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Comparing an Artificial Intelligence-Powered Chatbot to Standardized Patient Simulation for Teaching Breast Self-Examination: A Randomized Controlled Trial

Tanusree Biswas

Tutor / Clinical Instructor, College of Nursing, AIIMS Kalyani, India

Abstract

Background: Artificial intelligence-assisted simulation (AIAS) has emerged as a potential alternative, but its efficacy compared to SPS for BSE training has not been rigorously evaluated.

Objective: To compare the effectiveness of AIAS and SPS in teaching BSE to first-year medical, nursing, and paramedical students.

Design: An open-label, parallel-group randomized controlled trial.

Setting: Tertiary care institution in Eastern India.

Methods: 84 first-year medical, nursing, and paramedical students were randomized to receive either AIAS (n=42) or SPS (n=42) training for BSE. The outcomes assessed included BSE skill performance, knowledge, anxiety, self-confidence, and satisfaction. Assessments were conducted at baseline, immediately post-intervention, and at one-month follow-up.

Interventions

Participants in the AIAS group were provided access to the application using individual user IDs and passwords. Following an initial orientation within the app to familiarize themselves with its features, the participants used it for their BSE training. They could interact with the chatbot, view instructional videos, and practice BSE techniques guided by the app. The participants in the control group performed BSE on a standardized patient (a trained actress) using a wearable breast model in a private room under the supervision of an interventionist to ensure standardized scenario parameters. The sessions lasted for 15-20 minutes. Results: AIAS participants achieved higher immediate post-intervention BSE skill scores than SPS participants (16.4 vs. 13.1, $p<0.01$). At one month, the scores were comparable between the groups, suggesting convergence of skill retention. Both interventions led to significant and sustained improvements in BSE knowledge. No significant differences were observed between the groups in terms of anxiety, self-confidence, or satisfaction. At the one-month follow-up, 82.4% of the participants reported performing BSE, with no significant difference between the groups.

Conclusions: AIAS demonstrated superior immediate BSE skill acquisition compared to SPS, with comparable long-term outcomes across all metrics. These findings suggest that AIAS may offer an efficient, scalable alternative to SPS for BSE training, potentially addressing resource constraints in medical education, particularly in settings with limited access to standardized patients, while providing a platform for deliberate, on-demand practice.