International Journal of Innovative Research in Medical Science (IJIRMS)
Volume 09, Issue 11, November 2024,
https://doi.org/10.23958/ijirms/vol09-i11/2000

Original Article

Enhancing Psychiatry Education with WHO mhGAP Videos: Insights from Undergraduate Medical Students

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Received 05 October 2024; Accepted 06 November 2024; Published 12 November 2024

Abstract

Background: Psychiatry training is an essential component of undergraduate medical education, preparing future physicians to effectively address mental health disorders. The WHO's Mental Health Gap Action Programme (mhGAP) was developed to mitigate mental health care gaps, particularly in low- and middle-income countries. Not much information is available on the relevance and effectiveness of using these videos in enhancing the training process in undergraduate medical education. ***Aims:*** This study aimed to evaluate the effectiveness of WHO mhGAP training videos in enhancing psychiatry education for undergraduate medical students, specifically examining improvements in understanding psychiatric concepts, clinical skills, learning engagement, and cultural relevance. ***Methods:*** A cross-sectional study was conducted with 80 medical students in the psychiatry rotation at Al-Rayan National College of Medicine. Data was collected using a structured questionnaire addressing mhGAP video effectiveness, learning experience, and cultural relevance. Descriptive statistics were utilized to analyze the findings. ***Results:*** The study revealed that 92.5% of students reported that the mhGAP videos significantly enhanced their understanding of psychiatric concepts. Additionally, 73.75% of participants found the videos particularly effective in providing practical examples and case studies, while 72.5% felt that the videos enhanced their clinical readiness. In terms of engagement, 58% of students agreed that the videos were engaging and effectively captured their attention. The videos were also praised for their cultural relevance, with 60% of students finding the use of Arabic language more beneficial, and 55% feeling comfortable with the Lebanese accent used in the videos. ***Conclusion:*** WHO mhGAP videos were perceived as highly relevant and effective tools for enhancing the understanding of complex psychiatric concepts, clinical skills, preparedness, and engagement, while addressing cultural needs. Integrating these linguistically and culturally relevant videos into medical curricula is highly recommended to contextualize and improve psychiatry education in different educational settings.

Keywords: ***WHO mhGAP, Training Videos, Undergraduate Medical Education, Psychiatry Education.***

Introduction

Psychiatry education is a crucial component of undergraduate medical programs, equipping future physicians with the knowledge and skills needed to address mental health issues in their practice. Historically, psychiatry education has evolved significantly, shaped by changing societal attitudes and the growing recognition of mental health's importance (Gómez-Carrillo *et al.*, 2022). In the past, mental health was often stigmatized, and psychiatric disorders were poorly understood. As a result, psychiatry education received limited attention in medical curricula. However, as awareness grew regarding the prevalence and impact of mental health disorders, the importance of psychiatry education became increasingly recognized (Gómez-Carrillo *et al.*, 2022).

The challenges faced in psychiatry education are multifaceted. They include overcoming the stigma associated with mental health, addressing the complexity of psychiatric disorders, limited exposure to psychiatric patients during clinical rotations, and keeping up with rapid advancements in the field. These challenges require innovative teaching methods, collaboration between educators and mental health professionals, and a focus on evidence-based education (Jain & Parekh, 2021). Efforts to enhance psychiatry education have led to the adoption of simulation-based training, case-based learning, and the integration of psychiatry into other medical disciplines. Such approaches aim to better prepare future physicians to meet the mental health needs of patients (He *et al.*, 2021).

Simulation training has been widely recognized as a crucial component of medical education. It helped bridge the gap between theoretical knowledge and practical application in real-life medical scenarios. A study by Hosseini and Ahmadi (2022) found that simulation-based training with video-assisted debriefing is more effective in developing undergraduate medical students' decision-making skills and promoting their professional attitudes. By

integrating simulation training with video-assisted debriefing, students can improve their clinical reasoning, communication, teamwork, and problem-solving abilities, thereby enhancing their preparedness for clinical practice (Mahmood *et al.*, 2021).

In the context of psychiatry education, video simulations are particularly valuable. They provide students with visual representations of psychiatric disorders and their presentations, offering a dynamic learning experience that combines visual and auditory stimuli, promoting active engagement and information retention. Students can observe the nuances of psychiatric presentations, such as non-verbal cues, facial expressions, and body language, which are crucial in understanding the patient's mental state. The use of actors or real patients in the videos ensures consistency, allowing students to compare different presentations of the same disorder and develop their diagnostic skills (Mayer, 2021). Moreover, video simulations create a safe learning environment for students to practice their clinical skills, communication, and diagnostic abilities, enabling them to analyze interactions between healthcare professionals and patients and learn from mistakes made in the videos (Lau *et al.*, 2021).

Given the critical need for mental health services, the World Health Organization (WHO) developed the Mental Health Gap Action Programme (mhGAP) to address this pressing issue. The mhGAP program aims to train health professionals in assessing and managing common mental disorders, filling the gap in mental health care provision, particularly in low- and middle-income countries (WHO, 2021). A key component of the mhGAP program is the development of video materials designed to depict psychiatric conditions within the context of primary healthcare. These videos specifically address the cultural aspects of patients, ensuring that the training is relevant and accessible to diverse populations worldwide (Gómez-Carrillo *et al.*, 2022).

The integration of mhGAP training videos into medical school curricula represents a promising step towards enhancing mental health education for future healthcare professionals. While the mhGAP program has been successful in training non-specialized mental health professionals, its applicability and benefits within the medical school context are still in their early stages and require careful evaluation (He *et al.*, 2021). The mhGAP videos, which have been released in multiple languages, provide a comprehensive understanding of psychiatric disorders in diverse cultural contexts and facilitate the training of healthcare professionals globally.

This study aimed to measure the perception of medical students regarding their experience after being exposed to mhGAP video training materials. The goal is to assess how these materials enhanced their skills during simulation sessions, specifically in the assessment of common psychiatric disorders. By evaluating the students' perceptions and experiences, this research seeks to gain a better understanding of the relevance and effectiveness of the WHO mhGAP videos within the medical school context. Ultimately, the findings of this study may contribute to the ongoing improvement and adaptation of mental health education in medical schools, ensuring that future physicians are well-equipped to address the mental health needs of their patients.

Method

Study Design

This descriptive, cross-sectional study examined the effectiveness of WHO mhGAP training videos in psychiatry education among fifth-year medical students at Al-Rayan National College of Medicine, Al Madinah Al Munawwara, during the 2023–2024 academic year.

Study population

The study population included all fifth-year medical students enrolled in the psychiatry rotation at Al-Rayan National College of Medicine during the 2023–2024 academic year. This cohort was directly involved with the mhGAP video intervention as part of their curriculum.

Sampling technique and sample size

A census sampling approach was implemented, encompassing all fifth-year medical students in the psychiatry rotation at Al-Rayan National College of Medicine for the 2023–2024 academic year. With a defined population of 103 students, this method minimized selection bias and facilitated a comprehensive representation of student perspectives regarding the mhGAP videos. Of these, 80 students consented to participate, resulting in a response rate of 77.7%.

How WHO mhGAP Training Videos were used in our Psychiatric Course in undergraduate medical education program

The World Health Organization created mhGAP videos to address gaps in mental health care in low- and middle-income countries. These videos were designed to provide structured training in diagnosing and managing psychiatric disorders (WHO, 2021). Before conducting this study, the mhGAP videos were incorporated into the psychiatry rotation curriculum to supplement traditional teaching methods. Each video presented case scenarios and patient interactions, with learning objectives focused on clinical assessment, diagnostic skills, patient communication, and cultural competence. The videos were presented in Arabic language, making them culturally and linguistically appropriate for the participants. This approach is aimed at enhancing student engagement and retention by aligning the intervention with the cultural background of the cohort. At the end of the course, we distributed the questionnaire to assess medical students' perceptions toward the effectiveness of these videos in enhancing psychiatric education in undergraduate medical education.

Data Collection Methods

Data were collected using a pre-tested, pre-coded, validated self-administered questionnaire distributed to all medical students enrolled in the psychiatry rotation. The questionnaire was developed based on a review of relevant literature to assess various dimensions of student perceptions across four key constructs: effectiveness of mhGAP videos, learning experience and engagement, cultural relevance, and overall recommendation. The questionnaire was provided in either a printed format or through an online platform, depending on the participants' preference and feasibility.

Measurements

The questionnaire captured measurements related to students' perspective of mhGAP training videos, knowledge acquisition, attitudes toward the videos, and their potential impact on academic performance in psychiatry rotations, such as examination scores or clinical evaluations.

Data Analysis

The data analysis plan involved a comprehensive approach to analyzing the collected survey data. It included steps such as data cleaning and organization, calculation of descriptive statistics for demographic variables, assessment of reliability using Cronbach's alpha, demographic analysis to explore relationships, calculation of mean scores and standard deviations for Likert scale questions.

Ethical Considerations

Permission was obtained from the Al-Rayan National College of Medicine Authority, prior to the commencement of the study. Written informed consent was secured from all participants, ensuring their voluntary participation and full understanding of the research. Confidentiality and privacy were strictly maintained, with data securely stored and used exclusively for research purposes. Anonymity measures were implemented to protect participants'

identities, ensuring that individual responses could not be traced back to them.

Results

The study aimed to assess the effectiveness of WHO mhGAP training videos as a tool for enhancing the psychiatry education of undergraduate medical students. The analysis is based on responses from 80 medical students (year 5) who were exposed to these training videos during their psychiatry rotation. The age distribution of the participants predominantly fell within the 23-27 years age range, accounting for 75% of the sample. The gender composition of the cohort revealed a predominance of female students, who comprised 66.3% of the participants, whereas male students accounted for 33.8%. Most students were Saudi nationals, representing 90% of the cohort, as detailed in (**Figure 1**).

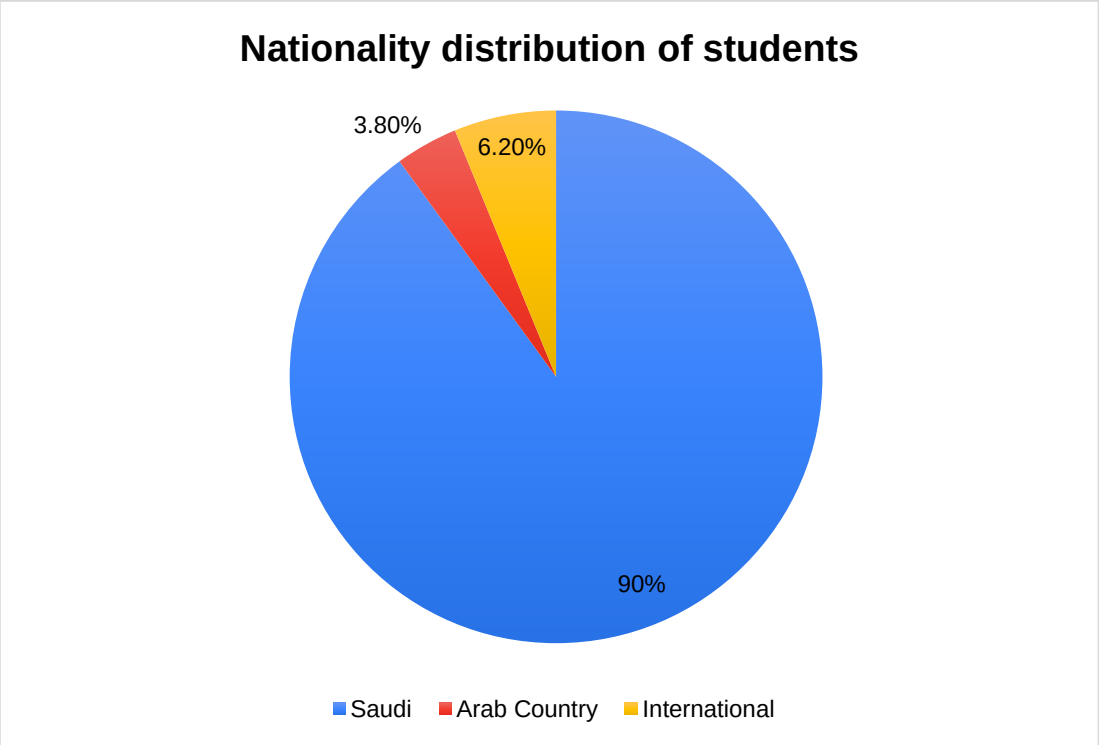

Figure 1: Nationality Distribution of Students (Pie Chart)

This pie chart illustrated the distribution of students by nationality, with the majority being Saudi nationals (90%), followed by international students and students from other Arab countries.

Effectiveness of mhGAP Videos

A significant majority of participants (92.5%, n=74) reported that the mhGAP videos effectively enhanced their understanding of psychiatric concepts. The videos provided practical examples and case studies that 73.75% (n=59) of participants found to substantially improve their learning experience. Furthermore, 72.5% (n=58) of respondents felt that the videos were particularly useful in preparing them for practical scenarios in psychiatry, indicating that the videos contributed meaningfully to their clinical readiness. The videos were also reported to have a positive impact on the development of clinical skills, with 71.25% (n=57) of students agreeing or strongly agreeing that their clinical skills in psychiatry were improved using these videos. The integration of theoretical knowledge with practical application was also facilitated by the videos, with 56% (n=45) of students affirming their effectiveness in this regard (**Table 1**).

Table 1: Student responses on Effectiveness of WHO mhGAP Training Videos in Psychiatry Education

Category	Response	Agree (n, %)	Disagree (n, %)
Effectiveness of mhGAP Videos	Enhanced Understanding of Psychiatric Concepts	74 (92.5%)	6 (7.5%)
	Improved Learning Experience	59 (73.75%)	21 (26.25%)
	Clinical Readiness	58 (72.5%)	22 (27.5%)
	Development of Clinical Skills	57 (71.25%)	23 (28.75%)
	Integration of Theoretical Knowledge with Practical Application	45 (56%)	35 (44%)

This table summarized student feedback on the WHO mhGAP training videos, showing high effectiveness in Psychiatry Education.

Learning Experience and Engagement

The mhGAP videos were perceived by many students to be as beneficial as live observations, with 61% (n=49) of students agreeing that watching the videos was as helpful as observing tasks in person. Moreover, the videos were useful during role-play exercises, with 52.5% (n=42) of students finding them beneficial for practice and 57.5% (n=46) stating that the videos encouraged practice during these exercises. In the context of bedside teaching, 59% (n=47) of participants agreed that the videos aided their practical learning experiences in hospital settings. For preparation for the Objective Structured Clinical Examination (OSCE), 58.75% (n=47) of students reported that the videos were a valuable resource, assisting them in their exam preparation by reinforcing key concepts and clinical skills. Engagement and attention were also highlighted, with 58% (n=46) of participants agreeing that the videos were engaging and effectively captured their attention, contributing to a more immersive learning experience (**Table 2**).

Table 2: Student responses on Learning Experience and Engagement of using WHO mhGAP Training Videos in Psychiatry Education

Category	Response	Agree (n, %)	Disagree (n, %)
Learning Experience and Engagement	Comparison with Live Observations	49 (61%)	31 (39%)
	Beneficial for Role-Play Practice	42 (52.5%)	38 (47.5%)
	Encouraged Practice in Role-Play	46 (57.5%)	34 (42.5%)
	Aided Practical Learning in Bedside Teaching	47 (59%)	33 (41%)
	Assisted in OSCE Preparation	47 (58.75%)	33 (41.25%)
	Engaging and Effectively Captured Attention	46 (58%)	34 (42%)

This table summarized student feedback on the WHO mhGAP training videos, showing high effectiveness in enhancing learning experience and students' engagement.

Cultural Relevance

The cultural relevance of the mhGAP videos was another important aspect of the study. Most students (56.25%, n=45) acknowledged that the videos adequately addressed the cultural context and diversity of patients within their region. This was particularly significant in the context of using the Arabic language, which 60% (n=48) of students found more useful than English. Additionally, 55% (n=44) of students reported that the use of a Lebanese accent in the videos was comfortable for their learning (Table 3).

Overall Recommendation

When asked about the overall use of the mhGAP videos, 57.5% (n=46) of participants strongly recommended their regular use in teaching psychiatry within undergraduate medical education (Table 3).

Table 3: Student responses on the Cultural Relevance of WHO mhGAP Training Videos in Psychiatry Education

Category	Response	Agree (n, %)	Disagree (n, %)
Cultural Relevance	Addressing Cultural Context and Diversity	45 (56.25%)	35 (43.75%)
	Use of Arabic Language is more Useful than English	48 (60%)	32 (40%)
	Comfortable Use of Lebanese Accent	44 (55%)	36 (45%)
Overall Recommendation	Strongly Recommend Regular Use of mhGAP Videos	46 (57.5%)	34 (42.5%)

This table summarized student feedback on the WHO mhGAP training videos, showing strong cultural relevance, with most students expressing positive experiences and recommending their continued use.

Discussion

The current study aimed to evaluate the efficacy of WHO mhGAP training videos in enhancing the educational experience of undergraduate medical students in psychiatry. The findings provided compelling evidence supporting the integration of these videos into the medical curriculum, particularly within psychiatry education.

Effectiveness of mhGAP Videos

The study findings revealed that an overwhelming number (92.5%) of students reported that the mhGAP videos significantly enhanced their understanding of psychiatric concepts. This finding is particularly noteworthy given the complexity of psychiatric education, which often involves abstract and complex concepts that are difficult to convey through traditional lecture-based methods. The use of multimedia, specifically video-based learning, had been shown to facilitate better understanding by engaging multiple senses and providing concrete visual representations of abstract ideas (Charlson *et al.*, 2019). This aligns with the Cognitive Theory of Multimedia Learning, which posits that people learn more deeply from words and pictures than from words alone (Charlson *et al.*, 2019).

Moreover, 73.75% of students found the practical examples and case studies in the mhGAP videos were helpful and underscored the importance of contextual learning in medical education. Contextual learning allows students to see the application of theoretical knowledge in real-world scenarios, thereby bridging the gap between theory and practice (Chaulagain *et al.*, 2020). The videos' ability to enhance clinical readiness, was reported by 72.5% of students, further highlighted their role in preparing students for the realities of clinical practice. However, while the results are generally positive, it could have been influenced by novelty bias towards the use of videos in a traditionally lecture-based learning environment and videos' alignment with their cultural and linguistic backgrounds, which may have made the material more engaging rather than reflecting the inherent quality of the content itself.

Learning Experience and Engagement

The study also examined the impact of mhGAP videos on students' learning experiences and engagement. 61% of students found the videos beneficial as live observations were particularly significant in the context of medical education, where live demonstrations and hands-on experiences are often considered the gold standard. However, in situations where live demonstrations are not feasible due to logistical constraints, limited access to clinical environments, or the need for repeated practice video-based learning offers a viable and effective alternative. This supports the broader adoption of video-based learning tools in medical education, as they can provide consistent, high-quality educational experiences that are accessible to all students, regardless of their geographical location or the availability of clinical resources (Faregh *et al.*, 2019).

Furthermore, the use of mhGAP videos in role-play exercises and bedside teaching was reported as beneficial by 52.5% and 59% of students, respectively illustrates their versatility as a teaching tool in undergraduate medical education. Role-play and bedside teaching are critical components of medical education, enabling students to practice clinical skills, develop communication abilities, and apply theoretical knowledge in a controlled, supportive environment. The mhGAP videos found to be useful in enhancing these experiences by providing students with concrete examples and structured scenarios that can be used to guide their learning and practice. However, it is also possible that the reported effectiveness of these videos could vary depending on how they are integrated into the broader curriculum and whether they are complemented by other forms of learning, such as interactive workshops or live patient interactions.

Cultural Relevance

A unique and critical aspect of the mhGAP videos is their cultural relevance, which was highlighted by 56.25% of students who felt that the videos adequately addressed the cultural context and diversity of patients. In psychiatry, cultural competence is essential, as mental health conditions and their treatment are often deeply intertwined with cultural beliefs, practices, and social norms (Chiu *et al.*, 2019). The ability of the mhGAP videos to incorporate culturally relevant scenarios likely contributed to their effectiveness

in enhancing students' understanding and preparedness for clinical practice in diverse settings.

The preference for Arabic language and the comfort with the Lebanese accent, reported by 60% and 55% of students, respectively, further underscored the importance of tailoring educational materials to the linguistic and cultural context of the learners. Language and communication are critical in psychiatry, where understanding the nuances of patient speech, behavior, and cultural background is vital for accurate diagnosis and effective treatment (Herrmann–Werner *et al.*, 2013). The mhGAP videos' use of culturally and linguistically appropriate content likely made the material more relative and easier for students to engage in, thus enhancing their learning experience.

Addressing Critical Gaps and Limitations

This study addresses a significant gap in the literature regarding the use of culturally tailored multimedia resources in medical education. While the benefits of multimedia learning are well-documented, there has been limited research on the impact of culturally specific content on student outcomes. By focusing on the mhGAP videos, which are designed with cultural and linguistic considerations in mind, this research contributed to a deeper understanding of how such tools can be used to enhance medical education in diverse settings.

However, several limitations of this study must be acknowledged, including the primary limitations of a cross-sectional study design as the predictor and outcome variables are evaluated simultaneously, making it difficult to establish an actual cause-and-effect relationship. The positive responses could also reflect students' expectations or preferences rather than objective improvements in learning outcomes.

Conclusion and Recommendations

The study findings revealed that the WHO mhGAP training videos were perceived by medical students as highly relevant and effective tools for enhancing psychiatry education in undergraduate medical students. The videos provided significant benefits in understanding psychiatric concepts, improving clinical skills, and offering culturally relevant content. These findings support the integration of mhGAP videos into the undergraduate medical curriculum as part of the psychiatric training tools to prepare students for the complexities of clinical practice. Further research is needed to explore the long-term impacts of using these videos on clinical practice and patient outcomes, and to determine how best to integrate them into a comprehensive educational strategy. Also, while this cultural alignment likely contributed to the positive reception of the videos, future research should explore how these findings compare to the use of culturally neutral content and whether the effectiveness observed is consistent across different cultural settings. Moreover, future research should aim to incorporate objective measures of learning outcomes, such as performance assessments or exam scores, to provide a more comprehensive evaluation of the mhGAP videos' effectiveness in undergraduate medical education.

List of abbreviations

mhGAP: Mental Health Gap Action Programme

WHO: World Health Organization

LMICs: Low- and Middle-Income Countries

OSCE: Objective Structured Clinical Examination

PHC: Primary Health Care

GPA: Grade Point Average

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Al-Rayan National College of Medicine. Written informed consent was obtained from all participants before their involvement in the study.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that they have no competing interests.

Funding Statement

This study did not receive any specific funding from public, commercial, or not-for-profit funding agencies.

Authors' contributions

Mohammed Salah Alfahal: Conceptualized and designed the study, led data collection and analysis, drafted the manuscript, and approved the final version for submission.

Mohammed Elmuttalut: Assisted in study design, contributed to literature review and data analysis, critically reviewed the manuscript for intellectual content, and approved the final manuscript.

Both authors have read and approved the final manuscript version and are accountable for all aspects of the work.

Acknowledgments

The authors would like to express their gratitude to Al-Rayan National College of Medicine for its support and resources that facilitated this study. Special thanks are extended to the psychiatry rotation students who participated in this research and provided valuable feedback on their learning experiences.

References

[1] Charlson, F., Chang, O., Kubuabola, I., Schess, J., Latu, C., Hunter, E., … & Shidhaye, R. (2019). Implementation of the mental health gap action programme (mhgap) within the Fijian healthcare system: a mixed-methods evaluation. International Journal of Mental Health Systems, 13(1). https://doi.org/10.1186/s13033-019-0301-z

[2] Chaulagain, A., Pacione, L., Abdulmalik, J., Hughes, P., Kopchak, O., Chumak, S., … & Skokauskas, N. (2020). WHO mental health gap action programme intervention guide (mhgap-ig): the first pre-service training study. International Journal of Mental Health Systems, 14(1). https://doi.org/10.1186/s13033-020-00379-2

[3] Faregh, N., Lencucha, R., Ventevogel, P., Dubale, B., & Kirmayer, L. (2019). Considering culture, context, and community in mhgap implementation and training: challenges and recommendations from the field. International Journal of Mental Health Systems, 13(1). https://doi.org/10.1186/s13033-019-0312-9

[4] Chiu, Y., Tang, S., Sun, J., Tsai, L., Hsieh, M., Lee, C., … & Ma, M. (2019). Using g-fast to recognize emergent large vessel occlusion: a training program for a prehospital bypass strategy. Journal of Neurointerventional Surgery, 12(1), 104-108. https://doi.org/10.1136/neurintsurg-2019-015171

[5] Herrmann–Werner, A., Nikendei, C., Keifenheim, K., Bosse, H., Lund, F., Wagner, R., … & Weyrich, P. (2013). "Best practice" skills lab training vs. a "see one, do one" approach in undergraduate medical education: an RCT on students' long-term ability to perform procedural clinical skills. Plos One, 8(9), e76354. https://doi.org/10.1371/journal.pone.0076354

[6] Hosseini, T., & Ahmadi, S. (2022). Effectiveness of video-assisted debriefing versus standard oral debriefing following screen-based simulation (cyberpatient TM) training. Journal of Medical Education, 21(1). https://doi.org/10.5812/jme-127021

[7] Hung, C., Ho, T., & Lin, C. (2019). Using a situated simulation-based program for improving students' interaction and observation skills with children in occupational therapy. https://doi.org/10.21203/rs.2.16490/v1

[8] Lazzara, E., Weaver, S., Weinger, M., Feldman, M., Rosen, M., Harrison, K., … & Seagull, F. (2011). Simulation in healthcare: one size fits all? Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 55(1), 828-830. https://doi.org/10.1177/1071181311551172

[9] Muessig, M., Sterz, J., Stefanescu, M., Bender, B., Hoefer, S., & Ruesseler, M. (2017). The impact of video feedback on acquiring competency in basic surgical skills (sterile working) in an undergraduate medical training program: a comparative effectiveness analysis. Journal of Advances in Education Research, 2(3). https://doi.org/10.22606/jaer.2017.23007

[10] Nunnink, L., Welsh, A., Abbey, M., & Buschel, C. (2009). In situ simulation-based team training for post-cardiac surgical emergency chest reopens in the intensive care unit. Anaesthesia and Intensive Care, 37(1), 74-78. https://doi.org/10.1177/0310057x0903700109

[11] Wang, C., Huang, C., Lin, S., & Chen, J. (2016). Using multimedia tools and high-fidelity simulations to improve medical students' resuscitation performance: an observational study. BMJ Open, 6(9), e012195. https://doi.org/10.1136/bmjopen-2016-012195

[12] Waseh, S., & Dicker, A. (2019). Telemedicine training in undergraduate medical education: mixed-methods review. JMIR Medical Education, 5(1), e12515. https://doi.org/10.2196/12515

[13] Zhao, Y., Zhou, Y., Zhang, H., Yang, X., Qian, D., Lin, J., … & Zhu, T. (2021). Simulation-based training following a theoretical lecture enhances the performance of medical students in the interpretation and short-term retention of 20 cross-sectional transesophageal echocardiographic views: a prospective, randomized, controlled trial. https://doi.org/10.21203/rs.3.rs-200314/v1