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The purpose of this article is to describe 'how to' organize and implement simulation drills at your institution, not to explain the benefits of simulation.

### **Who to involve**

Faculty – Ideally multidisciplinary: anesthesiologists, obstetricians, neonatologists, nurses and simulation specialists (if available).

Participants – The aim is to mirror the 'normal' care team, i.e. multidisciplinary, consisting of: anesthesiologists, obstetricians, neonatologists (attendings, fellows and residents); nurses; obstetric and anesthesia technicians; and clerks. Scenarios may incorporate participants from other departments such as the emergency department, trauma services, office of emergency management etc., depending on the scenario topic. The actual number of participants in each drill may be slightly higher than would normally be present in an actual clinical situation, however it is advisable not to have too many than would be normal as it distracts from the realism of the situation.

Institutional requirements guide the decision regarding mandatory simulation training verses voluntary, i.e. a contractual mandatory training requirement, or criteria for call commitment. It may be an option for programs to offer CME/CEU/MOCA credits, or financial incentive.

Observers - There may be (non-participant) observers present, e.g. medical students, healthcare providers from other (national and international) institutions. The number of observers should be limited (we limit to two observers per drill) to avoid participants feeling uncomfortable with an 'audience'.

Buy-in - To maintain a successful and productive simulation program, support from unit and department (and ideally institution) leadership is fundamental. Risk Management (medical legal department) may be interested to provide support/funding as simulation may be associated with a decrease in obstetric-related litigation.<sup>1</sup>

### **Where is the ideal location?**

The main question to consider is where to perform the drill, on-unit or off-unit/off-site.<sup>2</sup> Institutions may have dedicated simulation centers, or drills may be carried out in-situ, meaning they are performed in the labor and delivery unit, or elsewhere in the hospital such as the emergency department. There are pros and cons with both locations. We choose to carry out in-situ drills as our learners find most benefit from remaining in their own environment, with their usual equipment, and usual organization of equipment etc. (see 'System errors'). The cons are that the scenario equipment (including the manikin) needs to be transported and set-up for each drill, and if the unit is busy a labor room or operating room cannot be guaranteed to be available to use for the drill (or debrief). In this case, an alternative location needs to be determined ahead of time, so that on the day the drill can easily be performed at the

alternative site. As examples we have used a visitor's waiting room (but this has consequences for visitors) and a conference room as a mock labor room and operating room.

If the drill is carried out on the unit, temporary signage needs to be displayed in appropriate languages so that visitors are aware that a simulation drill is being performed. This will avoid them becoming alarmed if they witness what appears to be an emergency occurring near their family member.

### **Drill frequency**

What is the optimal frequency of participation: when is too often; when is not enough? This will depend on the number of staff members that need to participate. The aim is to avoid each drill having either too many, or too few participants (see 'Who to involve'). Due to the number of nursing staff at our institution (who are mandated to participate on an annual basis), we run the same scenario approximately 18-20 times over the course of one year to incorporate 4-5 nurses per drill, with a new scenario introduced every year.

### **Scenario topic**

There are various ways to decide the scenario topic. It is beneficial to simulate common as well as rare incidents/topics. The table lists drill topics we have carried out at our institution.

- a) Simulate a recent event that occurred in your unit
- b) Simulate a scenario that involves system errors that have previously been identified (see 'System errors')
- c) Contact Risk Management and enquire what were identified as main factors from actual law suits, root-cause-analyses and/or sentinel event cases, and try to bring elements of these factors into the scenario. Inadequate communication is a common finding from root-cause-analyses.
- d) Ask the participants from previous drill surveys (see 'Survey') which topic(s) they would like to simulate

Announced versus unannounced drills: A locally guided decision is whether to perform unannounced drills that staff participate in during clinical-duty, or announced drills during protected teaching?<sup>3</sup> The concern with unannounced drills during clinical-duty is potential for interruption of patient care. Alternatively, during protected teaching the participants can be fully engaged in the learning environment, but it may be harder to gather an adequate number of staff unless it is mandatory training.

### **Preparation**

Planning - Schedule planning meetings (approximately 5-6 are advisable) for faculty members to meet, as well as dress rehearsals (approximately 1-2). Have a clearly laid out agenda and an on-going 'to-do' list for drill preparation.

Time-line - Divided into: set-up (45-60 min); participant sign-in followed by introductions, prebrief including signing the 'Confidentiality' form and 'Consent for video/photographs and publication' form, orientation to the simulation set-up (30 min); drill (15-30 min); debrief (30-60 min); post-drill survey (optional, 5 min); dismantle set, which can either be carried out after the debrief, or during the debrief by faculty members not participating in the debrief (30 min).

Learning objectives - Each discipline should contribute 2-4 learning objectives that are specialty-specific or generic, covering cognitive, behavioral and/or technical elements.

Scenario design - Based around the learning objectives. It is desirable for at least one member from each discipline (anesthesiology, obstetrics, nursing, and neonatology (if applicable)) to be present at the planning meetings to ensure specific aspects of the scenario are valid with an appropriate balance for each discipline. Decide if the scenario topic should be unknown to the participants (to have an element of surprise during the drill) or known (allowing participants to openly discuss the drill topic in the unit beforehand). Delegate roles to faculty members to participate in the drill to aid the realism, including a role as the voice of the patient, and a role of a family member (if indicated). For the faculty member simulating the voice of the patient, if they need to be out-of-sight during the drill, they can sit behind a screen/curtain with their voice transmitted via a microphone and speaker (we use a karaoke machine, for example). They need to be able to see the drill so that they can respond appropriately to what is happening, which can be achieved with live streaming from a video recording device to a mobile device (see 'Debrief' for use of video recording).

Props - If carrying out in-situ drills, acquire an appropriate manikin that is portable and easily moveable (e.g. adult-size, full bodied with a pelvis). Devise props such as blood products, blood tubes, syringes for drugs (labelled), IV bags, monitoring etc. Decide whether to have a dry or wet set-up, i.e. fake blood and urine (water colored with food dye), water in syringes and IV bags etc. (see 'Equipment' regarding safety aspects). Lab results on cards, X-ray/CT images printed on paper or visible on a mobile device. Vital signs can be displayed from one mobile device (controlled by a faculty member, usually an anesthesiologist) to a second mobile device (as a monitor) using application software (for example, SimMon app using two iOS devices).

Equipment - Devise a list of every necessary item (from EKG stickers to the manikin etc.) and delegate who is responsible for obtaining the items and then store on a cart/in boxes for example, to make it easier to retrieve for each drill, rather than collecting items for each individual drill. After each drill make sure that every item has been replaced in the storage container so that there are not any simulation items left in a patient care area that could accidentally be used on a patient (clearly label items 'for simulation only', and all syringes and IVs should be dry, to avoid possible misuse).

Prebrief - Creation of a safe zone for simulation is of utmost importance for learning. Participants need to feel secure that they are not being assessed or judged in any way during the drill, and that their performance is not being reported or discussed with their supervisor. Allocating time for a prebrief is very valuable which includes setting expectations and assuring confidentiality. Ensuring all participants sign a confidentiality form prior to participating and reiterating 'what happens in simulation, stays in simulation' helps maximize learning.

System errors - Latent system errors (due to the workplace or system) can be identified during a drill. At the end of the drill participants can group together for a short (5 min) mini-debrief in the drill area, to identify system errors (plus human errors) that occurred during the drill. Errors can then be discussed at

the start of the formal debrief (for approximately 10 min), and delegated to the safety committee or unit management to address. This practice should model and contribute to establishing a routine of conducting team debriefs after real events occur.

Debrief - The formal debrief should occur in a designated area where participants can sit down in a quiet and conducive learning environment. The majority of the debrief should be based on the predetermined learning objectives. We recommend 1-3 debriefers, comprising of a lead debriefer and content experts such as an anesthesiologist and obstetrician (with representation from nursing and neonatology) for specific points that may be highlighted during the discussion. The use of playback video (with key time-points noted during the drill to aid discussion around the learning objectives) can be a very useful teaching tool in the debrief, so plan to set this up prior to the start of the drill (if indicated). Also, the debrief can be interspersed with informational slides to highlight specific learning points. It is of value to end the debrief asking each participant to share with the group what they learned from the drill or 'what did you learn today that you will use in your practice tomorrow?' This informs the simulation team if the learning objectives have been met, and reinforces learning for the participants.

Survey - A useful way to evaluate aspects of the drill including, content applicability, drill duration, anticipation of any barriers to implementing what was taught etc. is to ask the participants to complete a short survey at the end of debrief. It also affords you the opportunity to enquire which topics participants would like to simulate in the future.

Simulation team debrief - It is useful for the simulation team to meet immediately after the drill to discuss what went well and what challenges were encountered during the drill, so that these can be addressed/changed prior to subsequent drills.

## **Research and knowledge dissemination**

Simulation offers a great opportunity to carry out research and quality improvement (see 'System errors') and members of our simulation team have published multiple manuscripts.

Promoting simulation and disseminating knowledge can be carried out during lectures at seminars/conferences etc. However, if examples of videos/photographs are used during lectures, consent needs to be obtained from all participants who are seen and/or heard during a drill, so for all the drills we routinely include a 'Consent for video/photographs and publication' form at sign-in (see 'Time-line').

## **References**

- 1) Austin N, et al. Building Comprehensive Strategies for Obstetric Safety: Simulation Drills and Communication. *Anesth Analg.* 2016;123:1181-90
- 2) Sørensen JL, et al. Design of simulation-based medical education and advantages and disadvantages of in situ simulation versus off-site simulation. *BMC Med Educ.* 2017;17:20
- 3) Freund D, et al. Unannounced vs announced in situ simulation of emergency teams: Feasibility and staff perception of stress and learning. *Acta Anaesthesiol Scand.* 2019;63:684-92

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Table: Multidisciplinary obstetric simulation scenarios

Amniotic fluid embolism	Stat CD
Shoulder dystocia + neonatal resuscitation	Failed operative vaginal delivery + stat CD
Vaginal breech delivery + inverted uterus	Twin gestation with preeclampsia with severe features (Twin A: vaginal delivery, Twin B: stat CD)
Eclampsia	Refractory eclampsia + stat CD
Magnesium toxicity	PPH: Uterine atony (in the OR)
Anaphylaxis	PPH: Placenta accreta
Sepsis	PPH + introduction of MTP
Fire in the OR	PPH + introduction of checklist
Disaster preparedness training	Retroperitoneal PPH + DIC
Trauma in a pregnant patient (combined with ED and trauma services)	Maternal cardiac arrest (LAST) + PMCD