

IMPROVING NURSES' KNOWLEDGE AND CLINICAL PRACTICE IN INTRACRANIAL SURGERY CARE THROUGH PRACTICE IMPLEMENTATION

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ABSTRACT

Patients in the post operation phase of intracranial surgery need specialized care to prevent complications and achieve best outcomes. Nurses have an important role in the monitoring of the neurological status of the patient, managing the complications and ensuring patient safety. However, poor knowledge and poor practices may have negative consequences on the outcome of the patient. Thus, it is crucial to adopt evidence-based nursing practices to improve the competency and quality of the nurse's care in neurosurgical settings.

To evaluate the effect of implementing nursing practices on nurses' knowledge and clinical practices in the care of patients undergoing intracranial surgery at Punjab Institute of Neuro Sciences Lahore.

The quasi-experimental pretest-posttest study was performed on 64 registered nurses of a Punjab Institute of Neuro Sciences Lahore. Purposive sampling was done to select the participants. A structured questionnaire, comprising 20 items to assess knowledge, 15 items to assess clinical practice, and demographic characteristics was used to collect data. After baseline assessment, all nurses underwent a structured educational intervention based on evidence-based postoperative neurosurgical care, including the aspects of neurological monitoring, infection prevention, medication management, and documentation. Two weeks following the intervention, posttest was administered. The data were analyzed by SPSS 26. The techniques of descriptive statistics, paired sample t-test, Chi-square test and Pearson correlation analysis were used. A p value of <0.05 was used as a cutoff for statistical significance.

The average age of the subjects was 34.80 ± 8.93 years. Prior to the intervention, the moderate knowledge group accounted for 71.9% of the nurses and the poor knowledge group accounted for 28.1%. After practicing the nursing care, 64.1% had good level of knowledge. The mean knowledge score significantly increased from 11.02 ± 2.11 to 15.47 ± 2.42 ($t = -31.64$, $p < 0.001$). Concerning clinical practices, 57.8% of the nurses had a moderate practice and 42.2% a poor practice at baseline. The clinical practices of 79.7% were good after the intervention. The mean practice score significantly improved from 8.77 ± 1.79 to 12.84 ± 1.65 ($t = -41.68$, $p < 0.001$). Demographic variables such as gender, qualification, total nursing experience and working unit (current) did not correlate with posttest knowledge or practice levels ($p > 0.05$).

The use of structured nursing practices led to a significant increase in the knowledge and actual practice of the nurses about the care of patients receiving intracranial surgery. The results indicate that evidence-based educational programmes and standardised nursing protocols should be embedded in the care of patients in neurosurgical settings to further develop the competence of professionals and improve patient care standards.

Keywords: Intracranial surgery, nursing practices, knowledge, clinical practice, neurosurgical nursing, educational intervention, postoperative care, quasi-experimental study.

INTRODUCTION

One of the most complicated and risky surgeries that can be performed in the contemporary healthcare is intracranial surgery, which should be approached with the help of a multidisciplinary team and demand high levels of care at all levels of management. Intracranial surgery patients are mostly in a critical condition with some of the conditions being brain tumors, intracranial hemorrhage, traumatic brain injury, aneurysms and hydrocephalus. The mentioned patients face life-threatening risks of elevated intracranial pressure, cerebral oedema, infection, and seizures as well as the issue of neurological deterioration. (Zrelak et al., 2020).

Intracranial surgery is one of the most complex and dangerous areas of current medicine, in which the anatomical structures are incredibly complex, and there is a very small margin of error. Brain physiology demands that

postoperative treatment go well beyond the normal procedures used to manage common surgical recovery and it is crucial for nursing care to be performed with special expertise in order to avoid catastrophic neurological degeneration and systemic complications. (Hussein Mahmoud et al., 2023). Structured nursing practice is not only supportive but one of the most important elements that influences the survival and ability of a patient to achieve a good functional outcome in tertiary healthcare facilities. Recent studies have demonstrated that this shift from the traditional, reactive nursing approaches to pro-active, evidence-based approaches has greatly reduced morbidity and mortality rates related to the procedure of the ICP. Because the surgical procedures in neurosurgery are so complex, the neurosurgery team must rely on professionals from multiple disciplines, with the role of the nurse being a key part in keeping the patient physiologically stable, especially in the management of ICP and prevention of seizures. secondary brain injury. (Placencia et al., 2024)

The use of specialized care protocols, such as those for intracranial aneurysms, is another example of how refined nursing interventions can impact care. The comprehensive nursing measures based on the prevention of risks have been proved to play an important role in promoting neurological function recovery and reducing postoperative complications, which are better than those of the conventional care measures. Among those treated for unruptured intracranial aneurysms, there has been a connection between refined nursing care and better outcomes and life quality. The results indicate that providing nurses with tools to assess and manage risk can help them to anticipate and prevent potential problems from becoming serious complications. The incorporation of these fine arts into the routines of daily care needs to move away from task-based approaches and towards outcome-based, patient-centred methods. (Ma et al., 2025)

Nurses are the key players in the environment in terms of physiological stability, neurological surveillance, the avoidance of complications, and recovery. Both their clinical competence and knowledge have a direct impact on patient outcomes in neurosurgical units and intensive care units. The nursing interventions that can be applied during the intracranial surgery of a patient are a set of evidence-based measures, such as regular neurological evaluation, airway and hemodynamic stability, prevention of infections, maintenance of the balance of water and electrolytes, and analgesia. The tasks of the perioperative nurse are expanded with patient preparation and education before the operation to postoperative rehabilitation. Nevertheless, research has shown that nurses commonly experience issues, including the lack of knowledge, inability to continue learning, and inconsistent clinical practice within the neurosurgical environment. (Bartos, 2020)

The given reasons can result in the under-optimality of care delivery, slower identification of complications, and even the increase in hospitalization. As such, the introduction of structured nursing practices is a methodological way of standardizing care, enhancing the competencies of nurses, and guaranteeing that they follow evidence-based clinical practices on a regular basis. There are indications that the quality of nurses in terms of patient care in critical and surgical units can be significantly improved through education and training interventions aimed at knowledge development and improvement of nurses practices. (Melnik & Fineout-Overholt, 2022)

According to a study by Abd El-Maksoud et al., the introduction of a nursing education program among the patients requiring brain surgery resulted in a significant reduction in the level of knowledge of nurses alongside the clinical outcomes and the patient recovery levels, and also reduced the duration of hospital stay. (Abd El-Maksoud et al., 2019; Shady et al., 2025) The study findings imply the significance of structured models of nursing practice in the complex surgical unit. Evidence-based nursing practices are crucial to delivering high-quality care in tertiary healthcare settings because neurosurgical patients may need advanced monitoring and critical interventions. Punjab Institute of Neuro Sciences is the referral center, where patients with complex and severe neurological problems are treated. Therefore, the readiness and ability of nursing personnel play a paramount role in providing security and enhancing the best results. Ongoing professional learning and compliance with nursing standards can make nurses competent enough to offer timely and suitable interventions, identify the presence of subtle neurological alterations, and work as members of multidisciplinary teams. (Li & Luo, 2024)

RATIONALE OF THE STUDY

The conditions of the patients undergoing intracranial surgery are complex and critical and therefore necessitate a high level of special and continuous nursing care. Nursing management plays a very crucial role in the prevention of complications like the rise in intracranial pressure, infections, and deterioration of the neurological status of the patient. Nonetheless, the differences in the knowledge and clinical activities of the nurses, as well as the limited access to the systematic training programs, tend to lead to the inconsistency of the quality of care in the tertiary care institutions. The adoption of evidence-based nursing practices (NP) offers an organized framework that helps to increase the theoretical knowledge, clinical judgment, and compliance to standardized

care practices among nurses. It has been demonstrated that those interventions lead to enhanced competency, confidence, and patient outcomes of nurses in neurosurgical and critical care units. These practices help to make nursing performance safer, minimize postoperative complications, and increase patient satisfaction. The research is notable because it meets the necessity to enhance the nursing strength of the tertiary healthcare facilities, especially in the neurosurgical departments. Assessment of the effects of the introduction of nursing practices on the knowledge of nurses and clinical outcomes will help to gain more insights on how to improve training programs, institutional policies, and evidence-based nursing culture. The results will not only have a positive impact on nurses and patients but also help the healthcare administrators to enhance the overall quality and safety of the neurosurgical care delivery.

Significance of the study

Patients undergoing intracranial surgery require specialized and meticulous nursing care to prevent complications, support recovery, and ensure favorable neurological outcomes. The quality of such care largely depends on nurses' knowledge, skills, and adherence to evidence-based clinical practices. This study is significant as it evaluates the effect of implementing structured nursing practices on improving nurses' knowledge and clinical performance in the care of neurosurgical patients.

The findings will help identify existing gaps in practice and highlight areas for professional development. The results may also guide the formulation of continuous training programs and standardized care protocols in Punjab Institute of Neuro Sciences Lahore, ultimately contributing to improved patient safety and quality of care in neurosurgical units.

Objective and Purpose of the Study

To determine the impact of standardization of nursing practice on knowledge and clinical outcome of nurses in terms of patient in intracranial surgery in Punjab Institute of Neuro Sciences Lahore.

Question of the Study

Is there any impact of standardization of nursing practice on knowledge and clinical outcome of nurses in terms of patient in intracranial surgery in Punjab Institute of Neuro Sciences Lahore?

METHODOLOGY

3.1 Research Design

The study design was quasi-experimental (pre-test and post-test) study that seeks to determine the impact of applying the nursing practices in enhancing knowledge and clinical performance of nurses with respect to patient care in a context of intracranial surgery. This is a non-random design, which enables the evaluation of change prior to and after the intervention.

3.2 Clinical Settings

The research was done in the Neurosurgical Department of Punjab Institute of Neuro Sciences Lahore that offers elective and emergency neurosurgical services. The department is comprised of the surgical wards and intensive care units where the postoperative intracranial surgery patients receive their management.

3.3 Sample Size

A total of 64 nurses was enrolled. The sample size was estimated using satisfactory practice levels after intervention in nurses as 62% (Jasim & Jaddoue, 2023) by taking 10% margin of error and 90% confidence level using following formula:

$$n = \frac{z^2 - \frac{a}{2} p(1 - p)}{d^2}$$

Where;

p= prevalence of satisfactory practice levels in nurses was = 62%

d= Marginal error set at 10%

α = 0.05

Z= Standard normal deviation for 90% confidence interval

n= Number of patients = 64

3.4 Sampling Technique

The participants meeting the inclusion criteria was recruited using a non-probability purposive sampling method.

3.5 Duration of Study

The overall time was taken six months, which involved ethical approval, data collection, delivery of the intervention, posttest, data analysis, and writing of the report.

3.7 Data Collection Procedure

The study was based on quasi-experiment pretest-posttest research to determine the efficacy of an educational intervention on knowledge and clinical performance of nurses in relation to the postoperative management of patients who undergo intracranial surgery. The research was conducted with the nurses who are employed in the Department of Punjab Institute of Neuro Sciences Lahore. The Institutional Review Board (IRB) of the concerned university provided ethical approval and formal permission was sought with the hospital administration before data collection. The objectives of the study, the procedures, the possible benefits and the rights of all eligible nurses were told and informed consent was written.

The process of data collection was carried in three stages. During the baseline data collection in the pretest stage, the questionnaire and checklist was used to collect the baseline information on knowledge and performance during regular practice with patients. The intervention stage was including formal educative training program by the researcher which concentrate on the evidence-based practices in neurosurgical care which covered aspects such as neurological monitoring, prevention of infection, medication administration, and documentation guidelines. The sessions were interactive and involved lecture, demonstrations, multimedia contents as well as case-based discussions presented over two consecutive weeks, each session was an hour and a half. Handouts and visual aids were being obtained by the participants to summarize main care principles. During the posttest, two weeks after the intervention, the tools will be re-administered again to assess knowledge and clinical performance changes. The principal investigator was the only person who collect the data in order to ensure consistency, reliability, and confidentiality. All the information about the participants were coded in order to protect their anonymity and none of it is to be revealed in any reports or publications.

3.8 Data Collection Tool

The data was compiled in three sections conducted in a structured format with the help of validated interventions based on prior studies and evidence-based practices. (Abd El-Maksoud et al., 2019; Jasim & Jaddoue, 2023; Yu & Wu, 2024).

The demographic information, such as age, gender, qualification, total experience, years working in neurosurgical units, past related training, and the current work environment was documented in

Section A.

Part B comprised of 20 multiple-choice questions on theoretical concepts of postoperative care of intracranial surgery that cover areas such as neurological evaluation, infection management, drug and medication management, and the documentation. Every correct response was rated at 1 point and summative scores would be good ($\geq 75\%$), moderate (50–74%), or poor ($< 50\%$).

Section C contained 15 items clinical performance checklist that was assess the practices of the nurses when attending to patients with special emphasis on the standards of postoperative care, the timely identification of complications, and safety measures they take. A point was given with every action done correctly, and the level of performance was rated as good (80% and above), moderate (60-79%), and poor (less than 60%).

RESULTS

Table 4.2: Distribution of Nurses According to Knowledge Levels Before and After Implementation of Nursing Practices (n = 64)

Knowledge Level	Pretest n (%)	Posttest n (%)
Poor	18 (28.1)	0 (0.0)
Moderate	46 (71.9)	23 (35.9)
Good	0 (0.0)	41 (64.1)
Total	64 (100)	64 (100)

Before implementation of nursing practices, 71.9% of nurses had moderate knowledge while 28.1% demonstrated poor knowledge. Following the intervention, none of the nurses remained in the poor category, whereas 64.1% Genetics and Molecular Research 25 (10s): 2026

achieved good knowledge levels. These findings indicate a substantial improvement in nurses' knowledge following the educational intervention.

Table 4.3: Comparison of Mean Knowledge Scores Before and After Implementation of Nursing Practices (n = 64)

Variable	Mean $\pm$ SD	t-value	p-value
Pretest Knowledge Score	11.02 $\pm$ 2.11	31.64	<0.001*
Posttest Knowledge Score	15.47 $\pm$ 2.42		

*Significant at $p < 0.05$

The mean knowledge score increased significantly from 11.02 $\pm$ 2.11 before the intervention to 15.47 $\pm$ 2.42 after the intervention. Paired t-test analysis demonstrated a highly significant improvement in knowledge scores ($t = -31.64$, $p < 0.001$), indicating the effectiveness of the implemented nursing practices.

Table 4.4: Distribution of Nurses According to Clinical Practice Levels Before and After Implementation of Nursing Practices (n = 64).

Practice Level	Pretest n (%)	Posttest n (%)
Poor	27 (42.2)	0 (0.0)
Moderate	37 (57.8)	13 (20.3)
Good	0 (0.0)	51 (79.7)
Total	64 (100)	64 (100)

At baseline, 42.2% of nurses demonstrated poor clinical practices and 57.8% demonstrated moderate practices. Following implementation of nursing practices, 79.7% of nurses achieved good practice levels while none remained in the poor category, reflecting marked improvement in clinical performance.(Table 4.4, Figure 4.1)

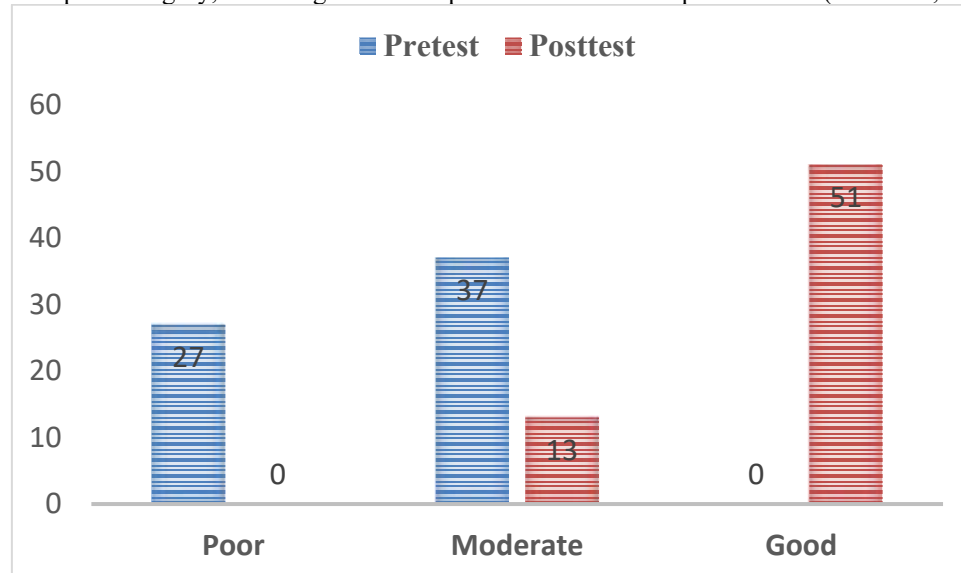


Figure 4.1: Distribution of Nurses According to Clinical Practice Levels Before and After Implementation of Nursing Practices (n = 64)

Table 4.5: Comparison of Mean Clinical Practice Scores Before and After Implementation of Nursing Practices (n = 64)

Variable	Mean $\pm$ SD	t-value	p-value
Pretest Practice Score	8.77 $\pm$ 1.79	41.68	<0.001*
Posttest Practice Score	12.84 $\pm$ 1.65		

*Significant at $p < 0.05$

The mean clinical practice score increased significantly from 8.77 ± 1.79 before implementation to 12.84 ± 1.65 after implementation. Paired t-test results showed a highly significant improvement in nurses' clinical practices ($t = -41.68$, $p < 0.001$), confirming the positive impact of the intervention.

Table 4.6 Association between Gender and Posttest Knowledge Level (n=64)

Gender	Moderate n (%)	Good n (%)	Total	χ^2	p-value
Male	10 (31.3)	22 (68.7)	32	0.611	0.434
Female	13 (40.6)	19 (59.4)	32		
Total	23 (35.9)	41 (64.1)	64		

Table 4.6 shows the association between gender and posttest knowledge level. Among male nurses, 68.7% demonstrated good knowledge compared to 59.4% of female nurses. However, the difference was not statistically significant ($\chi^2=0.611$, $p=0.434$). Therefore, posttest knowledge level was not significantly associated with gender. (Table 4.6, Figure 4.2)

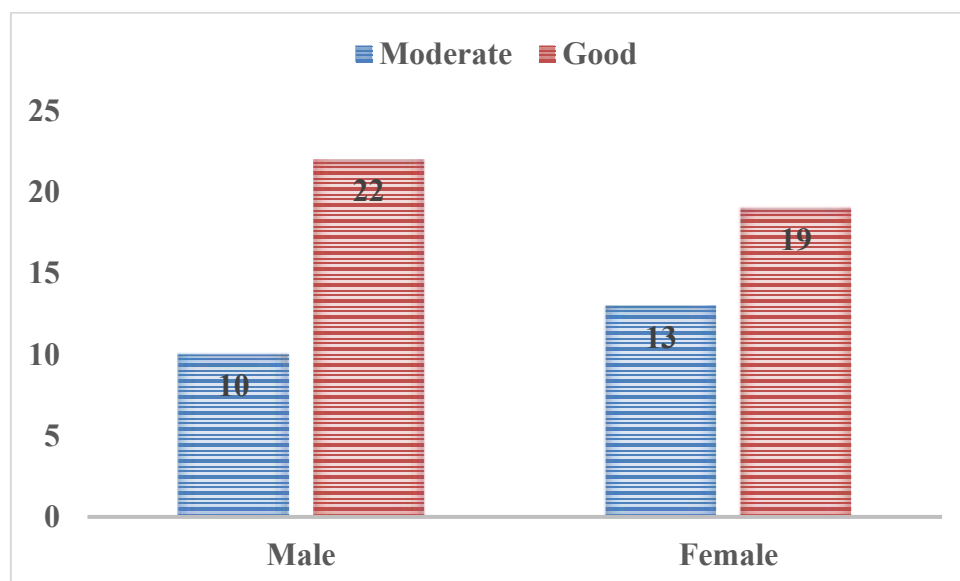


Figure 4.2 Gender vs Posttest Knowledge

Table 4.10 Association between Total Nursing Experience and Posttest Knowledge Level (n=64)

Experience	Moderate n (%)	Good n (%)	Total	χ^2	p-value
<2 years	7 (46.7)	8 (53.3)	15	4.920	0.178
2–5 years	7 (53.8)	6 (46.2)	13		
6–10 years	6 (30.0)	14 (70.0)	20		
>10 years	3 (18.8)	13 (81.2)	16		
Total	23	41	64		

Nurses with greater professional experience tended to have higher proportions of good knowledge. Nevertheless, the association between total nursing experience and posttest knowledge level was not statistically significant ($\chi^2=4.920$, $p=0.178$). (Table 4.10, Figure 4.6)

DISCUSSION

The present study showed that the mean age of the nurses participating was 34.80 ± 8.93 years, which indicates that the majority of the participants were in productive professional years. A satisfactory balance of male and female nurses (50.0% each) was seen. The majority of the participants held MSN (34.4%) and BSc nursing

qualification (28.1%) and about one-third had experience in nursing ranging from 6–10 years. The majority of the participants (more than half) had never had preoperative and postoperative care training. From these findings, it would seem that the participants were not all from the same educational background, nor from the same professional experience, but that a significant portion did not have specialized training in neurosurgical care. This was also found by Jasim and Jaddoue (2023), who noted that many nurses, having several years of professional experience, had not completed specialization training in the neurology area. This indicates the importance of ongoing professional learning and skills training in focused nursing environments. (Jasim & Jaddoue, 2023)

The results of the present study showed that nurses' knowledge increased significantly after the implementation of the nursing practices. Prior to intervention, 71.9% of the nurses had moderate knowledge while 28.1% had poor knowledge. After the intervention, 64.1% of the children attained good knowledge level and none remained in poor category. Furthermore, the mean knowledge score increased significantly from 11.02 ± 2.11 to 15.47 ± 2.42 ($p < 0.001$). This improvement could be due to the structured learning sessions and practical demonstrations, case discussions and evidence-based learning materials used throughout the intervention. The teaching methods probably increased the knowledge of the nurses about the neurological assessment, monitoring in the postoperative period and managing the risk of infection, medication administration, and documentation.

Likewise, Jasim and Jaddoue (2023) reported that a training program had a significant effect on the knowledge of nurses about the management of the patient with a neurological problem after surgery. (Jasim & Jaddoue, 2023) Furthermore, Yu and Wu (2024) found that evidence-based nursing education significantly improved nurses' knowledge and clinical judgment skills. The rise in the knowledge scores may also be attributed to the fact that over 50% of the nurses had not undergone any previous training in neurosurgery. The intervention, therefore, helped to fill gaps in knowledge and deliver new evidence-based information for daily clinical practice. (Yu & Wu, 2024)

One of the most important results of this study was the considerable improvement of clinical practices among the nurses after introducing nursing practices. In the pre-intervention period, 42.2% of the nurses were found to have poor practices and 57.8% had moderate practices. The intervention resulted in 79.7% of the participants having good clinical practice and no participants in the poor category. The mean practice score increased significantly from 8.77 ± 1.79 to 12.84 ± 1.65 ($p < 0.001$). The clinical performance improvement could be attributed to the hands-on aspects of the intervention such as demonstrations, return demonstrations, clinical guidance and practice reinforcement of evidence-based care principles. This improved clinical performance may have been partly due to better understanding of postoperative neurological monitoring, infection prevention, medication administration, documentation and patient safety. This was corroborated by Abd El-Maksoud et al. (2019) who noted that the application of clinical nursing guidelines had significant improvement in the practical performance of nurses. (Abd El-Maksoud et al., 2019)

Likewise, Yu and Wu (2024) reported the effectiveness of structured educational interventions where the quality of neurosurgical patient care was improved and evidence-based practices adhered to by nurses. (Yu and Wu et al., 2024) The American Association of Neuroscience Nurses also highlights that standardized nursing protocols can aid in better patient monitoring, lower risk of complications, and better patient outcomes after intracranial surgery. (Dallas, 2023) The substantial improvement noted in this research emphasizes the need for theory learning and skill development. Data shows structured training and clear clinical guidelines are associated with more effective and consistent implementation of recommended care practices among nurses (WHO, 2021).

The same results were obtained by Jasim and Jaddoue (2023) who observed that the demographic aspects of the participants did not significantly affect the post intervention knowledge outcomes in standardized educational programs. The lack of associations could suggest that both structured educational interventions and disparities in baseline knowledge between the various types of healthcare professionals can be reduced through structured educational interventions. (Jasim & Jaddoue, 2023)

CONCLUSION

The present study concluded that the implementation of structured nursing practices significantly enhanced the knowledge and clinical practice of the nurses related to patient care in the patients who underwent intracranial surgery. The educational program resulted in significant increases in nurses' knowledge of postoperative neurosurgical care, neurological assessment, infection prevention, medication administration, and documentation. In the same way, clinical performance in relation to postoperative monitoring, early detection of complications, safety for patients and professional and nursing behavior was greatly improved. The study's results showed that the scores for knowledge and practice significantly improved after the intervention, indicating that evidence-based

nursing education has a positive impact on improving work competency. Moreover, no significant differences were found in the posttest knowledge or practice by the demographic factors, including gender, qualification, nursing experience, and current working unit, which showed that the intervention had beneficial effects for all types of participants. It concludes that in general, it is important to carry out structured nursing practice programs, use evidence-based clinical guidelines, and increase the quality of nursing care and performance in neurosurgical practice.

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