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Original Research Article

Comparative Analysis of the Impact of Training on Hospital Warning Sign Recognition among Undergraduate Medical Students

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Abstract:

Aim: To assess the level of knowledge among undergraduate medical students at Madha Medical College & Research Institute regarding hospital warning signs and symbols, and emphasize its significance.

Background: Understanding the significance of hospital warning signs and symbols is pivotal for maintaining a secure healthcare environment. Awareness of these warning signs is crucial to prevent unintentional exposure to health risks. The research endeavours to offer insights that can inform policies, training protocols, and practical guidelines, fostering an environment where hospital warning symbols are not just present but comprehended and acted upon effectively.

Methods: A comprehensive cross sectional research methodology was implemented. The study cohort comprised 230 undergraduate students of phase I and phase III part II of medical curriculum. The pre- and post-tests were conducted to assess the impact of educational efforts on the targeted knowledge domain.

Results: The study recorded a mean pre-test score of 7.87 for all participants, which showed a significant improvement in the posttest score, reaching 9.49 out of 10. These findings highlight the importance of on-going and targeted safety education throughout the academic journey of healthcare students. It also emphasizes the need for tailored and continuous efforts to ensure that healthcare professionals are well-informed and safety-conscious.

Keywords: Hospital warning signs, pre-test, post-test.

Introduction

Warning signs and symbols serve as universally recognized visual cues that transcend language barriers. While they are not a substitute for comprehensive training, these symbols play a crucial role as reminders in workplaces and public spaces, emphasizing the importance of health and safety measures. In the context of hospitals, where the nature of work introduces heightened risks, clear visual indicators become even more essential for patients, visitors, and healthcare workers.

Hospital warning signs and symbols function as visual alerts, conveying information about hazardous environments, substances, or required safety measures. Thus, it becomes imperative for healthcare professionals to possess awareness and understanding of these symbols to ensure the consistent adherence to safety protocols. [1] The classification of signs and symbols into four categories—warning, prohibition, mandatory, and emergency—provides a standardized framework with specific colors and shapes, aligning with global safety regulations. [2] Familiarizing yourself with the distinctive characteristics of each symbol facilitates the identification of precautions, potential hazards, and necessary actions. Warning signs, indicated by black pictograms on a yellow background and triangular shapes, specifically warn of hazards or dangers. Examples include signs related to radioactivity, non-ionizing radiation, corrosive agents, or carcinogens, often found on the doors of X-ray and MRI units. Given the prevalence of medical equipment utilizing radiation in hospitals, awareness of these warning signs becomes crucial to prevent unintentional exposure to health risks.

Prohibition signs, featuring black pictograms on a white background with red edging and a red diago-

nal line, explicitly prohibit certain actions or Behaviours. Common instances include "do not enter" signs and "no smoking" signs, often located outside operation theatres and areas housing oxygen cylinders, medicines, and instruments. These signs underscore the importance of strict adherence to safety protocols in critical areas of the hospital.

Mandatory signs, identified by white pictograms on a blue background and circular shapes, prescribe specific behaviours. Examples include signs mandating the use of masks, protective eye gear, or full-body protective attire. Typically found outside laboratories and instrument storage rooms, these signs emphasize the essential requirement for protective measures to ensure the safety of individuals within those spaces.

Emergency signs, characterised by their green colour, white text, and rectangular shapes, serve to indicate the location or direction to emergency facilities. These include signs for emergency exits and facilities like first aid stations. Strategically placed along hospital hallways, emergency signs play a vital role in guiding people to exits during evacuations. Given the potential risks posed by fires in hospitals, which can induce panic and confusion, the effective guidance provided by emergency exit signs becomes indispensable in ensuring the swift and safe evacuation of individuals. [3]

In summary, understanding the significance of hospital warning signs and symbols is pivotal for maintaining a secure healthcare environment. The categorization into warning, prohibition, mandatory, and emergency signs establishes a standardized framework that transcends linguistic differences. Healthcare professionals must be well-versed in these symbols to enhance situational awareness, facilitate adherence to safety protocols, and ultimately contribute to a culture of safety within healthcare institutions.

The multifaceted nature of hospitals, encompassing diverse departments, potential hazards, and varied safety protocols, necessitates a nuanced approach to training on warning symbols. The sheer complexity of healthcare environments demands not only the presence of visual cues but also a workforce capable of interpreting and acting upon them effectively. This study is driven by the conviction that the mere existence of warning symbols is insufficient without a corresponding understanding and adherence from those who navigate these intricate spaces daily.

The scope of this research extends beyond a cursory examination of the impact of training on hospital warning symbols. It delves into the intricacies of healthcare operations, aiming to identify specific areas where training can be optimized to enhance the overall safety culture within institutions. By understanding the dynamics of knowledge acquisition and application, the research endeavors to offer insights that can inform policies, training protocols, and practical guidelines, fostering an environment where hospital warning symbols are not just present but comprehended and acted upon effectively.

Aim

To assess the level of knowledge among undergraduate medical students at Madha Medical College & Research Institute regarding hospital warning signs and symbols, and emphasize its significance.

Materials and Methods

To evaluate the proficiency of undergraduate students in recognizing commonly used hospital warning signs and symbols, a comprehensive cross sectional research methodology was implemented. The first step involved the creation of a Google Form consisting of 10 widely acknowledged hospital warning signs and symbols. Each question in the form provided multiple options, with only one option being the correct answer. This initial assessment aimed to gauge the baseline knowledge of participating students regarding hospital warning signs.

The study cohort comprised 230 undergraduate students of phase I and Phase III part II of medical curriculum enrolled at Madha Medical College and Research Institute in September 2023. These students willingly participated in the research by completing the Google Form test. The primary objective was to assess their initial understanding of hospital warning signs before any specific training or education on the subject.

Following the completion of the initial test, the same group of students underwent educational sessions focused on various hospital warning signs and symbols. These sessions were designed to augment their awareness and comprehension of these visual cues. The instructional content covered meanings, categories, and the significance of different warning signs commonly found in hospital environments.

After the educational intervention, participants took the same test once again. The purpose of the retest was to measure the impact of the teaching sessions on the students' knowledge and recognition of hospital warning signs. The hypothesis was that the increased awareness resulting from the educational sessions would lead to improved performance in identifying and interpreting the symbols presented in the test. The comparative analysis of pre-test and post-test results allowed for an assessment of the effectiveness of the educational intervention. Any noticeable improvement in scores would indicate that the teaching sessions positively influenced participants' awareness and their ability to interpret hospital warning signs and symbols.

This research methodology employed a pre and post-test design, providing a systematic approach to measure the impact of education on the targeted knowledge domain. The study focused on a specific group of undergraduate students, and the use of Google Forms offered a convenient and accessible platform for administering tests and collecting data. The structured design of the tests and the controlled educational intervention enabled a comprehensive examination of the research question related to the effectiveness of educational efforts in enhancing awareness of hospital warning signs and symbols among undergraduate students.

Results

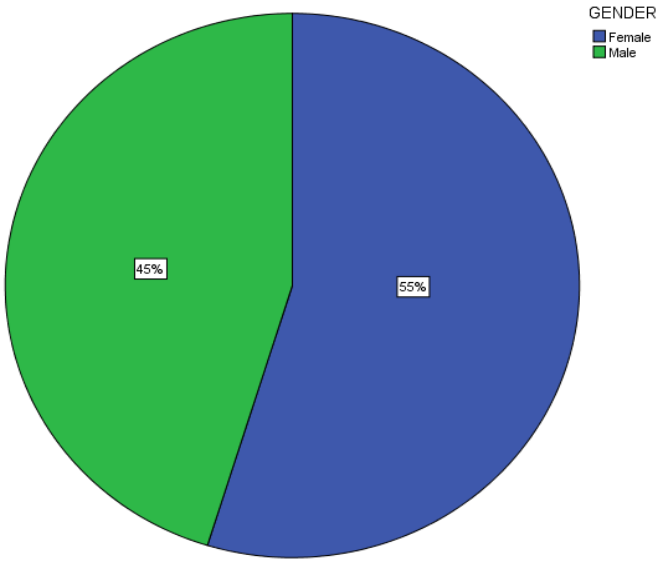
Our study comprised a diverse cohort of undergraduate students, with 55% females and 45% males participating. To ensure a balanced representation of the academic progression, an equal number of students from both Phase I and Phase III Part II were included in the study. The mean pre-test score for all participants was recorded at 7.87, while the post-test score showed a notable improvement, reaching 9.49 out of 10. Upon closer examination of the gender-based performance, we observed that female students exhibited a mean pretest score of 7.9, which increased significantly to 9.8 in the post-test assessment. Conversely, male students showed a pretest mean score of 7.8, which improved to 9.4 in the post-test. These findings highlight a positive trend in both genders, emphasizing the effectiveness of the training intervention. Further exploration into the academic progression of students revealed interesting patterns. In the pre-test phase, Phase III Part II students achieved higher scores with a mean of 8.2, surpassing the mean score of Phase I students at 7.2. However, the post-test results demonstrated a shift in performance. After the training, Phase I students exhibited a higher mean post-test score of 9.8, outperforming Phase III Part II students, who attained a mean score of 9.2.

The observed variations in pretest and post-test scores among different student groups suggest dynamic factors at play, influenced by both the training intervention and the inherent characteristics of each academic phase. The improvement in scores across the entire cohort and the divergent trajectories between genders and academic phases underscore the nuanced impact of training on the understanding and retention of hospital warning signs and symbols.

These findings not only contribute valuable insights into the effectiveness of educational interventions but also raise questions about the varying learning needs and responses of different student groups. As we delve deeper into the implications of these results, it becomes evident that tailoring training programs to meet the specific requirements of diverse student cohorts may enhance the overall impact of safety education in healthcare settings.

Table 1: Values obtained from the data collected

	Mean	N	Std. Deviation	Std. Error Mean
Pre-Test Score	7.87	230	1.461	0.096
Post Test Score	9.4913	230	0.91442	0.0603



Year of Study

Figure.1. Pie chart showing the distribution of male and female students in MBBS Phase I and Phase III Part II. The blue section represents male students and the green section represents female students.

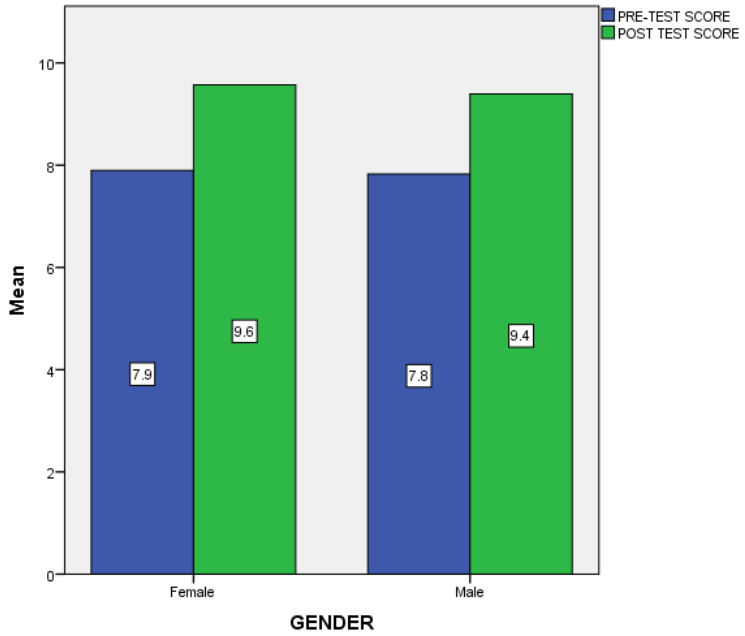


Figure 2: Bar graph comparing pre and post test scores of male and female students. The blue section represents the pre-test scores and the green section represents the post-test scores.

Discussion:

The outcomes of our study provide valuable insights into the effectiveness of training interventions on the understanding and recognition of hospital warning signs and symbols among undergraduate healthcare students. The diversity within our participant group, comprising both genders and students from various academic phases, enriches the discussion and prompts consideration of the nuanced factors influencing the results.

A significant aspect of our findings is the overall improvement in both pre-test and post-test scores, indicating a notable increase from an average pre-test score of 7.87 to a post-test score of 9.49 out of 10. This substantial enhancement suggests the success of the training program in effectively enhancing the understanding of hospital warning signs across the entire participant cohort. The significant improvement aligns with the intended objectives of the educational intervention, emphasising its success in imparting valuable knowledge to undergraduate healthcare students.

Several studies have demonstrated the positive impact of academic training on hospital warning signs and symbols for undergraduate and graduate students alike. For instance, research on undergraduate and postgraduate dental students' knowledge of hospital signs indicated substantial improvements from pre- to post-training tests, emphasising the importance of academic instruction on this topic. [4,5] Therefore, it is imperative to include this education as a fundamental aspect of the curriculum to equip students with the necessary knowledge and skills to ensure their safety and that of others. When scrutinising the performance based on gender, our study reveals interesting dynamics. Female students displayed a higher mean pre-test score (7.9) compared to their male counterparts (7.8), and this trend persisted in the post-test evaluation, with females achieving a mean score of 9.8 compared to males with a mean score of 9.4. While both genders demonstrated improvement, the higher post-test scores among females suggest potential variations in learning response or engagement levels, prompting further exploration into the specific factors influencing gender-based differences in educational outcomes. Our findings align with other studies examining gender differences in academic performance. For example, a paper by Khwaileh, F. M., & Zaza, H. I. analysed academic performance among undergraduate students at the University of Jordan from 2002-2007. Their research showed that female students outperformed their male counterparts academically in all years studied. The authors suggest that this could be due to females having a more positive attitude toward academics and a desire to excel in a male-dominated environment, whereas males prioritise extracurricular activities like sports over their studies. [6]

Similarly, a paper by METU examined over 10,000 undergraduate students and found that female students had higher scores on preparatory exams, university entrance tests, and overall GPAs compared to males. The METU authors attributed this to females' better attendance, study skills, motivation, and self-discipline in utilising

opportunities. [7] Although the METU study compared genders in high school and college, our paper focuses on undergraduates. The Jordan study aligns with the METU findings that females outperform males academically, likely due to teaching methods, economic factors, motivation, and self-efficacy. And self-discipline in utilising opportunities. While the METU study compared genders in high school and college, this paper focuses on undergraduates. The Jordan study aligns with the METU findings that females outperform males academically, likely due to teaching methods, economic factors, motivation, and self-efficacy. According to another study, the gender gap in academic performance can be explained by various factors such as teaching methods, motivation, and support from parents, and advocacy campaigns for women's empowerment. These factors account for the improved academic performance of females in tertiary education. However, males tend to engage more in extracurricular activities and economic ventures. [8]

An examination of academic progression uncovered a noteworthy shift in performance patterns between Phase I and Phase III Part II students. In the pre-test phase, Phase III Part II students scored higher (mean = 8.2) than Phase I students (mean = 7.2). However, the post-test results exhibited a reversal, with Phase I students surpassing Phase III Part II students (mean = 9.8 compared to 9.2). This shift implies that the training intervention had a differential impact on students at different academic levels. The initially higher pre-test scores among Phase III Part II students may suggest a baseline familiarity with the subject matter, while the substantial improvement in Phase I students post-training indicates a more significant response to the educational intervention. Several previous studies have also found similar results, including a research study conducted by Patron, H., & Lopez, S. in 2011. The study analysed a data set consisting of four-week Microeconomics courses at an online accredited University located in Florida, which used the Learning Management System known as Angel to keep records of the amount of time students spent online per day. The researchers analysed the relationship between grades and study time, quality of time, procrastination level, student ratings, and time-management skills. They unequivocally concluded that successful performance was not solely a function of time spent or effort put forth, but rather it was the increased frequency of training and consistency maintained throughout the course that led to success. [9] Therefore, it is clear that the greater the consistency in academic training, the better the academic performance and outcome. This highlights the absolute necessity of consistent academic training for medical students on hospital warning signs and symbols. Another paper unequivocally concluded that academics are crucial for shining in one's profession, but internships and training also influence the quality of the profession. [11] Another study concluded that success in academics depends on the quality of time spent studying, rather than the quantity of time. [10] Hence, consistent learning through academic training and real-life work exposure is absolutely essential for being able to apply the learning's in real life with perfection. The better performance of the phase III part II students could also be attributed to their age. A study aimed to explore the relationship between academic motivation and academic performance among high school students in Kenya. The findings of the study suggest that there is a significant correlation between academic motivation and academic performance among high school students. The study also revealed that academic motivation tends to decrease with age, as younger students had a higher mean score compared to their older counterparts. It is possible that the younger students, being new to the environment, are more concerned with their academic performance and appearance, whereas the older students have already established themselves in the environment. [12] Another study has shown that age doesn't have any significant association with academic performance, nor do any of the genetic polymorphisms that have previously been linked to age-related cognitive performance, decline, or brain plasticity. [13] One possible explanation for the better performance of phase III part I students in the pre-test could be their exposure to the hospital environment, where they regularly encounter various signs and symbols that give them an edge over phase I students who haven't yet had such experiences. The improved scores of phase I students after the post-test could suggest that phase III part II students were complacent and disinterested in academic training on information they already knew well.

These findings invite reflection on the potential factors contributing to the observed variations. Possible explanations include differences in prior exposure to safety education, varying levels of receptiveness to training content, and distinct learning needs at different academic phases. Adapting future educational interventions to account for these factors may optimise the efficacy of safety training programs.

Furthermore, the results underscore the significance of on-going and targeted safety education throughout the academic journey of healthcare students. The shift in performance between pre-test and post-test phases underscores the adaptability of knowledge and the potential for continuous improvement with consistent educational efforts. Integrating safety education as a recurring

component of the curriculum could further enhance the retention and application of knowledge among healthcare students.

In conclusion, the findings of this study underscore the positive impact of training interventions on the awareness of hospital warning signs and symbols among undergraduate healthcare students. The nuanced variations observed based on gender and academic phase provide valuable insights for refining future educational strategies.

The study contributes to the on-going discourse on safety education in healthcare, highlighting the need for tailored and continuous efforts to ensure a well-informed and safety-conscious healthcare workforce.

Conclusion:

The study concludes that training interventions effectively improve the understanding of hospital warning signs among undergraduate healthcare students. The findings also highlight gender and academic phase differences, emphasizing the need for tailored and continuous safety education strategies. Overall, the study emphasizes the importance of on-going efforts to ensure a well-informed and safety-conscious healthcare workforce.

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References:

1. Barrett, J. (2023, Nov. 18). Safety symbols and their meanings. Safeopedia. https://www.safeopedia.com/safety-symbols-and-their-meanings/2/6550
2. Allen, L. (2023, May 24). What are the 4 types of safety signs? Beaverswood. https://www.beaverswood.co.uk/what-are-the-4-types-of-safety-signs/
3. HASpod. (2020, August 13). The 5 health and safety signs and their meanings. HASpod. https://www.haspod.com/blog/management/5-health-safety-signs-meanings
4. Dr. S. Mounika and Dr.M.P.Brundha.et al /J. Pharm. Sci. & Res. Vol. 8(8), 2016, 856-858. Analysis of Knowledge about the Hospital Warning Symbols among the Undergraduate Dental Students - A Comparative Study.
5. Dr.Swetha.S and Dr.M.P.Brundha.et al Research Journal of Pharmacy and Technology. Volume 10(4). 2017. Analysis of Knowledge about the Hospital Warning Symbols among the Postgraduate Dental Students - A Comparative Study.
6. Khwaileh, F. M., & Zaza, H. I. (2011). Gender differences in academic performance among undergraduates at the University of Jordan: Are they real or stereotyping. College Student Journal, 45(3), 633-648.
7. Dayioğlu, M., & Türüt-Aşik, S. (2007). Gender differences in academic performance in a large public university in Turkey. Higher Education, 53, 255-277.
8. Wrigley-Asante, C., Ackah, C. G., & Frimpong, L. K. (2023). Gender differences in academic performance of students studying Science Technology Engineering and Mathematics (STEM) subjects at the University of Ghana. SN Social Sciences, 3(1), 12.
9. Patron, H., & Lopez, S. (2011). Student effort, consistency, and online performance. Journal of Educators Online, 8(2), n2.
10. Ramos, C., & Yudko, E. “Hits” (not “Discussion Posts”) predict student success in online courses: A double cross-validation study. Computers & Education, 2008; 50(4), 1174-1182.
11. Otete, A. R. (2015). The impact of academics and work experience on the quality of the accounting profession in Uganda.
12. Momanyi, J. M., Too, J., & Simiyu, C. (2015). Effect of students’ age on academic motivation and academic performance among high school students in Kenya. Asian Journal of Education and e-learning, 3(5).
13. Imlach, A. R., Ward, D. D., Stuart, K. E., Summers, M. J., Valenzuela, M. J., King, A. E., ... & Vickers, J. C. (2017). Age is no barrier: predictors of academic success in older learners. npj Science of Learning, 2(1), 13.