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Research Article

Comparison of the Effect of Observational Learning and Self-Directed Learning in Improving Technical Skills in Nursing Anesthesia Students of Iran: A Quasi-Experimental Study

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ABSTRACT

Background: The skill of intubation is one of the most important technical skills for anesthesia nurses, as it can be a lifesaver in times of crisis. Learning by observation (a method in which the learner observes the teacher and learns the skill through watching) and self-directed learning (the learner identifies their needs using their creativity, sets goals, and learns the desired skill through trial and error) are effective methods for learning technical skills. This semi-experimental study aimed to compare two methods, observational learning and self-directed learning, in improving technical skills in nurse anesthetists.

Methods: Nurse anesthesia students (n=60) were divided into two groups: Group A (n=30) and Group B (n=30). Group A experienced learning through the self-directed method, while Group B learned through observation and attempted to acquire skills by observing the instructor. All students were then evaluated and scored using the intubation checklist. The collected data were analyzed using SPSS version 16.0 software and presented as mean ± standard deviation (P value< 0.05).

Results: The data showed that there was no significant difference between the two groups in terms of demographic indicators. According to the results, both observational learning and self-directed learning can improve the learning of intubation skills in students. Self-directed learning led to a greater improvement in intubation scores for students (P value=0.001). But there was no significant difference between the two methods in terms of the need for frequent intubation.

Conclusion: Both observational and self-directed learning methods can be useful in improving students' technical skills, but the use of self-directed methods may be more effective.

Introduction

Learning technical skills and scientific knowledge is one of the primary goals of medical science education [1]. Safe intubation is one of the most crucial skills that can save patients' lives in critical situations and prevent severe damage to the brain and vital organs [2]. If a therapist lacks sufficient intubation skills, they may cause irreparable harm to the patient, such as prolonged hypoxemia, aspiration, and damage to the soft tissues of the esophagus and trachea [3].

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With advancements in intubation science and technology, the best and safest methods of intubation have emerged [4]. In today's society, when confronted with a patient who is unable to protect their airway or unable to breathe for any reason, having someone skilled in intubation can be lifesaving [5]. This skill is particularly crucial in the training of nurse anesthetists, as they work in high-risk environments like operating rooms, where safe intubation is essential [3].

Therefore, learning such a skill is one of the most important strategies in the training of nurse anesthetists [6]. In terms of education, you can seek help from different styles. These styles, learning methods, and educational methods can improve the scientific and practical skills of students. The teacher should choose the best method in education according to the nature of the lesson and the available resources to achieve the best results [7].

The reality of today's educational methods includes four major ways to learn: objective experience, reflective observation, abstract conceptualization, and active experimentation. Incorporating these methods along with the traditional method of education can be highly efficient in the field of medical sciences, facilitating the transfer of theoretical content to the clinical environment [8]. Through these methods, the teacher guides the students on how to learn the material effectively and apply it in practice [9].

Observational learning is an active and effective method for learning therapeutic techniques [10]. In this method, the instructor teaches the student how to work using real tools, and the learner gathers the necessary information by observing the technique [11]. The stages of this learning process include preparation, explanation, demonstration, experimentation, and measurement [12]. Among the positive aspects of this method, it can be mentioned that it increases students' self-confidence, reduces costs, and minimizes harm to patients [13].

Another method of learning is self-directed learning, in which individuals take charge of their own learning independently. In this method, the professor serves as a motivator and provides the necessary information to the student. The learning pace in this method depends on the individual's motivation and commitment [14]. In order for self-directed learning to align with educational goals, four key points should be considered: motivating learners, clearly defining educational goals, providing sufficient practice opportunities, and offering feedback during practice [15].

In medical science education, in addition to learning theoretical content, acquiring technical skills is one of the most important educational objectives. Through proper training in basic technical skills such as intubation, therapists can be equipped to effectively safeguard patients from serious risks in critical situations. The superiority of any teaching or learning method in improving the acquisition of technical skills in medical sciences has not been proven due to the use of various methods. Therefore, the present study aims to investigate and compare the effects of observation-based learning and self-directed learning in enhancing technical skill acquisition among nursing anesthesia students.

Methods

Ethical considerations

All research processes are supervised by the ethics committee of Hamedan University of Medical Sciences (Ethical code: IR.UMSHA.REC 1403.065). At the outset of the research, the objectives and methods were explained to the participants. Informed consent was obtained from the participants, and they were assured that they could withdraw from the study at any time if they chose not to continue their cooperation. The personal information of the participants was kept confidential.

Research settings and research methods

This study is a quasi-experimental study that was conducted from November 2013 to April 2013 at the paramedical faculty of Hamedan University of Medical Sciences. The target group of this study is nursing anesthesia students (n=60) in the 1st to 3rd semester of this university. The samples were selected using the available sampling method, which is a non-probability method. The reason for choosing this method was the small number of students who met the conditions of the study, and the researcher considered it necessary to include all students in the study. Then, using the random numbers table, the students were divided into two groups: group A (n=30) and group B (n=30).

Interventions

The intervention process took place in different stages of the training scenario: briefing sessions, participation in the training process, and performance evaluation. For group training, the researcher prepared and arranged a booklet containing the titles and standards of intubation and guided the education of students. These titles include the examination and evaluation of the patient's airway, choosing the appropriate devices to establish the patient's airway, establishing proper position when establishing the patient's airway, using the correct technique in performing laryngoscopy, using the proper technique for intubating the patient, fixing the tracheal tube in the appropriate place and in a standard way, connecting the patient to the anesthesia machine, and assessing the patient and establishing stability in breathing. Miller's anesthesia reference book was used to prepare this manuscript [16]. To ensure the contents of the pamphlet, this manuscript was sent to 3 lecturers of the Anesthesia Department for revision.

After adjusting the educational methods, the students were divided into two groups using a random table of numbers. In the briefing session, the students of group A were introduced to the self-directed learning method and the objectives of the research by the researcher. Pamphlets prepared at this stage were provided to the students along with necessary guidance. After that, they entered the simulation environment individually, where they had access to the booklet prepared by the researcher for learning purposes. Additionally, a smartphone with internet access was provided to the students in the simulation environment, if needed. Miller's book, which is the main reference for student education in this university, was also available in the simulation room. Each student was given one hour to be present in the simulator environment and study in a self-directed manner using the available resources.

For group B training, a trainer was selected to facilitate observational learning. A briefing session for an hour and a half was organized by the researcher to teach the study method and research objectives. The titles of this meeting were similar to the titles of the manuscripts mentioned in the self-directed learning method. The above manuscript was also provided to the professor. After the briefing session, trial sessions were held, and the quality of education was improved to the desired quality under the supervision of the researcher. In these sessions, the goal of the researcher was to plan detailed learning for intubation patients by observing the trainer in the simulator environment.

Simultaneously with the training of the students of group A, the students of group B took part in a briefing session where the objectives of the research and the learning method were explained, and they entered the simulator environment, individually and started learning using the teacher observation method. At this stage, the professor answered all the students' questions, and each training session for each student with the presence of the professor lasted about an hour.

Finally, after ten days, both groups of students were evaluated in the simulator environment by a trained examiner during intubation on the model using the standard intubation checklist [17], and based on this checklist, scoring became.

Evaluation process

The examiner was an experienced anesthesiology lecturer with 2 years of clinical work experience and 5 years of work experience in the educational environment. Initially, the evaluator participated in a 2-hour orientation session where the researcher explained the objectives of the research. During this session, the standard intubation checklist was reviewed. At this stage, 8 individuals were experimentally evaluated by the evaluator using the checklist. However, these results were not included in the main results of the research. The evaluations were conducted ten days after the interventions by the evaluator in the simulator environment. The evaluator was unaware of the learning method each student had experienced.

Data analysis

After collection, descriptive analysis was conducted. In this study, data analysis was performed using SPSS software, specifically the 22nd edition. To assess the normal distribution of the data, the Shapiro-Wilk test was utilized. To compare the means of quantitative variables between two groups (P value<0.05), the non-parametric Mann-Whitney method was employed for data analysis.

Results

Demographic findings (Table 1) showed that 70% of the participants were female (n=42), and 30% were male (n=18). Additionally, 5% of the participants were married, while the majority were single. The Chi-square test and Fisher's exact test revealed no statistically significant difference in terms of gender and marital status between the groups, indicating that both groups were homogeneous (P value > 0.05).

The scores obtained from the standard intubation checklist showed that Group A had a higher average score, indicating compliance with intubation standards (Table 2).

Table 1- Frequency distribution of people in two groups in terms of demographic variables (gender and marital status)

Demographic Variables		Group		Test-value	P value
		self-directed learning	observational learning		
Gender	Male	10(33.34%)	8(26.7%)	*1.41	0.234
	female	20(66.67%)	22(73.3%)		
	Total	30(100%)	30(100%)		
Material Status	single	29(96.7%)	28(93.3%)	1**	0.726
	Married	1(3.3%)	2(6.7%)		
	Total	30(100%)	30(100%)		

Table 2- Comparison of compliance points with intubation standards in two groups after intervention

Group	N	Mean	Std. Deviation	T value	P value
A	30	75.41	13.57	3.84	0.001
B	30	57.77	12.56		

An independent t-test revealed a statistically significant difference in scores between the two groups (P value< 0.05). Evaluation results showed no significant difference between the two groups in terms of the number of incorrect esophageal intubations and the need for intubation repetition (Figure 1).

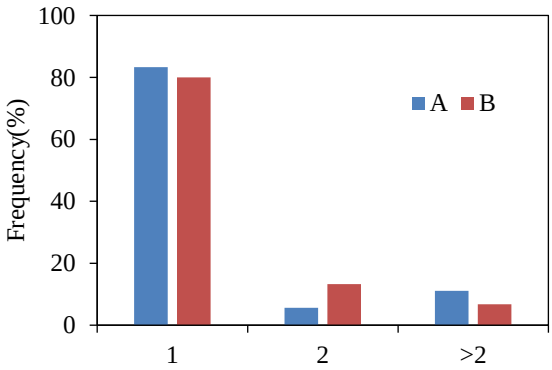

Figure 1- comparing the frequency distribution of people in two groups in terms of the number of repetitions

Discussion

Self-directed learning is a modern and dynamic method in which students learn and experience according to their personality type and needs. In fact, in this method, students obtain information that can easily be transferred to their long-term memory. Therefore, this method can be suitable for medical science education [18].

On the other hand, one of the active methods of learning in medical sciences is the observational method. In this method, the teacher teaches students how to perform a technique and how to use equipment while minimizing cost and time. By doing so, students are introduced to the standard methods of performing a technique [19].

Improving technical skills is one of the most important goals of education in medical sciences. Learning standard care techniques, along with increasing knowledge, can train a useful therapist who is effective in promoting the health of society and providing appropriate assistance to patients in critical times [20]. Intubation is one of the most important techniques for anesthesia nurses, who are crucial members of the anesthesia team. They can assist patients during critical stages such as anesthesia initiation and cardiopulmonary resuscitation. This technique can potentially save patients' lives or ensure controlled breathing during surgery, allowing for a safe and pain-free anesthesia experience [21].

Therefore, this study aims to compare the impact of learning methods on improving the intubation technical skills of nurse anesthetists. A self-directed and observational study was conducted. The present study showed that learning through observation can be more effective in standard intubation training compared to self-directed learning. However, the data reported in this study indicate that observational learning has not been superior in reducing the need for repeated intubation and reducing errors in esophageal intubation instead of tracheal intubation. This issue may be influenced by the lack of time students have for repetition and practice in their learning process.

Considering that medical techniques such as intubation are specialized, the evaluation stage and the examiner play crucial roles in research. Using an expert examiner in the assessment can provide more accurate data and ultimately reduce bias in the assessment [22].

Many studies have mentioned the effect of observational learning in teaching medical science techniques. In a study by Gervin et al., it was demonstrated that learning through observation was able to improve students' ability to diagnose damage in radiology photographs [13]. On the other hand, studies have shown that self-directed learning can be beneficial in fields related to medical sciences. In a study by Tawheed, which examined 27 articles on self-directed learning, it was found that self-directed learning was able to improve the technical skills of medical students [23]. According to the findings of Jimenez et al., which were conducted on nursing students in five European countries, nursing students can be successful in self-directed learning, and this approach can help improve their skills. However, the results of this research revealed that the level of self-directed learning skills among nurses in these five countries varied [24]. It should be noted that there are many factors that can affect the outcome of education in self-directed learning. One of these factors is an expert instructor who can guide the student in the right learning path and provide the necessary incentives [25].

By examining various studies, it is evident that many of them focus on the effect of two learning methods: self-

directed learning and observed learning. However, there has been no similar study comparing these two methods directly. According to the data from the present study, self-directed learning proves to be a suitable pathway for lifelong learning in nurse anesthetists. When combined with traditional educational methods and in compliance with standards, it yields better results than learning by observation. By facilitating self-directed learning, instructors can strengthen the development of technical skills in nursing anesthesia students and better prepare them to face clinical challenges.

Limitations and suggestions for future studies

The limitation faced by the researcher was the number of samples. It is recommended to repeat this research with more samples. On the other hand, it is recommended to provide students with practice time in future research and then evaluate them.

Conclusion

According to the findings of this study, it can be mentioned that the use of methods that involve most students in the educational process can be more effective in increasing knowledge. It should be kept in mind that according to the findings of this study, only effective training cannot be effective in reducing errors in performing technical skills.

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References

[1] Beiranvand S, Eslamizade N. Comparison of the laryngeal view with Airtraq and Macintosh laryngoscopes during tracheal intubation. J Clin Anesth. 2016; 5(1):40-44.
[2] Prekker ME, Driver BE, Trent SA, Resnick-Ault D, Seitz KP, Russell DW, et al. Video versus direct laryngoscopy for tracheal intubation of critically ill adults. N Engl J Med. 2023; 389(5):418-29.
[3] Russotto V, Myatra SN, Laffey JG, Tassistro E, Antolini L, Bauer P, et al. Intubation practices and adverse peri-intubation events in critically ill patients from 29 countries. JAMA. 2021; 325(12):1164-72.
[4] Geraghty LE, Curraín EÓ, McCarthy LK, O'Donnell CP, editors. The history of neonatal intubation. Semin Fetal Neonatal Med. 2023; 2(5).
[5] Riera J, Barbeta E, Tormos A, Mellado-Artigas R, Ceccato A, Motos A, et al. Effects of intubation timing in patients with COVID-19 throughout the four waves of the pandemic: a matched analysis. Eur Respir J. 2023; 61(3).
[6] Klemm UG. Certified registered nurse anesthetists' (CRNA) perceived ease and usefulness of video laryngoscopes for endotracheal intubation of surgical patients. AANA J. 2024.
[7] Qian M, Nicholson J, Tanaka D, Dias P, Wang E, Qiu L, editors. Augmented reality (AR) assisted laryngoscopy for endotracheal intubation training. In: Virtual, Augmented and Mixed Reality Applications and Case Studies: 11th International Conference, VAMR 2019, Held as Part of the 21st HCI International Conference, HCII 2019, Orlando, FL, USA, July 26–31, 2019.
[8] Ergashevich EA. Analysis of the state of use of modern teaching methods and technologies in educational institutions. J Mark Bus Manag. 2023; 2(6):7-12.
[9] Brockett RG, Hiemstra R. Self-direction in adult learning: perspectives on theory, research and practice. Routledge. 2018.
[10] Han F, Ellis RA. The relations between self-reported perceptions of learning environment, observational learning strategies, and academic outcome. J Comput High Educ. 2023; 35(1):111-25.
[11] Raj AR, Kathyayani B. Pre-operative breathing exercise using instructional demonstration in preventing post-operative pulmonary complications for patients undergoing elective abdominal surgery. Manipal J Nurs Health Sci. 2016; 2(1):16-20.
[12] Wu Q, Oh S, Tadayonnejad R, Feusner JD, Cockburn J, O'Doherty JP, et al. Individual differences in autism-like traits are associated with reduced goal emulation in a computational model of observational learning. Nat Ment Health. 2024; 2(9):1032-44.
[13] Semler MW, Keriwala RD, Clune JK, Rice TW, Pugh ME, Wheeler AP, et al. A randomized trial comparing didactics, demonstration, and simulation for teaching teamwork to medical residents. Ann Am Thorac Soc. 2015; 12(4):512-9.
[14] Taylor TA, Kemp K, Mi M, Lerchenfeldt S. Self-directed learning assessment practices in undergraduate health professions education: a systematic review. Med Educ Online. 2023; 28(1):2189553.
[15] Doo MY, Zhu M, Bonk CJ. Influence of self-directed learning on learning outcomes in MOOCs: a meta-analysis. Distance Educ. 2023; 44(1):86-105.
[16] Miller RD, Eriksson LI, Fleisher LA, Wiener-Kronish JP, Cohen NH, Young WL. Miller's anesthesia e-book. Elsevier Health Sci. 2014.
[17] Naeimi L, Bigdeli S, Soltani Arabshahi K. Level of self-directed learning readiness in medical students. Educ Strategies Med Sci. 2012; 5(3):177-81.
[18] Hill M, Peters M, Salvaggio M, Vinnedge J, Darden A. Implementation and evaluation of a self-directed learning activity for first-year medical students. Med Educ Online. 2020; 25(1):1717780.
[19] Carpenter D, Hu Z. Value of clinical observational

learning in work-integrated learning in health sciences education: students' views and experiences. Int J Learn Teach Educ Res. 2023; 22(6):552-67.
[20] Bjerrum F, Thomsen ASS, Nayahangan LJ, Konge L. Surgical simulation: current practices and future perspectives for technical skills training. Med Teach. 2018; 40(7):668-75.
[21] Higgs A, McGrath B, Goddard C, Rangasami J, Suntharalingam G, Gale R, et al. Guidelines for the management of tracheal intubation in critically ill adults. Br J Anaesth. 2018; 120(2):323-52.
[22] Khalafi A, Arman P, Manouchehrian N. Scenario-based simulation and debriefing sessions can potentially improve non-technical skills in nurse anesthetist students of Iran; a quasi-experimental study. Int J Africa Nurs Sci. 2022; 17:100495.
[23] Tohidi S, Karimi Moonaghi H. Self-learning module in medical education: a review of the literature. Iran J Med Educ. 2016; 16:72-83.
[24] Visiers-Jiménez L, Palese A, Brugnolli A, Cadorin L, Salminen L, Leino-Kilpi H, et al. Nursing students' self-directed learning abilities and related factors at graduation: a multi-country cross-sectional study. Nurs Open. 2022; 9(3):1688-99.
[25] Noh G-O, Kim DH. Effectiveness of a self-directed learning program using blended coaching among nursing students in clinical practice: a quasi-experimental research design. BMC Med Educ. 2019; 19:1-8.