CHAPTER 35

Designing a Simulation-based Learning Session in Skill Lab

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Key Points

- Training on manikins or task-trainers in skill labs for acquiring procedural skills has been envisioned in the new competency based curriculum.
- Skill labs have been set-up across all medical colleges in India.
- For training in procedural skills using manikins or task-trainer, a skill module must be designed beforehand.
- A typical simulation-based cycle will consist of three phases: Prebriefing, immersion and debriefing.

INTRODUCTION

The medical regulatory body of India—National Medical Commission (NMC) has made it mandatory for all the medical colleges in India to establish a skill lab (National Medical Commission, 2019). These labs are supposed to equip with manikins and part-task trainers. Further to train the students using skill labs and simulation-based learning; a structured module has been published by the regulatory body (Medical Council of India, 2019).

The curriculum designed by NMC for different subjects for undergraduate medical training in India contains some subjective competencies, which need to be attained through simulation-based learning. For example, in the subject of pharmacology, competency PH4.2 is *administration of drugs through various routes in simulated environment using manikins* (Medical Council of India, 2018, p. 143). One can design this simulation by using part-task trainers. Moreover, in the subject of medicine, during their fourth year of MBBS training, students are required to independently set-up an intravenous infusion in the patients (Medical Council of India, 2019, p. 4). This necessitate to train undergraduate students using manikins and/or part task trainers, by repeat independent practice, once the skill has been performed by the instructor and has been observed by the students, till attainment of satisfactory skills, so that they can perform the skills in the patients.

In this chapter, we will outline a feasible and practical plan to conduct a simulation-based learning session in skill labs in Indian medical colleges, and the rationale behind

the whole process. Few tips have been provided, based upon our personal experience in conducting these sessions.

DESIGNING A SIMULATION-BASED LEARNING SESSION

The first and foremost activity, before planning any simulation-based learning session is to design the learning objectives (LOs) of the session. After designing the LOs, facilitator/instructor must ensure that the designed LOs will be achieved with the planned simulation-based activity. Designer of the simulation activity must prepare a structured module for the simulation activity. To achieve outcomes, the design and development of simulation-based sessions must follow certain criteria, as outlined by INACSL Standards Committee (INACSL Standards Committee et al., 2021). It is advisable to use templates for simulation building; also known as 'Simbuild Template' (template for simulated patient based session is available from https://emsimcases.com/template/).

Tip 1: The skill training module released by NMC contains templates for designing a session/module along with some examples. These templates serve our purpose.

Before starting the session, facilitator must ensure that all the equipments and infrastructure required for the conduct of the session is available at the designated place. These simulation-based sessions conducted using manikins and part-task trainers typically consist of three phases – prebriefing, exposure to simulation-based experience (immersion), and debriefing (Chamberlain, 2015) (Fig. 35.1).

Tip 2: *It will be a nice idea to video-record these sessions, for further viewing, self-assessment and reflections, and feedback. One must plan before-hand for the same.*

Prebriefing

Prebriefing encompasses all the activities conducted prior to the start of actual simulation, including preparation activities and briefing activities (Chamberlain, 2017). A Delphi study involving simulation experts defined three phases of pre-brief, *viz*. planning, briefing and facilitating (McDermott, 2016). Prebriefing session helps to prepare and orient the learners and set the tone for the upcoming simulation exercise

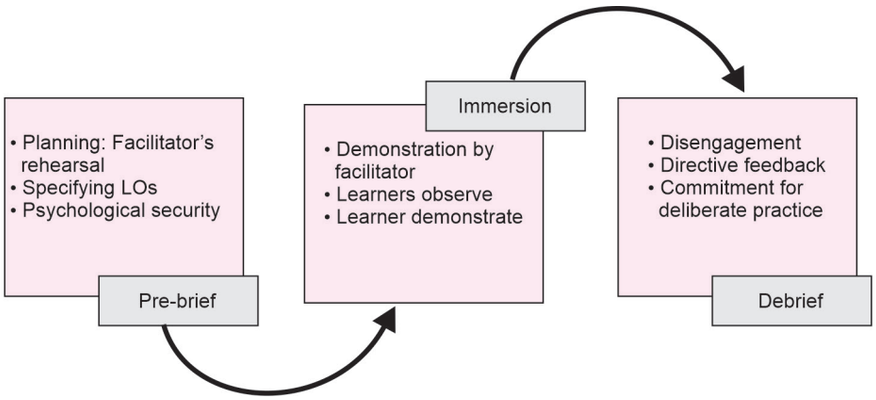

Fig. 35.1: Phases of simulation-based learning activity

and debriefing (Stephenson and Poore, 2016). Simulation exercise has been documented to provoke performance anxiety in the learners, which may develop into psychological distress. Video recording of such simulation sessions can further augment the distress (Henricksen et al., 2017). On the other hand, prebriefing has been documented to create psychologically safe environment, thus lowering the learners' anxiety (Rudolph et al., 2014). A structured and optimally conducted prebriefing session is reported to improve the outcome of debriefing and reflections (Page-Cutrara, 2015).

Tip 3: Prebriefing can start with the process of rehearsing of the simulation activity by the facilitator, if such a need is demanded.

Dieker et al (2019) has reported that behavior changes in the simulation that occurred due to rehearsals was transferred back to the classroom setting and improved the targeted teaching practices.

During the simulation session proper, after customary introduction, facilitator must correlate the simulation-activity with the curricular demand of the students (NMC curriculum of that particular subject). This is important to 'set the scene'. Besides, this orientation to the relevance of the content keep them motivated and engaged (Johansen, 2023). The purpose of video recording must be explained to the learners and their consent must be taken. Next step will be to outline the LOs of the session to the learners, and explain the outcomes expected from them. Effective learning objectives have been documented to improve the engagement of the learners with the content (Mager, 1997).

Tip 4: LOs along with other instructions and entire plan of session can be displayed on the power-point slides, if a projector is available in the demonstration/debriefing room attached to the skill lab.

A well-designed power-point has been reported to manage the instructor's and learners' cognitive load (Castro-Alonso et al., 2021). A written prebriefing plan has also been documented to standardize the process (Willhaus et al., 2014) and balance the cognitive load demand of the learners (Reedy, 2015).

Next step in prebriefing will be to ensure 'psychological safety' of the learners, which is one of the vital requirements for ensuring learning oriented environment in the simulation-based learning (Turner and Harder, 2018). Participants can be reassured by stating that the particular simulation activity is for learning purposes only, that they will not be assessed on the basis of this single activity, and that they will get ample opportunities for repeat practice before being certified.

At this juncture, learners must be briefed about the degree of reality (fidelity) they should expect in that particular simulation session. It must be explained to them that they are going to work on simulator which mimic reality, but many elements of the real-life experiences will be missing, and such elements must be briefed to them. This is important to establish a 'fiction contract' (Sharma et al., 2023). Thus, participants must be well aware - what can be simulated and what are the limitations of the simulator (Rutherford-Hemming et al., 2019).

Tip 5: Never try to hide anything from learners, considering the fact that you are working on a low fidelity manikin. A transparently established 'fiction contract' ensures better learning.

A prebriefing session, designed by taking in to account all the above mentioned tasks will ensure that all the four prebriefing practices described by Rudolph et al. (2014) for

establishing a safe container for learning in simulation *viz*. clarifying the expectations, creating a fiction contract, securing all the logistics, and ensuring psychological safety are met.

Immersion

It is postulated that simulation-based experiences must be immersive in nature (Lateef, 2010). Immersive experience conveys the meaning that the participants are involved with the simulation as if it is a real world (Gaba, 2004). Zhang (2020) described immersion as an illusion that engulfs participants' senses and stressed that perception of reality is influenced by participant's imaginative abilities.

While designing your immersive simulation activity, first consult your LOs and reinsure that the learning activity will be able to achieve the LOs—ensure that the immersive activity is in constructive alignment with the LOs (Biggs, 1996). The effectiveness of constructive alignment in promoting students learning and achieving curricular goals is well-established (Hamdoun, 2023).

Next important thing is to choose the proper simulator for the immersion – high fidelity or a low fidelity task-trainer; choice will be influenced by many factors, *viz*. cost, availability, instructor's competence, time availability for such sessions etc. The cost-effective task-trainers have been proven to provide opportunities for learning of specific procedural skills without compromising on the clinical reasoning and learners' satisfaction (Lapkin and Levett-Jones, 2011).

Tip 6: Most of the procedural-skill related curricular competencies of NMC undergraduate curriculum can be achieved with low fidelity manikins or part-task trainers, instead of costlier high fidelity manikins. Have those in more numbers, so that learners get ample opportunities to practice independently.

Next step obviously is to conduct the immersive activity—the simulation activity in actual. By this time the methodology must have been decided. What choice we have? Indian regulatory body has recommended demonstrate-observe-assist-perform (DOAP) session for skill training of undergraduate medical students (Medical Council of India, 2019, p. 1; Sundeep and Pillai, 2020). In a typical DOAP session, the skill is first demonstrated by the facilitator and the participants observe it, then participant assist the facilitator in conduct of skill activity and afterwards perform independently—the learning material used may be a manikin, part-task trainer or real patient (Fig. 35.2).

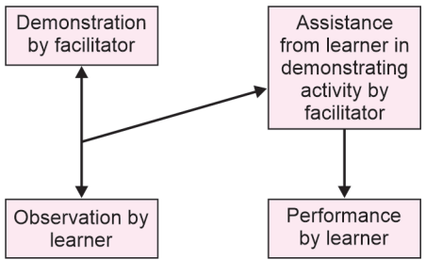

Fig. 35.2: Demonstrate-observe-assist-perform (DOAP) session

Tip 7: Designer of the simulation activity and the instructor need not be same. It is advisable not to overdo it; choose specialist simulation instructors (if available) for conduct, once you have designed it as faculty.

As stated earlier, it will be good idea to video record this immersive activity as well, including performance by the students, for future self-assessment and feedback.

Debriefing

Debriefing is the process intended to be carried out immediately after the simulation activity is over, for the purpose of—analyzing performance, providing feedback to the learners and providing opportunities for reflections by the participants for future improvement (Al Sabei and Lasater, 2016; Kim and Kim, 2017). The debriefing process has been reported to enhance learners' knowledge, skill acquisition and satisfaction (Fegran et al., 2023). The unequivocal effect of learners' reflection (Alf, 2023) and elaborative feedback (Van der Kleij, 2015) in improving learners' performance in simulation-based environments is adequately supported by published literature.

Many models are available for debriefing and these models have been explained in detail in Chapter 34 of this book. However, there are three essential components of any debriefing model—reflection-on-action by learners, elaborative feedback by facilitator, and commitment for future action.

Tip 8: During debriefing, learners should be given an opportunity to view their recorded performance. This prompts learners to reflect in a better way.

The selection of any particular debriefing method will depend upon the expertise of the facilitator, type of simulation activity, learners' phase of training, and time-constraints. For conducting procedural skill simulation-based session in our set-up of undergraduate medical training in Indian medical colleges, we strongly recommend 'rapid cycle deliberate practice (RCDP) in medical simulation' approach for debriefing (Peng and Schertzer, 2024). This approach has been explained in detail in Chapters 21 and 34 of this book. As per RCDP approach, when application of learnt skill on actual patients/clinical set-up is not immediate, repeated sessions of skill learning in simulation are arranged, along with micro-debriefing (Peng and Schertzer, 2024). In fact, feedback can be initiated within the simulation activity (during immersive phase), as per this approach (Patricia et al., 2017). RCDP has also shown promise in learning procedural skills (Gross, 2019).

In our set-up, students are going to apply their knowledge on actual patients, only during final years of training or sometimes during internship. Attrition of knowledge by then is bound to happen. Moreover, they are supposed to repeatedly practice the skill using simulation, for certification purposes—deliberate practice. RCDP approach also allows feedback during the immersive activity, which is often required in DOAP approach while student is performing the activity. So, RCDP approach is perfect for use in our case.

Though procedural skill training using manikins or task-trainers is not emotionally engaging and draining activity for the learners, such challenges are often faced during simulated patients-based training, particularly sessions focusing on communication

skills, empathy, altruism, etc. Nevertheless, it is important to secure disengagement of the learners from the immersive activity so as to ensure active debriefing.

Tip 9: Invite learners to a separate debriefing room/area for debriefing. This signals end of the immersive activity and ensures disengagement.

Pendleton model can be used for micro-debriefing and feedback (Pendleton et al., 2003). Pendleton model also allows learners to reflect on their actions. Directive feedback by the facilitator can be started during the simulation itself (immersion phase), when a student is performing the activity. Schober et al. (2019) in their randomized controlled trial found that 'stop-and-go' type of debriefing (where learner's performance is interrupted by facilitator feedback) have no deleterious effect on acquisition of skills compared to the classical postsimulation debriefing.

Tip 10: Don't hesitate to give feedback and correct the learner while he is doing activity during immersive phase; but do take care of 'psychological safety' of the learner.

At the end of the session, do emphasize to the learners that learning outcomes can be achieved only with deliberate practice. Do not forget to secure a commitment for future practice sessions, before their final 'assessment for certification'.

The same plan can be used for simulation sessions involving simulated or standardized patients, though the requirements, the level of simulation, the level of engagement and the methodology to conduct immersive activity will differ.

THEORETICAL UNDERPINNING

Such simulation activity is primarily grounded in the 'experiential learning theory', which states that a learner uses learning from real life experiences for constructing new knowledge (Kolb and Kolb, 2009). In medical training, those curricular related activities which give real life, hands-on experience to the students, in an authentic practice-based environment have been documented to draw their roots from the experiential learning theory (Yardley et al., 2012). This implies that in medical training, the best learning happens while learning through exposure to live patients. But considering the patient safety issues (as stated in Chapter 29 of this book); the simulation based activities are considered to be best suited alternative during the initial years of medical training (Jha et al., 2001).

Kolb (1984) explained the experiential learning cycle having four phases—concrete experience, reflective observation, abstract conceptualization, and active experimentation. In the simulation-based activity design explained in this chapter, all four phases of experiential learning cycle are implicitly reflected. The initial demonstration of the simulation activity by the facilitator and subsequent performance by one student constitute the concrete experience; the constant observation and then self-assessment during the debriefing constitute the reflective observation phase; directive feedback will help in abstract conceptualization; and commitment for further practice for certification purposes will keep the opportunities open for further active experimentation (Fig. 35.3).

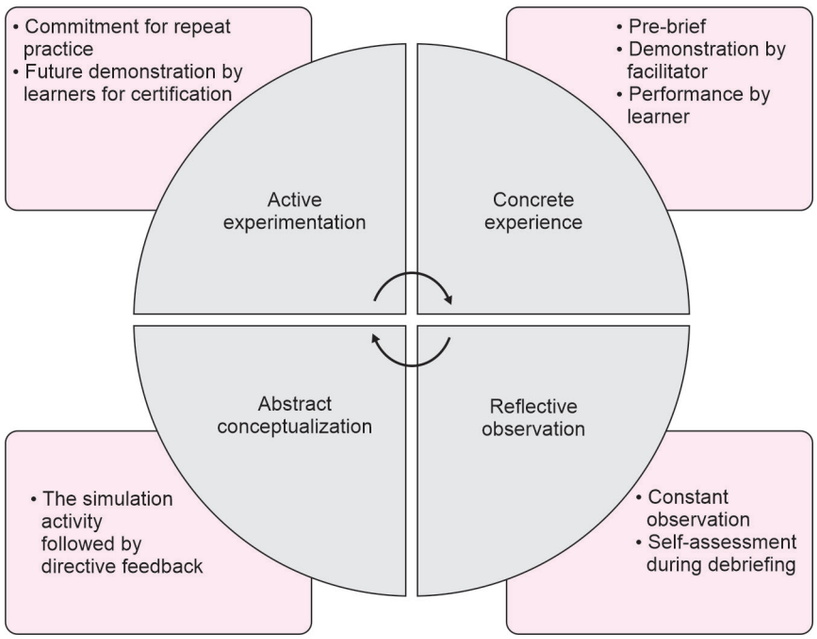

Fig. 35.3: Incorporation of phases of experiential learning cycle in the simulation-based activity

SUMMARY

Medical simulation is considered as a technique which not only replaces but at the same time amplifies the real experiences on live patients with immersive and interactive experiences created using manikins or virtual means (Lateef, 2010). Procedural skills can be learnt by the learners with the use of low fidelity task-trainers. This not only enhances patients' safety, but also provides opportunities to the learners for deliberate practice.

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