Chapter 8.4
Expecting the Unexpected: Contingency Planning for Healthcare Simulation

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ABOUT THE AUTHORS

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ABSTRACT

Contingency planning, or planning for what could go wrong, is a necessary part of any program that relies heavily on technology and people. Regardless of the time and effort put into preparing for a simulation session, inevitably there are unforeseen events that can delay, disrupt, or discombobulate a well-planned simulation training activity. Whether the situation is logistical nightmares, scenario glitches, equipment malfunction, learner obstacles, or embedded simulated persons (ESPs) who do not act as expected, even the best-planned sessions often require last-minute adjustments, troubleshooting, and disaster management. As facilitators and simulation operators, we are expected to react to all possible situations seamlessly so as to not take away the learning experience. While simulation specialists often need to improvise and “go with the flow” as part of the normal business of running simulation sessions, just “winging it” is neither sufficient nor efficient in handling all problems. A systematic and organized approach for contingency planning should be part of every simulation program's standard operations. This chapter will focus on some specific areas to consider, common problems to anticipate, and potential strategies for a sustainable process of mitigating disaster.

CASE EXAMPLE

It has been weeks of planning in the works: multiple iterations of clinical scenario revisions to ensure that the goals and objectives of the simulation session are educationally sound and logistically feasible; scenario programming changes; moulage, supplies, and equipment preparation; even piloting and revising the script with current students. The scenario you have worked so hard to bring to life is finally ready for prime time. You have your session and students scheduled. The ESPs are on cue and the scenario begins to unfold beautifully. As you get ready to head into the most critical portion of the scenario, you notice that the vital signs are not reacting as expected. You quickly survey your desktop, and glancing at your screen you

notice that the mannequin has lost connection with the computer controls. You try to keep the scenario flowing while trying to reconnect, but it is taking too long and the students and ESPs are getting confused because their interventions are not working as expected. *Do you stop the scenario? Can you get it to reconnect quickly? If it does reconnect, do you try to finish the same scenario? How much of the technical difficulties do you divulge? What contingency plans do you have for times when things do not go as expected? Surely this is not the first time the mannequin has lost connectivity.*

INTRODUCTION

> Developing a contingency plan involves making decisions in advance about the management of human and financial resources, coordination and communications procedures, and being aware of a range of technical and logistical responses … Time spent in contingency planning equals time saved when a disaster occurs.
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> —International Federation of Red Cross and Red Crescent Societies, 2012

Contingency plans are emergency plans to ensure rapid, organized, and effective conduct of rescue operations to minimize impact on the affected stakeholders. In most organizations, contingency plans are in place for dealing with natural disasters or catastrophic accidents. However, **contingency planning** is not only for major disasters; it also applies to and is a necessary component of any successful educational program, particularly when there is high reliance on technology and people. In cases of natural disasters, people's lives are at stake. In education, catastrophic consequences are less frequent; although lives are not lost when a course does not go as intended, learning opportunities may be lost and program sustainability may be affected. These losses in time, reputation, and resources are important enough to warrant a "Plan B."

In simulation-based education and training, regardless of the amount of work and effort one puts into development, programming, and preparations, at some point something unexpected will occur. It is in the nature of daily operations. Facilitation and operation of simulation-based education will inevitably result in failures in the system that very well could impact the quality of educational sessions. It does not matter what type of simulator one uses, what sophisticated audiovisual integration or home-grown system is in place—eventually things will go awry.

The question is, are simulation programs prepared to handle potential failures without missing a beat and negatively affecting learners? Is there a contingency plan for adverse events that one could predictably expect or reasonably anticipate? Many simulation experts can "wing it" through improvisation on the spot and get by in the heat of some technical difficulty, or as a last resort accept the misfortune and apologize for the unintentional occurrences. However, experience indicates that mishaps could occur more than once, and each person may deal with them differently. The solutions and ideas that have been tested and proven to work need to be documented and shared, or the value of learning from experience is lost.

Simulation facilitators and operators rely on technology, equipment, ESPs, staff, educators, and participants to work in unison for a successful educational session. When any of these are misaligned or not optimally functioning, even the best-planned educational session could be derailed. Thus, the ability to anticipate problems and expect the unexpected is especially important in simulation-based education due to high reliance on technology and a desire to create realistic environments for learning. There are emergency evacuation plans for earthquake, fire, and other disasters. There needs to be a simulation disaster plan as well.

Educators are constantly barraged with factors that threaten the quality of simulation sessions. Problems could

occur at any stage of simulation curriculum development and implementation. At the first conceptualization level, learning objectives should drive any educational activity, but often various constraints limit what we can do and an ideal session becomes one compromised by inadequate resources. Planning a simulation activity opens up a multitude of areas where things could go wrong and until the activity is implemented, it is difficult to anticipate all the possible scenarios for contingencies. Depending on circumstances and resources, contingency plans may vary between sites.

Effective contingency planning is more than just the advance preparation of written instructions that may be found in an operating procedures manual. A contingency plan is a live document that involves the practice of identifying resources as well as a streamlined method for communication and decision making during unexpected events. The goal is to manage problems in the shortest possible time without affecting educational gains. It is crisis resource management behind a dynamic simulation stage.

Very little has been written about contingency planning for simulation-based education. Tips on operations and administration of simulation programs refer to developing contingencies and propose questions for consideration (Huang & Dongilli, 2008; Stillsmoking & Murray, 2008). Troubleshooting guides for specific equipment are available but are often very technical and difficult to understand. Dieckmann et al. (2010) proposes a set of useful scenario “lifesavers” that could be used to redirect learners to minimize interruptions in the flow of the scenario. These could help restore the scenario to its intended progression (“within” the scenario) or change the original course of the scenario (“outside” the scenario) to match the unexpected actions in a logical way.

This chapter divides the discussion into three topic areas for contingency planning: technology, people, and things beyond your control. Outlined are examples of how quick roles and small changes within a scenario can be made seamlessly to offset failures in the system. These lessons are based on a combined 20 years of experience working in simulation operations, administration, education, and research. In each section, consider the following questions: “What is going to happen? What are we going to do about it? What can we do ahead of time to be prepared?” Those new to simulation should focus on preparation and prevention, as well as developing efficient processes. Advanced users could add to their repertoire of skills by considering further refinement, adaptation, and improvement of their contingency plans.

TECHNOLOGY

Technology is perhaps the most obvious culprit of a simulation program that frequently requires troubleshooting. Both an asset and a liability, technology is inherent in the world of simulation and has a huge impact on the success of our programs. Simulation programs range from single room to complex, high-tech, multimillion-dollar facilities with state-of-the-art capacities. Yet, even the most basic and simple program includes some level of integration of simulators, clinical equipment, and audiovisual equipment. As simulators become more advanced, and facilitators find more ways to distribute experiential exercises to the learners, there is greater dependence on technology to deliver educational sessions. Thus, it is critical to examine and plan for contingencies related to failures in technology.

Technology encompasses everything related to simulators, clinical equipment, and the intricate simulation program facility network. Potential problems could include the following:

1. Simulator hardware malfunction
2. Simulator software and programming errors
3. Clinical equipment malfunction
4. Audiovisual equipment issues

5. Wireless connectivity issues
6. Multimedia integration problems

Table 8.4.1 summarizes examples of technology-related problems and some possible contingency plans. When after troubleshooting the technology the problem is still unresolved, there are contingency alternatives that could save the day, including the following:

1. Stay the course of the scenario by going along with the unexpected changes.
    - Use an embedded simulated person (ESP) to relay messages while remaining in character (e.g., the embedded simulated nurse states, “We have been having some technical problems with our monitors all day long. Let me take the vital signs manually”).
    - Announce the technical difficulty during orientation or via paging system (“We apologize that we are encountering a technical difficulty with the simulator today. For the purpose of this scenario, please assume that chest rise is visible by the CO_2 tracing”).
    - Discuss during debriefing—make it a learning point (“What would you do if in real life the equipment failed on you?”).
2. Change the scenario
    - If the scenario was supposed to be a difficult airway scenario, but the laryngospasm and pharyngeal obstruction did not activate and the participant intubates the simulator without any problems, turn it into an anaphylaxis or bronchospasm case instead.
    - If simulator failure is known before session, choose scenarios that would not be affected by equipment malfunction and/or tell participants during orientation that a certain piece of equipment is not available or working that day (see Table 8.4.1).

PEOPLE

People are the greatest strength and resource to a simulation program. People can also be the biggest barrier to effectively implementing a simulation scenario. All the human resources, the personalities and experiences that educators, facilitators, learners, ESPs, and staff bring with them come into play on the simulation stage. There is great synergy if properly aligned but could be a nightmare to manage if diverging opinions, expectations, and feelings are not properly addressed. Potential problems to consider are the following:

1. Staff—training, out sick, or otherwise unavailable
2. Educators—training, late, or cancellation
3. Embedded Simulated Persons—training, off cue, or improper improvisation
4. Learners—difficult, aggressive, sensitive, distracted, no show, or late arrivals
5. Unexpected visitors—impromptu tours for important visitors, interruptions

One of the most common reasons that scenarios do not progress as expected is the unpredictable nature of human behaviors. People are the cornerstone of both the problems and the solutions. People can misbehave, intentionally or unintentionally. For various reasons, humans err and may not function at their best, even with the best intentions. Unexpected events could be participants who make up their own scenarios (for instance pretending something is done without actually doing it), ESPs that are too helpful and detract from learning objectives, or facilitators who are uncomfortable with simulation and resort to using the simulator as a backdrop to start lecturing.

Troubleshooting personnel issues may be even more difficult than troubleshooting technology, as feelings are involved and relationships can be at stake. However, everyone needs to be on the same page regarding the flow and expectations of the educational session. When everything is going smoothly, everyone is usually happy. When things go awry, high stress makes humans react in ways that may not be ideal, so it is important to manage people during these high-stress events and communicate effectively to mitigate distress.

Aside from proper training, the best way to avoid personnel problems is to make sure that everyone has the same expectations. Proper orientation and piloting of educational sessions with everyone who will be involved in the actual implementation will help identify areas of confusion. The concepts of teamwork and communication

are key to establishing a flow of information and resources to ensure smooth operations. Simulation is used for crisis management training for our learner participants. Those who work behind the scenes also need to practice what they preach. Teamwork and communication strategies from Crisis Resource Management and TeamSTEPPS tools should be fully utilized in the development and implementation of contingency plans (Agency for Healthcare Research and Quality, n.d.; Ostergaard et al., 2011).

TABLE 8.4.1 Technology Problems and Contingencies

Example Problem	Contingency Plan
Simulator Hardware Malfunction	
Birthing simulator does not release baby (baby is stuck inside).	If baby is critical to scenario development, simulate delivery and bring in a second baby to be used in the scenario. If baby is not critical to scenario development, simulate delivery and quickly give “baby” wrapped in blankets to other ESPs.
Compressor stops working.	Connect the mannequin to an alternate air source. If an alternate source is not available, run the scenario as “low-technology” simulation or with ESPs providing cues on pulses and chest rise.
During surgical airway procedure, the participant goes through the back of the trachea causing a leak.	For the current scenario, when critical actions are met, end the scenario. If damage occurred early in the training day and there are more scenarios planned, repair the damage by taping or gluing together the trachea to get through the rest of the day. Prevent this from happening in the first place by having the ESP stop the participant if they do an incorrect procedure that could damage the simulator.
Heart, lung, or bowel speakers malfunction.	Have the ESP let the participant know what they are hearing.
Lungs rip or have a leak and you are unable to positive-pressure-ventilate.	Turn on spontaneous breathing if the simulator has separate mechanism used for spontaneous breathing, or time breathing to the learner giving positive pressure ventilation.

One or both of the blinking eyes are stuck open or closed.	Redirect the participant by having the ESP or the patient indicate that the condition is a normal state. Have the ESP discretely close eyes manually and have the patient state “I hope you don't mind if I close my eyes here while you do your work.”
Other physical findings such as chest rise do not correlate with clinical interventions.	Have the ESP check and reassure normalcy.
Moulage problems such as wig or ulcer falls off.	Have the ESP discretely fix the error. If the learner notices before it gets fixed, state “Let me fix her wig—she gets embarrassed if it's not properly set.”
Vocal cords do not close during the laryngospasm scenario.	Have an alternate scenario available to run on the fly, for example, bronchospasm. Discuss during debriefing.

Simulator Software and Programming Errors

Scenario does not load or run as programmed.	Run scenario on the fly using your paper scenario flow diagram.
Software does not open or load.	Have the software available on backup computer. If available, use a different simulator. Run “low-technology” simulation by talking through the scenario with the participant to highlight educational goals and objectives.

Clinical Equipment Malfunction

Anesthesia machine or ventilator alarms because pressure is too high or low.	Change the alarm limits on the equipment. Redirect participants by letting them know that a technician has been called, and they are working on the problem. Have a ESP play the role of a technician to resolve the problem.
Clinical equipment loses power or batteries need to be recharged.	If possible, plug in or replace battery. Add troubleshooting as part of scenario and discuss in debriefing.
Equipment is broken during the scenario.	Advise the participant that it was the only one available, and should proceed. If the equipment would have provided diagnostic value to move the scenario forward, give results to the participant.

Audiovisual Equipment Issues

Debriefing room loses live audio/video feed in the middle of a scenario	Video-chat using videoconferencing unit, tablet, computer, or smartphone from the simulation room to debriefing room. Have participants observe and listen from inside the simulation room.

and participants cannot hear/see what is going on in the simulation.	
Audio connection is lost into simulation room and the patient cannot answer (speaker failure).	Have the ESP answer for the patient.
Audio is lost to ESP headphones (two-way communication between control room and simulation room fails).	Communicate with ESPs by passing notes, or by paging or texting. Step out of control room and let ESPs know of technical problem. Follow script exactly and have the ESPs come out if they are uncertain of actions.

Wireless Connectivity Issues

Mannequin is not connecting.	Hardwire the mannequin to computer or router.
Internet-based digital audiovisual system is down.	Abandon video recording and bring everyone into the simulation room to view and participate.

Multimedia Integration Problems

Integrating software or system is down and will not allow you to record or display audio/video in debriefing rooms.	When possible, go to basics and use camera without the integrated software. If not possible, see “Audiovisual equipment issues” above.
One of the integrated video, audio, or VGA inputs (i.e., vital signs) is experiencing delays and is not synced with the other feeds.	See “Audiovisual equipment issues” above.

Communication is absolutely critical for smooth operations and contingency planning. Implement a way to communicate between staff and educators—via paging, two-way radios, cell phone text, written notes, secret code signals, or gestures, or a combination of the above. After all the advance preparations, on the day of the session, having a huddle before each session and scenario can be a lifesaver. This allows last-minute changes to be shared and to take place on the basis of debriefing comments or other factors that only a few may be privy to. This is also a time to review with ESPs their cues, how the scenario should unfold, and what their

contingency plans are if something goes off script. Situation monitoring by all staff is important to constantly assess for signs of derailing or potential pitfalls. Relaying this information in a timely manner will catch errors before they occur.

Establishing expectations with participants is also important. Learners appreciate having an orientation and simulation contract that delineates what the expectations of the day will be. Make sure that learners understand the channels of communication for relaying patient findings. For example, tell the learners during orientation that a embedded simulated nurse might provide information about skin changes because the simulator is not able to show a rash. If the rules of engagement are clear, learners will be able to engage appropriately.

TABLE 8.4.2 People Problems and Contingencies

Example Problem	Contingency Plan
Your lead simulation technician calls in sick or your staff is stuck in traffic and the rooms are not set up yet.	Call in a backup technician. Set up a related task training station while you set up basic equipment or supplies needed for the first scenario.
Your staff is unprepared for the scenarios.	Give a quick overview of the scenario and explain how the scenario will unfold, its critical actions and events. Use cue cards.
The main educator has a personal emergency and is unable to teach.	Call a backup educator. Modify educational activity. Use low-technology simulation or other interactive exercises to illustrate the learning objectives.
The educator is using the mannequin as a prop to lecture with.	Pull the educator aside and let them know that learners can actually do hands-on procedures on the simulators. Orient new educators to capabilities and experiential learning theory. Ask for open reception to debrief after each teaching session. Redirect back to scenario by making the patient or ESP speak and stay in character.
The ESP is being too helpful and is revealing key points of the scenario.	Ask the ESP to step out of the room and advise them that they are being too helpful and that the participants need to identify key points on their own.
The ESP is overacting and is distracting from the scenario.	Tell the ESP that they are needed in the room next door and advise them appropriately. If they are still distracting, do not let them return to the scenario and talk to them after the session.
Participants are lost.	Provide a clear map and directions to the room. Place visible signs to direct them. Use a wireless headset to answer phones/inquires while you are setting up the rooms.
Participant is not buying	Have the ESP or patient redirect the participant by reminding them that he

into the scenario—says what he or she would do, but will not actually perform any of the tasks.	or she needs to perform the needed tasks.
An important visitor is brought by the administration for a personal tour during a high-stakes training event.	Have a prepared video or simulation recording that highlights trainings performed at your facility and training capabilities. Meet with the visitor after the scenario, or if appropriate invite the visitor to join in the facilitation and debriefing of scenario.

A range of issues related to people is explored in Table 8.4.2. First, because this chapter focuses on behind the scenes, staff issues are discussed. The simulation program staff team is absolutely essential to a successful program. These are the people who coordinate scheduling, run the operations of the various simulators and technologies, and set up and clean up after each session. They support education in every respect. All staff should be thoroughly trained in their roles and responsibilities. More intense training will need to be given to those who will be in key positions. It should also be noted that staff may be absent, tardy, or need to be relieved for one reason or another. Backup staff should therefore be trained for each position. At the very least, instructions for each activity should be clearly delineated on a checklist so others can help when needed.

Training of personnel involved in simulation is absolutely critical. If trained, dedicated personnel are not available for each role because of funding and budget restrictions, then cross-training for the facilitator or operator is advised. All simulators and much of the audiovisual equipment, regardless of how much they are touted to be easy to use, are quite complex. This means that everything may be working correctly, but because of lack of training and familiarity with the equipment, problems could arise during a scenario. Many institutions hire simulation technicians or operators and just hope that the staff will eventually get the hang of it and learn things independently.

Although many operators do eventually learn on the job, this is not ideal as incorrect practices and shortcuts may be adapted. Training of simulation specialists can include vendor training, but should also include disassembly and reassembly of the equipment so they have complete understanding of each component. Also, it is critical that each person be expected to document any technical problem so that these are logged. The steps to resolving problems should also be noted so that they can serve as a reference for future problems.

Educators and facilitators are another group of people who need management and coordination. Clinicians are busy people who may not be adequately prepared to run simulations that they are asked to do infrequently. Staff support is crucial to help them with logistics, paperwork, directing the scenario, and assisting them in observing for key actions for later debriefing. More advanced educators can serve as directors of the scenario and observe learner actions simultaneously, but oftentimes, simulation operators can help by pointing out specific things that might be missed in the chaos of the scenario. Feedback to educators is a crucial aspect for quality assurance and program improvement.

Facilitating a debriefing session requires skill and practice. Not all educators are as well trained in this area, so providing cognitive aids to help them will make the session run smoothly. Approaches to debriefing should match the learning objectives and consider learner experiences and perspectives. In time-constrained sessions, a simple structure for debriefing using “plus/delta” (what went well?/what could be changed?) or the three-questions approach (“What went well? What could be improved? What will I do next time/how will I put this to

practice?") may be easier to adapt or more appropriate compared to a more in-depth probing technique, whereas learning may require a deeper diagnosis of the reasons the learner performed an action versus coaching on the action itself. One example of this is the advocacy-inquiry method (Rudolph et al., 2007). Debriefing methods are evolving, and facilitation skills must be developed continuously and may be used together. Cognitive aids that provide sample questions to address both clinical management as well as teamwork skills offer educators a template for a more holistic debriefing.

Standardized patients are people who act in various roles. Embedded simulated persons are vital to scenario progression, especially in delivering specific cues needed to move a simulation training forward. For example, ESPs who play patients or patients' family members, a nurse, or a physician role could help push learners to action or redirect them if they go astray. Professional actors hired by the script are expensive, so most simulation programs use professional actors only for special occasions such as formal assessments. For formative simulation sessions, ESPs are played more commonly by simulation program staff or faculty to save on costs.

Embedded simulated persons help deliver critical information and allow for seamless transitions between simulated states. However, embedded simulated persons can sometimes derail the best-planned simulation scenario by inadvertently offering too much information, forgetting their lines, or simply introducing a negative tone to the simulation environment. Although these ESPs receive training to properly execute a scenario, sometimes inconsistencies or confusion make it necessary to create a contingency plan to rescue a scenario.

Learners might also provide unexpected consequences. Learners are often confused about what is simulated and what is real. Some have not accepted simulation as an immersive learning tool and remain on the sideline unable to get into character or see the simulator as anything other than a plastic dummy. Others have active imaginations, seeing or pretending to see things that are not really there. Still others get so immersed that they end up emotionally engaged and distraught when things go wrong. All of these possibilities are reasons to have for contingency plans.

The interplay of learners, faculty, staff, and ESPs make up the simulation performance. To minimize confusion, a proper orientation is necessary. This includes familiarizing participants with the simulated environment; the simulators, equipment, and supplies used in the scenarios; and the rules of engagement for what is real and what cannot be simulated. Create a "Fictional Contract" with the participants for simulation (Dieckmann, 2009).

It is also wise to use the "Rules of Improv." At the start of each scenario when learner participants enter the room, use the ESPs to orient them by stating the following:

1. Who you are (the learner): "Hi, Dr. Young, you're the intern on call today, right?"
2. Who I am (the ESP): "I'm the float nurse covering for another nurse who is on break."
3. Where we are: "Thanks so much for coming to the MICU."
4. What is happening: "I was just doing my usual assessments here with Mr. Johnson and he suddenly started having heart palpitations."

Because the learners are the main reason for running the simulation training, it is essential to redirect them if needed to optimize the learning opportunities. If ESPs stay in character, it is easier for participants to get into character. If educators lay out expectations at the beginning, participants will behave naturally and take advantage of the simulation experience.

Finally, people not involved with the education session can also interrupt an otherwise well-planned simulation session, not deliberately but as a matter of interest in simulation. The Dean could drop by for an unexpected tour with important potential donors. It would be inappropriate and unwise to ignore these important people, but at the same time, the educational session will suffer if you put it on pause. The best solution is to gauge the visitors'

availability. If feasible, offer to have them observe and then give them a tour and talk to them after the scenario, or ask

whether they would like to schedule an appointment so that you can spend dedicated time with them. If they do not have time and are just passing by, spend a few minutes to find out what they would like to know, then apologize and let them know you are about to run a simulation scenario. Get a staff member to assist. Provide them with a brochure and self-guided map/tour of the simulation program. Visitors should understand that these are educational sessions and will generally make concessions so that they do not disturb ongoing programs. A visitor policy should be in place, made visible, and enforced (Table 8.4.2).

THINGS BEYOND YOUR CONTROL

As much as facilitators try to take charge of and prevent all possible failures in the system, there are some things that are beyond control, such as:

1. Traffic
2. Facility issues: pipelines down, loss of pressure in pipelines, power loss
3. Renovation/construction noise
4. In situ or situated environments (Table 8.4.3)

DEVELOPING A CONTINGENCY PLAN

The chapter provides examples of possible breakdowns due to technology, people, and things beyond our control, along with some actionable solutions. However, there are many more possible problems and it is impossible to list every single one. As technology advances, new unanticipated problems will arise. Therefore, more important than providing a litany of problems and solutions is to create and practice a systematic process for coming up with contingency plans to deal with problems.

TABLE 8.4.3 Other Problems and Contingencies

Example Case(s)	Contingency Plan
Traffic: Major freeway construction projects or accidents have your key educators delayed for up to an hour.	Play an educational game that complements the scheduled training. Prepare knowledge-based practice questions (Jeopardy) or use screen-based simulation or task trainers to fill time.
Facility issues: Pipeline is down.	Use E or H cylinders.
Renovation/construction: Construction in the building limits rooms to use.	Have a flexible schedule or add more in situ trainings.
Construction creates noise or noise is heard through walls in adjacent simulations.	During orientation, advise participants of the possibility of loud noise. Work with contractors to minimize noise during critical periods of time.

In situ: Patient care takes priority—a patient needs a room reserved for in situ simulation.	Have equipment and supplies ready to be transported to another room if one becomes available. Reschedule or move to the simulation program.
Participants have to leave to take care of patients before debriefing is over.	Prepare general debriefing notes that can be distributed to participants. Make sure that those who have to leave are followed up by one of the educators.

Contingency planning can be broken down into several processes:

1. Assessment and Inventory of Needs and Risks (“What is going on? What could happen?”)
2. Prevention Strategy (“What can we do ahead of time to prepare?”)
3. Action Plan for Emergencies (“What are we going to do about it?”)
4. Event Review, Reassessment, and Update (“How can we improve?”)

The first step to contingency planning is to conduct a program assessment to determine what resources are available (equipment, people, time, and money) and what could go wrong. Consider the following while taking inventory of available assets and liabilities.

Dedicated Technicians

When it comes to technology, the best way to be prepared for the unexpected is to first and foremost know the equipment that will be used during the training session and do everything possible to prevent mechanical failure. For this reason, having dedicated technology-savvy simulation technicians or specialists who work with the equipment, day in and day out, can be beneficial and worth the investment. Dedicated personnel should be trained to operate, troubleshoot, and maintain clinical equipment and simulators in the simulation program and communicate with the team about known or potential problems with a specific piece of equipment that may affect a particular session. Creating a log of technical problems and their resolution is the beginning of contingency planning.

Many new programs purchase expensive equipment before they build their educational programs. Purchasing equipment before dedicated personnel have been identified to learn to use it is a disaster waiting to happen. If dedicated personnel are not available to help set up, maintain, repair, and run the simulators, it might be best to avoid spending money on highly complex simulators. Many simulators tout multiple advanced features when all that is really needed is the ability to display vital signs, palpate and auscultate, and defibrillate. There are creative low-budget ways to run simulation sessions without compromising the fidelity of the learning experience.

Dedicated Space

Having dedicated space can also reduce the amount of contingency planning and troubleshooting that needs to be done. If simulators and other equipment are in a set location and they do not need to be reconnected or plugged in every time a session is run, then there is less likelihood

that something can get missed during the setup. Likewise, using a dedicated computer for the simulator controls can reduce problems with the simulators. Often simple things like changing a channel, com-port, or being connected to the wrong network (e.g., Internet vs. mannequin) are the source of many problems. Having the experience of relocating a simulation program three times in a period of 10 years highlights how frequent moves add headaches and contingencies. Constant movement causes confusion and parts can be easily misplaced. Trying to organize, label, and tag things together and maintain a general area for storage can help but inevitably

something goes missing. Dedicated storage space and identified locations for equipment and supplies make setup and operations run much more efficiently.

Dedicated Audiovisual System and Communication Channels

The audiovisual component of a simulation program is another critical area where problems could occur. For instance, the live streaming of the simulation recording into a conference or debriefing room for observing participants is suddenly lost. It could be a wireless connectivity issue or a camera problem. By having a dedicated communication system in place, personnel will be able to identify, prioritize, and troubleshoot loose wires, misplaced parts, or incorrect connection figurations. Stepwise troubleshooting is easier if there is consistency in function and location. Should the wireless communication system fail for the staff and educators, a backup system such as using pagers and cell phones should take place.

The key to prevention of failures is vigilant adherence to systematic preparations and maintenance. It is easy to leave at the end of a long day and not put everything back in its place, checking to make sure equipment is ready at any time. However, factoring in that time to rebuild will save time in the long run. Documentation is crucial to preserve lessons learned by all parties involved in the process.

UPDATE YOUR CONTINGENCY PLANS

Contingency plans, once prepared, should not be treated as static documents. Rather, they should be regarded as dynamic documents that need to be regularly reviewed and updated with changing circumstances, educational programs, and technology. In reviewing and updating contingency plans, the following factors should be taken into account:

- New technology or space
- New scenarios that pose new challenges
- New staff/educators/learners
- Experiences, results from training or simulation exercises, and feedback

BEEN THERE, DONE THAT: HOW CAN I CONTINUE TO IMPROVE OR SUSTAIN WHAT I HAVE ACHIEVED?

A review and update of contingency plans should be done at minimum on an annual basis. This review should identify areas where plans need to be modified and further training is needed. There are several approaches to this review. In healthcare organizations, disaster drills are part of regular safety protocols. Most hospitals have annual simulations to increase awareness and prepare for anticipated emergencies (Bartley et al., 2006). With simulation contingencies, every session could be a drill. Continual assessment of how well each simulation program team member reacts to problems will provide insight for further training. Just as we use simulation for patient care practice, simulation exercises for testing and refining contingency plans can be very useful. These exercises also provide a means for building teamwork and professional development. Simulation exercises may be done purely as a paper exercise, through mock activities, or a combination of both approaches. Debriefing should follow immediately after the simulation exercise. This review can be done at an annual simulation retreat or time set aside for programming and development.

Another strategy to review what could improve a program is to prepare a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis for the program, on the basis of institutional contingency planning operational manual. Questions to consider for SWOT analysis are listed in Table 8.4.4. As a team, make a diagram or list the simulation program's Strengths, Weaknesses, Opportunities, and Threats. Review lessons learned from other

high-tech systems that you foresee becoming integrated into simulation, such as electronic medical records. Advance planning for the future, opportunities to involve others including engineering and information technology, and developing own intranet for internal users are some examples of ways to continuously improve upon your operations. If there are plans for a build-out or expansion of the simulation center, get started on anticipating the needs and problems associated with renovation and new technology. The experience of moving several times over the past decade has highlighted many lessons to optimize operations in a single-suite simulation room as well as a multiroom facility. By examining the history and future goals, one is better able to anticipate what the next decade will look like. Being flexible and open to change is essential for evolving any simulation program.

TABLE 8.4.4 Questions to Consider for SWOT Analysis

Strengths	**Weaknesses**
1. What does your simulation program do well at? 2. Are your resources sufficient for your programmatic needs? 3. Are you reaching your market or target audience? 4. Is your personnel team well trained and talented?	1. What areas does your simulation program do poorly in? 2. Are you constantly struggling with limited resources: educator recruitment and training, staff turnover, time and space constraints? 3. What problems frequently surface or could be avoided? 4. Are your contingency plans effective?
Opportunities	**Threats**
1. What are the trends you see in usage? 2. Are there new departments and areas for growth and development? 3. Do you have new simulation technologies? 4. Do you have a research and development team?	1. Are there changes in leadership (political or economical)? 2. What are your competitors doing? 3. What obstacles do you foresee? 4. Is feedback reviewed and integrated?

Another way to prepare is to apply the Failure Mode and Effects Analysis (FMEA) model to gauge the adequacy of a contingency system (Duwe et al., 2005; Herzer et al., 2009). FMEA is a systematic, proactive method for evaluating a process to identify where and how it might fail and to assess the relative impact of different failures, to identify the parts of the process that are most in need of change. FMEA is different from a Root Cause Analysis, which reviews actions after the events have occurred. In FMEA, anticipated problems are reviewed and prevention and reaction strategies are identified. FMEA is used to examine processes for possible failures. By correcting the process, one can prevent failures from occurring rather than reacting to adverse events after failures have occurred. FMEA includes a team review of the following:

- Steps in the process
- Failure modes (What could go wrong?), the likelihood of occurrence and the ability to detect them
- Failure causes (Why would the failure happen?) and the strategies to fix them

- Failure effects (What would be the consequences of each failure?) and its severity

FMEA can also be instrumental for evaluating a new process before its implementation and to determine the impact of a proposed change to an existing process. A number of free Excel templates for FMEA can be found online.

SUMMARY

Simulation is a powerful educational tool, but with high reliance on technology, one can easily become encumbered by technical problems. Contingency planning for simulation is therefore critical to minimize disruptions to the educational experience. Contingency plans call for high integration of the talents of personnel, the advances of technology, and the experience and foresight to anticipate the future.

Contingency plan implementation involves a systematic approach of assessment, prevention, anticipation, reaction, review, and reassessment. Prevention is critical. All efforts should be made to prevent problems from occurring. This means checking and preparing any equipment or technology to be used the day before a session. Checklists and cognitive aids for scenario setup and equipment testing are strongly recommended for every educational activity.

If prevention requires skilled preparation, anticipation is an art of foresight. Anticipation of potential technical problems and anticipation of human interactions with the equipment are equally important. With experience, one can reasonably predict reactions and gauge how scenarios will unfold. Thinking ahead and planning for potential problems will help minimize surprise emergencies. Documenting these on a written contingency plan shows advanced foresight and preparedness.

When there are unexpected events occurring in the face of the best preparations, appropriate reactions make the difference between disaster and successful rescue so that those in the learner seats do not even notice that seamless smoothing was happening behind the scenes. The concepts of crisis resource management should be in practice:

1. React to the emergency in a calm and collected manner.
2. Call upon available resources.
3. Communicate clearly with all channels affected. Practice the teamwork and communication strategies that you teach in your simulation courses.

In conclusion, quality control is practiced when contingency plans are rehearsed, reviewed, and revised regularly. Contingency planning is essentially an evolving simulation scenario that all of us play a part in creating and reenacting. Having discussed the multitude of disaster possibilities and the strategies to overcome them before failures occur, we can ensure that we (as the behind-the-scenes team) get out alive and stress-free, but more importantly that our learners will leave with the best educational experience they could get with the resources we have.

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