EDITORIAL

Simulation-based activities: How to get started?

Actividades basadas en simulación: ¿Cómo empezar?

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Clinical simulation has established itself as an essential educational tool in the health care field. Its main objective is to improve patient safety by promoting the acquisition of technical and nontechnical skills through the construction of a parallel reality that allows for the development of individuals, teams and organizations. It has been used in emergency care settings[1] to train staff on the response to critical situations, which is particularly relevant in pediatrics, given their low incidence. Currently, simulation is being applied to a growing number of activities outside critical care.

The purpose of this editorial is to provide a summary of the key processes to consider in the design and implementation of simulation-based activities (SBAs).

Experiential learning as an educational tool

The theoretical model that supports SBAs is the experiential learning cycle described by Kolb and Kolb.[2] This theory conceptualizes learning as a dynamic and cyclical four-stage process that is triggered by a concrete experience (in this case, a simulation scenario). The second stage is to observe and reflect critically on the experience. The third involves abstract conceptualization to develop theories or models to apply to new experiences (in an SBA, reflection and conceptualization take place in the discussion following the scenario). Last of all, the fourth stage involves active experimentation, in which the participant applies the theoretical models to new situations (simulated or real), which become new concrete experiences, thereby closing the circle. The strengths of experiential learning, which link theory with practice, allow adaptation to different learning styles and promote autonomy as well as critical reflection, making SBAs a very effective educational approach.

Simulation-based activities as an ongoing improvement process

The ADDIE model (Analysis, Design, Development, Implementation and Evaluation)[3] offers a structured and systematic framework to design, develop and implement effective educational activities. Table 1 presents the ADDIE model applied to SBAs. To design a SBA that has an impact on learning in participants, a preliminary needs analysis should be conducted, using different methodologies, in addition to establishing specific, measurable, achievable and relevant

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Table 1 Stages of simulation-based learning with the ADDIE approach.

A	Analysis	Identify learning needs (participants, instructors, organization)	
		Establish learner profile and identify necessary resources (human and material resources, time)	
D	Design	Establishing the objectives	
		Designing the evaluation plan	
		Selection of educational approach or methodology (SimZones)	
		Selection of dissemination channels	
		Planning	
D	Development	Developing and producing or securing educational materials and learning resources	Scenario design (authenticity)
			Develop prebriefing and/or debriefing plan
I	Implementation	Creating an environment conducive to learning (psychological safety)	Prebriefing and briefing
		Setting up a specific experience	Scenario
		Reflective observation + conceptualization	Debriefing
		Summary leading to the real or simulated experience	Closure
E	Evaluation	Assess learning outcomes and quality of instruction with pre- and post-simulation assessments	Kirkpatrick's Four Levels of Training Evaluation

objectives within a given time frame. Once the activity is developed and implemented, the process must be evaluated to assess whether the objectives were achieved and to identify areas for improvement for instructors or new needs among participants. Kirkpatrick's Four Levels of Training Evaluation[4] is one of the models most widely used for the purpose.

Design of a simulation-based activity. The SimZones model

The SimZones model proposed by Roussin y Weinstock[5] is a system for organizing SBAs that takes into account the experience of participants and the learning objectives. It divides simulations into five zones (Fig. 1), of which the last one corresponds to learning in situ in the real-world work setting.

In *zone 0*, learners are inexperienced, there is no instructor and the feedback is automatic: A surgeon learns a new laparoscopic technique using a specific simulator. *Zone 1* simulations are for learning foundational technical skills: a group of residents learn how to perform orotracheal intubation. *Zone 2* are used for acute situational instruction on technical or nontechnical skills: residents practicing the management of septic shock. The goals in these zones are related to the actions that need to be performed and how they need to be performed to achieve the expected outcomes.

In *zone 3* simulations, the objectives involve evaluating the cognitive frames that affect decision-making when a team faces a complex situation. These SBAs promote the development and growth of expert care teams and are chiefly applied to native teams.

On the other hand, the debriefing is the intentional discussion that follows a simulation experience and is the linchpin of experiential learning. The SimZones model takes into account the level of experience of the learners and the type of learning objectives to select the approach to debriefing. In zone 0–2 simulations, a debriefing aimed at correcting actions without questioning the underlying assumptions is preferred, using a more instructional approach with inexperienced participants (zone 1) or a more reflective approach with more experienced participants (zone 2). Zone 3 simulations use a debriefing approach that involves questioning and modifying one's own mental models or scripts, promoting profound changes through reflective feedback and facilitator support. Thus, the SimZones model adjusts the type of debriefing according to the learners' experience, encouraging critical reflection and ongoing professional development.

Implementation of a simulation-based activity

The implementation of an SBA consists of four stages: *prebriefing, briefing, scenario* and *debriefing*. *Prebriefing* includes prior preparation, during which the purpose and objectives of the simulation, the ground rules for participation and the materials are explained. A key point that must be established during the prebriefing and maintained throughout the activity is psychological safety, which could be defined as the shared belief among team members that each of them can take risks without fear of being judged by the rest of the team or the facilitator. These components includes elements such as confidentiality, respect and curiosity.

Briefing is the specific introduction to the scenario and provides context to participants just before it begins. Both prebriefing and briefing are necessary for participants to become involved and to elicit mental, physical and emotional processes that are as similar as possible to a real-world situation.
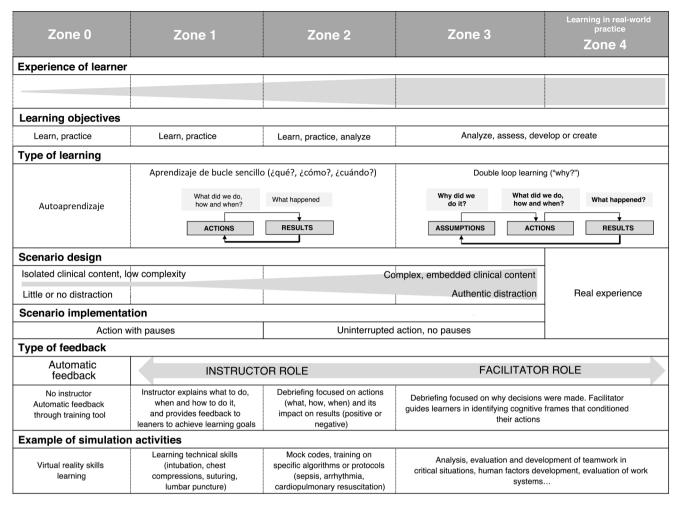
	Zone 0	Zone 1	Zone 2	Zone 3	Learning in real-world practice Zone 4
Experience of learner					
Learning objectives					
	Learn, practice	Learn, practice	Learn, practice, analyze	Analyze, assess, develop or create	
Type of learning					
	Autoaprendizaje	Aprendizaje de bucle sencillo (¿qué?, ¿cómo?, ¿cuándo?) What did we do, how and when? → What happened ACTIONS ↔ RESULTS		Double loop learning ("why?") Why did we do it? / What did we do, how and when? / What happened? ASSUMPTIONS ↔ ACTIONS ↔ RESULTS	
Scenario design					
	Isolated clinical content, low complexity			Complex, embedded clinical content	Real experience
	Little or no distraction			Authentic distraction	
Scenario implementation					
	Action with pauses		Uninterrupted action, no pauses		
Type of feedback					
	Automatic feedback	← INSTRUCTOR ROLE		FACILITATOR ROLE →	
	No instructor. Automatic feedback through training tool	Instructor explains what to do, when and how to do it, and provides feedback to leaners to achieve learning goals	Debriefing focused on actions (what, how, when) and its impact on results (positive or negative)	Debriefing focused on why decisions were made. Facilitator guides learners in identifying cognitive frames that conditioned their actions	
Example of simulation activities					
	Virtual reality skills learning	Learning technical skills (intubation, chest compressions, suturing, lumbar puncture)	Mock codes, training on specific algorithms or protocols (sepsis, arrhythmia, cardiopulmonary resuscitation)	Analysis, evaluation and development of teamwork in critical situations, human factors development, evaluation of work systems…	

Figure 1 *SimZones* model for organizing simulation-based learning. Adapted from Roussin and Weinstock.[5]

The scenario is the specific experience that will be reflected upon and subsequently conceptualized. It includes elements that give it physical realism (perceived by the senses), conceptual realism (coherence of what happens in the scenario) and emotional realism (emotions similar to those of real-world practice), providing an experience that facilitates the interaction among participants that is as faithful a reflection of reality as possible.

Debriefing is the core and longest part of an SBA. In this stage, learners receive feedback to improve their skills. For it to be effective, it is structured in key phases:

- Reaction: participants expresses the feelings triggered by the scenario; this step helps release stress and prepare for analysis.
- Description: the simulation is recalled and summarized, including the challenges experienced in the scenario, to gain a clear and objective record of what took place. Participants are thus led to reflect on what occurred during the simulation.
- Analysis: recording of observations. Critical reflection is encouraged in order to identify successes and mistakes and build models or concepts that can be applied in the real world.

- Summary: key learnings are summarized and participants are encouraged to integrate what they have learned into real-world situations or future simulations.

Simulation beyond the training of individuals (teams and systems)

Simulation-based activities offer a unique opportunity for teams to practice and evaluate their behavior in terms of teamwork and other nontechnical skills (leadership, communication, etc) while participating in realistic scenarios under conditions that are safe both for patients and the members of the team. Simulation is also a useful tool in the analysis of systems and the design of work protocols or spaces, as it helps narrow the gap between how the work is perceived and how it actually is.

References

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