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Research Article

Assessment of Nurses' Compliance throughout Caring of newborn with convulsions at neonate intensive care unit in Hafr Albatin, Saudi Arabia

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Abstract

Background *Neonatal convulsions are among the most critical medical emergencies in neonatal intensive care units (NICUs), requiring prompt intervention to prevent severe neurological complications and mortality. Proper nursing care plays a pivotal role in managing these seizures, yet compliance with standardized protocols varies significantly among healthcare professionals. This study aimed to assess the knowledge, practice, and compliance of nurses in caring for neonates experiencing convulsions at the NICU of Maternity and Children Hospital in Hafr Al-Batin, Saudi Arabia. It further examined the relationship between nurses' knowledge levels and their adherence to clinical protocols.*

Methods *A descriptive cross-sectional study was conducted between March 2024 and May 2024. A purposive sample of 71 registered nurses with at least one year of NICU experience was selected. Data were collected using a web-based questionnaire distributed through WhatsApp, comprising a structured interview questionnaire and a performance checklist adapted from validated sources. The study assessed nurses' demographic characteristics, knowledge, and practice using a scoring system, categorizing competency levels as poor, average, or good. Data analysis was performed using IBM SPSS 26.0, applying descriptive statistics, Pearson correlation, and linear regression to evaluate relationships between knowledge, practice, and compliance.*

Results *The findings indicated that 47.9% of nurses had poor knowledge, 38.0% had average knowledge, and only 14.1% demonstrated good knowledge regarding neonatal convulsions. Additionally, 57.7% of nurses exhibited poor practice in seizure management, while 25.4% showed average performance, and only 16.9% displayed good compliance with clinical protocols. Significant correlations were observed between knowledge and practice ($r = 0.638$, $p < 0.001$), suggesting that increased knowledge was associated with improved compliance. Furthermore, demographic factors, including age, education, experience, and prior training, were significantly associated with knowledge and practice levels ($p < 0.001$), highlighting the role of continuous education in improving neonatal seizure management.*

Conclusion *This study demonstrated that the majority of NICU nurses exhibited suboptimal knowledge and practice regarding neonatal convulsions, with significant gaps in adherence to evidence-based protocols. The findings underscore the urgent need for targeted training programs, structured hospital policies, and ongoing competency assessments to improve neonatal convulsion management. Implementing standardized guidelines and providing continuous education can significantly enhance nursing compliance, patient safety, and neonatal outcomes.*

Keywords *Neonatal convulsions, nursing compliance, NICU, neonatal seizure management, nurses' knowledge, nurses' practice, Hafr Al-Batin, Saudi Arabia*

Introduction

Neonatal convulsions represent one of the most critical medical emergencies in neonatal care, requiring immediate intervention and specialized management. These convulsions, characterized by sudden and involuntary neurological activity, can occur at any gestational age, yet the first week of life is particularly vulnerable. The occurrence of convulsions during this period is associated with high mortality rates and long-term neurodevelopmental complications. Agrawal & Fox (2018) emphasized that neonatal seizures significantly contribute to morbidity and mortality, especially among preterm infants and those with low birth weight. The primary causes of neonatal convulsions include hypoxic-ischemic encephalopathy, intracranial hemorrhage, septicemia, meningitis, metabolic imbalances such as hypoglycemia and hypocalcemia, as well as genetic disorders and congenital infections (Hart et al., 2017). Additionally, Samanci et al. (2023) indicated that metabolic disturbances, particularly hypoglycemia and electrolyte imbalances, are among the leading factors in neonatal seizure pathophysiology, requiring careful monitoring and timely medical intervention.

Nurses play a vital role in managing neonatal convulsions, extending beyond direct medical interventions to educating families, promoting self-management strategies, and ensuring optimal health outcomes for affected neonates. However, nursing compliance with evidence-based seizure management practices is influenced by various factors, including knowledge, level of education, and clinical experience. Mohamed et al. (2017) highlighted that nursing compliance is essential in improving neonatal outcomes, as deviations from established protocols can prolong seizure activity, increase hospitalization duration, and lead to long-term complications. Effective neonatal care depends on well-trained nurses who possess the necessary expertise

and adhere to established clinical guidelines to minimize risks and improve patient survival (Elshafie et al., 2021). Moreover, Ahmed et al. (2019) found that continuous professional education significantly enhances nurses' compliance, improving their ability to manage neonatal convulsions effectively.

The global incidence of neonatal convulsions remains a major concern, with an estimated prevalence of 3 per 1,000 live births in full-term neonates and up to 57 per 1,000 among preterm infants (Knežević-Pogancev, 2019). Studies indicate that approximately 80% of neonatal seizures occur within the first week of life, requiring urgent intervention to prevent adverse neurological outcomes (Samanci et al., 2023). Hussein Abdelhammed et al. (2022) reported that inadequate nurse training and non-compliance with standardized seizure management protocols contribute significantly to neonatal morbidity. Given these statistics, evaluating nursing compliance in managing neonatal convulsions is imperative to improving the quality of care provided in NICUs (Samanta, 2021).

The conceptual framework guiding this study highlights three key variables: nurses' knowledge, practice, and compliance with established protocols. Nurses' knowledge encompasses their understanding of pathophysiology, clinical manifestations, and evidence-based management of neonatal convulsions. It serves as a foundational element influencing their ability to provide effective care. Nurses' practice refers to their actual execution of clinical tasks and adherence to protocols within the NICU setting, directly affecting patient outcomes. Compliance with protocols reflects the extent to which nurses integrate evidence-based recommendations into their clinical decision-making and caregiving practices (Elshafie et al., 2021). Institutional factors such as resource availability, organizational policies, and access to continuous training further impact these elements. Alikari & Zyga (2018) emphasized that healthcare institutions should prioritize professional development initiatives to enhance nursing compliance and improve neonatal seizure management.

This study also incorporates theoretical perspectives to explore the mechanisms underlying nursing compliance. The Socio-Ecological Model (SEM) suggests that nurses' adherence to protocols is influenced by multiple levels, including individual knowledge, interpersonal relationships within healthcare teams, institutional guidelines, and societal health norms (Nguyen & Wusthoff, 2021). The Information-Motivation-Behavioral Skills (IMB) model posits that compliance is driven by access to accurate information, motivation to provide high-quality care, and confidence in implementing recommended interventions (Güngör et al., 2023). Additionally, Self-Determination Theory highlights autonomy, competence, and relatedness as key drivers of behavior change in clinical settings. Bandura (1997) argued that self-efficacy plays a crucial role in nurses' ability to comply with complex clinical protocols, reinforcing the importance of ongoing education and institutional support.

High-risk neonates are particularly vulnerable to convulsions due to factors such as prematurity, low birth weight, congenital defects, and maternal health conditions. These infants require specialized and intensive medical care, often in NICUs equipped with advanced technology. Many HRNs depend on respiratory support, nutritional assistance, and strict infection control measures to prevent complications (Sharma et al., 2021). Due to their underdeveloped immune systems, these neonates are highly susceptible to infections, which can trigger convulsions (Desalew et al., 2020). Healthcare professionals play a crucial role in providing education, emotional support, and guidance to families, ensuring effective continuity of care even after discharge (Zhou et al., 2014).

Maintaining strict adherence to nursing protocols is critical for ensuring the safety and well-being of neonates experiencing convulsions. Compliance involves following established clinical guidelines, hospital policies, and legal frameworks that govern neonatal care. Identifying areas where nurses struggle with adherence allows for the implementation of targeted interventions aimed at enhancing their knowledge and skills. Strengthening compliance through structured educational programs can significantly improve neonatal outcomes and reinforce the importance of evidence-based practice in NICUs (Ma et al., 2021). Wu et al. (2024) highlighted that ongoing cognitive-behavioral interventions for healthcare professionals enhance their decision-making processes and adherence to neonatal care protocols.

Neonatal convulsions remain a leading cause of neonatal mortality and neurodevelopmental impairment, necessitating strict compliance with established management protocols. Despite advancements in neonatal care, many neonates continue to experience seizures, with significant variation in nurses' adherence to standardized care practices. Studies show that neonatal convulsions occur in approximately 3 per 1,000 full-term births and up to 57 per 1,000 preterm births (Samanci et al., 2023). Non-compliance with established neonatal seizure management protocols has been associated with prolonged hospitalization, increased seizure severity, and worsened neurodevelopmental outcomes (Mohamed et al., 2017). Evaluating the factors that influence nursing compliance is crucial for improving neonatal seizure management and optimizing long-term patient outcomes.

Nursing compliance with neonatal convulsion management protocols is vital to improving neonatal survival rates and reducing the risk of long-term disabilities. Ensuring adherence to clinical guidelines significantly enhances patient safety, treatment effectiveness, and overall healthcare quality (Hussein Abdelhammed et al., 2022). By assessing nurses' knowledge, skills, and adherence to clinical guidelines, this study aims to identify practice gaps and areas requiring targeted intervention. Ahmed et al. (2019) emphasized that continuous professional training enhances nurses' competencies, leading to better neonatal care outcomes. Moreover, assessing compliance can provide valuable insights into institutional policies, highlighting areas for

improvement in neonatal healthcare facilities.

This study aims to assess nurses' compliance with neonatal seizure management protocols in NICUs in Hafr Al-Batin, Saudi Arabia. By identifying areas of non-compliance, this research seeks to provide data for improving patient safety through targeted interventions and structured training programs designed to enhance adherence to evidence-based practices. The specific objectives include evaluating nurses' knowledge regarding neonatal convulsion management, assessing their practical application of clinical protocols, and examining the relationship between nurses' knowledge and their compliance with best practices. Addressing gaps in nursing compliance through systematic assessment, targeted education, and institutional support will ultimately contribute to improving the quality of neonatal seizure management and patient outcomes in Saudi Arabia.

Methods

This study employed a descriptive cross-sectional hospital-based design, conducted from March 2024 to May 2024, to assess nurses' compliance in caring for neonates with convulsions at the Neonatal Intensive Care Unit (NICU) of the Maternity and Children's Hospital in Hafr Al-Batin, Saudi Arabia. The hospital was chosen as the study setting due to its specialized neonatal services and its role as a referral center for high-risk neonates, making it an ideal environment to evaluate nurses' adherence to convulsion management protocols.

A purposive sampling technique was used to recruit registered nurses (RNs) working in the NICU. Eligibility criteria included a minimum of one year of experience in neonatal care and an active employment contract with the hospital. Nurses who were unavailable during the data collection period, as well as interns and trainees, were excluded from the study. The sample size was determined based on previous studies using a 5% absolute error and a 5% Type I error. The calculated sample size was 71 nurses, ensuring sufficient statistical power to assess compliance and its associated factors.

Data collection was conducted using a web-based questionnaire using google forms. A secure and encrypted platform. Participation was entirely voluntary, which was electronically distributed through e-mail with prior coordination with nursing directors. The questionnaire's landing page included an explanation of the study's purpose, confidentiality assurances, and completion guidelines. To ensure data quality, participation was restricted to one response per IP address, and the estimated completion time was 15–18 minutes.

Two primary data collection tools were used in the study. The first tool was an interview questionnaire sheet, developed after an extensive literature review. It consisted of two sections: the first collected personal and socio-demographic data, including age, marital status, nationality, job title, education level, years of experience, and prior training in neonatal convulsion care. The second section assessed nurses' knowledge

regarding neonatal convulsion management. This section comprised 30 closed-ended questions (Yes, No, or "I don't know") adapted from Hussein & Hatab (2022). These questions covered essential topics such as the definition, causes, classification, signs and symptoms, seizure precautions, and nursing care before, during, and after a convulsion.

The second data collection tool was a performance checklist sheet, which was adapted and modified from Ahmed, et al (2020) to assess nurses' practical compliance with neonatal convulsion management. The checklist included 10 key performance items categorized into pre-convulsion nursing care (three items), nursing interventions during convulsions (three items), and post- convulsion care (four items). Responses were recorded using a three-point scale, where participants could select "Always" (2 points), "Sometimes" (1 point), or "Never" (0 points).

The scoring system for nurses' knowledge and practice classified their competency levels into good (≥ 75%), average (60–74%), and poor (< 60%). The knowledge section had a total score of 30 points, with 1 point assigned for correct responses and 0 points for incorrect or "I don't know" answers. The practice section had 10 performance-based items, with scores ranging from "completely done" (2 points) to "not done" (0 points).

The data analysis was conducted using IBM SPSS Statistics version 26.0. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize demographic characteristics, knowledge, and practice scores. Pearson correlation analysis examined the relationships between knowledge, practice, and compliance, while linear regression analysis was conducted to explore the impact of knowledge and practice on compliance. Additionally, a mediation analysis was performed to determine whether knowledge influenced the relationship between practice and compliance.

The validity of the study instruments was confirmed through expert panel review by five faculty members specializing in neonatal and nursing research. Reliability was assessed using internal consistency reliability measures, with Cronbach's alpha computed for both knowledge and practice components. The results indicated acceptable reliability, confirming that the study tools were appropriate for measuring the intended variables.

Ethical approval was obtained from the National Committee of Bioethics, with formal approval issued in February 2024. Participants were informed of their voluntary participation, and digital informed consent was obtained before completing the survey. Submission of the questionnaire was considered as implied consent to participate in the study.

The study was conducted between February and May 2024, covering all stages, including planning, data collection, analysis, and reporting. Several limitations were acknowledged. Firstly, the study was conducted in a single healthcare facility, limiting the generalizability of findings to other hospitals in Saudi Arabia.

Secondly, reliance on self-reported data introduced the possibility of response bias, as participants may have provided socially desirable responses rather than fully accurate reflections of their practices.

Results

The study sample consisted of 71 registered nurses working in the Neonatal Intensive Care Unit (NICU) at the Maternity and Children's Hospital in Hafr Al-Batin, Saudi Arabia. The sample was selected using purposive sampling, ensuring that all participants met the inclusion criteria of having at least one year of experience in neonatal care. Data were collected through a web-based questionnaire, with demographic characteristics analyzed to provide insights into the nurses' background and professional experience.

Table (1) demonstrated the socio-demographic characteristics of the studied nurses. The majority of participants (73.2%) were between 25-35 years old, with a mean age of 31.70±6.05 years. Regarding nationality, 73.2% were Saudi nationals, while 26.8% were non-Saudis. In terms of marital status, 59.2% were married, while 38.0% were single, and 2.8% were widowed. Regarding educational qualifications, 54.9% held a bachelor's degree, 36.6% had a diploma, and 8.5% held a master's degree. The majority of nurses (59.2%) resided in rural areas, whereas 40.8% lived in urban settings. As for years of experience, 45.1% of nurses had 6-10 years of experience, 43.7% had 1-5 years, and only 11.3% had 11-15 years. These findings indicated that most nurses in the study were young, predominantly Saudi, and had considerable experience in neonatal intensive care, making them well-suited for assessing compliance in managing neonatal convulsions.

Table (1): Percentage distribution of the studied nurses according to their socio-demographic characteristics (n=71)

Variable	N	%
Age		
25-35 years	52	73.2
35 -45 years	19	26.8
Mean ± SD	31.70±6.05	
Nationality		
Saudi	52	73.2
Non-Saudi	19	26.8
Marital Status		
Single	27	38.0

Married	42	59.2
Widowed	2	2.8
Educational qualifications		
Bachelor	39	54.9
Diploma	26	36.6
Master	6	8.5
Residence		
Urban	29	40.8
Rural	42	59.2
Years of experience		
1-5 yrs.	31	43.7
6-10 yrs.	32	45.1
11 – 15 yrs.	8	11.3

The study assessed nurses knowledge regarding the care of neonates with convulsions in neonatal intensive care units (NICUs), revealing significant gaps in their understanding. The overall knowledge level, as depicted in the bar chart, showed that 47.9% of nurses had poor knowledge, while 38.0% demonstrated an average level, and only 14.1% exhibited a good knowledge level. These findings suggest a considerable need for enhanced training and educational interventions to improve neonatal convulsion management among nursing staff.

Table (2) provides a detailed breakdown of the nurses' knowledge across different aspects of neonatal convulsion care. More than two-thirds (64.8%) of the participants correctly identified the definition of neonatal convulsions, while 70.4% recognized Hypoxic-Ischemic Encephalopathy (HIE) as the most common cause. However, classification knowledge was inconsistent, with 76.1% correctly identifying clonic seizures as rhythmic jerking movements, yet only 28.2% recognized tonic seizures, and 32.4% identified myoclonic seizures, indicating a high level of uncertainty in seizure differentiation.

Regarding signs and symptoms, 60.6% of nurses correctly identified cyanosis (bluish discoloration of the skin) as a key indicator, but recognition of other critical symptoms, such as eye deviations (35.2%) and poor feeding (49.3%), was relatively low. In terms of convulsion precautions and nursing care, 62.0% of the participants emphasized maintaining airway and breathing, as well as temperature management, highlighting an awareness of essential emergency interventions.

However, parent education (38.0%) and follow-up care (45.1%) received lower scores, reflecting gaps in nurses' ability to provide comprehensive post-convulsion care.

The total knowledge score ranged between 2 and 27, with a mean score of 15.51 ± 6.02, suggesting a moderate level of overall knowledge. These findings underscore the urgent need for targeted training programs to improve nurses' competency in neonatal convulsion management, particularly in recognizing seizure types, identifying symptoms, and ensuring effective post-seizure care.

Table 2: Nurses' knowledge regarding the care of neonates with convulsions at neonate intensive care units (n=71)

ITEMS	Correct		Incorrect /I don't know	
	N	%	N	%
Definition				
1. Newborn convulsions definition	46	64.8	25	35.2
Causes:				
2. Hypoxic-Ischemic Encephalopathy (HIE)	50	70.4	21	29.6
3. Maternal Factors	37	52.1	34	47.9
4. Birth Trauma	39	54.9	32	45.1
5. Infections	26	36.6	45	63.4
6. Metabolic Disorders	41	57.7	30	42.3
Classification:				
7. Subtle seizures are subtle movements or changes in behavior	32	45.1	39	54.9
8. Clonic seizures are rhythmic jerking movements.	54	76.1	17	23.9
9. Tonic seizures are stiffening of muscles.	20	28.2	51	71.8
10. Myoclonic seizures are brief, rapid muscle contractions	23	32.4	48	67.6
11. Focal seizures are limited to one area of the body	24	33.8	47	66.2
Signs and Symptoms:				
12. Repetitive, rhythmic movements	38	53.5	33	46.5

13. Stiffening of limbs or arching of the back	41	57.7	30	42.3
14. Altered consciousness or responsiveness.	35	49.3	36	50.7
15. Eye deviations or staring spells.	25	35.2	46	64.8
16. Changes in breathing pattern	32	45.1	39	54.9
17. Cyanosis (bluish discoloration of the skin)	43	60.6	28	39.4
18. Apnea (temporary cessation of breathing)	33	46.5	38	53.5
19. Abnormal eye movements	38	53.5	33	46.5
20. Excessive crying or irritability	30	42.3	41	57.7
21. Poor feeding or sucking difficulties	35	49.3	36	50.7
Convulsion Precautions and Nursing Care during and after Convulsions:				
22. Newborn safety during convulsion	40	56.3	31	43.7
23. Time the Seizure	41	57.7	30	42.3
24. Maintain Airway and Breathing	44	62.0	27	38.0
25. Seizure Documentation	33	46.5	38	53.5
26. Vital Sign Monitoring	39	54.9	32	45.1
27. Temperature Management	44	62.0	27	38.0
28. Medication Administration	39	54.9	32	45.1
29. Parent Education	27	38.0	44	62.0
30. Follow-up Care	32	45.1	39	54.9
Total score (Range)		15.51±6.02 (2-27)		

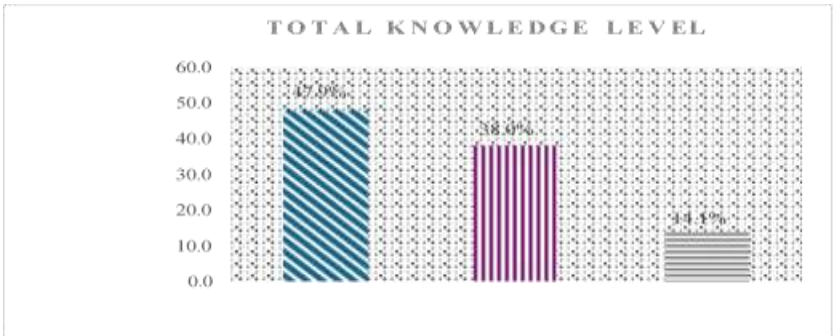

Figure 1: Level of Knowledge regarding care of neonates with convulsions at neonate intensive care units (n=71)

The study evaluated the performance of nurses in caring for neonates with convulsions at Neonatal Intensive Care Units (NICUs), revealing significant deficiencies in nursing practice. As shown in Figure 3, the majority of nurses (57.7%) demonstrated poor practice, while 25.4% exhibited an average level of practice, and only 16.9% had good practice. These findings indicated a substantial gap in nursing competencies, emphasizing the need for further training and adherence to standardized protocols for neonatal convulsion management.

Table (3) provided a detailed analysis of nurses' performance before, during, and after a convulsive episode. In pre-convulsion care, 47.9% of nurses reported always conducting a thorough assessment, while a significant proportion (57.7%) stated that they only sometimes provided education to caregivers and implemented seizure precautions, indicating inconsistencies in preventive care measures. During convulsions, 38.0% of nurses reported always responding promptly to ensure the child's safety, whereas a concerning 81.7% reported only sometimes observing and documenting convulsion characteristics and vital signs, which was a critical aspect of seizure management. Additionally, 31.0% always administered emergency anticonvulsant medications, while 26.8% never administered them, highlighting variations in medication adherence.

Post-convulsion care showed further performance challenges. Only 23.9% of nurses consistently performed recovery and stabilization assessments, while a large proportion (43.7%) did so only sometimes. Similarly, discharge planning was often neglected, with 39.4% of nurses never engaging in this essential process, potentially affecting long-term patient outcomes. The total performance score ranged from 5 to 20, with a mean score of 11.09 ± 4.32, reinforcing the overall low level of compliance with best practices.

These findings suggested that while nurses demonstrated moderate competence in responding to convulsions, gaps existed in preventive measures, documentation, medication administration, and post-convulsion follow-up care. The high percentage of poor practice (57.7%) underscored the urgent need for targeted training programs, improved institutional policies, and greater clinical supervision to enhance nursing performance in neonatal convulsion management.

Table 3: Performance of nurses regarding care of neonates with convulsions at neonate intensive care units (n=71)

Items	Always		Sometimes		Never	
Nurses' Performance in the Care of Children with Convulsion Before Convulsion:						
1. Conduct a thorough assessment for the child	34	47.9	24	33.8	13	18.3
2. Provide education to the child's caregivers	17	23.9	41	57.7	13	18.3

3. Implement appropriate seizure precautions for the neonate.	18	25.4	41	57.7	12	16.9
Nurses' Performance in the Nursing Role During Convulsion:						
4. Respond promptly during a convulsion episode and ensure the child's safety	27	38.0	44	62.0	0	0.0
5. Closely observe and document the characteristics and duration of the convulsion, vital signs, and any associated symptoms.	13	18.3	58	81.7	0	0.0
6. Administer emergency anticonvulsant medications	22	31.0	30	42.3	19	26.8
7. Nurses' Performance in the Nursing Role After Convulsion:						
8. Recovery and Stabilization	17	23.9	31	43.7	23	32.4
9. Assessment and Evaluation	17	23.9	31	43.7	23	32.4
10. Emotional Support and Education	14	19.7	41	57.7	16	22.5
11. Discharge Planning	21	29.6	22	31.0	28	39.4
Total score (Range)	**11.09± 4.32 (5-20)**					

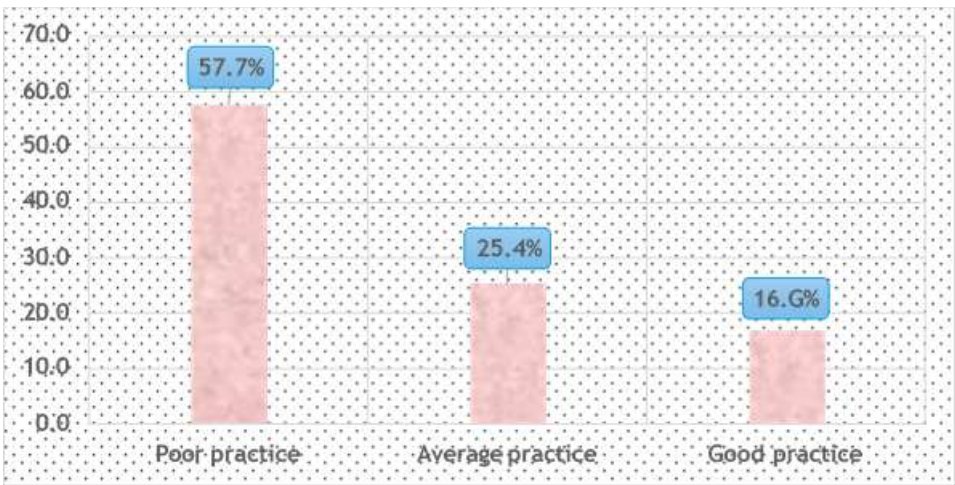

Figure 2: Level of nurses' performance regarding care of neonates with convulsions at neonate intensive care units (n=71)

The study examined the relationship between nurses' demographic characteristics and their knowledge level regarding neonatal convulsion care. As shown in Table 4, there were statistically significant associations between knowledge level and age, educational qualifications, years of experience, and previous training, with p-values below 0.001 in all cases. However, nationality, marital status, and place of residence did not show a statistically significant relationship with knowledge level.

Regarding age, younger nurses between 25-35 years were more likely to have poor knowledge (94.1%), whereas 60% of nurses aged 35-45 years demonstrated good knowledge, indicating that more experienced nurses had better knowledge levels ($X^2 = 15.892$, $p < 0.001$). Similarly, educational qualifications played a crucial role, with 81.5% of diploma holders having average knowledge, while 60% of bachelor's degree holders and 40% of master's degree holders had good knowledge ($X^2 = 28.838$, $p < 0.001$). These findings suggested that higher education was associated with better knowledge of neonatal convulsions.

The findings also revealed that years of experience significantly influenced knowledge levels ($X^2 = 30.515$, $p < 0.001$). Nurses with 1-5 years of experience predominantly had poor knowledge (52.9%), while 60% of nurses with 11-15 years of experience had good knowledge, reinforcing the notion that clinical exposure and professional experience enhance competency in neonatal convulsion management.

Training history was another critical determinant of knowledge levels. Among nurses who had received previous training, 90% exhibited good knowledge, while 100% of those who lacked prior training had poor knowledge ($X^2 = 42.202$, $p < 0.001$). This result strongly indicated that continuous education and training programs significantly improved nurses' understanding of neonatal seizure management.

Conversely, nationality, marital status, and residence did not show statistically significant associations with knowledge levels ($p > 0.05$). These findings suggested that factors such as cultural background, living environment, and marital status did not influence nurses' knowledge as much as education, experience, and training did.

Table 4: Relation between demographic characteristics of the studied nurses and their knowledge level

Variable	Knowledge level						Significance test
	Poor		Average		Good		
	N	%	N	%	N	%	X^2 (P)
Age							
25-35 years	32	94.1	16	59.3	4	40.0	**15.892 (<0.001)****
35 -45 years	2	5.9	11	40.7	6	60.0	
Nationality							
Saudi	32	94.1	16	59.3	4	40.0	0.922 (0.631)
Not- Saudi	2	5.9	11	40.7	6	60.0	
Marital Status							
Single	10	29.4	12	44.4	5	50.0	2.492 (0.646)
Married	23	67.6	14	51.9	5	50.0	

Widowed	1	2.9	1	3.7	0	0.0	
Educational qualifications							
Diploma	17	50.0	22	81.5	0	0.0	
Bachelor	16	47.1	4	14.8	6	60.0	**28.838(<0.001)****
Master	1	2.9	1	3.7	4	40.0	
Residence							
Urban	13	38.2	13	48.1	3	30.0	1.179 (0.555)
Rural	21	61.8	14	51.9	7	70.0	
Years of experience							
1-5 yrs.	18	52.9	13	48.1	0	0.0	**30.515(<0.001)****
6-10 yrs.	16	47.1	12	44.4	4	40.0	
11 – 15 yrs.	0	0.0	2	7.4	6	60.0	
Previous training							
Yes	0	0.0	4	14.8	9	90.0	**42.202 (<0.001) ****
No	34	100.0	23	85.2	1	10.0	

The study examined the relationship between nurses' demographic characteristics and their performance levels in caring for neonates with convulsions, revealing significant associations with age, educational qualifications, years of experience, and previous training. As presented in Table 5, nurses' performance levels were significantly influenced by these factors, while nationality, marital status, and place of residence did not show statistically significant relationships.

In terms of age, younger nurses aged 25-35 years were more likely to demonstrate poor performance (90.2%), whereas 58.3% of those aged 35-45 years exhibited good performance (X^2 = 15.024, $p < 0.001$). These results suggested that older and more experienced nurses performed better in neonatal convulsion care, likely due to greater clinical exposure and confidence in handling critical cases.

Educational qualifications also played a critical role, with 53.7% of diploma holders demonstrating poor performance, while 50.0% of nurses with a bachelor's degree and 25.0% of those with a master's degree achieved good performance levels ($X^2 = 11.173$, $p = 0.025$). These findings highlighted that higher education significantly contributed to improved nursing performance in convulsion management.

Years of experience had a notable impact on performance ($X^2 = 25.757$, $p < 0.001$), as 53.7% of nurses with 1-5 years of experience showed poor performance, whereas 50.0% of those with 11- 15 years of experience

exhibited good performance. These results reinforced the idea that practical experience was a crucial determinant of nursing competency. Similarly, previous training was strongly associated with performance levels ($X^2 = 40.824$, $p < 0.001$), as 83.3% of nurses who had received training demonstrated good performance, compared to only 16.7% among those without training. This finding underscored the importance of continuous professional education in enhancing nurses' skills and adherence to neonatal convulsion management protocols.

The correlation between nurses' total knowledge and performance was further illustrated in Figure 4, which showed a significant positive correlation ($r = 0.638$, $p < 0.001$). This result indicated that higher knowledge levels were associated with better performance in neonatal convulsion care. The regression analysis suggested that for every unit increase in knowledge, performance scores improved accordingly, emphasizing the need for targeted educational interventions to bridge knowledge gaps and enhance nursing practice.

Table 5: Relation between demographic characteristics of the studied nurses and their performance level

Variable	Performance level						Significance test
	Poor		Average		Good		
	N	%	N	%	N	%	X^2 (P)
Age							
25-35 years	37	90.2	10	55.6	5	41.7	**15.024(<0.001)****
35 -45 years	4	9.8	8	44.4	7	58.3	
Nationality							
Saudi	32	94.1	16	59.3	4	40.0	0.922 (0.631)
Not- Saudi	2	5.9	11	40.7	6	60.0	
Marital Status							
Single	12	29.3	10	55.6	5	41.7	5.555 (0.235)
Married	28	68.3	8	44.4	6	50.0	
Widowed	1	2.4	0	0.0	1	8.3	
Educational qualifications							
Diploma	22	53.7	14	77.8	3	25.0	**11.173 (0.025)***
Bachelor	17	41.5	3	16.7	6	50.0	

Master	2	4.9	1	5.6	3	25.0	
Residence							
Urban	15	36.6	9	50.0	5	41.7	0.936 (0.626)
Rural	26	63.4	9	50.0	7	58.3	
Years of experience							
1-5 yrs.	22	53.7	9	50.0	0	0.0	**25.757(<0.001) ****
6-10 yrs.	18	43.9	8	44.4	6	50.0	
11 – 15 yrs.	1	2.4	1	5.6	6	50.0	
Previous training							
Yes	2	4.9	1	5.6	10	83.3	**40.824(<0.001) ****
No	39	95.1	17	94.4	2	16.7	

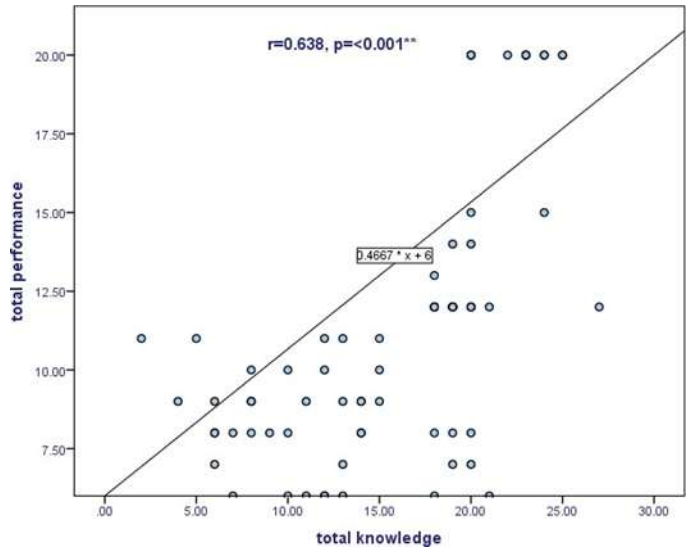

Figure 3: Correlation between nurses' knowledge and performance regarding care of neonates with convulsions at neonate intensive care units

Discussion

Neonatal convulsions represent a critical medical emergency, associated with high mortality rates, increased risk of neurological impairments, and a higher likelihood of developing epilepsy in later life. Given the severity of this condition, immediate intervention and specialized nursing care are essential. Nurses play a pivotal role in managing convulsions in neonatal intensive care units (NICUs), ensuring patient stabilization, monitoring treatment efficacy, and educating caregivers (Musawi & Mahmud, 2023). This study aimed to evaluate nurses'

proficiency and knowledge in neonatal convulsion management, identifying key gaps in compliance with evidence-based care practices.

The socio-demographic characteristics of the studied nurses revealed that the majority (73.2%) were between 25-35 years old, with a mean age of 31.70±6.05 years. Most nurses (73.2%) were Saudi nationals, and more than half (59.2%) were married. In terms of education, 54.9% held a bachelor's degree, while 59.2% resided in rural areas. Experience levels varied, with 45.1% of nurses having 6-10 years of experience. These findings aligned with a study by Hussein Abdel- Hammed, Saad Al Sharkawwi, & Nader (2022), which found that most NICU nurses were between 30-35 years old, with a mean age of 28.85 ± 5.85 years. However, while half of the nurses in their study had a diploma, this study found a higher prevalence of bachelor's degrees, suggesting a shift toward higher education levels among NICU nurses.

Regarding knowledge levels, the findings indicated a substantial gap in nurses' understanding of neonatal convulsions. More than 47.9% had poor knowledge, 38.0% demonstrated average knowledge, and only 14.1% had good knowledge. These results were consistent with Gamil, Abdel Aty, and Faltas (2022), who found that more than 25% of nurses had good knowledge, while less than one-third had average knowledge, and nearly half exhibited poor knowledge. The observed knowledge deficits could be attributed to limited specialized training programs, a lack of hospital regulations for neonatal convulsion management, and insufficient exposure to advanced clinical guidelines. These findings contrasted with Taha et al. (2016), who reported 56.5% of nurses had good knowledge, 24.2% had fair knowledge, and only 19.4% had poor knowledge. The discrepancy may be due to differences in institutional training programs and access to continuing education opportunities.

Training attendance emerged as a significant factor influencing knowledge levels. The study found that the majority of nurses had never attended formal training on neonatal convulsions. This result aligned with Mediani et al. (2019), where 70% of nurses reported never receiving intensive care unit (ICU) training. However, Aneed, Naeem, and Najee (2020) found contradictory results, reporting that 75% of NICU nurses had participated in convulsion training programs. This discrepancy suggests inconsistencies in training availability across different healthcare settings, reinforcing the need for standardized educational interventions to ensure competency in neonatal convulsion management.

The findings also demonstrated a strong correlation between knowledge levels and demographic factors. Age, years of experience, education, and prior training were all statistically significant predictors of knowledge ($p < 0.001$). Specifically, nurses with more than 11 years of experience demonstrated significantly higher knowledge scores than those with less than five years of experience. These results aligned with Mohamed (2017), who reported that longer years of experience correlated with better adherence to neonatal care

protocols. However, nationality, marital status, and place of residence did not significantly impact knowledge levels ($p > 0.05$), reinforcing that clinical exposure and education play a more influential role than personal demographic factors.

The study also evaluated nurses' practice levels in neonatal convulsion care, revealing that the majority (57.7%) exhibited poor practice, while 25.4% demonstrated average practice, and only 16.9% had good practice. These findings aligned with Abdelhammed, Al Sharkawwi, & Nader (2022), who found that two-thirds of nurses demonstrated competent practice, while one-third had incompetent practice. However, Ghaydaa et al. (2019) reported a significant improvement in practice scores following the implementation of a structured nursing protocol, suggesting that targeted interventions could enhance compliance and performance.

A significant positive correlation ($r = 0.638$, $p < 0.001$) was found between nurses' knowledge and performance levels, indicating that higher knowledge levels were associated with better clinical practice. This result was consistent with Unsar et al. (2020), who found a strong positive correlation between nursing knowledge and attitudes toward epilepsy care. Furthermore, a study by Shawahna and Jaber (2020) demonstrated that nurses with at least two years of experience performed significantly better in epilepsy management than those with less experience. These findings highlight the need for continuous education programs to reinforce knowledge retention and improve clinical practice.

Finally, the study emphasized the importance of institutional support in improving compliance. The lack of hospital regulations, standardized protocols, and structured training programs significantly contributed to poor nursing performance. This was evident in the study by Gamil, Abdel Aty, and Faltas (2022), which found that nurses lacked adequate training on diagnostic procedures, medication administration, and seizure precautions. Similarly, Alhalaiqa et al. (2018) reported that less than half of nursing students had adequate knowledge of epilepsy, reinforcing that deficiencies in nursing education begin early in professional training.

Overall, the findings underscored the urgent need for targeted training programs, structured hospital policies, and ongoing competency assessments to improve neonatal convulsion management. Addressing knowledge gaps and reinforcing best practices through evidence-based education and institutional reforms could significantly enhance nursing compliance, patient safety, and overall neonatal outcomes.

Conclusion

The findings of this study revealed that nurses' knowledge and practice regarding the care of neonates with convulsions in NICUs were largely inadequate, with the majority demonstrating poor knowledge and suboptimal clinical performance. A significant positive correlation was found between knowledge levels and

nursing practice, indicating that higher knowledge resulted in better performance. Key demographic factors, including age, years of experience, education, and prior training, were statistically significant predictors of knowledge and practice, whereas nationality, marital status, and residence did not show significant associations. The study highlighted a notable gap in structured training programs, hospital protocols, and compliance with standardized guidelines, reinforcing the need for institutional reforms to enhance nursing competency in neonatal seizure management.

Based on these findings, the following action-oriented recommendations are proposed to improve nurses' competency in neonatal seizure management, Implement regular in-service training focused on neonatal seizure care for NICU staff. Establish structured and standardized hospital protocols for the early identification and management of neonatal convulsions. Adopt evidence- based clinical guidelines to ensure consistent practice and adherence to the latest standards. Conduct periodic competency-based assessments to evaluate and enhance nursing performance. Organize simulation-based workshops to strengthen nurses' confidence and clinical decision- making in emergency scenarios.

Based on these findings, targeted interventions such as implement periodic in-service training focused on neonatal seizure care and management, establish structured educational programs, and competency-based assessments and evaluation are recommended to improve nurses' proficiency in neonatal convulsion care. Establish standardized hospital protocols and evidence-based guidelines is critical to ensure consistent practice and adherence to best practices. Ongoing professional development opportunities, including organizing simulation-based training and workshops, will enhance nurses' confidence and skills in managing neonatal convulsions. However, the study had limitations, including a small sample size, single-center design, and reliance on self-reported data, which may affect the generalizability and accuracy of findings. Future research should consider multi-center studies with larger sample sizes to validate these results and develop comprehensive strategies for improving neonatal seizure management in diverse healthcare settings.

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Author Contribution

This study is based on original research conducted by Reem Abdullah Q Alanazi, Master of Science in Nursing in Critical Care, College of Applied Medical Sciences, Nursing Department, Hafr Albatin University, under the supervision of Dr. Selwa Yousef Abdeldafie.

Reem Abdullah Q Alanazi was responsible for study conception, data collection, statistical analysis, and initial manuscript drafting. Dr. Selwa Yousef Abdeldafie provided guidance on study design, contributed to data interpretation, and supervised manuscript revisions. Both authors approved the final version of the manuscript.

Conflict of Interest

The authors declare no conflict of interest regarding the publication of this paper. This study was conducted independently and did not receive any external funding.

Ethical Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board (IRB) before data collection. Written informed consent was obtained from all participants, ensuring confidentiality, anonymity, and voluntary participation. Participants were informed of their right to withdraw from the study at any time without consequences.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. To protect participant privacy, all data have been anonymized and securely stored in compliance with ethical guidelines.

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