ASSESSMENT OF NURSES KNOWLEDGE REGARDING MENINGITIS IN A TERTIARY CARE CHILDREN'S HOSPITAL OF LAHORE

Original Research

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ABSTRACT

Background: Meningitis remains a life-threatening infection causing inflammation of the meninges surrounding the brain and spinal cord, posing a significant burden in pediatric care settings. Nurses, being the first point of contact, play a critical role in early detection, implementation of infection control practices, and appropriate patient management. Ensuring that nurses possess adequate knowledge is vital for reducing complications, improving outcomes, and minimizing the risk of nosocomial transmission.

Objective: The study aimed to assess the level of knowledge among nurses regarding meningitis and to identify educational gaps to inform targeted interventions for improved nursing competence and infection control practices.

Methods: A descriptive cross-sectional study was conducted over four months at a tertiary care children's hospital in Lahore. A total of 285 nurses from pediatric wards, emergency units, and intensive care units were selected through simple random sampling. Inclusion required at least six months of pediatric care experience. Data were collected using a validated, structured questionnaire comprising 12 knowledge-based items. Demographic and knowledge data were analyzed using SPSS version 27. Descriptive statistics such as frequency, percentages, means, and standard deviation were used to categorize knowledge levels into poor (1–4), fair (5–8), and good (9–12).

Results: Among the 285 participants, 162 (56.8%) were under 30 years of age, and 249 (87.4%) were female. Educational qualifications included Diploma in Nursing (39.6%), Midwifery (17.2%), BSN (37.5%), and MSN (5.6%). Knowledge levels revealed that 59 nurses (20.7%) had poor knowledge, 132 (46.3%) had fair knowledge, and 94 (33.0%) had good knowledge. The mean knowledge score was 2.12 ± 0.724, indicating moderate variability across the cohort.

Conclusion: The findings suggest that although a foundation of meningitis-related knowledge exists among nurses, significant gaps remain, particularly in infection control and clinical decision-making. Structured educational programs, workshops, and hands-on clinical training are strongly recommended to enhance nurses' competencies and elevate the quality of pediatric care.

Keywords: Education, Infection Control, Meningitis, Nurses, Pediatric Nursing, Tertiary Care Centers, Training Programs.

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INTRODUCTION

Meningitis, an acute and potentially life-threatening condition characterized by inflammation of the meninges surrounding the brain and spinal cord, presents a significant clinical challenge due to its rapid progression and potential for severe complications, including neurological deficits and death. Early identification and appropriate management of meningitis are essential to reducing its morbidity and mortality, particularly in settings where healthcare resources may be limited. Nurses, as frontline healthcare providers, play a pivotal role in the early recognition of meningitis symptoms such as fever, headache, neck stiffness, and altered mental status, which are often the first clinical cues indicating the onset of the disease (1). Evidence-based nursing interventions are central to improving patient outcomes in meningitis care. These include vigilant monitoring of vital signs, effective pain management, maintaining adequate hydration, and providing holistic supportive care tailored to the patient's condition. Additionally, implementing strict infection control measures such as patient isolation and hand hygiene is critical in minimizing the risk of nosocomial transmission, particularly in high-risk clinical environments (2). The accurate identification of the etiological agent—whether bacterial, viral, or fungal—is essential for guiding treatment protocols, as each form of meningitis requires distinct therapeutic strategies to ensure optimal outcomes (3).

In rural and resource-constrained settings, systemic challenges such as limited access to diagnostic tools, insufficient healthcare infrastructure, and inadequate training pose significant barriers to the effective management of diseases like cryptococcal meningitis. A study from rural Uganda identified educational deficits and resource scarcity as critical limitations preventing nurses from delivering optimal care. The findings emphasized the need for targeted training programs, better supply chains, and supportive frameworks to empower healthcare workers in managing cryptococcal meningitis effectively (4). Research continues to support the transformative impact of educational interventions on nurses' knowledge, practices, and adherence to clinical protocols. An instructional program at Minia Fever Hospital significantly enhanced nurses' understanding of meningitis etiology, clinical presentation, and universal precautions such as proper hand hygiene and personal protective equipment usage (5). Similarly, in pediatric settings, structured protocols have been shown to improve nurses' ability to identify and manage post-lumbar puncture headaches—a common complication in meningitis care—through early symptom recognition and appropriate pain management strategies (6). In the context of viral meningitis in children, timely nursing interventions focusing on pain control and hydration have also been associated with improved recovery outcomes and reduced complications, highlighting the essential role of continuous neurological assessments and caregiver education in pediatric care (7).

Further supporting this perspective, research demonstrated that, customized training programs significantly improved nurses' clinical competencies, from accurate neurological assessments to stringent infection prevention practices, reinforcing the importance of equipping nurses with both theoretical knowledge and practical skills in managing meningitis cases (8). Similarly, another study underscored the need for ongoing assessments of nurses' knowledge regarding clinical signs, treatment protocols, and preventive strategies to ensure sustained readiness and optimal patient care delivery (9). Educational programs tailored to emergency settings have also proven effective. Research found that, a structured curriculum led to significant improvements in nurses' performance in emergency units, enhancing their ability to recognize acute symptoms, initiate timely interventions, and communicate effectively with patients and families (10). In neonatal care, where early diagnosis and swift intervention are vital, the implementation of specialized education programs has enhanced nurses' understanding of pathophysiology, clinical manifestations, and evidence-based management of neonatal meningitis, thereby contributing to improved neonatal outcomes (11).

Despite basic pediatric knowledge, many nurses remain inadequately prepared to manage the intricacies of bacterial meningitis in children. Research conducted in pediatric teaching hospitals in Baghdad identified substantial knowledge gaps, particularly regarding early symptom detection, appropriate antibiotic use, and complication monitoring (12). These gaps pose serious risks to timely intervention and may lead to irreversible outcomes such as permanent neurological damage or death. Educational initiatives that emphasize practical training in diagnosis, treatment, and infection control measures are therefore essential to bridge these deficiencies (13). Ultimately, by strengthening theoretical and practical nursing competencies through targeted and ongoing education, the quality of care for meningitis patients—particularly vulnerable pediatric populations—can be significantly improved. In light of these findings, this study aims to evaluate the impact of structured educational interventions on nurses' knowledge and clinical practice in the management of meningitis, with the objective of enhancing evidence-based care delivery and improving patient outcomes.

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METHODS

This study adopted a descriptive cross-sectional design to assess nurses' knowledge regarding meningitis within a tertiary care Children's Hospital located in Lahore. The research was conducted over a span of four months and involved registered nurses working across various pediatric care settings, including the emergency department, intensive care units (ICUs), and general pediatric wards. A sample size of 285 nurses was calculated using the Raosoft sample size calculator, based on a 95% confidence interval and a 5% margin of error, from a total eligible population of approximately 1100 pediatric nurses. Participants were selected through a simple random sampling method to ensure representativeness and reduce selection bias. The inclusion criteria comprised registered nurses with at least six months of continuous experience in pediatric care and those who expressed voluntary willingness to participate in the study. Nurses who were on extended leave, absent during the data collection period, or not directly involved in pediatric patient care were excluded to maintain the integrity of responses and relevance of knowledge assessed. Ethical approval was obtained from the institutional review board of the Children's Hospital, Lahore, and informed written consent was secured from all participants. Prior to data collection, each participant was briefed on the study's objectives, confidentiality assurance, and their right to withdraw at any point without penalty.

Data were collected using a pre-validated structured questionnaire that was adapted from a previously published study, ensuring relevance and reliability. The instrument consisted of two parts: the first section collected demographic data including age, gender, qualification, years of experience, and work unit, while the second section comprised 12 close-ended items designed to assess knowledge about meningitis. Each item was scored dichotomously (correct/incorrect), with cumulative scores categorized as poor (1–4), fair (5–8), and good (9–12), reflecting the participant's overall knowledge level regarding meningitis. The data were coded and entered into IBM SPSS version 27 for statistical analysis. Descriptive statistics, including frequencies and percentages, were calculated to summarize the demographic characteristics and distribution of knowledge scores. The categorization of knowledge levels provided a clear overview of the nurses' understanding of meningitis and allowed for the identification of potential gaps requiring targeted educational interventions.

RESULTS

A total of 285 nurses participated in the study. The age distribution revealed that the majority, 162 participants (56.8%), were under the age of 30, while 123 nurses (43.2%) were over 30 years, indicating a relatively young workforce within pediatric units. Gender-wise, there was a prominent female predominance, with 249 participants (87.4%) identifying as female and only 36 (12.6%) as male, reflecting a common demographic trend in pediatric nursing environments. Regarding educational qualifications, 113 nurses (39.6%) held a Diploma in Nursing, while 49 (17.2%) possessed Midwifery qualifications. A significant proportion, 107 nurses (37.5%), had earned a Bachelor of Science in Nursing (BSN), and a smaller fraction, 16 participants (5.6%), held a Master of Science in Nursing (MSN). This distribution illustrates a diverse range of academic backgrounds among the nursing staff, with a substantial representation of diploma and BSN holders. The analysis of knowledge scores, based on 12 structured items assessing knowledge of meningitis, showed that all 285 responses were valid, with none missing. The mean knowledge score was 2.12, with a standard deviation of 0.724, suggesting moderate variability around the mean. The observed scores ranged from a minimum of 1 to a maximum of 3.

When categorized into knowledge levels, 59 participants (20.7%) demonstrated poor knowledge, 132 (46.3%) showed fair knowledge, and 94 (33.0%) exhibited good knowledge of meningitis-related nursing care. Cumulatively, 67.0% of the participants had fair to good knowledge, indicating that although a significant proportion had a basic understanding, there remains a considerable knowledge gap among the rest of the cohort. Further analysis was conducted to explore potential associations between socio-demographic characteristics and the knowledge levels of participants. Cross-tabulation revealed that younger nurses (<30 years) exhibited a higher proportion of good knowledge (37.7%) compared to their older counterparts (>30 years), where only 27.6% achieved good knowledge scores. Similarly, educational background showed a strong association with knowledge levels. Among those with a Bachelor of Science in Nursing (BSN), 44.9% demonstrated good knowledge, whereas only 15.9% of Diploma holders and 12.5% of those with midwifery qualifications achieved the same. Notably, nurses with a Master of Science in Nursing (MSN) had the highest proportion of good knowledge at 62.5%. These findings suggest that both younger age and higher educational attainment were positively correlated with better knowledge of meningitis management among pediatric nurses. This emphasizes the need for targeted educational interventions particularly aimed at diploma- and midwifery-trained nurses to bridge knowledge gaps and ensure uniform standards of care.

Table 1: Demographics of Participants

Variable	Frequency	Percentage (%)
Age <30 years	162	56.8
Age >30 years	123	43.2
Female	249	87.4
Male	36	12.6
Diploma in Nursing	113	39.6
Midwifery	49	17.2
BSN	107	37.5
MSN	16	5.6

Table 2: Knowledge Level Distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	POOR KNOWLEDGE	59	20.7	20.7	20.7
	FAIR KNOWLEDGE	132	46.3	46.3	67.0
	GOOD KNOWLEDGE	94	33.0	33.0	100.0
	Total	285	100.0	100.0	

Table 3: Knowledge Levels by Age Group

Age Group	Good Knowledge (%)	Fair Knowledge (%)	Poor Knowledge (%)
<30 years	37.7	47.5	14.8
>30 years	27.6	44.7	27.6

Table 4: Knowledge Levels by Educational Qualification

Qualification	Good Knowledge (%)	Fair Knowledge (%)	Poor Knowledge (%)
Diploma in Nursing	15.9	51.3	32.8
Midwifery	12.5	45.8	41.7
BSN	44.9	39.3	15.8
MSN	62.5	31.2	6.3

Figure 1 Educational Qualification of Participants
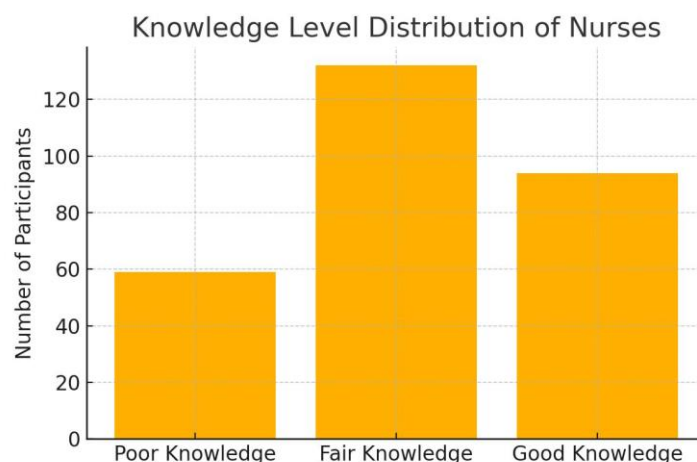
Figure 2 Knowledge Level Distribution of Nurses

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DISCUSSION

The findings of this study revealed considerable variation in the knowledge levels of nurses concerning infection control measures in the context of meningitis management. A majority of the participants demonstrated fair to good knowledge, with 46.3% falling in the fair category and 33.0% in the good category. This distribution reflects a positive trend toward awareness, yet the presence of 20.7% of participants with poor knowledge underscores a significant gap in foundational understanding that needs to be addressed. The observed variability in knowledge levels is consistent with prior research, which emphasized that structured education and clinical training significantly influence nurses' compliance with infection control protocols. Similar studies have shown that clinical exposure and hands-on experience play a vital role in translating theoretical knowledge into practice, particularly in high-risk areas such as pediatric care (14-16). The standard deviation of 0.724 suggests moderate dispersion in knowledge scores, further highlighting inconsistencies in participants' preparedness. These discrepancies may be influenced by differences in educational qualifications, ranging from diploma holders to those with advanced nursing degrees (17). Notably, knowledge levels improved progressively with higher education, suggesting a direct correlation between academic attainment and understanding of infection prevention strategies. This supports the notion that integration of infection control into both undergraduate curricula and postgraduate continuous education frameworks is crucial for strengthening baseline competencies across the nursing workforce (18,19).

The study's strength lies in its diverse participant pool, encompassing a wide range of educational and professional backgrounds. This provided a robust perspective on the knowledge spectrum among nurses working in pediatric settings. The inclusion of 285 participants enhanced the reliability and generalizability of the findings. The classification of knowledge levels into poor, fair, and good enabled a comprehensive analysis of the cohort's understanding, while the use of descriptive statistics such as means and standard deviations ensured objective evaluation of data. Despite these strengths, several limitations must be acknowledged. The use of a narrow scoring range (1 to 3) may have restricted the ability to detect subtle differences in knowledge, potentially oversimplifying the interpretation of participant competency. Self-reported responses also carry inherent biases, such as overestimation or underestimation of actual knowledge, which may have influenced the accuracy of the findings. Moreover, the study assessed knowledge without evaluating corresponding practices, limiting the ability to infer how well theoretical knowledge is translated into clinical application. This disconnect between knowledge and behavior remains a critical area for future investigation, particularly in infection control where implementation fidelity is as important as conceptual understanding.

Additionally, the impact of qualification as a potential confounding variable suggests that generalizing these findings across all nursing cadres should be approached with caution. While higher qualifications were linked with better knowledge scores, the influence of clinical experience, workplace culture, and ongoing institutional support may also contribute significantly to infection control practices, and these variables warrant further exploration (20,21). The findings support the urgent need for targeted educational interventions focused on bridging specific knowledge gaps, particularly among diploma and midwifery-trained nurses. Practical training modules that reinforce theoretical learning should be prioritized, and regular evaluations of both knowledge and infection control practices must be implemented (22). Collaborative efforts with nursing education institutions are necessary to incorporate infection prevention comprehensively into the curriculum. Additionally, dissemination of simplified, user-friendly infection control guidelines may support better compliance in clinical settings. Future research should aim to measure not only knowledge but also behavioral adherence to infection control protocols and the outcomes of training interventions over time. Longitudinal studies assessing the sustainability of educational impacts would provide valuable insights into how training translates into practice and patient safety. Expanding the scope to include qualitative assessments may also help identify systemic barriers to infection control compliance, offering a more holistic understanding of the challenges and opportunities for improvement in clinical practice.

CONCLUSION

This study concluded that while a foundational understanding of infection control measures exists among pediatric nurses, considerable variation in knowledge highlights the need for targeted educational reinforcement. Differences in training and educational background appear to influence the depth of knowledge, pointing to a critical opportunity for structured interventions aimed at standardizing infection control competencies. Strengthening nurse education, particularly for those with limited exposure to updated protocols, holds practical significance in improving clinical safety and care quality. These findings emphasize the importance of continuous professional development as a cornerstone for enhancing infection prevention practices within pediatric healthcare settings.

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AUTHOR CONTRIBUTION

Author	Contribution
Mussarat Jafar	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Waleed Iqbal*	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Beenish Zafar	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Sabiha	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published

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