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Evaluation of Nurses' knowledge about complications of craniotomy

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ABSTRACT

Objective(s): The aim of this study to evaluate nurses' knowledge regarding complications of craniotomy surgery and to determine the relationship between nurses' knowledge and their socio-demographic characteristics.

Methods: A descriptive study was designed on a purposive sample (non-probability sample) of 40 nurses in the Neurological Hospital in the intensive care units in Baghdad Governorate, and for the period from 1/12/2022to 28/2/2023, the questionnaire was constructed to collect data and conducted the study, and then determine the validity content of the questionnaire through a experts panel in adult nursing while internal consistency of reliability through the pilot study. The data was collected through a questionnaire and the data was analyzed through the application of descriptive and inferential statistical methods.

Results: The results of the present study showed that nurses who provide health care to patients with craniotomy in intensive care units have a poor level of knowledge reveals there is no relationship Socio-Demographic Characteristics and the Knowledge of the Complications of Craniotomy, except the age and educational level that have a relationship at a p value = 0.015 an effective on level of knowledge.

Conclusions: The study concluded that nurses in neurosurgery intensive care units in Baghdad Hospital need to be more informed of the complications of craniotomy surgery.

Recommendations: The study recommends conducting an educational program, which is essential to improve nurses' knowledge of the complications of craniotomy surgery.

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تقييم معارف الممرضين حول مضاعفات عمليات القحف

المستخلص

الأهداف: هدفت هذه الدراسة إلى تقويم معرفة الممرضات بشأن مضاعفات جراحة الجمجمة وتحديد العلاقة بين معرفتهن وخصائصهن الاجتماعية والديموغرافية .الطرق :تم تصميم دراسة وصفية على عينة غرضية)عينة غير عشوائية (من ٤٠ ممرضة في مستشفى الأمراض العصبية في وحدات الرعاية المركزة في محافظة بغداد، وللفترة من ٢٠٢٢/١٢/١ إلى ٢٠٢٣/٢/٢٨، وتم بناء استبيان لجمع البيانات وإجراء الدراسة، ثم تحديد صحة محتوى الاستبيان من خلال لجنة خبراء في تمريض الكبار، بينما تم تحديد التماثل الداخلي للموثوقية من خلال الدراسة التجريبية .جمعت البيانات من خلال استبيان وتم تحليلها باستخدام أساليب إحصائية وصفية واستنباطية .

النتائج :أظهرت نتائج هذه الدراسة أن الممرضات اللاتي يقدمن الرعاية الصحية للمرضى الذين أجروا جراحة الجمجمة في وحدات الرعاية المركزة يمتلكن مستوى ضعيف من المعرفة، وتكشف عدم وجود علاقة بين الخصائص الاجتماعية والديموغرافية والمعرفة بشأن مضاعفات جراحة الجمجمة، باستثناء العمر والمستوى التعليمي اللذين يظهران علاقة بقيمة p= 0.015 مؤثرة على مستوى المعرفة .

الاستنتاجات :استنتجت الدراسة أن الممرضات في وحدات الرعاية المركزة لجراحة الأمراض العصبية في مستشفى بغداد بحاجة إلى المزيد من المعلومات حول مضاعفات جراحة الجمجمة.

التوصيات :توصي الدراسة بإجراء برنامج تعليمي، الذي يعتبر ضروريًا لتحسين معرفة الممرضات بشأن مضاعفات جراحة الجمجمة .

الكلمات المفتاحية :جراحات الجمجمة، معرفة الممرضات

Introduction

Craniotomy is a neurosurgical technique that involves opening the skull to gain access to the brain, with the procedure referred to as a "craniotomy [(1)].

Common reasons for performing a craniotomy include the treatment of subarachnoid hemorrhage, brain tumors, or severe head injuries, to ensure a successful craniotomy with minimal difficulty, a comprehensive understanding of the fundamental anatomy and physiology of the human body is essential. the choice of skull bones to be targeted during the procedure depends on the underlying causes and impact of the specific disease [(2)].

Complications following intracranial surgery continue to be a major concern for medical professionals, common issues such as hemorrhage, cerebral edema, cognitive impairments, behavioral abnormalities, electrolyte imbalances, infections, seizures, venous thrombosis, and hydrocephalus, prompt identification and effective management of these problems play a crucial role in achieving positive patient outcomes [(3)].

The surgical approach holds significant importance in contemporary neurological care, allowing the treatment of conditions that were previously considered untreatable, the surgical technique is continuously evolving and updated based on the latest available information [(4)]. Nurses are pivotal in overseeing complications post-craniotomy. Serving as primary caregivers, they diligently monitor patients post-surgery, promptly identifying any signs of complications. They conduct thorough neurological evaluations, monitor vital signs, and assess consciousness levels. Nurses are trained to recognize early indicators of issues like intracranial hemorrhage, infection, and cerebral edema. Their collaboration with the healthcare team involves implementing interventions, including administering medications, pain management, and infection prevention [(5).].

The incidence of brain and central nervous system (CNS) malignancies has been on the rise in Iraq, with brain tumors ranking as the

sixteenth most prevalent diagnosis in 2012, contributing to 256,000 new cases, the incidence of brain and CNS malignancies has exhibited an upward trend from 2.882% in 2000 to 5.53% in 2015, with an additional 1160 cases reported outside the Kurdistan area of Iraq [6]. Studies have emphasized the significance of recognizing and managing postoperative complications following craniotomy. Al-Hashimi and Alkhateeb (2020) conducted a spatial analysis of brain and other CNS cancers in Iraq from 2000 to 2015, highlighting the importance of monitoring and addressing complications related to craniotomy. Additionally, Al-Zurfi (2019) developed an automated classification system to determine malignant grades of brain tumors, underscoring the need for accurate evaluation and timely intervention in the context of craniotomy complications [7].

Methods

A descriptive study design was carried out at Neurosurgical Teaching Hospital in Baghdad City. The primary hospital for neurosurgery in Iraq, from December 1st, 2022 to March 28th, 2023.

A convenience sampling method for their study, which was deemed appropriate based on the population characteristics and research objectives. This nonprobability sampling technique typically involves selecting participants who are readily available and easily accessible within a certain location or setting in this study for 40 nurses. who works in the Neurosurgical Teaching Hospital in Baghdad City. To safeguard the confidentiality of individuals' information and uphold ethical standards in research conduct, the following measures have been implemented: The questionnaire employed in the study has received approval from the Research Ethics Committee of the College of Nursing at the University of Baghdad. Additionally, the researcher secured written consent, indicated by participants' signatures on the informed consent section of the study questionnaire. It is emphasized that participants' information is treated with utmost confidentiality, exclusively for scientific research purposes.

The questionnaire consist from three sections was used in the study: the first section was composed of the demographic characteristics (age, gender, years of experiences, monthly income, education level), the second section consist of nurse's knowledge of complications of craniotomy and the third part is of the nurse's knowledge for management of complications, for all the questions the right answer take the result (high)and the wrong answer take the result (low).

The content validity is determined through a panel of (12) experts Seventh of the m are faculty members of the Adult Nursing Department, five of the m are neurological specialists. Cronbach's Alpha was used to measure the internal consistency on 15 nurses and it was acceptable (0.71).

Data was gathered through interviewing the nurses face-to-fac.

The SPSS (Statistical Package for Social Sciences) version (21) was applied for the statistical analysis of the study, a confidence interval of (0.95) and a P-value of less than (0.05) is considered to be significant. Data were analyzed using descriptive statistical data analysis such as frequency and percentage, in addition to inferential statistical data statistics such as Pearson correlation, the association between the knowledge and the nurses' characteristics.

Results

Table 1. Distribution of nurses According to their Demographic Characteristics N=40 nurse

Variables	Groups	F	%
Gender	Male	18	45
	Female	22	55
Age (years)	36	27	67.5
	36-46	12	30
	46-56	1	2.5
	56	0	0
Educational level	Graduate of Nursing Prep	3	7.5
	Medical Institute	18	45
	College of Nursing	18	45
	Postgraduate	1	2.5

N=number**, F=** Frequency**, %=** Percentage.

Table (1) reveals that females constitute the majority of the, accounting for 55% of the participants. In terms of age, a significant portion of the sample, approximately 67.5%, falls within the age range of 36 years or younger. Furthermore, the data shows that 45% of the participants come from medical institutes and colleges with nursing degrees. When it comes to, around 50% of the respondents reported earning between 600,000 to 900,000 Iraqi Dinars (IQD).

Table 2. Evaluation of Nurses' Knowledge about craniofacial Operations

The first domain: information about craniotomy surgeries	Response	Statistical Parameters		Mean	evaluation
		F	%		
1. One of the reasons for craniotomy surgery is….	Correct	13	32.5	0.325	low
	Incorrect	27	67.5		
2. The craniotomy is performed under the influence	Correct	26	65	0.65	High
	Incorrect	14	35		
3. According to your knowledge, what is the shortest?	Correct	6	15	0.15	low
	Incorrect	34	85		
4. post-operative monitoring?	Correct	14	35	0.35	low
	Incorrect	26	65		
5. During the first 24 hours, what should the nurse do?	Correct	25	62.5	0.625	High
	Incorrect	15	37.5		
6. When can a patient undergoing craniotomy return to practice his normal life?	Correct	19	47.5	0.475	low
	Incorrect	21	52.5		
7. When can a person undergoing craniofacial….	Correct	9	22.5	0.225	low
	Incorrect	31	77.5		
8. When can a person shower after surgery?	Correct	16	40	0.4	low
	Incorrect	24	60		
9. When should stitches and staples be removed after a craniotomy?	Correct	11	27.5	0.275	low
	Incorrect	29	72.5		
10. One of the paragraphs below is the cause of inflammation (infection)….	Correct	25	62.5	0.625	high
	Incorrect	15	37.5		

The mean of the Score: (0.50). low = (mean less than 0.50) high= (mean 0.50 or more)

Table (2) reveal that, in general, the study participants received a "low" rating for all the items assessed, except for items numbered 2, 5, and 10, where their responses received a "high" rating.

Table 3. Evaluation of Nurses' Knowledge about the Complications of Craniotomy (N= 40 Nurses)

The second domain:	Response	Statistical Parameters		Mean	evaluation
		F	%		
1- What are the most likely complications after cranioplasty?	Correct	7	17.5	0.175	low
	Incorrect	33	82.5		
2- What is the type of emergency or urgent operation (craniotomy) that is used in the case of a brain tumor due to bleeding, clot, or infection?	Correct	8	20	0.2	low
	Incorrect	32	80		
3- One of the se complications is not present in the craniectomy (Craniectomy)?	Correct	11	27.5	0.275	low
	Incorrect	29	72.5		
4-When do you expect to have double bleeding after a craniectomy?	Correct	10	25	0.25	low
	Incorrect	30	75		
5- What are the complications resulting from cranioplasty?	Correct	12	30	0.3	low
	Incorrect	28	70		
6- What should the nurse not notice while examining the wound after the operation?	Correct	18	45	0.45	low
	Incorrect	22	55		
7- Is one of these signs present normally (i.e., not as a pathological complication) in patients undergoing craniofacial surgery?	Correct	17	42.5	0.425	low
	Incorrect	23	57.5		
8- What is the sign that should be prevented or avoided, which warns of bleeding after the operation of the craniofacial?	Correct	6	15	0.15	low
	Incorrect	34	85		
9- One of these signs is an indication of the presence of leakage in the cranial fluid (CSF leak) after the operation as a complication.	Correct	10	25	0.25	low
	Incorrect	30	75		
10- The enlargement of the head resulting from a rise in the cranial fluid occurs after surgery?	Correct	6	15	0.15	low
	Incorrect	34	85		

The mean of the Score: (0.50). low = (mean less than 0.50) high= (mean 0.50 or more).

Table (3) displays the evaluation of responses provided by the study sample during the study, specifically regarding their understanding of the complications associated with craniotomy. The research outcomes reveal that, across all the assessed items, the responses from the nurses were categorized as "low."

Table 4. Evaluation of the Knowledge of Nurses` Towards Nursing Care for Patients with Craniofacial Operations and its Complications

The Third Domain		F	%		evaluation
1- What is the first and most important thing a nurse does to take care of the cranial wound and prevent infection?	Correct	24	60	1	
	Incorrect	12	30		high
2-Among the most important nursing interventions to double the leakage of cranial fluid are:	Correct	11	27.5	0.275	
	Incorrect	29	72.5		low
3- Which of the options below is not related to nursing	Correct	6	15	0.15	

interventions when there is a rise in cranial fluid?	Incorrect	34	85		low
4- Which of the options below is not among the nursing interventions …….	Correct	8	20	0.2	
	Incorrect	32	80		low
5- Which of the options below has nothing to do with nursing interventions to prevent infection?	Correct	9	22.5	0.225	
	Incorrect	31	77.5		low
6- One of the se instructions is not among the instructions that the nurse carries out to teach patients upon discharge from the hospital	Correct	14	35	0.35	
	Incorrect	26	65		low
7- Which of these instructions should the nurse teach to the patient upon leaving the hospital?	Correct	26	65	0.65	
	Incorrect	14	35		high
8- One of the best positions for a craniotomy patient to prevent complications is?	Correct	9	22.5	0.225	
	Incorrect	31	77.5		low
9- What are the necessary procedures to be used by the nurse when a convulsion occurs after the craniotomy?	Correct	24	60	0.6	
	Incorrect	16	40		high
10- How does the nurse deal with the surgical incision when changing the bandage?	Correct	23	57.5	0.425	High
	Incorrect	17	42.5		

The mean of the Score: (0.50). low = (mean less than 0.50) high= (mean 0.50 or more.

Table (4) indicate that, with the exception of items numbered 1, 7, 9, and 10, where their responses were categorized as "high," the nurses responses at the study were generally marked as "low" for all other items.

Table 5. The Relationship between Nurses' Knowledge about the Complications of Craniotomy and their Socio-Demographic Characteristics

Demographic data	Rating	F.	%	Chi-Square Tests	p-value
Age (years)	36-46	12	30	Df=2	0.015(S)
	46-56	1	2.5		
	56 and more	0	0		
Gender	Male	18	45	X^2=9.73[a] Df=2	
	Female	22	55		0.136(N. S)
Educational level	Graduate of Nursing Prep	3	7.5	X^2 =46.6a	
	Medical Institute	18	45	Df=3	0.000(S)
	College of Nursing	18	45		
	Postgraduate	1	2.5		

F= Frequency, **%**= percentage, **P value**= 0.001.

Table (5) reveals there is no relationship Socio-Demographic Characteristics and the Knowledge of the Complications of Craniotomy, except the age and educational level that have a relationship at a p value = 0.015 and 0.000, respectively.

Discussion

Through the data analysis of distribution of the socio-demographic variables (Table 1), it is evident that approximately more than half of the study sample (55%) were female. This finding is consistent with the study conducted in 2010 in Iraq where the majority of the sample (66.7%) was female [(8)]. In terms of age, the study sample predominantly consisted of individuals aged 36 and below (67.5%). However, this result disagree a previous

study in North America that found most nurses fell into the age group of 25-35 years[9].

Regarding the level of education, less than half of the sample (45%) had received degrees from medical institutes and colleges of nursing. Furthermore, 55.5% of the sample had participated in training courses, which aligns with the findings of another study in Ireland that focused on training courses related to traumatic head injury[10].

The dominance of females (55%) in the nurses could be due to the fact that nursing is traditionally seen as a female-dominated profession Women have historically been more inclined to pursue careers in healthcare and nursing.

The high percentage (67.5%) of participants aged 36 and below could be attributed to the fact that younger individuals are more likely to actively participate in studies and surveys. Additionally, this age group might be more represented in nursing as it's a professional that about attracts younger individuals.

The significant proportion (45%) of participants from medical institutes and colleges specializing in nursing is likely due to the study's focus on healthcare professionals and nursing degrees. This could also be influenced by the availability of participants with relevant backgrounds.

Table (2) displays the evaluation results of the study sample's responses regarding "information on nurses' knowledge of craniotomy operations." The mean score of the nurses' responses is 0.50, which serves as the threshold for determining high or low. According to the criteria stated, a mean score of less than 0.50 is considered a low, while a mean score of 0.50 or more is considered a high. The results indicate that most of the items studied, for the nurses' responses low below the high threshold. In other words, the mean scores for these items are less than 0.50, suggesting a lack of knowledge in those areas. However, there are three specific items (numbered 2, 5, and 10) for which the nurse responses meet or exceed the high threshold. This implies that the nurses demonstrated an acceptable level of knowledge or understanding in relation to those particular items. Based on the information presented in Table (3) and Table (4), it appears that the evaluation is evaluating the knowledge of nurses regarding complications of craniotomy and nursing care for patients with craniofacial operations and its complications. The tables show the responses of 40 nurses, indicating whether their answers were correct or incorrect for each question.

In Table (4), the evaluation of nurses' knowledge of the complications of craniotomy, the results show that the majority of the nurses had incorrect responses for most of the questions, as indicated by the "Incorrect" response percentages being higher than the "Correct" response percentages. The mean score for this evaluation is below 0.50, suggesting that the nurses, on average, did not demonstrate a satisfactory level of knowledge in this domain. The possible justifications for the results are:

Nurses may have diverse specializations, and not all may have experience or training in neurosurgery or craniotomies. This lack of specialization can lead to a lack of knowledge of associated complications.

Nurses in certain healthcare settings may have limited exposure to patients undergoing craniotomies, reducing their opportunity to witness and learn of associated complications.

Nursing education programs may not adequately address the intricacies of craniotomies and their complications. Additionally, nurses might not have access to ongoing education on these topics.

Similarly, in table (4), the evaluation of nurses' knowledge towards nursing care for patients with craniotomy operations and its complications, the results indicate that the nurses had incorrect responses for several questions. However, there are some questions where the majority of the nurses provided correct responses. The mean score for this evaluation is above 0.50, implying that, on average, the nurses demonstrated a satisfactory level of knowledge in this domain. These results agree with the study in Saudi Arabia that found a majority of nurses have a low level of knowledge about complications of craniotomy [(14)].

The paragraph describes the results of a study related to nurses' knowledge of nursing care for patients with craniofacial operations and their associated complications, with most responses categorized as "low" except for specific items (1, 7, 9, 10) where the responses were marked as "high." The potential justifications for these findings are:

It's possible that the study participants had varying levels of knowledge regarding craniofacial operations and their complications. Some nurses may have had more exposure or training in this area, leading to "high" responses on certain items, and Items 1, 7, 9, and 10 may have covered topics or aspects of nursing care that were more familiar or commonly encountered by the study participants, which could explain the "high" responses on these item.

The overall "low" responses suggest that there may be gaps in the nursing education and training related to craniofacial operations and their complications. It's possible that these topics are not adequately covered in nursing curricula.

Nurses with more experience may have performed better on the test, especially on items related to practical nursing care, as they may have encountered such cases during their careers.

Access to educational resources and materials on craniofacial operations and complications may have varied among the study participants, influencing their knowledge levels.

Nurses who received specific training or attended workshops related to craniofacial operations and their complications might have performed better on the test.

Table (5) illustrates the relationship between knowledge of the complications of craniotomy among staff nurses and their socio-demographic characteristics. The table indicates there are no relationship between the level of knowledge of the complications of craniotomy and socio-demographic characteristics, except the age and level of education that have a relationship at a p value 0.015 and 0.000, respectively. These findings are consistent with previous research exploring the relationship between demographic characteristics and knowledge of craniotomy complications. Wang et al. (2018) in China, observed that older nurses had greater experience in caring for patients with neurological disorders, which led to a more comprehensive understanding of complications associated with craniotomy. Likewise, in a study by Zhang et al. (2019)in china , it was found that nurses with higher levels of education demonstrated enhanced knowledge regarding the prevention and management of postoperative complications in neurosurgical patients.[(11)(12)] . The possible justifications for these results are: age as a factor, The significant relationship between age and knowledge of craniotomy complications ($p = 0.015$) could indicate that older healthcare professionals may have had more exposure to or experience with craniotomy cases during their careers. This experience might lead to a better understanding of the associated complications.

The strong relationship between educational level and knowledge (p = 0.000) suggests that individuals with higher levels of education, such as advanced degrees or specialized training in neurosurgery or related fields, are more likely to possess in-depth knowledge of craniotomy complications. This is plausible as higher education about ten involves more extensive medical training and exposure to complex procedures.

The lack of significant relationships with other socio-demographic characteristics (e.g., gender, income, employment status) may indicate that these factors do not have a substantial influence on knowledge of craniotomy complications in this particular nurses. Other variables might be more influential in shaping their knowledge.

The mention of p-values (p = 0.015 and p= 0.000) implies that these relationships are statistically significant. This means that the observed relationships between age and educational level and knowledge of craniotomy complications are not likely due to chance but are meaningful findings based on the data.

Given the significant relationship between educational level and knowledge, healthcare institutions may consider about firing targeted educational programs to enhance the knowledge of nurses and healthcare professionals of craniotomy complications, especially for those with lower educational backgrounds.

The relationship with age highlights the value of experience in nursing. Older professionals may have accumulated knowledge through years of practice, but this should.

Conclusions

The following conclusions have been made in light of the findings of the current investigation and light of the discussion and interpretation of the data:

1. Female Nurses are more than males. Nurses' age group (36-45) years is more than other age groups.
2. Most of the Nurses have graduates of the Nursing Institute. and college of nursing, and high percentage of the nurses have 1-5 years of experience in nursing. High percentage of the nurses have less than 5 years of service in critical units**.**
3. No statistically significant relationship was found between gender and years of nursing experience with knowledge of craniotomy complications, age and educational level were identified as factors significantly associated with nurses' knowledge in this area. This suggests that older age and higher educational attainment may contribute to better knowledge of craniotomy complications**.**

Recommendations

Healthcare institutions should prioritize the implementation of education programs targeting specific areas of nursing practice, these programs should be designed to enhance nurses' knowledge and skills, ultimately improving patient care. Ongoing prof essionalsal development opportunities should be provided to nurses, focusing on updating their knowledge in critical care practices. This can be achieved through workshops, seminars, or online courses tailored to their respective areas of specialization.

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