PLOS ONE

RESEARCH ARTICLE

Barriers and practices in pain management for intubated patients: A study of critical care nurses in Southern West Bank hospitals

Ibrahim Salim[1], Moath Abu Ejheisheh[2], Ahmad Ayed [3], Ibrahim Aqtam [4]*, Ahmad Batran[2]

1 Al Mezan Specialized Hospital, Hebron, Palestine, 2 Faculty of Allied Medical Sciences, Department of Nursing, Palestine Ahliya University, Bethlehem, Palestine, 3 Faculty of Nursing, Arab American University, Palestine, 4 Department of Nursing, Ibn Sina College for Health Professions, Nablus University for Vocational and Technical Education, Nablus, Bethlehem, Palestine

* ibrahim.aqtam@nu-vte.edu.ps
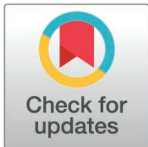
Abstract

Introduction

Effective pain management is vital for intubated patients in intensive care units, as these individuals cannot verbally communicate their discomfort. The knowledge, attitudes, practices, and perceived obstacles of nurses are critical factors that influence successful pain management.

Objective

This study aimed to evaluate the knowledge, attitudes, practices, and perceived obstacles faced by critical care nurses regarding pain management in intubated patients within hospitals located in Southern West Bank.

Methods

A cross-sectional survey was carried out with 199 critical care nurses utilizing the Nurses' Knowledge and Attitudes Survey Regarding Pain, alongside a modified tool for assessing perceived barriers to pain management. The data collected were analyzed to pinpoint deficiencies in knowledge and barriers impacting effective pain management strategies.

Results

The analysis showed that 192 out of 199 nurses (96.5%) lacked sufficient knowledge regarding pain management. System-related barriers, including the lack of standardized protocols and ineffective communication with physicians, were frequently identified as obstacles, averaging a score of 2.41 out of 3. Additionally, nurse-related barriers comprised insufficient time for providing non-pharmacological interventions (73.9%) and a lack of confidence in utilizing assessment tools (43.7%). Patient-related issues, such as difficulties in communication (72.4%) and hesitancy to report pain (58.8%), were also noted.

A notable difference in knowledge scores was observed based on prior education in pain management, with those having received training (41.7%) performing better.

Conclusion

The findings underscore the need for focused educational initiatives, the establishment of standardized protocols for pain management, and enhanced interdisciplinary communication. These improvements are essential for optimizing pain management practices and ensuring better patient outcomes. The results suggest that addressing knowledge gaps and systemic barriers could lead to significant enhancements in patient care and health policies.

Introduction

Effective pain management is a critical component of patient care, particularly in intensive care units (ICUs), where intubated patients often endure significant pain without the ability to communicate their discomfort, a challenge observed globally across critical care settings [1,2]. Proper pain management improves patient outcomes, prevents complications, and enhances overall quality of life [3,4]. Nurses play a key role in assessing and managing pain in these environments, with their knowledge, attitudes, and practices significantly influencing the quality of care provided [5]. However, evidence suggests that nurses in ICUs often lack sufficient knowledge and training in pain management, leading to inconsistent and inadequate patient care [6,7].

Despite its importance, research indicates that critical care nurses frequently struggle with pain assessment and treatment due to knowledge gaps, limited resources, and inconsistent institutional protocols [8]. In high-resource settings, guidelines for pain management are well established, but in low-resource areas, including the Southern West Bank, nurses often rely on individual clinical judgment rather than standardized protocols [9,10]. Barriers such as inadequate educational resources, the absence of clear guidelines, and time constraints often result in suboptimal pain relief, negatively impacting patient recovery and satisfaction [11,12]. While international guidelines advocate for comprehensive pain management strategies, adherence varies widely, particularly in low-resource settings such as those in the Southern West Bank [13].

Existing research in the Southern West Bank remains limited regarding pain management for intubated patients. Most studies focus on general pain management in ICUs without addressing the specific challenges faced by nurses managing non-verbal patients [14,15]. Furthermore, prior studies fail to comprehensively examine systemic, nurse-related, and patient-related barriers in this region [16]. Addressing pain in this patient demographic presents distinct challenges due to communication difficulties, compounded by the lack of standardized protocols and inconsistencies in nursing education [17]. Additionally, previous studies in this region have not explored the impact of selection bias in research on nurses' pain management practices, further limiting the generalizability of findings [18].

By identifying these gaps, this study aims to provide new insights into the challenges and solutions for effective pain management [19]. Specifically, this research evaluates the knowledge; attitudes, practices, and perceived barriers critical care nurse's face in managing pain for intubated patients in the Southern West Bank. By identifying nurse-related, physician-related, patient-related, and systemic obstacles, the study seeks to provide a foundation for targeted interventions to enhance pain management protocols and training programs. The ultimate

goal is to improve the quality of pain management, leading to better patient outcomes and satisfaction while informing health policies that address regional healthcare disparities [20].

Methods

Study design, sample, and setting

A descriptive cross-sectional design was used to evaluate the knowledge, attitudes, practices, and perceived barriers of critical care nurses regarding pain management for intubated patients. This design enabled data collection at a single point in time, providing a comprehensive snapshot of the targeted population's current knowledge and attitudes [15].

The study was conducted in governmental and non-governmental hospitals across the Southern West Bank, specifically in intensive care units (ICUs) and coronary care units (CCUs). These hospitals were selected due to their high patient admission rates for critically ill and intubated patients, ensuring a relevant study population. Patients in these settings typically present with complex medical conditions requiring prolonged intubation, making effective pain management a critical component of care. By selecting diverse hospital settings, the study aimed to improve the generalizability of findings to a broader range of healthcare facilities in the region [16].

Sampling

A convenience sampling method was employed to recruit participants, targeting nurses working in the selected ICU and CCU units. The required sample size was calculated using an online sample size calculator (Raosoft) with a 95% confidence level, a 5% margin of error, and an estimated population of 300 nurses, resulting in a minimum sample of 169 participants. To account for potential non-response, the sample size was adjusted to 204 nurses, and 199 ultimately participated. Five were excluded due to being on leave or failing to return completed questionnaires [17].

Inclusion criteria.

- Registered nurses currently working in ICU or CCU settings

- A minimum of six months of experience in critical care

- Willingness to participate and provide informed consent

Exclusion criteria.

- Nurses working in non-critical care units

- Administrative nursing staff with no direct patient interaction

- Nurses on extended leave during the study period

Convenience sampling was chosen due to logistical constraints and the need for timely data collection; however, this approach may introduce selection bias. Convenience sampling, while practical, may have led to the overrepresentation of nurses who are more proactive in professional development, potentially inflating knowledge levels compared to the general ICU nurse population. Conversely, those experiencing higher workloads may have been underrepresented, skewing perceptions of time constraints and systemic barriers. Future research should consider randomized sampling techniques to improve generalizability.

Instruments and validation

The study utilized a structured questionnaire composed of three sections to collect data:

1. **Demographic information:** Age, gender, academic qualifications, employment location, years of professional experience, and prior education related to pain management. (See S1 Questionnaire for details).

2. **Nurses' Knowledge and Attitudes Survey Regarding Pain (NKASRP):** Originally developed by Ferrell and McCaffery, this tool assesses pain management knowledge and attitudes among nurses. It was adapted to fit cultural and linguistic nuances specific to nurses in the Southern West Bank. A bilingual panel of nursing educators and pain management experts reviewed the translation for clarity and relevance [15,16]. (See S1 Questionnaire).

3. **Perceived Barriers to Pain Management Scale:** This tool, initially developed by Coker et al. and later adapted by Elcigil et al., was modified to reflect system-level challenges specific to Palestinian healthcare settings, such as limited access to specialized pain management teams and communication difficulties [16]. (See S1 Questionnaire).

To ensure validity and reliability, both instruments were pre-tested on a small sample of ICU nurses (n = 15) who were not included in the main study. Cronbach's alpha coefficients exceeded 0.70 for both instruments, confirming their internal consistency [17].

Data collection

The researchers coordinated with hospital administrators and department heads to explain the purpose of the study and the data collection process. Nurses who met the inclusion criteria and expressed interest in participating were given detailed study information, including its objectives, procedures, potential risks, their right to withdraw, confidentiality, anonymity, and a consent form. Participants were required to sign an informed consent form before proceeding.

Data collection was conducted using a self-administered electronic questionnaire distributed between June 5, 2024, and July 15, 2024. Nurses were provided quiet rooms in their respective hospitals to complete the questionnaire, which took approximately 15 minutes. The researchers were present to address any questions and clarify survey items. Completed questionnaires were returned directly to the researchers on the same day.

Ethical consideration

Ethical approval was secured from Palestine Ahliya University's Institutional Review Board (IRB) (Project Number: CAMS/CCNA/25/524). The study adhered to the ethical principles outlined in the Declaration of Helsinki. Participants were informed that their involvement was voluntary, and declining participation would not affect their professional standing or responsibilities.

Confidentiality and anonymity were rigorously maintained by coding the data and restricting access to the research team. Participants provided written informed consent before inclusion in the study, and all ethical and legal standards were upheld to protect participants' rights.

Data analysis approach

The collected data were entered and analyzed using IBM SPSS Statistics version 27. Descriptive statistics summarized demographic data and questionnaire responses, including frequencies and percentages for categorical variables and means with standard deviations for continuous variables.

Inferential statistical analyses included independent t-tests and one-way ANOVA tests to examine the relationship between nurses' knowledge and attitudes with demographic

characteristics such as education level and years of experience. Pearson correlation tests explored associations between different barrier categories, including system-related, nurse-related, patient-related, and physician-related factors. Multivariate regression analysis identified predictors of knowledge levels and pain management practices.

A p-value of < 0.05 was considered statistically significant in all analyses. All statistical tests were two-tailed to ensure rigorous hypothesis testing and account for potential confounding variables.

Results

Participant demographics

Out of 204 distributed questionnaires, 199 (97.5% response rate) were completed and returned by the nurses. The demographic analysis revealed that 114 (57.3%) of participants were under 30 years old. The majority of respondents were male, comprising 110 (55.3%), and 104 (52.3%) identified as single. Most participants held a bachelor's degree in nursing (129 or 64.8%). Additionally, 147 (73.9%) had less than 5 years of experience, while 83 (41.7%) had received prior education on pain management, as shown in Table 1.

Nurses' knowledge and attitudes regarding pain management

Analysis of the nurses' knowledge and attitudes regarding pain management indicated that only 7 (3.5%) nurses had an adequate level of knowledge, while 192 (96.5%) demonstrated inadequate knowledge, as shown in Table 2, Fig 1.

Table 1. Participant's characteristics.

Demographic Characteristics	N	%
Age		
Less than 30 years	114	57.3
30 - 39 years	68	34.2
40 years or above	17	8.5
Gender		
Male	110	55.3
Female	89	44.7
Marital Status		
Single	104	52.3
Married	89	44.7
Divorced	6	3.0
Educational Level		
Diploma	59	29.6
Bachelor	129	64.8
Master or above	11	5.5
Experience in ICU		
Less than 5 years	147	73.9
5 - 9 years	46	23.1
≥ 10 years	6	3.0
Previous Pain Education		
Yes	83	41.7
No	116	58.3

https://doi.org/10.1371/journal.pone.0320430.t001

Table 2. Levels of nurses' knowledge and attitudes regarding pain.

Knowledge and Attitudes	N	%	M (SD)
Adequate knowledge	7	3.5	45.7 (10.4)
Inadequate knowledge	192	96.5	

Note: N = sample size; % = percentage; cutoff point = 80%

https://doi.org/10.1371/journal.pone.0320430.t002
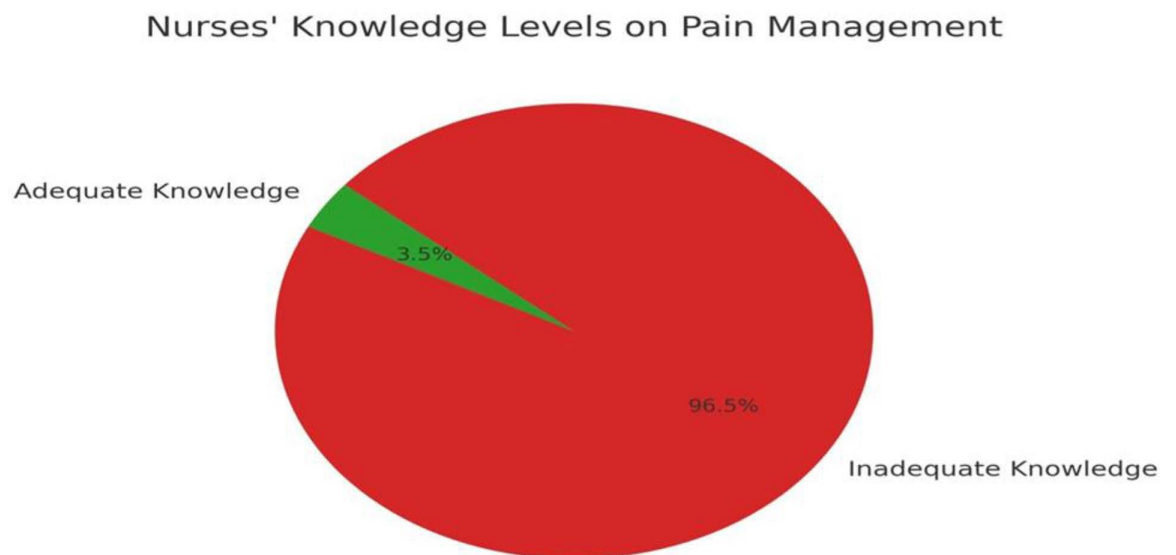
Fig 1. Nurses' knowledge levels on pain management.

https://doi.org/10.1371/journal.pone.0320430.g001

"I feel unsure about assessing pain in intubated patients because we were never formally trained on standardized pain scales," one participant noted.

"Sometimes, even when we suspect a patient is in pain, we hesitate to administer medication due to the lack of clear protocols," said one ICU nurse with seven years of experience.

"We rely on our intuition rather than standardized assessment tools, which makes pain management inconsistent," another nurse explained.
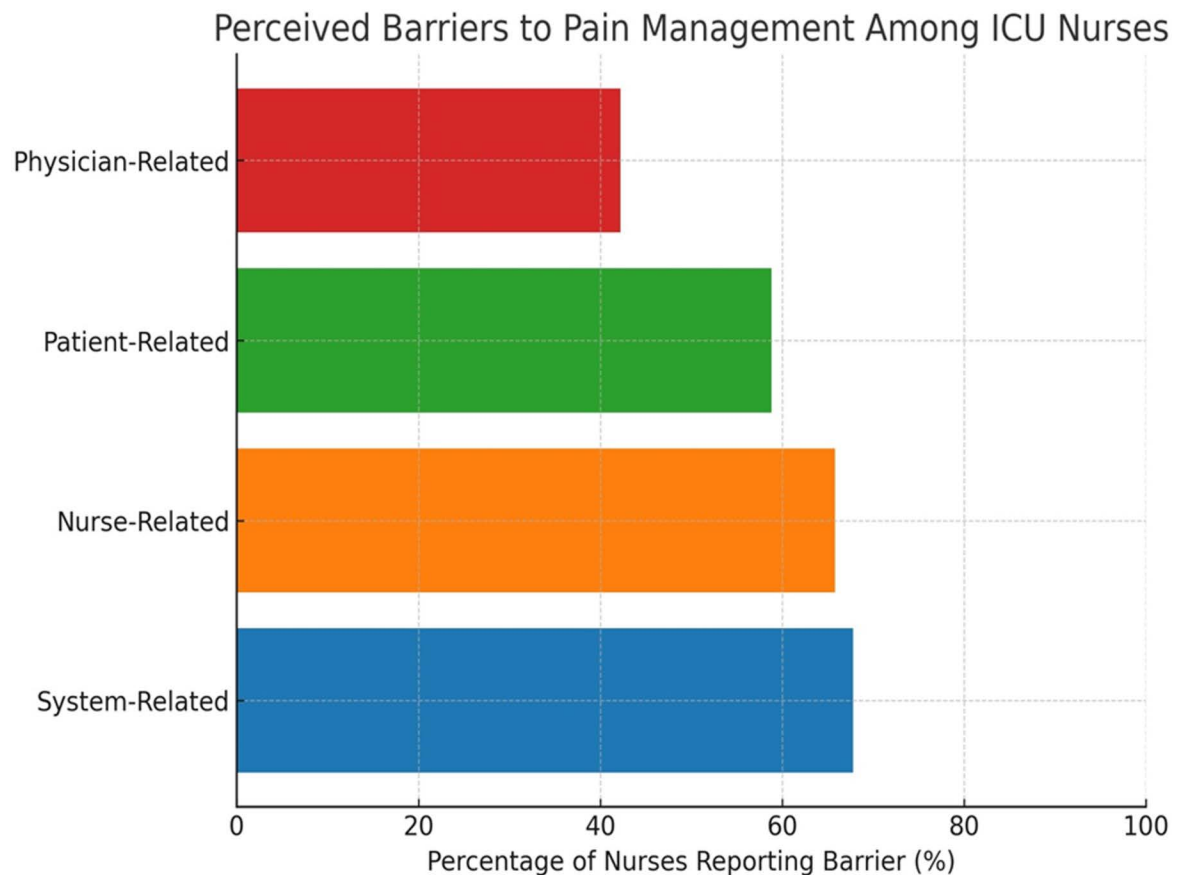
Nurses' perceived barriers to pain management

The analysis revealed a mean score of 2.37 ± 0.39 for the total perceived barriers to pain management among nurses. Among the barrier types, system-related barriers were identified as the most significant obstacles to effective pain management, exhibiting the highest mean score of 2.41 ± 0.44. In contrast, physician-related barriers had the lowest mean score of 2.28 ± 0.53, as presented in Table 3. This indicates that nurses perceive systemic factors, such as a lack of standardized protocols and difficulties in communication, as more substantial challenges in managing pain effectively compared to barriers related to physician interactions.

Table 3. Nurses' perceived barriers to management of pain.

Barriers	Min	Max	M	SD
Patients Related	1.00	3.00	2.35	0.44
Nurse Related	1.00	3.00	2.40	0.51
Physician Related	1.00	3.00	2.28	0.53
System Related	1.36	3.00	2.41	0.44
Total	1.12	3.00	2.37	0.39

https://doi.org/10.1371/journal.pone.0320430.t003

Fig 2. Perceived barriers to pain management among ICU nurses.

https://doi.org/10.1371/journal.pone.0320430.g002

Nurses identified multiple barriers impacting effective pain management, classified into system-related, nurse-related, patient-related, and physician-related challenges. Fig 2.

One nurse explained, *"We lack clear hospital-wide guidelines, and sometimes we have to rely on our own judgment when managing pain in intubated patients."*

Patient-related barriers

Among patients-related barriers, "Patients' difficulty with completing pain scales" (144, 72.4%) and "Patients' reluctance to report pain" (117, 58.8%) were the most commonly reported challenges. The least reported barrier was "Patients reporting their pain to the doctor, but not to the nurse" (66, 33.2%), as shown in Table 4.

Nurse-related barriers

For nurse-related barriers, "Inadequate time for health teaching with patients" (147, 73.9%) and "Inadequate time to deliver non-pharmacologic pain relief measures" (131, 65.8%) were the most frequently reported issues. Conversely, the least reported barrier was "Inadequate staff knowledge of pain management" (87, 43.7%), as illustrated in Table 5

Physician-related barriers

For physician-related barriers, the most frequently reported issue was "Doctor's indifference" (114, 57.3%). The least reported barriers included "Physicians' reluctance to prescribe opiates because of the side effects," "Inadequate knowledge of pain management," and "Physicians' lack of trust in the nursing assessment of pain," each reported by 84 (42.2%) nurses, as shown in Table 6.

System-related barriers

The analysis of system-related barriers indicated that "Lack of guidelines for pain management" (135, 67.8%) and "Difficulty contacting or communicating with physicians to discuss treatment of pain in patients" (131, 65.8%) were the most commonly reported barriers. In contrast, the least reported barrier was "Inconsistent practices around giving as-needed medications for the patient" (81, 40.7%), as shown in Table 7.

Nurses' knowledge and attitudes by demographic characteristics

To assess differences between mean scores of nurses' knowledge and attitudes regarding pain management and their demographic characteristics, independent t-tests and ANOVA tests

Table 4. Patients-related barriers.

Patients-related Barriers	Agree	Disagree	Do Not Know
Patients' difficulty with completing pain scales (e.g., 0-10)	144 (72.4)	40 (20.1)	15 (7.5)
Consumers not demanding results	111 (55.8)	66 (33.2)	22 (11.1)
Patients' reluctance to take pain medication for fear of addiction	108 (54.3)	55 (27.6)	36 (18.1)
Caregiver's indifference	80 (40.2)	79 (39.7)	40 (20.1)
Patients' reluctance to take pain medications because of side effects	99 (49.7)	53 (26.6)	47 (23.6)
Patients reporting their pain to the doctor, but not to the nurse	66 (33.2)	100 (50.3)	33 (16.6)
Patients' reluctance to take opioids	88 (44.2)	69 (34.7)	42 (21.1)
Patients' reluctance to report pain	117 (58.8)	56 (28.1)	26 (13.1)
Patients not wanting to bother the nurses	105 (52.8)	72 (36.2)	22 (11.1)

https://doi.org/10.1371/journal.pone.0320430.t004

Table 5. Nurses-related barriers.

Nurses-related Barriers	Agree	Disagree	Do Not Know
Inadequate time for health teaching with patients	147 (73.9)	25 (12.6)	27 (13.6)
Inadequate time to deliver non-pharmacologic pain relief measures	131 (65.8)	19 (9.5)	49 (24.6)
Inadequate staff knowledge of pain management	87 (43.7)	92 (46.2)	20 (10.1)
Nursing staff reluctance to administer opiates	90 (45.2)	79 (39.7)	30 (15.1)
Fear of pain medications because of side effects	124 (62.3)	35 (17.6)	40 (20.1)
Inadequate assessment of pain	96 (48.2)	74 (37.2)	29 (14.6)
Nurses' indifference	105 (52.8)	62 (31.2)	32 (16.1)

https://doi.org/10.1371/journal.pone.0320430.t005

Table 6. Physician-related barriers.

Physicians-related Barriers	Agree	Disagree	Do Not Know
Inadequate assessment of pain and pain relief	104 (52.3)	66 (33.2)	29 (14.6)
Doctor's indifference	114 (57.3)	55 (27.6)	30 (15.1)
Physicians' reluctance to prescribe opiates because of the side effects	84 (42.2)	51 (25.6)	64 (32.2)
Inadequate knowledge of pain management	84 (42.2)	92 (46.2)	23 (11.6)
Physicians' fear of addiction of medicine	98 (49.2)	54 (27.1)	47 (23.6)
Physicians' reluctance to prescribe adequate pain relief for fear of overmedicating	104 (52.3)	39 (19.6)	56 (28.1)
Physicians' lack of trust in the nursing assessment of pain	84 (42.2)	81 (40.7)	34 (17.1)

https://doi.org/10.1371/journal.pone.0320430.t006

Table 7. System-related barriers.

System-related Barriers	Agree	Disagree	Do Not Know
Lack of psychosocial support services	117 (58.8)	41 (20.6)	41 (20.6)
Patient-to-nurse ratio	115 (57.8)	34 (17.1)	50 (25.1)
Lack of social workers experienced in hospital settings	99 (49.7)	63 (31.7)	37 (18.6)
Lack of guidelines for pain management	135 (67.8)	38 (19.1)	26 (13.1)
Lack of access to professionals who practice specialized pain treatment methods	118 (59.3)	54 (27.1)	27 (13.6)
Difficulty contacting or communicating with physicians to discuss treatment of pain in patients	131 (65.8)	38 (19.1)	30 (15.1)
Not having a documented pain treatment plan for each patient	122 (61.3)	38 (19.1)	39 (19.6)
Lack of alternative non-pharmacologic therapy for pain management	122 (61.3)	52 (26.1)	25 (12.6)
Inconsistent practices around giving as-needed medications for patients	81 (40.7)	51 (25.6)	67 (33.7)
Lack of medicine in markets	116 (58.3)	70 (35.2)	13 (6.5)
Lack of equipment or skill in using equipment	115 (57.8)	70 (35.2)	14 (7.0)

https://doi.org/10.1371/journal.pone.0320430.t007

were conducted. The analysis revealed significant differences according to educational level ($P < 0.05$) and previous pain education ($P < 0.05$). Nurses who had received previous pain education had a higher mean score (M = 48.1 ± 13.5) compared to those who had not (M = 44.0 ± 7.0), as summarized in Table 8.

Discussion

This study examined the knowledge, attitudes, practices, and perceived barriers of critical care nurses regarding pain management for intubated patients in Southern West Bank hospitals. By utilizing the Nurses' Knowledge and Attitudes Survey Regarding Pain, valuable insights were gained. Our findings reveal that a vast majority of nurses (96.5%) demonstrated inadequate knowledge of pain management, a result that is consistent with previous regional studies [19]. Similar research conducted in neighboring countries, including Jordan and Lebanon, has reported comparable challenges related to insufficient training and the lack of standardized protocols [20].

The analysis also highlighted several barriers impacting effective pain management. System-related barriers, such as the absence of clear, standardized guidelines and difficulties in nurse–physician communication, were identified as major challenges. These findings echo earlier reports from the region [19]. Additionally, nurse-related and patient-related barriers were observed, further complicating the delivery of optimal pain management practices [19,20].

The results reveal a substantial gap in knowledge among critical care nurses, with a notable percentage exhibiting insufficient understanding of pain management. This gap is influenced by multiple factors, including limited opportunities for professional development

Table 8. Differences in knowledge and attitudes by demographics.

Variable	M (SD)	Statistical Test	p-value
Gender			
Male	46.1 (9.5)	t = 0.548	.584
Female	45.3 (11.4)		
Educational Level		F = 3.703	.026[*]
Diploma	8.2 (1.1)		
Bachelor	10.9 (1.0)		
Master or above	11.4 (0.4)		
Experience		F = 2.614	.076
Less than 5 years	46.7 (11.2)		
5 - 9 years	42.9 (7.3)		
≥ 10 years	42.8 (5.5)		
Age		F = 2.813	.062
Less than 30 years	47.2 (11.7)		
30 - 39 years	43.8 (8.6)		
40 years or above	43.5 (4.7)		
Previous Pain Education		t = 2.50	0.014[*]
Yes	48.1 (13.5)		
No	44.0 (7.0)		

[*]Significant at the 0.05 level.

and the inconsistent incorporation of pain management education within nursing curricula [17,18,19]. Similar trends have been reported in global studies, where critical care nurses in low-resource settings demonstrate significant deficiencies in pain management knowledge due to inadequate formal training and limited access to continuing education opportunities [1,6,20].

Attitudinal barriers were identified as significant factors impacting practices. The study indicated that nurses often underestimate or dismiss patients' pain reports due to misconceptions about pain expression, leading to underassessment and inadequate pain relief. This finding echoes earlier research highlighting negative attitudes toward self-reports as a barrier to effective pain control [20]. A recent global review found that cultural perceptions of pain, combined with high workloads and stress, contribute to reluctance in administering adequate analgesia, even when clinical evidence supports its necessity [2]. Such attitudes may also stem from workplace stress and decision-making challenges nurses face in high-pressure environments, as highlighted in recent studies [17]. Addressing these attitudinal challenges is critical for improving the quality of pain management and enhancing patient outcomes [21].

Analysis of perceived barriers revealed significant systemic issues, including the absence of standardized protocols and communication difficulties, as the primary challenges to effective pain management. These systemic obstacles reflect findings from the literature, emphasizing the necessity for organizational support and the establishment of clear pain management protocols [5,7]. The impact of systemic barriers is further reinforced by recent evidence highlighting that ICUs without well-defined pain management policies often exhibit lower adherence to evidence-based practices and increased variability in patient outcomes [4].

Patient-related challenges, such as difficulties in using pain scales and hesitance to report pain, were also noted. The results indicate that nurses are aware of these issues, highlighting the need for alternative pain assessment tools that cater to non-verbal patients [22]. Emerging

research suggests that implementing artificial intelligence (AI)-based pain assessment tools in ICUs could improve the accuracy of pain detection in intubated patients, particularly when traditional assessment methods are ineffective [6].

Additionally, nurse-related barriers, including insufficient time for education and the delivery of non-pharmacologic measures, reflect the heavy workload encountered by nurses in critical care environments. These challenges are compounded by stress and burnout, which have been found to influence resilience and decision-making under challenging conditions [23]. This finding is consistent with the literature that emphasizes the influence of time constraints and psychological stress on effective pain management [24]. A 2023 study reported that integrating digital training modules into nursing shifts can mitigate these barriers by providing on-demand education without disrupting patient care responsibilities [25].

The findings concerning physician-related barriers, such as hesitancy to prescribe opioids and insufficient knowledge about pain management, are consistent with literature that points to similar challenges faced by healthcare providers globally [26,27]. Physicians' reluctance to prescribe adequate analgesia, often due to concerns about opioid dependency and regulatory restrictions, remains a major issue, as documented in international pain management guidelines [28]. Enhancing communication and education across disciplines regarding pain management practices is vital for overcoming these barriers.

The findings of this study not only highlight the barriers faced in the Southern West Bank but also have implications for global healthcare. Similar challenges are observed in other middle- and low-income countries, where resource limitations, staffing shortages, and inconsistent policies affect pain management quality. Studies from sub-Saharan Africa and Southeast Asia have reported nearly identical barriers, emphasizing the global need for structured pain management protocols and interdisciplinary collaboration [29].

Strengths and limitations

The strengths of the study include a high response rate (97.5%), which enhances the reliability of the findings, and the use of validated instruments for measuring knowledge and attitudes. Its focus on pain management for intubated patients addresses an important aspect of nursing practice.

However, the study's cross-sectional design limits the ability to establish causal relationships, and the findings may not be generalizable to other contexts. Additionally, the reliance on self-reported data may introduce bias, affecting the accuracy of the results. Future research should consider longitudinal studies to assess the long-term effects of pain management interventions and training programs.

Recommendations

To address these barriers, several innovative and region-specific recommendations can be considered. Hospitals should adopt standardized pain management protocols to ensure uniform, evidence-based guidelines that reduce discrepancies in practice and promote adherence to best practices. Targeted continuing education should be integrated into nurses' professional development, incorporating mandatory training programs, digital learning modules, and simulation-based education to reinforce practical skills without disrupting workflow. Enhancing interdisciplinary collaboration through regular workshops between physicians, nurses, and pharmacists can improve communication and minimize physician-related barriers to pain treatment. Telehealth for pain management training can provide nurses with virtual education programs and online certification courses, overcoming geographic and scheduling constraints. The implementation of AI-powered pain assessment

tools in ICUs can enhance the accuracy of pain detection for non-verbal patients, particularly those under mechanical ventilation. Additionally, mobile-based pain assessment applications can assist nurses with real-time, evidence-based bedside pain evaluation, supporting more efficient clinical decision-making. Institutional policy reform is essential, with government and hospital administrators integrating mandatory pain management education into nursing curricula and ongoing professional development programs to ensure sustainable improvements in pain management practices. By implementing these recommendations, hospitals and policymakers can significantly enhance pain management practices, improve patient outcomes, and create a more supportive work environment for healthcare providers. In conclusion, this study underscores the urgent need for comprehensive reforms in pain management within critical care settings. The consistency of our findings with those of other regional studies [19,20] further highlights the importance of adopting these targeted strategies to achieve meaningful improvements in patient care.

Directions for future research

Future research should focus on developing and evaluating evidence-based educational interventions to improve nurses' knowledge and attitudes toward pain management, particularly in resource-limited settings. Studies exploring the effectiveness of AI-driven pain assessment tools for non-verbal ICU patients could provide valuable insights into technology-assisted pain management. Additionally, longitudinal studies assessing the impact of standardized pain management protocols on patient outcomes and nursing practices would help establish best practices tailored to critical care settings. Further research is also needed to investigate the role of interdisciplinary collaboration in overcoming physician-related barriers and improving pain management strategies. Qualitative studies exploring nurses' experiences, emotional burdens, and ethical dilemmas related to pain management could offer deeper insights into attitudinal barriers and potential interventions. Finally, policy-oriented research examining the integration of pain management training into nursing curricula and continuing education programs would help guide institutional and governmental reforms, ensuring a sustained improvement in pain management practices.

Conclusion

This study identified significant gaps in critical care nurses' knowledge, attitudes, practices, and perceived barriers to effective pain management for intubated patients in Southern West Bank hospitals. Alarmingly, 96.5% of nurses exhibited inadequate knowledge, highlighting the urgent need for enhanced education. Systemic and attitudinal barriers, particularly the absence of standardized pain management protocols and negative perceptions toward pain treatment, must be addressed through targeted interventions.

To improve patient care, healthcare institutions should implement standardized pain management guidelines, enhance interdisciplinary communication, and integrate ongoing pain education into nursing curricula. Policymakers must also invest in accessible professional development opportunities, such as telehealth-based training and AI-driven assessment tools. By taking these steps, critical care environments can improve pain management outcomes, ultimately benefiting patient recovery and well-being.

Supporting information

S1 Questionnaire. Study questionnaire.
(DOCX)

References

1. Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. Pain. 2020;161(9):1976–82. https://doi.org/10.1097/j.pain.0000000000001939

2. Nordness MF, Hayhurst CJ, Pandharipande P. Current perspectives on the assessment and management of pain in the intensive care unit. J Pain Res. 2021;14:1733–44. https://doi.org/10.2147/JPR.S256406 PMID: 34163231

3. Givler A, Bhatt H, Maani-Fogelman PA. The importance of cultural competence in pain and palliative care. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023 May 22.

4. Al-Sayaghi KM, Fadlalmola HA, Aljohani WA, Alenezi AM, Aljohani DT, Aljohani TA, et al. Nurses' knowledge and attitudes regarding pain assessment and management in Saudi Arabia. Healthcare (Basel). 2022;10(3):528. https://doi.org/10.3390/healthcare10030528 PMID: 35327006

5. Saleh AM. Nurses' assessment and management practices of pain among intensive care patients in King Khalid Hospital, Kharj, Riyadh. Heliyon. 2023;9(9):e19986. https://doi.org/10.1016/j.heliyon.2023.e19986 PMID: 37809981

6. Rababa M, Al-Sabbah S, Hayajneh AA. Nurses' perceived barriers to and facilitators of pain assessment and management in critical care patients: a systematic review. J Pain Res. 2021;14:3475–91. https://doi.org/10.2147/JPR.S332423 PMID: 34764688

7. Sweity EM, Salahat AM, Sada AA, Aswad A, Zabin LM, Zyoud SH. Knowledge, attitude, practice and perceived barriers of nurses working in intensive care unit on pain management of critically ill patients: a cross-sectional study. BMC Nurs. 2022;21(1):202. https://doi.org/10.1186/s12912-022-00990-3 PMID: 35883057

8. Olimat Y, Albashtawy M, Ayasrah I, Qaddumi J, Hamadneh S, Salameh AB, et al. Knowledge and attitudes regarding pain management among ICU nurse's. MLU. 2021;21(3):267–9. https://doi.org/10.37506/mlu.v21i3.2995

9. Innab A, Alammar K, Alqahtani N, Aldawood F, Kerari A, Alenezi A. The impact of a 12-hour educational program on nurses' knowledge and attitudes regarding pain management: a quasi-experimental study. BMC Nurs. 2022;21(1):250. https://doi.org/10.1186/s12912-022-01028-4 PMID: 36071419

10. Ayed A, Ejheisheh MA, Salameh B, Batran A, Obeyat A, Melhem R, et al. Insights into the relationship between professional values and caring behavior among nurses in neonatal intensive care units. BMC Nurs. 2024;23(1):692. https://doi.org/10.1186/s12912-024-02343-8 PMID: 39334248

11. Alorfi NM. Pharmacological methods of pain management: narrative review of medication used. Int J Gen Med. 2023;16:3247–56. https://doi.org/10.2147/IJGM.S419239 PMID: 37546242

12. World Health Organization. WHO guidelines on the pharmacological treatment of persisting pain in adults with medical illnesses. Geneva: WHO; 2021.

13. Ayed A, Malak M, Alamer R, Batran A, Salameh B, Fashafsheh I. Effect of high-fidelity simulation on clinical decision-making among nursing students. Interact Learn Environ. 2023;31(4):2185–93. https://doi.org/10.1080/10494820.2023.2204274

14. Ahmadi S, Vojdani P, MortezaBagi HR. The study of nurses' knowledge and attitudes regarding pain management and control in emergency departments. BMC Emerg Med. 2023;23(1):26. https://doi.org/10.1186/s12873-023-00793-y PMID: 36907850

15. Song M-K, Donovan HS, Piraino BM, Choi J, Bernardini J, Verosky D, et al. Effects of an intervention to improve communication about end-of-life care among African Americans with chronic kidney disease. Appl Nurs Res. 2010;23(2):65–72. https://doi.org/10.1016/j.apnr.2008.05.002 PMID: 20420992

16. Elcigil A, Maltepe H, Eşrefgil G, Mutafoglu K. Nurses' perceived barriers to assessment and management of pain in a university hospital. J Pediatr Hematol Oncol. 2011;33 Suppl 1:S33-8. https://doi.org/10.1097/MPH.0b013e3182121bef PMID: 21448032

17. Abu Arra AY, Ayed A, Toqan D, Albashtawy M, Salameh B, Sarhan AL, et al. The factors influencing nurses' clinical decision-making in emergency department. Inquiry. 2023;60:469580231152080. https://doi.org/10.1177/00469580231152080 PMID: 36705018

18. Jamal K, Alameri RA, Alqahtani FM, AlGarni RS, Alamri NA, Elshnawie HA, et al. Knowledge and attitudes of critical care nurses regarding pain management in Saudi Arabia. Med Arch. 2023;77(1):49–55. https://doi.org/10.5455/medarh.2023.77.49-55 PMID: 36919126

19. Khudhair AS, Abid Ali WD, Kataa HK. Study on nurses knowledge corresponding pain management. SJAHSS. 2020;08(04):216–8. https://doi.org/10.36347/sjahss.2020.v08i04.007

20. Taínta M, Arteche Y, Martín I, Salas V, Goñi R. Knowledge and attitudes of intensive care unit nurses regarding pain in patients. An Sist Sanit Navar. 2020;43(2):177–87. https://doi.org/10.23938/ASSN.0872 PMID: 32814927

21. Almutairi AM, Pandaan IN, Alsufyani AM, Almutiri DR, Alhindi AA, Alhusseinan KS. Managing patients' pain in the intensive care units: nurses' awareness of pain management. Saudi Med J. 2022;43(5):514–21. https://doi.org/10.15537/smj.2022.43.5.20220169 PMID: 35537732

22. Beeckman D, Defloor T, Schoonhoven L, Vanderwee K. Knowledge and attitudes of nurses on pressure ulcer prevention: a cross-sectional multicenter study in Belgian hospitals. Worldviews Evid Based Nurs. 2011;8(3):166–76. https://doi.org/10.1111/j.1741-6787.2011.00217.x PMID: 21401859

23. Aqtam I, Ayed A, Toqan D, Salameh B, Abd Elhay ES, Zaben K, et al. The relationship between stress and resilience of nurses in intensive care units during the COVID-19 pandemic. Inquiry. 2023;60:469580231179876. https://doi.org/10.1177/00469580231179876 PMID: 37278278

24. Kia Z, Allahbakhshian M, Ilkhani M, Nasiri M, Allahbakhshian A. Nurses' use of non-pharmacological pain management methods in intensive care units: a descriptive cross-sectional study. Complement Ther Med. 2021;58:102705. https://doi.org/10.1016/j.ctim.2021.102705 PMID: 33677019

25. Olimat Y, Albashtawy M, Hamadneh S. Integrating digital technology into pain management education for critical care nurses: a review of emerging trends. BMC Nurs. 2024;23(1). https://doi.org/10.1186/s12912-024-02367-2

26. Hamdan KM, Shaheen AM, Abdalrahim MS. Barriers and enablers of intensive care unit nurses' assessment and management of patients' pain. Nurs Crit Care. 2022;27(4):567–75. https://doi.org/10.1111/nicc.12624 PMID: 33797160

27. Hariri B. Nurses' knowledge, attitudes, and barriers to effective pain management in intensive care units in governmental hospitals in West Bank, Palestine. 2021.

28. Innab A, Alammar K, Kerari A. The impact of e-learning on nurses' knowledge and attitudes regarding pain management: a cross-sectional study. BMC Med Educ. 2023;23(1):415. https://doi.org/10.1186/s12909-023-04638-1

29. World Health Organization. WHO guidelines on the pharmacological treatment of persisting pain in adults with medical illnesses. Geneva: WHO; 2023. Available from: https://www.who.int/publications/i/item/9789241550390