBERRY “CLOTS”

**TABLE 1 AMALGAMATED SIMULATION SUPPLY LIST: MARKED SIMULATION AND STORED OUT OF DIRECT CARE AREA**

On hand and stockpiled	Purchased (purpose)	Alternatives
1. IV bags, etc.	Simulated blood (active bleeding)	• Order simulated blood products from a health care education or simulation supply company
2. Labels	• Theatrical supply company	• Check online for “fake blood” recipes with ingredients such as corn syrup or chocolate syrup help to create viscosity
3. Female pelvis (previously purchased)	• Red and green food coloring	
4. Foley catheter		
5. IV catheter	Simulated blood (blood administration)	A picture of a blood bag can be used as a prompt or attached to a bag with appropriately colored fluid.
6. IV start kit	• Health education and simulation supply company	
7. Pressure bag or manual blood pressure cuff (optional)	Yellow food coloring and water (simulated urine)	Order simulated blood products from a health care education or simulation supply company
8. Uterine tamponade balloon (previously purchased/expired)	Jellied cranberry sauce (blood clots)	Red gelatin-style dessert
9. Blood collection tubes	Cranberry-flavored or red tinted juice boxes (starting IV, drawing samples for laboratory tests)	Purchase IV arm from a health education or simulation supply company

Note. IV = intravenous.

FIGURE 2 MEDICATION LABEL: FOR SIMULATION ONLY

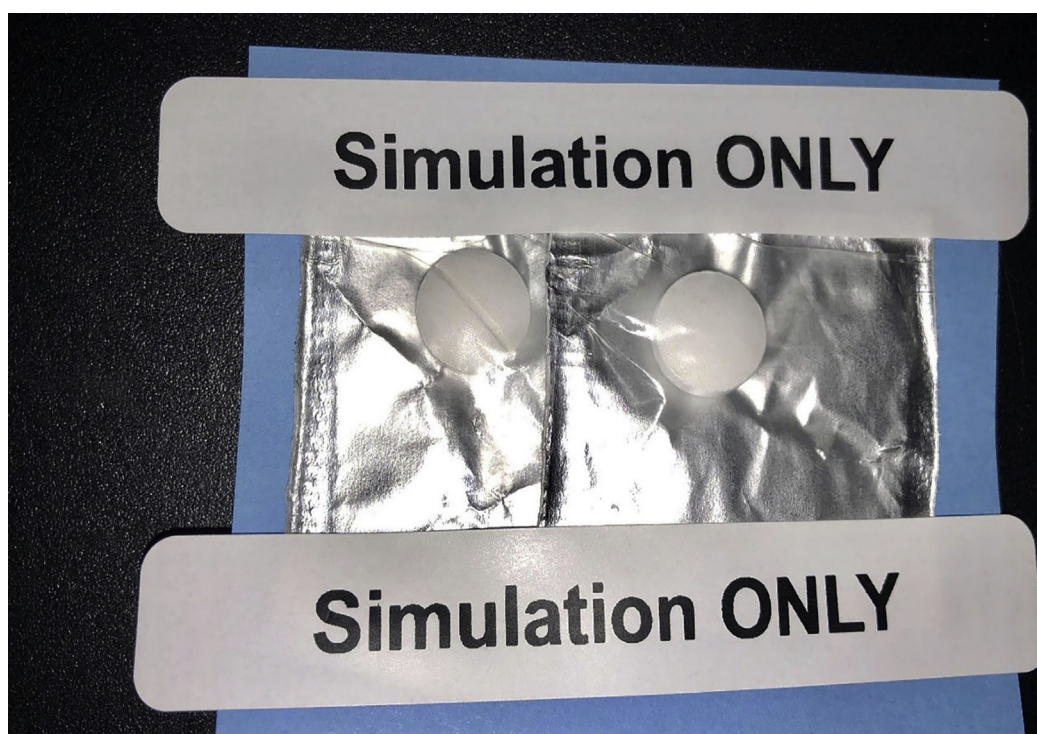


TABLE 2 MEDICATION ADMINISTRATION

Equipment and Supplies	Execution and Staging	Alternatives
Medication vial	<ol style="list-style-type: none"> 1. Empty vial of contents 2. Replace contents with water or NS 	Purchase simulated medications from simulation or educational supply company
Stabilized large orange	<ol style="list-style-type: none"> 1. Mark as “Inedible, for simulation purposes only” 2. Cut bottom of orange and place it on a flat surface for stabilization 3. Discard immediately after use 	Injection pad
Labels	<ol style="list-style-type: none"> 1. Label 1: name and dosage of medication 2. Label 2: “For simulation use only” (Sørensen et al., 2017; see Figure 2) 	

Briefing—Instruct participants of the following for safety and realism:

1. Follow all the tenants of safe medication administration.
2. Medications are simulated.
3. Measure, draw up, and administer medication into simulated injection site.
4. Remind participants not to inject the standardized patient, but the orange instead.

Clinical Pearls

- Be prepared to remind participants that they are not to just verbalize administering the simulation medications but to administer them in real time.
- Use brightly colored labels marked “For simulation.”

Note. NS = normal saline.

FIGURE 3 VISUAL PROMPT FOR BLEEDING

Our primary supply attainment strategy became stockpiling any reserve from expired supplies on the unit. Because this was an external offering, a site liaison was engaged as a navigator to help gather needed equipment and supplies (e.g., intravenous [IV] catheters, blood collection tubes, etc.). This process ensued months before the planned date of the course and therefore provided adequate time to gather supplies that would have otherwise been discarded. Additionally, the comprehensive PPH supply list

that is a provision of the OPS program was used as a springboard for planning.

If another PPH curriculum were chosen instead of the AWHONN OPS Program, such as ACOG's obstetric drill program, it would be necessary to determine the feasibility of using that program's checklist, if offered, in lieu of developing one. In either case, based on the budget and the choice of high-, low-, or medium-fidelity simulation, design of a supplemental supply list may be necessary.

TABLE 3 VISUAL PROMPT FOR BLEEDING

Equipment and Supplies	Execution and Staging	Alternatives
<ul style="list-style-type: none"> • Under-buttocks pad • Red biohazard bag • Measuring cup with premeasured amount of water (optional) • Cue card with printed QBL amount (optional) 	<ol style="list-style-type: none"> 1. Layer 3 or 4 under-buttocks pads with simulated bloody underpads 2. Alternate clean pads with simulated blood 3. Remove clean pad when ready to prompt with additional bleeding 4. Pour premeasured water to add weight to the pads (optional) 	Active bleeding

Briefing:

Unless you have weighted the pads, this alternative serves as a sufficient prompt, thereby negating the need to include it in the brief. If the pads are weighted, participants should be advised that they are expected to quantify blood loss with the methodology used at their facility.

Note. QBL = quantified blood loss.

BOX 2 ASSIGNING ROLES

Scripts

- Use of scripts provides standardization to a clinical scenario.
- Scripts can be used with the standardized patient, confederate provider, etc.
- The OPS course curriculum provides standardized scripts that can be adapted to suit scenario objectives.

Confederates

- Alternately, if the team was able to meet the objectives and a more advanced scenario is desired, providing other elements to achieve different objectives is optional.
 - A confederate is scripted and otherwise prepared (demeanor, etc.) to role-play according to objectives (e.g., inexperienced nurse, concerned family member, gruff charge nurse, or provider).
- The benefit of including a confederate is that it appends realistic elements to the scenario. This may further challenge the team from the skills and teamwork perspectives (see section on realism).

Assigning Roles

- Can be done ahead of time and assigned based on skills
- Can be switched within scope to afford an opportunity to display leadership and other teamwork behaviors
- If simulation is interprofessional, switching interprofessional roles can help with the development of mutual respect and cross-monitoring.
- Should the team complete the debrief and decide that it is necessary to get a better footing on skills or teamwork, it may be more feasible to maintain the original assigned roles.
- Roles can also be assigned randomly within a discipline if there is a similar skill level from participants using one of the following examples.
 - Traditionally
 - Picking a number from 1 to 10
 - Blindly selecting a role from a hat or bag
 - Using a randomizer app (see [Figure 4](#))
 - Many available at no cost
 - Some contain a customizable list feature
 - Can be a lively alternative
 - Is an equitable way to demonstrate random selection

Note. OPS = Obstetric Patient Safety.

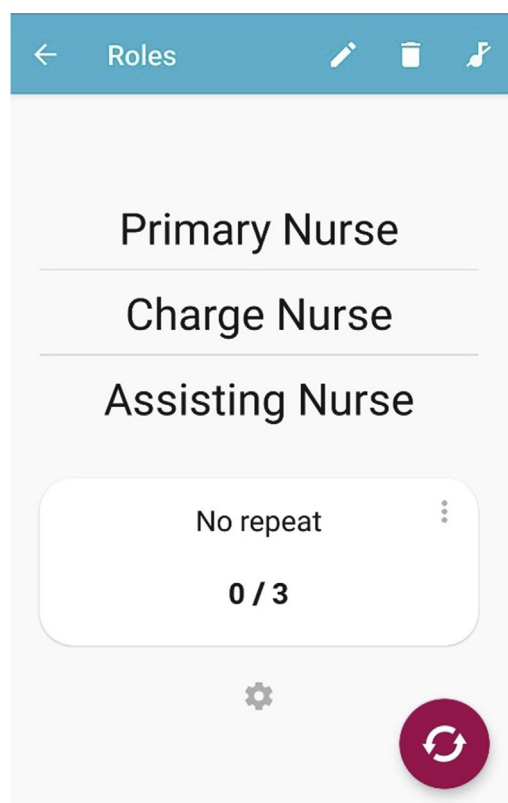
We used a combination of purchased simulation medications and other supplies while scouting for expired medications and supplies on the unit. This can be a very cost-effective alternative and a pragmatic use of dated articles that are vetted during accreditation readiness, for example. In addition to those cost-saving measures, many of the purchases proved to be nominal. Food coloring is an example of a minor grocery store purchase that was used to craft simulated urine and blood. We were even able to defer the cost of our simulated blood clots by raiding our home pantries for leftover cranberry sauce from Thanksgiving (see [Figure 1](#)). An excerpt of the amalgamated list of supplies and equipment gathered and purchased during the planning phase of the course is included in [Table 1](#).

“Faculty planning simulations must also incorporate cleanup procedures and an awareness among simulation

instructors of how patient safety can be compromised due to poor planning” ([Sørensen et al., 2017](#), p, 6). Therefore, with safety in mind, facilitators should ensure that all simulated supplies and medications are labeled accordingly (see [Figure 2](#)). As an additional precaution, they should be kept separate from direct care areas when not in use. Suggestions for simulation medication preparation and administration are listed in [Table 2](#).

To preserve equipment and the in situ simulation environment, it is important to be mindful of the manufacturer’s recommendations when choosing simulation aids. For example, simulated blood products or their alternatives may discolor the simulator or other equipment that may be needed for future direct care use. Therefore, it is prudent to take the time to research the recommendations and test them before selection.

FIGURE 4 RANDOMIZER APP



If using simulated blood is not an option due to lack of access or it is found to be harmful to the equipment, an alternative can be exercised. A good visual prompt is a weighted under-buttocks pad with an attached biohazard bag cut-out (see [Figure 3](#)). At a minimum, applying this graphic cue should prompt learners to assess the standardized patient (e.g., vital signs and amount of bleeding).

Additional cues, such as providing the amount of quantified blood loss (QBL), are also an option. The quantity can be written on the underpad or cue card. This yields additional assessment information with which to track cumulative blood loss in the scenario. In lieu of supplying the amount of QBL, measured water can be applied to the underpad ahead of time. This physical sign enables QBL skills practice, further challenging participants to accurately assess the QBL themselves. This has been dubbed an elegant solution that uses supplies that are readily available on the unit (see [Table 3](#)).

Implementation

Presimulation Briefing

While it is not to be confused with a briefing that is performed by the participants and takes place as part of the simulation team event, a presimulation briefing serves a similar purpose for simulation preparation. Led by the simulation facilitator,

participants are encouraged to engage in this short, instructive session before beginning the simulation. The goal is to “share the plan, discuss team formation, assign roles and responsibilities, establish expectations and climate, and anticipate outcomes and likely contingencies” ([Agency for Healthcare Research and Quality, 2016](#), p. 6). See [Box 2](#) and [Figure 4](#) for practical tips on assigning roles.

Prebriefing on Starting an IV

[Chamberlain \(2015\)](#) completed a concept analysis of prebriefing in nursing simulation and recommended that prebriefing be conducted by faculty educated in the use of simulation to enhance learner engagement and effectiveness of the experience. “A well-designed prebriefing phase of the simulation-based learning experience, which structures preparation activities and makes expectations clear to learners, can help reduce student anxiety, improve student performance, and enhance learning” ([Page-Cuttrara, 2015](#)).

During our prebriefing session, it was necessary to provide clear guidance on the process for starting an IV during the simulation. This was key to keeping the flow of the simulation from being disrupted and to safeguarding our standardized patient. We had to devise a novel and cost-effective approach to starting an IV and drawing blood for laboratory tests. This was necessary to maintain the element of realism, because we did not have an IV arm or a high-fidelity simulator at our disposal. Once apprised of the setup and the use of the juice box venous access tool, the participants needed only a succinct reminder during the scenario that it was permissible to actually start an IV with this device (see [Figure 5](#)). Details on preparing and briefing for this IV alternative are listed in [Table 4](#).

Presimulation Preparation

Even before executing the brief, learners should be furnished with foundational content to draw from and build on in the simulation experience. Although there is not enough research to determine if one method of preparation is associated with superior learning outcomes versus another, there is a consensus that the inclusion of alternate methods of presimulation preparation and/or prebriefing leads to better learner outcomes than traditional approaches or no preparation at all ([Tyerman et al., 2016](#)). Although there is no strict recommendation as to when these activities should take place (e.g., within a week versus on the same day of the simulation), we advocate that they take place on the same day of the course, if possible. Execution immediately before a drill or simulation can serve as an icebreaker and help reinforce knowledge or principles that may be applied in the simulation.

The AWHONN OPS Program uses a variety of preparatory work, including a game that reviews PPH concepts. This is played before the simulation as a refresher of the online and didactic content provided by the course. It was encouraging to witness a greater degree of relaxation from the participants

FIGURE 5 INTRAVENOUS LINE ALTERNATIVE



TABLE 4 IV INFUSION ALTERNATIVE		
Equipment and Supplies	Execution and Staging	Alternatives
<ul style="list-style-type: none">• Individual juice container with red drink• Glove• Tape	<ol style="list-style-type: none">1. Tape juice container to the dorsal side of the standardized patient's hand so that juice box is taut.2. Cover surface with an opaque glove to help hold juice box in place and to mask the juice box to some degree.3. Cut out fingers of glove (optional).	<ul style="list-style-type: none">• High-fidelity simulator• Medium-fidelity IV arm
Briefing: <ol style="list-style-type: none">1. Inform participants that they have access to supplies to start an IV and draw laboratory test samples on the patient should the scenario dictate.2. Allow participants to examine the mock venous access setup.3. Instruct participants to limit punctures to this mock site and not to otherwise prod the standardized patient.4. All standard safety measures for starting an IV should be observed; for example, immediately place the needle used into a sharps container to prevent needle sticks.5. Participants should be prepared for the possibility of a flashback of fluid.		
Clinical Pearls <ul style="list-style-type: none">• Regardless of the gauge, attempt to the shorter-length IV catheter and appropriate angle when starting the IV. This safety precaution will help you to limit the stick to just the juice box, avoiding sticking your standardized patient.• Inject food coloring or simulated blood into the area for straw insertion if a darker red coloring is desired.		
<i>Note.</i> IV = intravenous line.		

BOX 3 TEAM KNOWLEDGE CHECK GAME

Activity Time: 20 Minutes

Directions to Participants

1. As perinatal care providers, we must be ever ready to respond to a variety of unanticipated high-risk, low-frequency events. Therefore, to simulate the sometimes-unpredictable nature of an obstetric emergency, the questions in the game have not been categorized but have randomly arranged into 20 toss-up questions.
2. Because a timely response to emergencies is also key, speed will be a factor in this game.
 1. A toss-up question will be directed to the individual who sounds his or her buzzer first.
 2. A maximum of 2 seconds will be given to answer a toss-up question after activating your buzzer.
 3. A maximum of 6 seconds will be allowed to answer bonus questions.
3. Ten points can be earned per correct answer to each toss-up question.
4. Points are assigned per team, because our wins and opportunities are tied to our team performance.
5. There are five hidden bonus questions per game. These bonus questions are attached to toss-up questions at varied points in the game.
6. To earn the opportunity to answer bonus questions, an individual team member must answer the associated toss-up question correctly.
7. To simulate collaboration during a pregnancy-related emergency, the entire team will get to weigh in on the bonus question. These questions typically have multiple answers, and the points are awarded according to the number of correct answers.

Participant Charge

1. I am certain that each team will have great success using their interprofessional skills to respond accurately and expeditiously to the questions!
2. Have fun!

with each presimulation activity. A degree of levity helps optimize performance during the simulation event and continued learning during the debriefing (Tyerman et al., 2016).

Another example of a game that can be used for this purpose incorporates a lock-out buzzer system and features

an interprofessional mixed-team format. The speed required to buzz in first with the correct answer to the question simulates the quick and accurate thinking required in an emergency.

Separating the groups into teams assists with team building. Team building and collaboration are also

FIGURE 6 SAMPLE SLIDE FROM THE TEAM KNOWLEDGE CHECK GAME

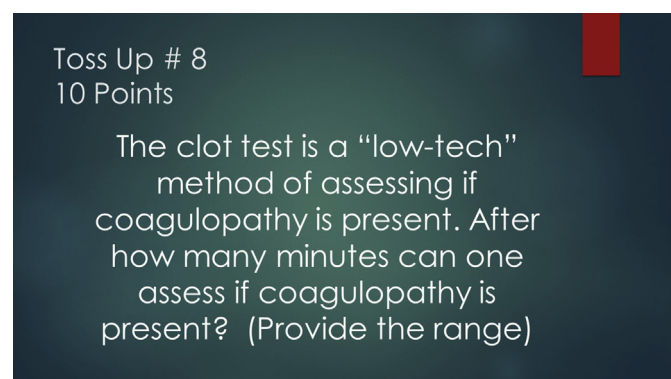


FIGURE 7 SAMPLE SLIDE FROM THE TEAM KNOWLEDGE CHECK GAME

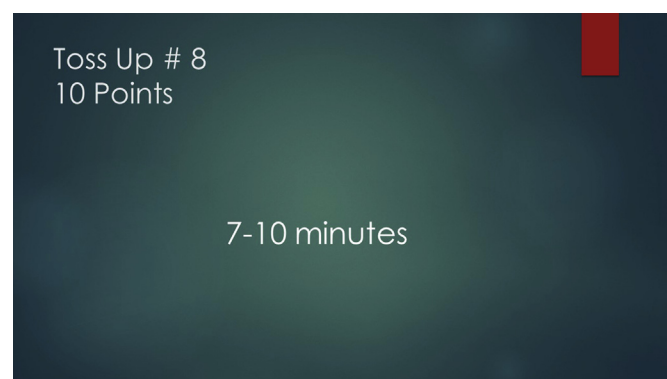


FIGURE 8 VITAL SIGNS PICTURE

Vitals Signs in Real Time Reflecting Omissions Made by Participants

- For example if participants fail to obtain a temperature, I have each vital sign set in appear, disappear mode.
- T: 98.6
- P: 110
- R: 22
- BP: 180/71

Note. BP = blood pressure; P = pulse, R = respiratory rate; T = temperature.

simulated when teams are encouraged to work together to answer a bonus question (multiple-answer question in which additional points can be earned for each correct answer). Before introducing the game, it may be helpful to frame the exercise as a fun part of the learning experience and a warm-up for the simulation activity. Providing context for the activity may help those who are reluctant to participate in active learning strategies. Each facility will

need to decide whether game participation is optional, based on activity objectives. For example, if the purpose is a presimulation icebreaker and there is a feasible alternative available, a game could be made an optional part of the curriculum. If the game is the required knowledge check, however, it may be an indispensable part of the curriculum. When this game is played as an interprofessional group, it may help create an atmosphere of a “flattened” hierarchy. Participants tend to root for their teammates and pull together on the bonus questions, which fosters camaraderie. Box 3 shows an example of team-oriented instructions for a general obstetric emergency game (see Figures 6 and 7).

Facilitating Realism

Ideally, the facilitator works to mimic what is experienced in the clinical setting with creative staging and solid cues. These efforts will help participants honor their charge to suspend disbelief and treat the scenario as close to real as possible (Lioce et al., 2015). Modest yet critical examples of how we worked to foster realism throughout the simulation include the presentation of vital signs, adhering to time elements, staging the woman having a cesarean birth, and imitating active bleeding.

TABLE 5 VITAL SIGN SIMULATION

Equipment and Supplies	Execution and Staging	Alternatives
<ul style="list-style-type: none"> • Laptop or desktop computer • Wireless presentation remote • Vital signs equipment (blood pressure cuff, thermometer, etc.) 	1. Create a slide presentation with vital signs cues for various stages of the simulation on separate slides.	Premade, laminated cue card that display vital signs, ultrasonography reports, etc. as determined by the scenario
	2. Use the animation feature of the presentation software to make the vital signs appear one at a time on the slide as the participants simulate taking the vital signs.	Use the hyperlink feature to provide the option of advancing to vital signs as simulated.
	3. Use a wireless remote to inconspicuously display each vital sign that is simulated.	

Briefing:

Participants should be made aware of how the vital signs will be displayed—that is, participants will need to simulate that they are taking the blood pressure or verbalize that they are counting respirations.

Clinical Pearls

- Displaying the vital signs, in either form, is superior in fidelity to calling out the vital signs.
- A facilitator may not have the opportunity to see if the group will assign someone to attend to and call out vital signs in the simulation. Opting to have the facilitator call out vital signs can rob the group of the opportunity to demonstrate situational awareness, particularly when vital signs are set to be cycled by the group in the simulated environment.
- Any lapses in situational awareness or misses in vital signs should be explored in the debrief as an opportunity.
- Using the presentation software display option will permit the facilitator to control when the vital signs are displayed. Therefore, new vital signs do not have to be displayed for viewing until the taking of vital signs is simulated.
- The facilitator should not display respiration, temperature, and/or pulse oximeter findings if only the blood pressure and pulse are assessed.

FIGURE 9 CESAREAN SCAR



Vital Signs

A primary focus of physical realism for the group was how vital signs were to be presented. Because we did not have a high-fidelity simulator that could display vital signs via the virtual patient monitor that typically accompanies the simulator, we opted for a persuasive look-alike. Our vital signs were displayed via a slide presentation on the computer screen located directly above the location where vital signs are typically displayed in a patient's room. By using the presentation software's "appear" and "disappear" features and a wireless presentation remote, we were able to display vital signs contemporaneously with when they were taken (see [Figure 8](#)). See [Table 5](#) for additional information about its execution.

Staging

We used a simulated cesarean birth scar and a simulated urine-filled Foley catheter to stage our medium-fidelity, standardized patient hybrid (see [Figures 9](#) and [10](#)). See [Table 6](#) for details on this simple but effective staging.

Active Bleeding

Simulating active bleeding is an author favorite. This particular element spans all three of the guidelines for fidelity in that it lends physical, conceptual, and psychological reality to the scenario. Participants get to observe bleeding (physical fidelity). Additionally, the amount of bleeding changes and is consistent with the vital signs and symptomatology of the patient as the bleeding ensues (conceptual fidelity). These dynamics cause the participants to encounter competing priorities (e.g., quantifying blood loss and medication administration) within the context of the simulation. Hence, this "psychological fidelity works synergistically with physical and conceptual fidelity to promote participant engagement" ([Lioce et al., 2015](#), p. 311). See [Table 7](#) for tips on simulating active bleeding.

Time Elements

Simulation participants often question if they should really start the IV, insert a Foley catheter, or draw and send samples for laboratory tests, among other tasks. This is

FIGURE 10 PATIENT WITH MEDIUM-FIDELITY PELVIS

posed as a question or, sometimes, the tasks are skipped with the assumption that it is sufficient for the nurse or provider to verbalize that the task was accomplished. In many instances, she or he may settle for pretending to undertake the task without physically doing it. Solely verbalizing tasks can remove the opportunity for participants to individually perform a skill or coordinate team efforts and observe the time it takes to do so. As previously asserted, mimicking the clinical environment can enhance a participant's ability to become more fully immersed in a simulation. This also includes incorporating realistic aspects of time in a scenario.

The OPS curriculum provides an opportunity for guided practice of uterine tamponade balloon placement. This is a time-critical skill. If you have an interprofessional team in your course, participants may practice their role-specific skills, and, if time permits, switch roles. For example, it is useful to have a nurse place the tamponade balloon while the obstetric provider assists—effectively reversing scope-specific roles. Doing this can help foster mutual respect for

the unique challenges of each role. See [Table 8](#) for more on time-critical skills.

Debriefing

Debriefing Using Video Review

There are many tenets of successful debriefing that are beyond the scope of this article (e.g., adequate facilitator training and debriefing techniques). However, two areas of note that were of value to our simulation were performing video review of the event and using a modified version of the OPS debriefing form.

“The use of video review during debriefing can have a profound impact on the participants and may help the facilitator guide the debriefing by grounding the discussion using objective evidence of what occurred during the simulation” ([Sawyer et al., 2016](#), p. 215). Because the scenario called for staggered participant arrival times, we opted to play the video in its entirety in lieu of a segmented review. Consequently, all involved in the

TABLE 6 CESAREAN BIRTH STAGING

Equipment and Supplies	Execution and Staging	Alternatives
<ul style="list-style-type: none"> • Medium-fidelity pelvis 	Position between the legs of the standardized patient.	
<ul style="list-style-type: none"> • Transparent or semitransparent tape • Staples or sterile adhesive strips 	<ol style="list-style-type: none"> 1. Staple approximately 6 inches of transparent tape vertically in $\frac{1}{4}$-inch to $\frac{1}{2}$-inch increments. 2. Overlay and affix the moulage scar to the medium-fidelity pelvis in the area where a low transverse incision would typically be made. 	The incision can be bandaged or approximated with glue according to the facility process
<ul style="list-style-type: none"> • Yellow food coloring • Foley catheter • Water 	As few as 1 or 2 drops in 12-ounce bottle of water will yield the typical straw-colored urine that is seen after cesarean birth.	—
<ul style="list-style-type: none"> • Firm uterus • Small plastic grocery bag 	Medium-sized rubber or polystyrene foam round or oval object (e.g., softball, stress ball etc.) tied in the small plastic grocery bag with handles	—
<ul style="list-style-type: none"> • Boggy uterus • Small plastic grocery bag 	Medium-sized (9- to 12-inch) latex balloon filled until it is doughy and tied in the small plastic grocery bag with handles	

Briefing:

1. Briefing for participants should include any hand-off information that is needed about the cesarean birth scenario. Participants need not be told about the faux scar and urine.
2. The standardized patient should act as a confederate in the simulation and switch between the boggy and firm uterus according to the facilitator's cues.

Clinical Pearls

- Although we purchased several packs to ensure that we had adequate yellow food coloring to yield ample volumes of urine, we found that a small amount of food coloring is quite sufficient.
- Observe for the possibility of very little or no uterine massage of the boggy uterus. Participants may approach this intervention very tentatively because of the staging of a fresh cesarean birth scar.

scenario received a complete presentation of events, thus promoting a more objective reflection of individual and team performance to frame the discussion during the debrief.

Advances in technology have made it simpler to film and then play back simulations. However, we still faced technical issues when preparing to use a video camera with a projector for this purpose. Therefore, it became necessary to switch to the planned backup method of recording and replaying the scenario via a laptop with video capability. Although seating had to be arranged closer to the screen, the screen size was large enough to view the recording comfortably for our small group. Once the video was viewed, it was subsequently deleted as per our standard agreement with videotaping. The advantages and disadvantages of three common methods of videotaping simulations are listed in [Table 9](#).

Planned Debriefing

Debriefing is an indispensable part of simulation-based learning. This is a reflective time to explore team wins and opportunities in skills and team behaviors. If the simulation is executed in situ, the debrief can also be an opportunity to explore any system challenges in accordance with simulation objectives ([ACOG Committee on Patient Safety and Quality Improvement, 2018](#)). It can also be a time to identify opportunities for process improvement. Once such area that was identified during one of the scenarios was in optimizing the time to initiate a blood transfusion. We incorporated a 5-minute delay into the simulation to account for the time it would take to retrieve simulated O-negative blood from the blood bank. The participants were able to contemplate their performance and illuminate the opportunity they had in avoiding the delay in treatment

TABLE 7 SIMULATING ACTIVE BLEEDING

Equipment and Supplies	Execution and Staging	Alternatives
• Medium-fidelity pelvis	—	—
• Simulated blood or alternative	1. Inject simulated blood into the liter bag of fluid. 2. Continue to add simulated blood until it is of a dark red hue.	—
• Liter bag of IV fluid	—	—
• Free-flow IV tubing and tape	1. Spike the liter bag of fluid and tape to the bottom of the pelvis. 2. Unclamp tubing to simulate active bleeding.	—
• Pressure bag (optional)	Use optional pressure bag or blood pressure cuff to help the simulated blood run faster or for a continuous flow.	Manual blood pressure cuff (optional)
• Disposable underpads (multiple)	Place clean or soiled underpads beneath medium-fidelity pelvis,	Towels, sheets, or reusable underpads

Briefing:

No special briefing required.

Clinical Pearls

- When making the fluid in the liter bag appear bloody, it should reflect a dark enough hue to illicit the response for frank bleeding.
- Cover liter bag of simulated frank blood with a pillowcase or black plastic grocery bag so as not to distract participants.
- Placing the bloody fluids in a liter bag allows for a quick visual confirmation of the accuracy of the quantification of blood loss during the scenario.
- Keep an account of the amount of simulated blood that is added to the liter bag and add it to your liter total.
- Dress the standardized patient in dark-colored leggings under the hospital gown for modesty and less evident staining of clothing.

Note. IV = intravenous.

caused by not preparing the blood administration setup before the arrival and administration of the simulated emergency-release blood.

The OPS curriculum provides a standardized yet customizable debriefing tool. Addendums were made to assist us in providing a debriefing emphasis on teamwork behaviors and to add further detail to expected key behaviors. This was done to ensure that these key behaviors were observed during the simulation or playback and then addressed in the debrief. Communication is an example of an appropriate primary key team behavior for which a facilitator would closely observe during a PPH simulation. This standard intervention is listed in the “Expected Key Behaviors” checklist contained in the *Simulation Scenario Guide* included in the AWHONN OPS Program. The checklist also provides examples of the team members to whom this communication should be directed.

Because there was a strong emphasis on teamwork behaviors in our simulations, we customized the list to include specific information about what should be communicated (e.g., the Situation–Background–Assessment–Recommendation technique to the obstetric provider upon the initial call and upon arrival to the bedside). Other team-oriented competencies, such as using closed-loop communication, can also be incorporated based on the breadth of the simulation objectives. Furthermore, there may be technical and safety skills to validate. Performing dual verification or using the electronic health record to scan before blood administration are examples of important technical and safety practices.

The AWHONN OPS debriefing form can also be adapted for debriefing after PPH clinical events. Alternatively, ACOG and the Council on Patient Safety in Women’s Health Care have devised a debriefing form for PPH that can be used for

TABLE 8 TIME-CRITICAL SKILLS

Time-Critical Skills	Example	Facilitator Considerations
Simulating lapsed time	Obtaining cross-matched or O-negative blood from the blood bank or implementing a massive transfusion protocol	<ol style="list-style-type: none"> 1. If possible, make the simulation interdisciplinary to include the unit secretary, blood bank, and other key players. 2. During drills for which the blood bank is not available to participate, time a practice run to the blood bank to ascertain the elapsed time to retrieve emergency release blood. 3. Set a timer during the actual scenario to simulate elapsed time, prohibiting the runner from returning to the simulation within that 7- to 10-minute time frame, for example. This will help ascertain the actual amount of time it would take to retrieve the needed items and help uncover any system-related issues. 4. Capture time information from previous PPH events on the unit. Use the time data captured from the event as a gauge for task completion. This time-sensitive goal could then be used in the scenario. For example, it can be used to challenge a more advanced/high-performing group. Alternatively, it could be added as an objective if there are facility-identified goals or improvements that are identified for the group.
Simulating a time-critical skill	Inserting a uterine tamponade balloon	<ol style="list-style-type: none"> 1. Provide an opportunity for guided practice, because this is a provider skill that may not be implemented clinically on a routine basis. 2. Timed practice before the simulation may also help simulate the clinical demands of placing a tamponade balloon during an active hemorrhage. 3. After guided practice, this skill can be repeated against a timer or other participants. This will still serve the purpose of simulating timed pressure but may make it more enjoyable for the participants.

both purposes as well (ACOG, 2019; Council on Patient Safety in Women's Health Care, 2018). Resources on PPH debriefing may prove valuable to facilities because team debriefs after PPH drills and after cases of severe hemorrhage are now an accreditation agency requisite (The Joint Commission, 2019).

Conclusion

With the worsening of maternal mortality and morbidity in the United States, accreditation and professional organizations have responded with evolutionary changes in guidelines for performance (ACOG Committee on Patient Safety and Quality Improvement, 2018; The Joint Commission, 2019). Drills and simulations are recommended for experiential learning to prepare for emergencies, including PPH (The Joint Commission, 2019).

Professional organizations including AWHONN have responded to this crisis by supporting the concept of interprofessional team training and by creating evidence-based educational curricula to meet this need. However, hurdles to widespread simulation implementation continue to persist. Many institutions find simulation challenging, resource intensive, and otherwise intimidating because of a lack of familiarity with the modality and/or a lack of skilled facilitators. None of the aforementioned factors need be an obstacle. With some guidance, such as mentoring from experts or partnering with local simulation resources, as well as resourceful creativity, one can initiate or bolster existing PPH simulation events. Our hope is that teams in even low-resource environments can apply the practical tips discussed here and use them directly or apply them as a foundation for other creative approaches to enhance the

TABLE 9 ADVANTAGES AND DISADVANTAGES OF COMMON METHODS OF VIDEOTAPING SIMULATIONS

Video Methodology	Advantages	Disadvantages
Traditional video camera	<ul style="list-style-type: none"> • Relatively inexpensive option • Better frame rates mean less potential for video stuttering 	<ul style="list-style-type: none"> • May require separate projector capabilities for playback • Additional equipment (i.e., video cards, audio cords, and cables) may be required • Potential wear and tear of cords with repeated use
Mobile phone with video capability	<ul style="list-style-type: none"> • Readily accessible • Easy to use • Some cell phone models have projector capabilities 	<ul style="list-style-type: none"> • Varying range of quality • May require separate projector capabilities for playback • Smaller size may prove inappropriate for group viewing
Laptop with video capability	<ul style="list-style-type: none"> • Because the video was captured on the laptop, there is an inherent ability to display video directly from the screen by screen mirroring • Some cell phone models have projector capabilities • Participants can readily view the video with close seating • Can attach LCD or speakers to increase volume 	<ul style="list-style-type: none"> • Poor resolution depending on the model • Screen may be too small for larger group viewing

Note. LCD = liquid crystal display.

realism of low- and medium-fidelity PPH simulations. Incorporating successful learning experiences into a robust PPH quality improvement program is envisioned as the formula to optimize clinical practice for better PPH outcomes in Georgia and beyond (The Joint Commission, 2019). **NWH**



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