

Analysis of the Effect of The Error Method Demonstration in The Teaching of Basic Nursing Laboratory Operation

Hui Chen¹, Qian Wang^{2*}

¹Department of Family Medicine, Shaanxi Provincial People's Hospital, Xi'an 710068, Shaanxi Province, China

²Department of Emergency Medicine, Shaanxi Provincial People's Hospital, Xi'an 710068, Shaanxi Province, China

*Corresponding author: Qian Wang, sxsyywq@126.com

Copyright: © 2024 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: *Objective:* This paper is mainly to deeply study and systematically explore the practical application of the error-demonstrating method in the teaching of basic nursing laboratory operation and the impact and effect it produces. *Methods:* 80 cases of nursing interns in our school were randomly selected for analysis and research from January 2023 to December 2023, 40 cases of traditional teaching methods were named as the reference group, and 40 cases of demonstration and error methods were named as the seminar group and in-depth analysis and evaluation of the teaching effect of the two groups after the implementation of different teaching modes were carried out. *Results:* The seminar group achieved remarkable results in terms of teaching effect, and the performance of the interns in this group was significantly better than that of the reference group in terms of medical key skills such as aseptic operation technique, intravenous infusion operation, intramuscular injection operation, and catheterization operation, $P < 0.05$, which is of research value. *Conclusion:* After the nursing interns received the teaching intervention of the demonstration of the error method, their experimental operation performance and hands-on ability were significantly improved, and at the same time effectively stimulated their interest in learning, which is worth using.

Keywords: Teaching effectiveness; Error-demonstrating method; Basic nursing; Traditional teaching

Online publication: April 26, 2024

1. Introduction

The Error Method Demonstration is a systematic teaching method that includes five core components: demonstration, practice, error presentation, correction, and summarization. In the laboratory classroom, the instructor will first demonstrate the teaching content in a standardized manner, after which the interns will practice. Next, the instructor will intentionally demonstrate an incorrect operation and ask the intern to identify and correct it. Finally, the instructor will summarize the root causes of the errors, avoidance strategies, and their possible negative effects to help the interns understand and correct the errors, while encouraging them to practice consistently between correct and incorrect modes of thinking ^[1]. Currently, the traditional

“demonstration-practice-summary” teaching method is commonly used in basic nursing laboratory teaching but has many shortcomings. For example, it may limit the interns’ thinking skills and make them rely too much on memorizing the operation procedures and imitating the teacher’s actions, rather than actively exploring and innovating. In nursing specialty education, cultivating technical and skilled personnel is an important mission of higher vocational education ^[2]. Given this, 80 nursing interns were selected for this study to explore the application value of the error method demonstration in the teaching of basic nursing laboratory operations.

2. Information and methods

2.1. General information

In this study, 80 nursing interns were selected from our school from January 2023 to December 2023, out of which 42 were males and 38 were females. They were divided into two groups of 40 each. One group was taught using the traditional teaching method and served as the reference group with interns aged 18–24 years old, with an average of 21.23 ± 2.34 years. The other group was taught using the demonstrative method and served as the seminar group with interns aged 18–25 years old, with an average of 21.47 ± 2.27 years. After preliminary analysis, the differences between the two groups were not significant ($P > 0.05$).

2.2. Methods

Both groups participated in study group discussions and agreed to focus the experimental program on the core skills of aseptic technique manipulation, intravenous infusion, intramuscular injection, and catheterization. The 40 nursing interns in the reference group were taught using traditional teaching methods whereas interns in the seminar group were taught using the demonstration-practice-error-correction-summary method. Firstly, the aseptic technique operation demonstration method was used. Interns were taught the correct operation steps and ensured that sterile and non-sterile items were placed separately and in a reasonable layout to avoid cross-contamination ^[3]. When opening the sterile wrap, special attention was paid so that the hand does not touch the inner surface of the wrap to maintain its sterility. When accessing the sterile holding forceps, the open end was always closed and must not touch the edge of the container mouth to prevent contamination. During use, the open end of the sterile holding forceps faced downward and avoided non-sterile areas ^[4]. In addition, when clamping the treatment towel, the arm avoided crossing the sterile area while ensuring that the treatment towel was not positioned below the operating table to maintain the integrity of the sterile environment. A series of hands-on training sessions were organized for the interns, during which the instructor was responsible for observing and evaluating the performance of the interns and recording the problems in detail ^[5]. These problems were mainly related to improper operation of quality checking of sterile solutions, irregular use of cotton swabs, incorrect methods in rinsing bottle tops, improper behavior during liquid pouring, and failure to record the opening information correctly. To help interns correct these errors, on-site demonstrations were conducted and the correct operation steps were explained in detail ^[6]. Second, the intravenous infusion method was carried out. A series of errors that may occur in the practical operation of the interns was presented, including drug preparation and failing to strictly follow the “three checks and seven pairs” system, which leads to the contamination of the needle. When draining the liquid, the operation was not carried out according to the standard procedure, resulting in operation failure. In addition, during the operation process, the intern’s hand may directly touch the patient’s sterilized area, which increases the risk of cross-infection ^[7]. During the puncture process, the tourniquet was not correctly tied and the needle was contaminated and still punctured, and the angle of puncture was not properly controlled. After removing the needle, the compression technique was incorrect and does not follow the “three-loose” principle. In response to the above problems, the interns

were asked to make corrections immediately and record the error points in detail. At the same time, the teacher pointed out any errors that the interns failed to discover on their own to ensure that future operations are more standardized [8]. Third, the intramuscular injection operation error demonstration method was carried out. A series of errors that may occur in the practical operation of the interns were put forward, including the failure to pay attention to the protection of patients' privacy in the process of environmental assessment. In the extraction of drug solution, the operation process failed to follow the norms [9]. There may also be obvious defects in the manipulation of needle holding. In the process of drug checking and patient information verification, the verification procedure was not strictly implemented, resulting in insufficient checking and information verification. In addition, there were deviations in the positioning of the anatomical site, where the holding technique of the cotton swab was not standardized, and the range of sterilized skin was too limited. There was a failure to properly arrange the patient's position when placing them. The needle entry site was contaminated and the use of medication was not economical. Needle plugs were not securely fastened and necessary items such as dry swabs were forgotten. After demonstrating these wrong operations, the teacher then provided solutions [10]. Lastly, the indwelling catheterization operation error method was carried out. By taking female indwelling catheterization as an example, a series of errors that may occur in the practical operation of the interns was presented, including opening of the secondary disinfection package, unstandardized aseptic operation, the arm crossed the sterile zone while laying the cavity towel, inappropriate order of secondary disinfection, and using the already contaminated left hand to access sterile items. These actions significantly increase the risk of infection [11]. After wearing gloves, contact with the patient's bedding and other items were avoided to ensure the hygiene and safety of the operation process. However, this rule was not observed in practice. Other errors include failure to secure the urinary catheter and the clamping operation was not carried out when the catheter was withdrawn. There were also shortcomings when communicating with the patient such as failing to remind them to keep still or to take deep breaths. After demonstrating these wrong operations, the teacher then provided solutions [12].

2.3. Observation indexes

At the end of the teaching period, a comprehensive assessment was organized for both groups of interns. The assessment was conducted by 4 senior faculty members, each of whom was responsible for supervising a specific operation to ensure fair and objective grading. The assessment covered key skill areas such as aseptic technique, intramuscular injection, intravenous infusion, and urinary catheterization. To visualize the difference in performance between the two groups, detailed statistics and comparative analyses of their test scores were conducted and the results were presented in a table.

2.4. Statistical analysis

All research data were analyzed by the SPSS 23.0 software. Measurement data were expressed as mean \pm standard deviation and the count data were expressed as %. Measurement data were analyzed using a *t*-test, and count data were analyzed using a chi-squared (χ^2) test. Results were considered statistically significant at $P < 0.05$.

3. Results

As shown in **Table 1**, the aseptic operation technique, intravenous infusion operation, intramuscular injection operation, and urinary catheterization operation assessment scores of the interns in the seminar group were higher than those of the reference group ($P < 0.05$).

Table 1. Comparison of the assessment results of aseptic operation technique, intravenous infusion operation, intramuscular injection operation, and urinary catheterization operation of interns between the two groups (mean \pm standard deviation, points)

Group	Cases, <i>n</i>	Aseptic operation technique	Intravenous infusion operation	Catheterization operation	Intramuscular injection operation
Reference group	40	74.45 \pm 2.17	76.37 \pm 3.62	75.15 \pm 2.64	72.32 \pm 3.43
Seminar group	40	89.12 \pm 2.54	86.45 \pm 3.84	89.32 \pm 2.98	90.12 \pm 2.42
<i>P</i>		< 0.05	< 0.05	< 0.05	< 0.05

4. Discussion

The traditional teaching method usually adopts the “lecture” mode, with the teacher as the core and the students mainly playing the role of imitation and learning, which limits the students’ innovation. Although the teacher will explain the operation process and precautions in detail, some students still find it difficult to avoid mistakes in actual operation [13]. In the teaching practice of the error demonstration method, the systematic steps of demonstration, error demonstration, error correction, and summarization are carried out to ensure sufficient interaction between teachers and students and allow students to think actively. Students can discover the mistakes demonstrated by the teacher and can make correct adjustments independently. This process requires a high level of concentration, judgment, and skill application, and also requires students to self-evaluate to continuously improve their skills. By comparing and evaluating correct and incorrect operations, students can identify the root causes of errors and explore corrective methods, thus giving full play to their subjective initiative. Furthermore, this method is student-centered, aiming to enhance the intern’s sense of autonomy and achievement [14].

After systematic empirical research verification, the error demonstration method has shown significant results in enhancing the self-correction ability of nursing interns. This method not only strengthens student awareness of the importance of basic nursing practice but also lays a solid foundation for their future careers. The application of the demonstration of error method in the teaching practice of basic nursing has significantly improved the performance of nursing students in laboratory operations [15]. This significant improvement is mainly attributed to the fact that the error-demonstrating method helps students actively determine and correct errors, thus deepening their understanding and mastery of the key points of nursing operations. In addition, when teachers carry out teaching activities, the use of the error teaching strategy can not only create a positive and energetic learning atmosphere for the classroom but also effectively stimulate the student’s enthusiasm for learning [16].

5. Conclusion

The use of the error method in the teaching of basic nursing laboratory operations has significant effects. This method not only effectively stimulates the learning interest of interns but also significantly improves their performance in laboratory operations. At the same time, through the application of the error method, the interns’ hands-on ability improved, and their innovative and critical thinking ability were cultivated. It is worthwhile to widely popularize and apply it in clinical nursing education.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Ma L, Huang J, 2021, The Application of Demonstration and Error Teaching Method in The Practical Teaching of Cardiopulmonary Resuscitation for Medical Students. *Modern Vocational Education*, 2021(38): 80–81.
- [2] Liu Y, 2021, Discussion on the Effect of Demonstration of Error Method in The Pre-Internship Skills Intensive Training of Nursing Students. *Modern Vocational Education*, 2021(28): 230–231.
- [3] Zhang X, Li D, 2020, The Application of Demonstration and Error Method in The Teaching of Basic Nursing Laboratory Operation. *Health Career Education*, 38(2): 91–92.
- [4] Wu M, Zhang Y, Pei T, et al., 2019, The Application Effect of Demonstrating Error Method in Teaching Basic Nursing Laboratory Operation. *World Digest of Latest Medical Information*, 19(55): 301–302.
- [5] Zou F, He Q, 2019, The Application of The Demonstration of Error Method in The Teaching of Aseptic Technique Skills. *Science and Education Guide (Late)*, 2019(3): 101–102.
- [6] Zhang N, The Application of Project Teaching Method in The Practical Teaching of Higher Vocational Basic Nursing. *Heilongjiang Science*, 13(3): 152–154.
- [7] Qiu X, Shi Y, 2022, Exploration of Experimental Teaching Reform of Basic Nursing Based on Experiential Teaching Mode. *Science and Education Guide*, 2022(9): 73–75.
- [8] Zhang X, 2022, The Implementation Value of Sandwich Teaching Mode in Basic Nursing Theory Teaching. *Heilongjiang Science*, 13(5): 56–58.
- [9] Zhu S, 2022, Application of Blended Teaching Method in The Teaching of Higher Vocational Basic Nursing Course. *Hebei Vocational Education*, 6(3): 86–89.
- [10] Wang Q, Wang T, Wu Y, et al., 2022, Analysis of the Application of Action-Oriented Teaching Mode in Basic Nursing Laboratory Teaching. *Health Career Education*. 40(15): 92–95.
- [11] Li X, Wu C, Zhou J, et al., 2022, Research on the Application of Evidence-Based Teaching Model in Basic Nursing Teaching Practice. *Abstract Compilation of the 5th Shanghai International Nursing Conference: Shanghai Nursing Society*, 2022: 212-213.
- [12] Guo J, 2023, Effectiveness of Process-Based Evaluation in Basic Nursing Teaching. *Knowledge Base*, 2023(5): 154–156.
- [13] Wang X, 2023, Analysis of the Application Effect of Diversified Teaching Method in The Teaching of Basic Nursing Course. *China Community Physician*, 39(13): 149–151.
- [14] Huang Q, Liu M, Tang T, 2023, Research on the Application of Nursing Humanistic Care Teaching Mode in Basic Nursing Practical Training. *Chinese Nursing Education*., 20(10): 1181–1184.
- [15] Kang M, 2018, The Application of Demonstration of Error Method in The Teaching of Basic Nursing Laboratory Operation. *Electronic Journal of Clinical Medicine Literature*, 5(32): 113–114.
- [16] Lu H, 2019, The Application of The Show-Error Method in The Intensive Training of Pre-Practice Skills of Nursing Students. *Family Medicine: Access to Medicine and Drug Selection*, 2019(1): 233.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.