Simulation Primer

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Objectives

1. Understand how to appropriately use the simulation scenario templates to run a simulation in the APLS course.
2. Describe the different aspects of realism.
3. Recognize the essential components of a prebriefing to prepare your students for simulation.
4. Describe how to conduct a post-simulation debriefing.

Chapter Outline

What is Simulation?
Simulation as a Learning Modality
Essential Medical Equipment and Supplies
Running a Simulation Scenario—How to Use the Scenario Templates
Realism
Preparing Students for the Simulation Experience
Debriefing
Equipment List
Recommended Reading
What is Simulation?
Simulation has been defined as the re-creation of reality to a sufficient degree to meet a specific need. As it pertains to health care, simulation can be defined as the re-creation of a medical event or scenario in a sufficiently realistic manner to engage participants and achieve specific educational objectives. Note that this definition does not require specific equipment or materials. Simulation is a technique and not a tool. Clinical simulation can use:
• A full-size, high-fidelity mannequin
• An actor, called a standardized patient
• Computer-based case scenarios

Simulation has been shown to be an effective instructional method for protocol-driven clinical educational curricula, such as Advanced Cardiac Life Support (ACLS). This approach is similarly well suited for incorporation into the APLS course for those centers or programs that have simulation resources. The number of such programs has increased substantially in the past decade. APLS has included case scenarios for discussion for some time; adapting these cases to more formal group simulation events is within the resources of most simulation programs. Because the course is a broad survey of pediatric care, it is likely that similar cases have been developed locally for other purposes.

In the Appendix to this section, we provide 19 cases meant to serve as models and examples for the inclusion of simulation cases within the APLS course structure. Time constraints will prevent conducting the full set of cases, and the instructors will need to choose which cases to use to best suit their local resources and educational needs.

Note that the case materials provided are not written for a specific model or brand of simulator. Cases are written for specific age groups that reflect the current sizes of available simulators. Cases can be adapted to fit the type of simulator available.

Simulation as a Learning Modality
As previously noted, evidence is available to support the effectiveness of simulation-based education to improve participant knowledge and skills. This evidence spans specialties within medicine (eg, internal medicine, pediatrics, surgery) and across professions (eg, nursing, dentistry). Evidence is also available to support the use for simulation to improve team performance in areas of leadership and communication. The interested reader is directed to two excellent reviews that describe the current evidence supporting simulation in medical education and what represents best practices in implementing this type of instruction (see the Recommended Reading section).

Essential Medical Equipment and Supplies
To build simulation scenarios into an APLS course, essential medical equipment and supplies are necessary. For a comprehensive list of supplies needed, refer to the Equipment List section in this module.

Running a Simulation Scenario—How to Use the Scenario Templates
As part of the simulation primer, a package of 19 simulation scenarios is provided that can be used as part of the APLS course. These scenarios, half of them infant scenarios and the other half child scenarios, were carefully designed and tailored to the learning objectives for specific sections of the course. The scenarios were designed to be followed by a 5-minute debriefing session facilitated by the APLS instructor.
Before running a scenario, the content and the case progression should be carefully reviewed. Ideally, the vital signs and physical findings for each stage should be programmed into the simulator beforehand or a simulator operator will be needed to make changes as the case progresses. Each case should be pilot-tested to ensure the simulator scenario runs as desired. Some scenarios require some moulage or makeup—prepare this ahead of time and ensure enough time during the course to remove and reapply makeup as needed.

Each scenario is laid out on a tabbed template with five separate columns. Column 1, on the far left, indicates the scenario stage. Scenario stages depict the clinical condition of an infant or a child. As the condition of the patient changes, the scenario will progress from one stage to the next. The scenarios in this package have anywhere from two to five stages. Column 2 describes the patient’s condition in each stage, with a detailed outline of the history, appearance, and physical findings for the patient. Column 3 lists the expected interventions—these are tasks or orders that should be performed by the medical team during that stage. (Note that these items are guides for debriefing and not written to be used as formal assessment items.) Some of these items might not be directly observable and might require the debriefer to ask participants why they might have chosen specific steps. The decision to progress from one stage to the next is left up to the discretion of the instructor and should be determined by how much time the team has taken in that stage, what interventions have been completed, and which learning objectives are left to be covered. Column 4 is an empty space in which instructors are able to make notes of findings they observed during the simulation scenario. These notes should be used as the basis for further discussion during the debriefing session. Column 5 indicates the suggested time to be spent in each scenario stage.

When the scenario is ready to be started, the history indicated in stage 1 should be read and the scenario program started so that the simulator mimics the physical findings indicated in that stage. Generally speaking, the scenarios are written such that the patient’s clinical condition worsens from one stage to the next. This approach is to allow the instructor to challenge the student to treat the deteriorating patient and to address all the potential learning objectives for the case. Instructors should consider altering the vital signs in response to the interventions of the medical team. For example, if oxygen is applied to a desaturating patient, the instructor might want to increase the oxygen saturation slightly. Scenarios can also be tailored to student groups on a case-by-case basis. Groups that are struggling to get through all the necessary interventions in a particular scenario stage might end up spending more time in that stage and possibly not even complete all the stages for that scenario.

**Realism**

The use of advanced simulation technology to teach resuscitation skills is only one part of the simulation as a learning modality. To optimize the simulation-based learning experience, the instructor should be attentive to various aspects of realism when running the simulation scenarios (Table 1).

- **Physical realism** refers to the physical properties of the simulation mannequins and space used to run the simulated scenario. Creating a space that closely mimics the real clinical environment that will allow students to suspend disbelief and subsequently become more fully engaged in the simulation experience. Creating such a space includes tasks such as positioning the monitors, crash cart, and stretcher to mimic that in real life, providing all the equipment and supplies necessary, and providing equipment that is the same brand or make as the equipment that students use in their real work environment (eg, same defibrillator). The physical properties of the simulator should be introduced to the students at the beginning of the course so that they are familiar with the various cues
Preparing Students for the Simulation Experience

Some students might be new to the simulation-based learning environment; thus, it is important to provide a short introduction to this type of learning before starting any scenarios. The content of this introduction should include the following: (1) description of simulation-based learning, (2) performance expectations, (3) orientation to the simulator, and (4) description of debriefing.

1. Description of simulation-based learning—simulation-based learning allows trainees to learn and practice in a realistic environment.

TABLE 1 Enhancing Realism During Simulation

<table>
<thead>
<tr>
<th>Type of Realism</th>
<th>Strategies to Enhance Realism</th>
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<tbody>
<tr>
<td>Physical</td>
<td>• Create a realistic clinical space—room should mimic hospital resuscitation room</td>
</tr>
<tr>
<td></td>
<td>• Provide all necessary equipment</td>
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<tr>
<td></td>
<td>• Use equipment that is familiar to the team (same make and models when possible)</td>
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<tr>
<td></td>
<td>• Provide patient charts and nursing flow sheets</td>
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<td></td>
<td>• Use makeup on mannequin when appropriate</td>
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<tr>
<td>Conceptual</td>
<td>• Ensure scenarios and case progressions are conceptually sound</td>
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<tr>
<td></td>
<td>• Alter vital signs according to student interventions</td>
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<tr>
<td></td>
<td>• Do not “fast-forward”—run scenarios in real time</td>
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<tr>
<td>Emotional</td>
<td>• Orient students to the simulation experience and outline expectations</td>
</tr>
<tr>
<td></td>
<td>• Minimize verbal feedback from the instructor during simulation</td>
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<td></td>
<td>• Ensure that instructors stay hands-off as much as possible</td>
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<tr>
<td></td>
<td>• Ensure that instructors remain out of sight during simulation</td>
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<td></td>
<td>• Use actors to play roles as necessary</td>
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</table>

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1. Description of simulation-based learning—simulation-based learning allows trainees to learn and practice in a realistic environment.
without causing any harm or danger to the patient. Teams of trainees will be challenged to provide medical care to acutely ill or injured pediatric patients and will be asked to do so in a manner consistent with the way they provide care in real life. Training in this manner gives teams a chance to make mistakes with no real consequence and to improve communication and teamwork skills that can further enhance delivery of care.

2. Performance expectations—trainees will be asked to “suspend disbelief” or actively immerse themselves in the simulation and pretend that things are real. Doing so will likely heighten emotional realism and ultimately enhance the learning experience. Instructors should also agree to do everything in their power to make the experience as realistic as possible for the trainee.

3. Orientation to the simulator—because various different types of simulators exist, each course should be preceded by a brief orientation to the physical capabilities and findings of the simulator, including physical examination findings and what the student can and cannot do to the simulator mannequin. For example, students should be shown where to insert an intraosseous needle and where to place the paddles when defibrillating the simulator.

4. Debriefing—simulation-based learning can be an intimidating and emotional experience. Thus, trainees should be reassured that the simulation environment is a safe place to learn and that the role of the instructor is to help facilitate learning via debriefing in a non-intimidating manner. Some students feel a lot of stress during the experience, whereas others might become upset or emotional after the simulation is over. Instructors should acknowledge this during the orientation and reassure students that the debriefing is meant to be a confidence- and competency-building exercise and not a forum to point out and judge people’s mistakes. Extra attention should be made available to students who are upset or distressed after the simulation.

Debriefing

Debriefing is the post-simulation facilitated discussion in which participants have an opportunity to consider the events of the simulation, explore what things went well and what could be improved, and integrate these concepts to improve future clinical practice. In more general practice, debriefing a 10-minute case might last 20 minutes or longer, depending on the specific objectives of the case and the number of participants. This discussion often takes place in a separate conference space and might offer the ability to replay sections of the session from a video recording.

In the context of use in the APLS course, debriefings will need to be abbreviated and likely be held in the same room as the simulation with the group gathered around the simulator. The goal of this short 5-minute session is to touch on events of the case with an effort to have the learners explore what goals they achieved and where they might have had problems. Some key concepts are as follows:

- Open discussion with a minute for participants to respond to the question, “How did that feel?” This allows participants to “blow off steam” and get ready to talk in more depth. Note that using the word “feel” gets a different response than “How did it go?” which prompts an immediate entry into a discussion of the case.

- Open discussion by asking the group to summarize the events in one sentence. This lets the leader know whether they are all on the same page.

- One approach to debriefing in this abbreviated timeframe is the “plus/delta” framework. One draws a two-column table on a whiteboard and asks the group to list which items they “did well” (plus) and which could be improved (delta [change]).

- As time permits, the session should be brought to a close by either summarizing the learning goals for the case or asking the
participants to offer one thing they learned that they could take away from this case for the future.

<table>
<thead>
<tr>
<th>Plus/Delta Framework</th>
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<tbody>
<tr>
<td><strong>Plus (+)</strong></td>
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An important debriefing concept is to avoid “loaded questions,” which are worded in such a way to imply one correct answer that you know and they do not (e.g., “What was the one thing you missed in that case?”). The best approach is to ask open-ended questions that begin conversations rather than getting one-word answers.

For those interested in further reading about debriefing techniques, refer to the Recommended Reading section for a list of excellent review articles.

**Equipment List**

Two sets of equipment are necessary: one set sized to fit an infant and the other to fit a 5-year-old child.
- Stethoscope
- Blood pressure cuff
- Thermometer
- Electrocardiogram monitor leads
- Oxygen saturation probe
- Electrocardiogram and oxygen saturation monitor
- Simple oxygen masks
- Nonrebreather oxygen masks
- Oxygen source
- Oropharyngeal airways
- Nasopharyngeal airways
- Self-inflating bag and masks
- Oxygen tubing
- Respiratory nebulizer masks
- Suction device, catheters, and tubing
- Laryngoscope and blades
- Endotracheal tubes
- Stylets
- Magill forceps
- End-tidal carbon dioxide detectors
- Towel roll
- Cervical spine collars
- Intravenous catheters
- Intraosseous needle supplies
- Tape
- Intravenous tubing
- Intravenous fluid bags
- Syringes
- Medication in labeled syringes or vials
- Needles
- Defibrillator with both pads and paddles
- Blankets
- Stretcher or bed
- Makeup kit

**Recommended Reading**

**Simulation as a Learning Modality**


**Debriefing**


**References**