Transforming the Healthcare Simulation Spectrum:
Now, Next and Beyond

19 - 21 October 2022 | Academia, Singapore

CONFERENCE S3 2022

SingHealth DukeNUS ACADEMIC MEDICAL CENTRE
Institute of Medical Simulation

SESAM PROMOTING SIMULATION IN HEALTHCARE EDUCATION

SIMGHOSTS

Low-Cost Simulators: Development, Skills Targeted and Implementation

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Introduction

Simulations have developed over the past 40 years to include varying fidelities and modalities of simulation. Learning in a simulation-centered environment has benefits, ranging from improved patient care to specific skills acquisition while catering to students' numerous and varied learning approaches. The application of simulation to medical education and its amalgamation with other modes and substitutes allows for a more integrated learning and testing curriculum that advances the current trajectory of medical education. Such developments, however, are limited to resource rich areas, leaving behind low-middle income countries to use traditional, less evolved methodologies and practices. This review explores different aspects of simulation and focus specifically on low-cost task trainers and their accessibility. The purpose of the study is to assess the accessibility of low-cost task trainers in terms of cost-effectiveness, distribution, validation, and frequency within specific specialties.

Method

To acquire the required data and filter it into the relevant categories. Our search strategy involved title and abstract based analysis of publications, including the keywords: "low cost - task trainer". Upon reviewing 84 publications acquired from PubMed and filtering the relevant articles dated between 2005 and 2021, we categorized the specialty the device is specific to, whether the model has been validated or not, the price range, how recently and where the model was developed. The documentation of the selection process was conducted following PRISMA

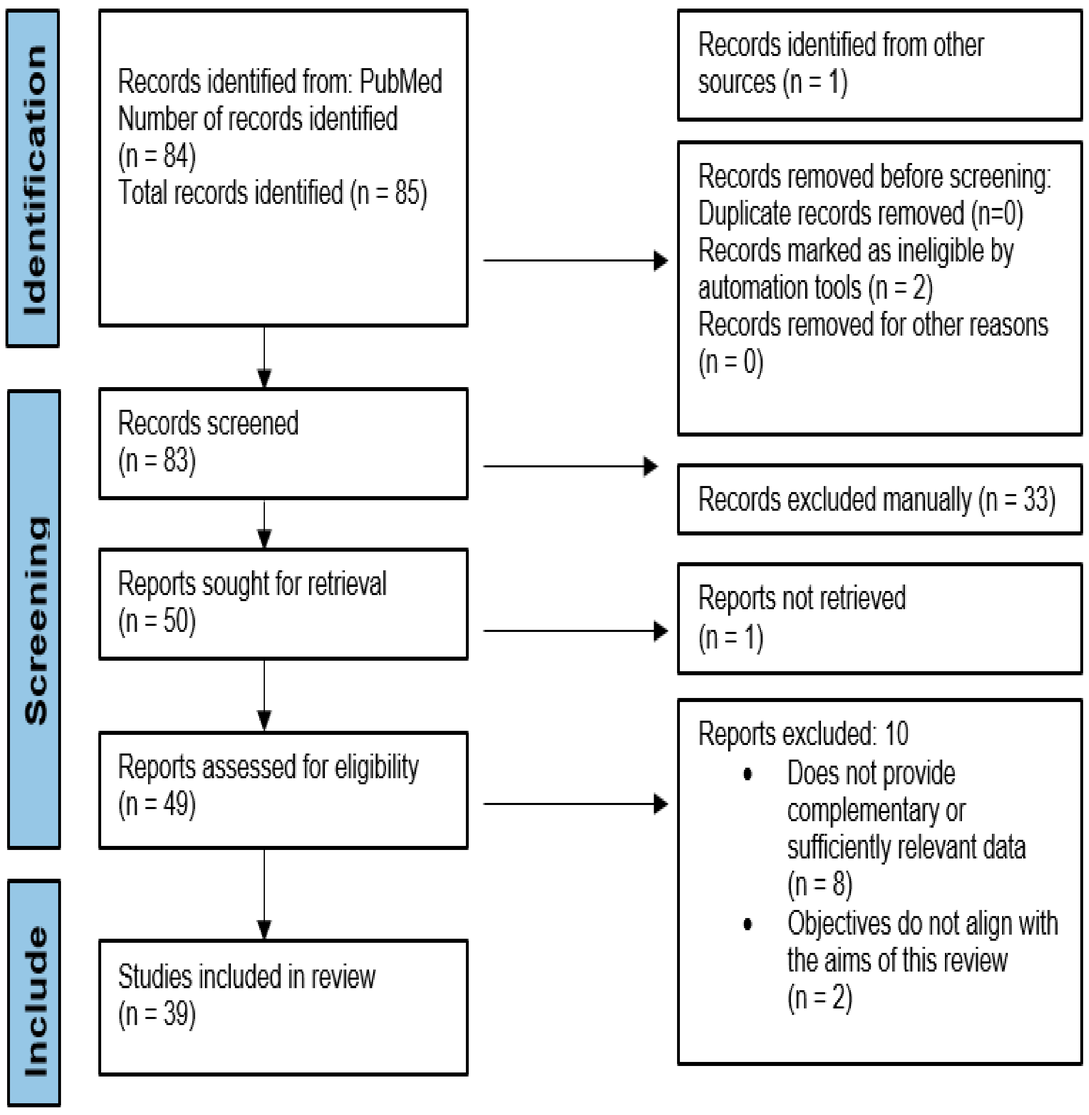

Figure 1. Systematic review of relevant publications following PRISMA

Results

After carefully analyzing the accumulated data from the selected 39 publications, most studies (i.e., 6 out of 39) were published in 2020. Emergency Medicine was the most common specialty for which low-cost trainers were developed (9 out of 39 procedural simulators); Otolaryngology followed this with 8 out of 39 trainers and general surgery with 7/39 of the task-trainers. The price ranges fluctuated and fell within the price bracket of USD 0 to USD 400 collectively. The review also uncovered the concentration of development of such innovations solely in high income countries (HICs).

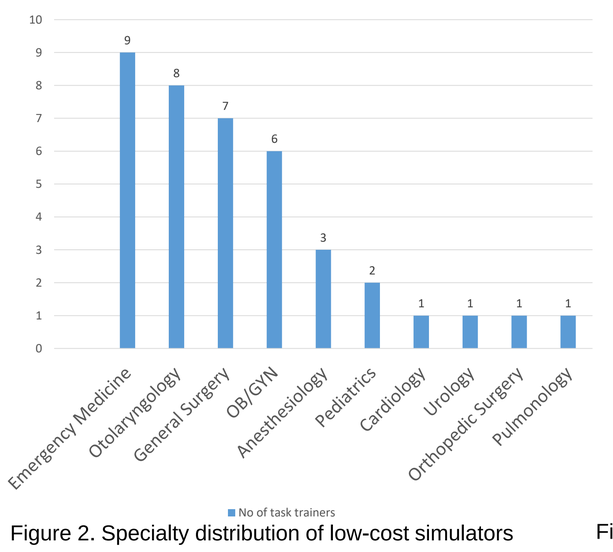

Figure 2. Specialty distribution of low-cost simulators

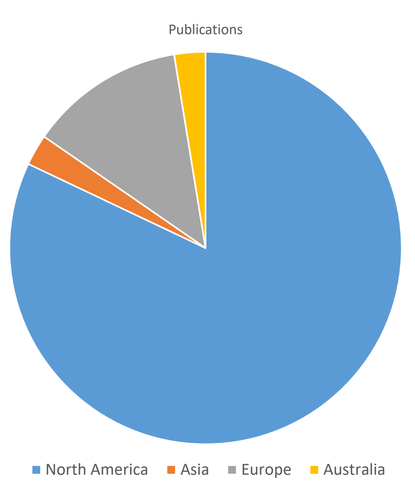

Figure 3.Distribution of publications across continents

Discussion

After a careful review of the accessibility of low-cost simulations as a means of teaching in medical education, we concluded that more advanced methods of teaching centered around realism are sparse in low-middle income countries and vary in terms of advancement, feasibility, cost effectiveness, and resource availability.
Therefore, alternatives and initiatives should be established to propagate a new, more immersive, simulation-centric medical pedagogy of which a relatively large sample can reap benefits. We have set apart parameters by which we can monitor the spread of the technology internationally and determined from our limited findings that simulation is a valuable tool that can significantly benefit multiple facets of the education of tomorrow's physicians.
Future conjunction of simulation with low-cost substitutes along with increased encouragement and enthusiasm towards developing cost effective simulation-based learning environments (SBLEs) with the reserves and requirements of these areas in mind may prove to be a reliable option for low and middle resource settings.

Conclusion

After a careful review of the accessibility of low-cost simulations as a means of teaching in medical education, we can conclude that more advanced methods of teaching centered around realism are sparse in low-middle income countries and vary in terms of advancement, feasibility, cost effectiveness, and resource availability. Therefore, alternatives and initiatives should be established to propagate a new, more immersive, simulation-centric medical pedagogy of which a relatively large sample can reap benefits. We have set apart parameters by which we can monitor the spread of the technology internationally and determined from our limited findings that simulation is a valuable tool that can significantly benefit multiple facets of the education of tomorrow's physicians.

For more information, including figures, detailed classification, and additional analysis, please scan the QR code with your phone or tablet camera.