Narrative Review

Simcrafting: A comprehensive framework for scenario development for simulation

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ABSTRACT

Simulation can be an excellent teaching and learning method if the scenarios are created appropriately. It starts with assessing the learner's needs and is followed by laying down objectives embracing the SMART principles. While creating a scenario, it is essential to consider the different aspects of realism, such as physical, contextual and psychological aspects. Using moulages and props helps in creating physical realism. The simulation expert should also be aware of the learner's experience and decide the SimZones for their learners based on their level of clinical expertise. The scenario progression needs to be laid down in stages. The role of the embedded participant needs to be decided *a* priori, and the embedded participant should be well-versed in their role. Pilot testing is a crucial step in simulation development as it keeps the simulation expert aware of the loopholes in the simulation scenario before running.

Key words: Debriefing, development, moulages, prebriefing, realism, SimZones, simulation scenario

INTRODUCTION

To create engaging simulation-based experiences for participants, it is essential to have a standardised simulation design.[1] The purpose of simulation scenarios is to evaluate, instruct and assist students in identifying gaps in their knowledge or application of that knowledge. Planning for any simulation-based activity must be deliberate, methodical, adaptable and cyclical.[2] The design and development of simulation scenarios should consider factors that promote efficacy to produce the desired results. Creating a successful simulation scenario involves meticulous planning and is divided into several steps. Simulation-based experiences should be developed in collaboration with subject matter experts and simulationists who are well-versed in simulation education, pedagogy and practice.

NEEDS ASSESSMENT AND FORMULATING OBJECTIVES

The scenario creation process begins with assessing the learner's needs, following which goals for simulation and measurable learning objectives are identified. It provides opportunities for standardised clinical experiences and addresses relevant and identified competencies to improve the quality of care and patient safety. Once the learner's needs have been assessed, it is crucial to set achievable learning objectives. The objectives are the desired outcomes the student will be able to accomplish by the end of the simulation. The SMART model can create precise goals and objectives: S-specific, M-measurable, A-achievable, R-relevant, and T-timely.

CREATING REALISM IN A SIMULATION SCENARIO

While designing a simulation scenario, it is important to create realism to provide experiential learning for the learners. The degree of realism presented in a

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simulated training or educational environment is known as fidelity in simulation. Emphasising the difference between fidelity and modality or technology is crucial. These terms must continue to be distinct from one another. High technology does not always mean high fidelity.

The intellectual, psychological and physical components of fidelity are considered during scenario designing to ensure the objectives are met. In other words, the emphasis should be on providing cues and stimuli often present to influence behaviour and decision-making. The degree to which the physical setting of a simulation-based activity closely resembles the real environment in which the scenario would arise in real life is known as physical (or environmental) fidelity [Figure 1]. The patient(s), simulator/ mannequin, standardised patient, environment, tools, embedded actors and associated props contribute to physical fidelity. Conceptual fidelity guarantees that every component of the case or scenario realistically relates to each other.[3]

The use of props and moulages can help the facilitator take care of the physical fidelity. The tools employed correctly to replicate the task environment's auditory, kinetic, visual and sensory cues are called props. For example, connect the monitoring devices to the 'patient'; if you don't have anything to link them to, you can conceal the cables behind the pillow. Moulages help assist in the assessment of patients. For example, creating cyanosis in a baby with hypercynotic spells by painting the lips and tongue blue with the help of watercolour. Moulages aids in meeting the learning objectives [Figure 2]. According to published research, moulage is a reliable tool while creating scenarios that involves assessing, identifying and managing burns and skin diseases.[4]

SIMULATION ZONES

Another aspect that needs to be considered while designing the scenario is the learner's experience. A simulation scenario designed for a novice learner would differ from the simulation scenario for an experienced learner. Simulation scenarios can, therefore, be categorised into various SimZones based on the type of learners the facilitator is catering to.[5]

Solitary learners frequently use virtual simulation technology to practice autofeedback tasks included in Zone 0 simulations. Foundational clinical skills are taught through practical education in Zone 1 simulations. Acute situational teaching, such as clinical fake codes, is included in Zone 2 simulations. Zone 3 simulations support the development of teams and systems by having real, native participant teams. Translation of Zone 3 in real patient care settings is known as Zone 4 [Figure 3].

Figure 1: Room setup for simulation

Figure 2: Moulage exhibiting a burnt hand with blister and a hand with ulcer

	Zone 0 Auto feedback	Zone 1 Foundational Interaction	Zone 2 Acute Situational Instruction	Zone 3 Team and System Development	Zone 4 Real life Debriefing & Development
Learners and goals	Individual learners Learning procedural skill	Individual learners Learning procedural skill	Partial team with role playing Learning procedural , developing proficiency	Full native team(no role playing) Building shared understanding and innovative solution	
Clinical signal and Noise	Isolated clinical content Less distraction	Isolated clinical content Less distraction	Complex embedded clinical content More distraction	Complex embedded clinical content More distraction	Complex embedded clinical content Authentic distraction
Action and debriefing	Auto feedback	Pause and correct Instructor provides mastery feedback, teaching	Uninterrupted action Instructor provides mastery feedback, teaching	Post event debriefing Facilitator guides positive refection and development	
Examples	Auto feedback skill practice Virtual reality Skill practice	Procedural Skills workshops Clinical orientation	Mock codes Acute situational training	Crisis team training and development Cross Specialty system development Human factor development	

Figure 3: SimZones in simulation

SCRIPTING THE SIMULATION SCENARIO

Once the needs assessment and SimZone are selected, the next step is to start scripting the scenario. The first part of the scenario writing is the case history on which the simulation will be based. While writing the case scenario, the subject experts need to be consulted to maintain conceptual fidelity. For example, vital signs are consistent with the diagnosis. Preparing a prebriefing plan is the next important step that helps establish a psychologically safe learning environment.

Embedded actors: An embedded participant is an experienced professional who acts as a team member in a simulation scenario. The embedded participants are well-versed in the scenario and help steer it in the right direction to meet the learning objectives.[5]

PREPARATION

In continuation with preparing the prebriefing plan, the facilitator needs to list down all the equipment required to run the simulation effectively, which includes the type of necessary mannequin, medical equipment such as airway devices such suction machine, oxygen device, endotracheal tube, laryngoscope, intravenous cannula, syringes, drugs, nasogastric tube, defibrillator etc.

Learners must come to the simulation scenario with adequate knowledge of the subject matter on which the scenario is based. The facilitator can provide reading material a few days prior or discuss the content before starting the simulation scenario. This will enable the learners to focus on learning psychomotor and affective skills during the session, which is the core purpose of simulation.[6] When learners come to the learning session with adequate preparation, they are more likely to be engaged in the simulation, and there will be fewer interruptions in the continuity of the scenario's progress.[7]

PREBRIEFING

The prebriefing starts with an introduction of the facilitators and the learners. A brief ice-breaking activity, such as asking each member about their favourite food or hobby, can establish a conducive learning environment. It is essential to convey to the learners that whatever happens during the simulation will be kept confidential, and the learners must not discuss mistakes or behaviours of other learners outside the simulation session. The facilitator can also maintain a basic assumption that all learners are intelligent, interested, and willing to improve patient care, which will enhance the psychological safety of the session. A fiction contract is established with the learners to treat the mannequin as real. The facilitator must get the participants oriented to the learning environment. The learners are instructed to suspend their disbelief and feel as real as possible. The facilitator can use the given "name" of the mannequin while introducing the mannequin to the learners with normal parameters to enhance realism. It is also essential to mention embedded participants and their role in the scenario.

PROGRESSION OF SCENARIO

Scenario scripting needs to be done systematically, keeping conceptual fidelity in mind. The stages of the scenario need to be precisely planned. The scenario script should include the patient's condition, simulator parameters, expected outcomes and facilitator notes. The role of the embedded participant is mentioned clearly in the scenario progression sheet. Table 1 shows a sample format of how to write scenario progression.

DEBRIEFING

Debriefing is the cornerstone of simulation-based education, where introspection of the event and discussion take place in a non-threatening environment. According to Lederman, the debriefing process consists of seven common structural elements: the debriefer, the participants, the impact of the experience, the recollection of the experience, the mechanisms for reporting on the experience and the time to process it.[8] Several debriefing frameworks have emerged to guide the process of debriefing. Most of these frameworks align with the elements described by Lederman. Some of these frameworks are outlined in Table 2. Regardless of the debriefing framework used, perhaps the most important task of the facilitator is to create an atmosphere where the learners are free from blame and ridicule and honest, open discussion can take place. The goal of the debriefing should be to learn from the mistakes and to improve.

The approach to debriefing can be learner-guided or facilitator-guided. This will be primarily decided by the expertise and experience of the debriefer, as well as that of the learners. For example, novice learners may need more of a facilitator-driven approach,

Table 1: Example of scenario progression – cardiac arrest

Stage	Patient condition	Simulator parameter	Expected intervention	Faculty, actor notes
Stage 1 4–6 min	Gen: unconscious airway: not maintained No air entry No breathing No pulse The patient was pale, unresponsive	HR: pulse not felt. RR: nil. BP: Not recordable ECG: Asystole SpO_2: not recordable	• Hand sanitiser and gloves • Identifies cardiac arrest • Call for Code Blue Team • Team leader allocates roles (compressor, airway, monitor/defib, IV injection, CPR coach) to each team member • Compressor at the right side, Airway person at the head end, Monitor/defib at the left side, IV at the left side, and Team leader at the foot end. CPR coach in the middle for a femoral pulse check • Start high-quality CPR • Ratio 30:2 in case of single rescuer. Two-rescuer ratio is 15:2. • Rate – 100 compression/min • Depth – approx. 2 inches or 5 cm • One breath over 1 s with a visible chest rise. • Avoid hyperventilation. • Minimum interruption of <10 s	• If they do not feel for a pulse and only look at the monitor, then pause and debrief • If the right roles are not assigned, then pause and debrief • If they do not apply a cardiac board before starting CPR, then pause and debrief • If they do not apply a step stool before starting CPR, then pause and debrief • If the rhythm is not identified as asystole, then pause and debrief • If CPR coach role is not assigned, then pause and debrief with the demonstration of CPR coach role • If any of the components of the high-quality CPR is not performed or performed inappropriately then pause and debrief • Pause and debrief till the ergonomics of resuscitation are not correct

Table 2: Debriefing frameworks used in SBE

Framework	Phases	Description
Three-Phase Model (Debriefing with good judgement)[8,9]	Reactions	Explore, identify and acknowledge learners' emotions/feelings towards the simulation event
	Analysis	Identification, directed discussion and feedback on key performance gaps
	Summary	Summarise learning in view of objectives and review key learning points
GAS Model[10]	Gather	Narration of event by team leader with inputs from the other learners
	Analyse	Explore using reflection and close relevant performance gaps
	Summarise	Summarise learning in view of objectives and review key learning points
Team GAINS[11]	Reactions	Explore, identify and acknowledge learners' emotions/feelings towards the simulation event
	Clinical debriefing	Explore and debrief the clinical event.
	Transfer	Relate the simulated experience to reality
	Behavioural skills discussion	Discussion of behavioural skills and relation to clinical outcomes
	Summarisation	Summarise the learning experience.
	Repeated practice	Supervise clinical practice
PEARLS healthcare debriefing tool[12]	Reactions	Explore, identify and acknowledge learners' emotions/feelings towards the simulation event
	Description	Determine the progression of the event to establish a shared mental model
	Analysis	Explore and close relevant performance gaps
	Summary	Identify vital take-home messages.

whereas experienced learners can steer the discussion themselves with minimal guidance. The learning objectives and complexity of the simulation scenario will also decide the approach to debriefing.

The analysis phase of the debriefing is where most of the reflection and learning takes place. Some of the methods of facilitation during this phase are as follows: (1) Directive feedback, (2) Plus Delta and (3) Advocacy inquiry.[13] Directive feedback is a technique that is highly facilitator-driven. Here, the facilitator provides solutions to most of the performance gaps, dominating the discussion. It can be used for novice learners, but one has to be careful as it discourages open discussion. Plus Delta facilitates the analysis phase whereby the facilitator elicits the positive ('Plus') and negative ('Delta') actions or inactions the learners perform during the scenario. This technique is helpful to open up discussions and lead the learners into deeper reflective learning, and also when there is limited time available for debriefing. Advocacy inquiry is a facilitation technique wherein the facilitator explores the frame of mind behind an action that has occurred. The facilitator assumes a stance of genuine curiosity as to why a particular action led to the worsening patient's condition and seeks to know the reason for the action. For example, '*Nurse Rashmi, I observed that chest compressions were delayed by 2 minutes after*

the patient went into cardiac arrest. I am concerned that this led to further delay in return to spontaneous circulation. I am curious to know why there was a delay in starting chest compressions.'

Advocacy inquiry seeks to explore the non-technical skill gaps during team simulation training and help address performance errors due to human factors.

PILOT TESTING

A dry run or rehearsal of the whole simulation-based experience, once the design is complete to ensure it serves the intended purpose, allows learners to accomplish goals and works effectively for them. When implementing the pilot programme, note any unclear, absent or inadequate components of the simulation-based experience. It may not always be possible to test the simulation-based experience before facilitation. Sometimes, feedback from learners also provides meaningful inputs and fine-tuned scenarios for future utilisation.

CONCLUSION

Designing an effective scenario requires meticulous planning to provide real-life experience. Considering the anticipated performance or knowledge gap, every simulation scenario must be prepared.

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