

Short Communication

Can simulation-based education replace the hands-on experience learning during the COVID-19 pandemic?

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Abstract

Background: Although simulation-based learning is expensive but cost-effective and advantageous as well if utilized appropriately. It is known to enhance clinical competence among medical students. There is a dire need to enhance the utilization of simulation-based clinical teaching skills to replace hands-on experience involving patients. The objective of this article was to highlight the importance of simulation-based education (SBE) in medical training.

Methodology: For the study purpose, literature focusing on the use of SBE in medical training was reviewed. The databases including Google Scholar, PubMed, Research gate, Scopus, The Nation news, BBC news were searched using the keywords Simulation-Based Education, Clinical Skills, Vygotsky's Zone of Proximal Development, Objectively Structured Clinical Examination and COVID-19. We also designed a pilot study to demonstrate the effect of simulator-based training among medical students.

Results: Efforts are being made to support SBE as an alternative method for clinical skill training in medical and dental undergraduate students during this pandemic. As it is cost-effective, ensures patient safety, and reduces the risk of health hazards by refining the medical provider's abilities.

Conclusion: Due to the pandemic, skill training sessions on simulators via zoom can play a significant role in improving skills among medical students with the least exposure to COVID-19 infection.

Keywords

Simulation-Based Education, COVID-19, Clinical Skills, Vygotsky's Zone of Proximal Development, Objectively Structured Clinical Examination.



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Introduction

Medical and dental students are currently confronted with extremely unusual challenges due to the unexpected spread of COVID-19 infection globally. Pandemic has created a most difficult situation in conducting medical education, clinical skill training sessions for the faculty and students, and avoiding exposure to COVID-19 infected patients in hospitals. This problem can be resolved by medical faculty and clinicians adapting to SBE (Simulation-based education) as a methodology for clinical skill training for undergraduate medical students, thus enhancing students and patient safety. This will also reduce the risk of cross-infection and diseases transmission in medical and dental undergraduates, along with better patient care and improvement in clinical skill training^{1,2}.

The most serious issue in training students on patients is while examining patients who may be COVID-19 positive are at high risk of getting infected. Thus, as the students go through the clinical rotations and will be a source of increasing the number of COVID-19 cases, there is a shortage of personnel protective equipment (PPE) as per the guidelines of the Association of American Medical Colleges³.

There is no correct prediction of the exact duration these unprecedented circumstances will last. Thus the faculty and students need to adapt to the new normal in medical education and teaching methodologies. Physical distancing is most essential along with PPE in avoiding the spread of infection and is a challenge for the medical faculty and students. Physician training requires extensive knowledge and clinical skills to provide patient care. After acquiring the basic sciences knowledge, undergraduate medical and dental students are trained in clinical postings. In a study done for that by simulated-based mastery learning, all the learning objectives and skills were trained so well that one-year post-training medical students obtained high test scores⁴.

The effective implementation of simulation-based education (SBE) includes curriculum integration,

planning and trained faculty⁵. SBE can be used to assess medical and dental students for the various techniques and skills in OSCE and clinical examinations.

Strengths & weaknesses of SBE

SBE is an innovative method enabling the development of clinical skills in a risk-free environment, now used to supplement the clinical skills among undergraduate and postgraduate medical students. Planned learning opportunities are devised for students to practice clinical skills and procedural skills on simulators that can be transformed into clinical practice later^{1,2,4,6}.

Some of the benefits of a new approach to clinical teaching in undergraduate medicine include:

- Flexibility for both students and clinicians in terms of when and where clinical learning can occur, a significant emphasis on active and experiential learning, and increased generalization, standardization and integration of learning.
- The clinical skills can be broken down into smaller components which are easier for the students to master at their own pace. It offers the opportunity to practice multiple times without hesitation and embarrassment to the student.
- The learning experience can be planned to increase in complexity and diversity as the student progresses through different stages of skill mastery.

Literature is replete with studies that support clinical skills training through simulation because of significantly better scores on exams when compared with conventionally trained undergraduate medical students, either used alone or in combination with conventional methods. The only challenge associated with SBE is its cost and faculty training⁷. The available literature presents mixed results of cost vs benefit of SBE^{7,8}.

Utility of SBE during the pandemic

The rapidly evolving and uncertain pandemic situation has affected more than 80 countries worldwide; the education system experienced a drastic shift from hands-on experience learning to distant learning via zoom. The clinical teaching, however, remained suspended for long, as the facilitators were unsure regarding the risk-free intermittent learning model. However, studies on health care professions education suggest increased use of SBE and replacement of teaching in real-life with SBE to allow smooth continuity of education and reducing the risk of exposure of students while allowing their timely promotion to the next level of education at least till the pandemic crisis lasts. Universities in Singapore and Canada

put to use mannequin simulators and videotaped vignettes to replace teaching in real-life clinical settings during the outbreak of the SARS virus^{9,10}.

Simulation-based education (SBE) is being adopted in medical, educational strategies. It provides healthcare professionals to learn clinical skills in a safe learning environment. However, this will require devices for simulation or simulated patients and trained medical faculty. Figure 1 displays the Vygotsky Zone of proximal development, where the outermost zone indicates the learner cannot do on guidance. The zone of proximal development is the zone where learner can do with guidance (by the clinical skill training sessions by simulator-based training during the pandemic), and the inner zone indicates achieved development¹¹.

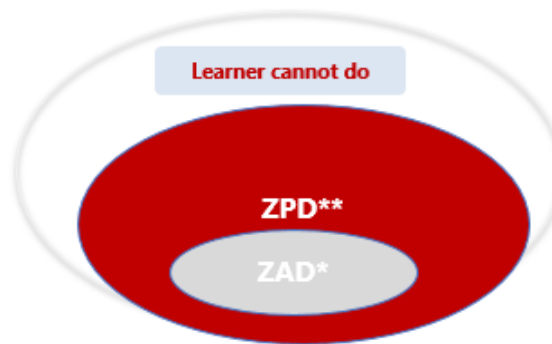


Figure 1: Vygotsky Zone of proximal development¹¹

ZAD* – Zone of Achieved development; Learner can do right now

ZPD** - Zone of Proximal development; Learner, can do when guided

Discussion

A virtual patient is a computer simulation of a live clinical case for medical students teaching and for training purpose¹²⁻¹⁴. This methodology includes dividing students into groups, and the students first attend a lecture followed by a virtual patient learning activity¹³. SBE is highly beneficial in clinical training in a time of pandemic for the undergraduate, medical school planning of education. SBE should be integrated into the medical curriculum with careful integration of curriculum to include all the important skills in accordance with the real patients. The results

revealed that simulative training could significantly enhance the graduate score of medical and dental students compared with the control.

The OSCE (objectively structured clinical examination) scores of participating medical students in the clinical skill competition¹⁵⁻¹⁸, trained using simulations, were dramatically higher than those of students trained through traditional methods, and we also observed that the OSCE marks were significantly increased for the same participant after simulative training for the clinical skill competition. Clinical teaching in traditional

medical education is provided within a short duration; in response, the knowledge and experience gained by the clinical learners lack and are insufficient to provide appropriate patient care^{7,16,19-22}. Thus SBE that can be understood, retained and practiced easily without risk of exposure is being considered a useful option in medical education during the COVID-19 pandemic²³⁻²⁶.

The outcomes of our pilot project were also reflective of the need to substitute the hands-on practicing to SBE; we conducted a pre and post-training quiz for evaluating the effect of simulation-based clinical training and hands-on demonstration. Both the groups did well after training, but SBE not only improved the clinical skills of the medical students but also saved the healthcare cost and developed a confident learning environment. The technology and design of simulation have been the mainstay of research in the past, with little attention towards the understanding of the learning theories and processes on which it is based^{7,27}. The use of SBE should be supported by theory-driven research and economic evaluation of effectiveness in terms of the improvements in students' knowledge, skills and attitudes versus the cost incurred by the stakeholders.

The medical schools must consider the simulation-based learning model using the standardized patient pool or manikins and conduct most of the clinical teaching this way to replace real-life patient teaching. As the termination of this pandemic is uncertain, but till then, the clinical teaching of medical students cannot be halted. However, we can predict that this pandemic may result in far-reaching adjustments in the way the curriculum of medicine is delivered and nurtures advancements at this critical moment.

Conclusion

Simulation provides a promising solution for the acquisition of a variety of clinical skills till the students can be allowed in the clinical environment without the risk of getting infected. Sophisticated simulations recreate the experiences of real-life to

a great extent and range from simple to complex and comprehensive tasks/ skills that are otherwise learnt in a real-life clinical environment. To explore the multitude of possibilities, simulations should be relied upon for practicing skills in a risk-free environment in replacement of clinical hours.

Conflicts of Interest

The authors have declared that no competing interests exist.

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