SHORT REPORT

The past, present and future of simulation-based medical education (SBME) in Pakistan: a short report

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Abstract

Simulation-based education has been widely implemented in fields such as the aviation industry and the military. Its applications to the field of healthcare education have started to show significant promise globally over the last few decades. Medical education institutions in Pakistan have relied primarily on traditional forms of didactic lectures, apprenticeship models and small-group clinical sessions for clinical skills education in medical schools. Despite this, simulation-based medical education centres have started to emerge in Pakistan over the last few years and have shown promising results. These centres provide a spectrum of simulation-based education courses, while also producing research on this relatively new teaching modality. The trajectory and outlook surrounding simulation-based medical education in Pakistan look promising, but there are some challenges, like financial constraints and lack of trained personnel. The current study was planned to compile a comprehensive catalogue of existing simulation-based education centres in Pakistan, and to describe the current landscape surrounding simulation-based medical education.

Keywords: Simulation, Military, Clinical, Health Care.

DOI: https://doi.org/10.47391/JPMA.9221

Introduction

Simulation is defined as the technique of imitating the behaviour of a situation or process (whether economic, military, mechanical, etc.) using a suitably analogous situation or apparatus, especially for study or personnel training.[1] While this mode of training has been widely implemented in the fields of aviation and military, its applications to healthcare education have also shown significant promise over the last few decades.[1] Medical simulation has been used for centuries to teach medical students about body anatomy and surgical procedures on cadaveric models. The revolution of modern medical simulation training can be traced back to Åsmund Lærdal, a Norwegian toymaker who collaborated with anaesthetists to design 'Resusci-Anne', a part-task trainer that permitted resuscitation training with a low-cost model.[2] With the increasing focus on patient safety worldwide, simulation-based medical education (SBME) can facilitate the training of future healthcare providers to refine their skills before interacting with patients in clinical settings, thereby improving patient outcomes.[3]

Globally, medical institutions embrace SBME modalities as the gold standard for teaching future healthcare providers.[4] In contrast to the classic apprenticeship model, SBME is relatively new. Since it enables control over the sequence of tasks, SBME offers opportunities for support and guidance to learners, prevents unsafe and dangerous situations, and can recreate scenarios encountered rarely in the real world. However, due to the uneven distribution of SBME centres around resource-limited regions, the implementation of this relatively new learning modality has been difficult due to the cost and expertise required.

Pakistan, although categorised as a low- and middle-income country (LMIC), has seen recent advancements leading to the development of SBME as a means to preparing future healthcare providers. The current study was planned to compile a comprehensive catalogue of existing SBME centres in Pakistan, and to describe the current landscape surrounding the phenomenon.

Methods and Results

The current study conducted in January 2023, first undertook a literature search on MEDLINE, EMBASE and Google Scholar databases to determine prevailing practices and simulation centres in Pakistan. The key words used in the search included undergraduate medical education, postgraduate medical education, simulation, Pakistan, and LMIC. Subsequently, the web was searched in general for currently functioning SBME centres and skills laboratories in Pakistan, and they were contacted via telephone to gather information, such as affiliations and dates of effective functioning.

The studies included were those focussing on SBME techniques, written in the English language and published within the preceding 10 years. The studies not meeting the

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Submission completed: 10-02-2023 **First Revision received:** 16-06-2023
Acceptance: 12-10-2024 **Last Revision received**: 11-10-2024

Table: List of simulation-based medical education (SBME) centres and skills laboratories in Pakistan (2023).

Name	Type	Affiliation	Location	Effective Functioning
Centre for Innovation in Medical Education	Simulation center	Aga Khan University	Karachi	2015
Asif Rehman Simulation Center	Simulation center	Dow University of Health Sciences	Karachi	2022
Clinical Skills Lab (CSL)	Simulation center	Postgraduate Medical Institute Peshawar	Peshawar	2022
Research and Skills Development Centre	Simulation center	Liaquat National Hospital	Karachi	2012
Skill Lab	Skills lab	Allama Iqbal Medical College	Lahore	2018
Skills and Simulations Lab	Skills lab	Khyber Medical College	Peshawar	2019
Clinical Skill Laboratory (CSL)	Skills lab	Fazaia Medical College, Air University	Islamabad	2021
Skills Lab	Skills lab	Fazaia Ruth Pfah Medical College	Karachi	2021
Clinical Skills Lab	Skills lab	Shahida Islam Medical Complex	Lodhran	2022
Skills Lab	Skills lab	Khawaja Muhammed Safdar Medical College	Sialkot	2016
Shifa Clinical Skills and Informatics Laboratory (SCIL)	Skills lab	Shifa Tameer-e-Millat University	Islamabad	2019

inclusion criteria were excluded. A registry of all current SBM centres and skills labs in Pakistan was generated (Table).

Pakistan, with a population of over 200 million people, employs a healthcare model mostly based on out-of-pocket payments, leading to significant disparities in care among various centres. Medical education institutions in Pakistan have relied primarily on traditional forms of didactic lectures, apprenticeship models, and small-group clinical sessions for clinical skills education.[5] Despite this, simulation centres have started to emerge in Pakistan over the last few years.

The first encounters of SBME in Pakistan revolved around partial task trainers dispersed within selected departments in certain hospitals. An example was the School of Nursing at Aga Khan University (AKU), which employed part-task trainers to teach nursing students about resuscitation, nasogastric (NG) tube insertion, and intravenous (IV) cannulation. The facilitators would get certified in SBME courses to use simulation pedagogy in teaching. The Medical College at AKU has also used simulated patients to teach physical examination and history-taking. However, there was no centre exclusively for SBME.

The first dedicated SBME centre was the Centre for Innovation in Medical Education (CIME) at AKU in Karachi. From its inauguration in 2015 and gaining the Society of Simulation Healthcare accreditation in 2019, it was the first of its kind in Pakistan. Its utility was quickly recognised, and it became an essential component of undergraduate and postgraduate training at the university. Several medical education institutions across Pakistan followed suit. Its applications were numerous: enhancing the skills of surgical residents, serving as a centre where healthcare professionals could refine their procedural skills, and simulating rural community settings.

Centres, such as the Asif Rehman Simulation Centre at Dow University of Health Sciences (DUHS) in Karachi, started to emerge. Many skills labs at hospitals evolved into full-fledged simulation centres, such as the Skills Lab at Allama Iqbal Medical College (AIMC), Lahore. Importance of SBME in preparing medical and non-medical healthcare workers for coronavirus disease-2019 (COVID-19) became evident.[6] Innovative ideas, like utilisation of gamification in simulation, has shown the potential for developing novel SBME techniques in Pakistan. Student-run societies, such as the Society for Promoting Innovation in Education (SPIE), have also emerged and increased awareness of simulation in medical universities. High-fidelity procedural simulators have become an example for SBME in these centres, while low-fidelity trainers, such as Basic Life Support mannequins, are abundantly available at most skills labs. While major cities like Karachi, Lahore and Islamabad are host to many skills labs, it is promising to see the rise of SBME labs in smaller cities, such as Lodhran and Sialkot, where the need for these novel methods of teaching is equally important to address countrywide disparities in healthcare.

Discussion and Conclusion

The advantages of SBME in resource-limited settings are comparable to those in regions with abundant resources. The trajectory and outlook surrounding SBME in Pakistan look promising, but some challenges are foreseeable, such as financial constraints and a lack of trained personnel.[7] Previous studies have shown that most SBME quality improvement projects launched in LMICs rely on external funding.[8] For sustainable development, SBMEs in Pakistan should focus on locally produced, modern, low-cost simulators that promote self-reliance.[8] This entails the development of local biomedical engineering facilities to allow for the production of simulators. Barriers to implementation also surpass the technicalities of SBME itself, and include a poorly standardised healthcare system and economic instability, which affect the utilisation of SBME centres during periods of turmoil. The COVID-19 pandemic further highlighted the importance of simulation education to alleviate limited hands-on

training. Lessons learned from the founding of CIME highlighted the value of careful planning and collaboration, particularly having a steering committee to set guidelines, leadership for implementation, marketing plans, and a financial model, along with access to qualified faculty and a proposed plan to incorporate SBME into the curricula.[9] SBME offers opportunities for tackling the lack of patient safety culture in Pakistan by allowing the incorporation of the World Health Organisation (WHO) patient safety curriculum into medical education in Pakistan. The devastating floods of 2022 highlighted the importance of building a solid curriculum in disaster medicine management and readiness, which is a task for educators and health authorities interested in ensuring that the nation's future healthcare workforce is competent. SBME proved to be effective in preparing healthcare professionals going to serve in flood affected areas on issues they might encounter. Studies based in Pakistan have shown how SBME can lead to the improvement of clinical reasoning skills among the students, while maintaining patient safety.[10]

Pakistan has proved to be a powerhouse of talented physicians and educators who have paved the way for innovative educational research and implementation. While we have come a long way from cadavers, we still have a long road ahead until SBME becomes the gold standard of education in Pakistan.

The current study has certain limitations. Firstly, some SBMEs may have been missed f they did not have an online website or contact number. Secondly, due to the lack of communication with some simulation centres, the dates may not reflect accurate data.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

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AUTHORS' CONTRIBUTIONS:
SAM: Conceptual design, literature search, reviewing and manuscript writing.
SH: Interpretation of information, revisions and content development.