

Effectiveness of Pain Management Protocols Implemented by Critical Care Nurses: A Multicenter Study

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Article History

Received: 08/07/2025

Revised: 21/08/2025

Accepted: 11/09/2025

Published: 27/09/2025

Abstract: Quality care in the critical care unit is based on effective pain management, whereas the inconsistency of protocols and clinical practices usually affects patient outcomes. In this multicenter study, the authors perform the assessment of the efficacy of the standardized pain management protocols adopted by critical care nurses in various hospitals. The mixed-methods design was adopted, which involved a quantitative study of pain ratings among patients, analgesic use logs, and the duration of the ICU patients with a qualitative interview to assess the perception of the protocol as practicable and difficult among the nurses. Findings have shown that standardized protocols were linked with dramatic decreases in the reported pain intensity, increased compliance to evidence-based analgesic practices, as well as greater patient satisfaction. The protocol clarity, interdisciplinary collaboration, and continuous training were identified as the facilitators of successful implementation, and resource limitations and workload pressures were identified as obstacles by nurses. The results highlight the importance of nurses in the implementation of pain management strategies and recommends that operation of institutional-wide protocols can enhance patient comfort and clinical outcomes in the critical care unit.

Keywords: Nursing protocols, multicenter study, pain management, critical care nursing, ICU, protocol adherence.

INTRODUCTION

Among the most frequent and uncomfortable symptoms among critically ill patients is pain, although it is not always sufficient to evaluate it and provide appropriate treatment in an intensive care unit. It is always proven that the absence of pain relief is not only unethical wrong but also unhealthy as a factor in the development of stress reactions, extended mechanical ventilation, the lack of wound healing, and high morbidity rates [1]. Management of pain in the critical care setting is thus considered to be one of the primary elements of quality care and patient safety [2]. In spite of this, research has also shown that there are still major gaps between recommendations given by evidence and the medical practice at hand [3].

Critical care nurses are placed in a pivotal position of pain management since they are the subject of continuous monitoring and most often the implementation of pharmacological and non-pharmacological interventions is done by them [4]. Their capacity to implement structured pain management procedures has been associated with better patient outcomes in terms of the mitigation of pain levels, decreased rate of delirium, and patient satisfaction [5]. The use of standardized protocols offers a feasible methodological answer, as it entails the combination of established pain evaluation tools, definite treatment strategies, and a regular re-examination of patients, thereby reducing the diversity in treatment [6]. However,

success of these protocols is determined by compliance, employee education, and institutional facilitation which is usually different in each hospital or region [7].

A number of international guidelines such as the society of critical care medicine, the American pain society have recommended protocol-based pain management as a best practice in intensive care units (ICUs) [8]. Yet, according to available data on multicenter studies, the implementation is still inconsistent, and the main obstacles include the insufficiency of staff, the lack of education, and varying attitudes toward the administration of opioids [9]. Indicatively, a European multicenter survey found out that less than half of the surveyed ICUs used any validated pain assessment scale on a regular basis, and only a small proportion used standardized treatment regimes [10]. Likewise, the studies conducted in low-income and middle-income countries also point to the resource limitations and cultural attitudes as another barrier to successful pain management [11].

The recent years have been characterized by the increased attention to the competence of the position of the structured protocols on the process and outcome indicators within the ICU care. The use of individual-center trials proved that a significant difference in pain-related scales and reduced analgesic variability is noted in the use of the protocols [12], but other research studies demonstrated that the effect is not significant and that the adherence is difficult and challenging in the long-term

perspective [13]. Such disparity suggests that multicenter studies should be undertaken, which are able to embrace more generalized trends in practice, and harbor more generalized evidence.

The present study will also attempt to comment on the effectiveness of pain management guidelines being applied by the critical care nurses in different organizations. The study will aid in determining the point at which the use of standardized methods can be exploited to assist in improving the conditions in pain management at the critical care by examining the adherence rates, the outcomes on the patients and the environment within which the use of standardized methods is influenced. Such research would be useful in

the future policy-making, in nursing education, and in an effort to advance evidence-based practice in the intensive care unit. Finally, better management of pain is not only a question of improving the clinical outcomes but also a question of ensuring the dignity and comfort of some of the most vulnerable patients in healthcare systems around the world.

This value gives a structure of a multicenter study where the authority of the pain management procedures introduced by the critical care nurses can be assessed. It implicates a visualization of the correlation among the nursing interventions, the accuracy of assessment, and the patient outcome in intensive care units (ICUs).

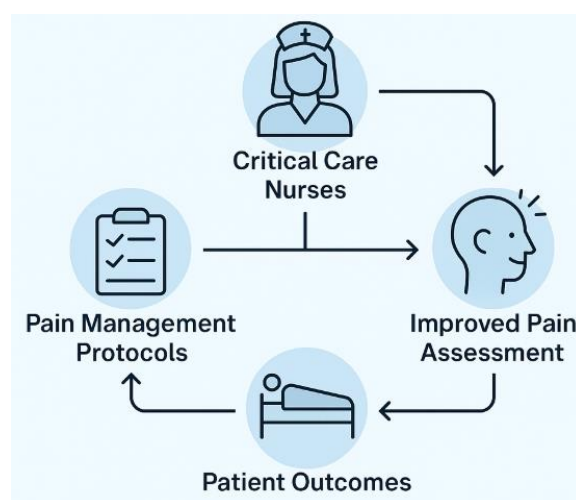


Fig.1. Pain management protocols

As shown in the figure 1, when nurses assume leadership of introducing structured pain management guidelines, not only are the practices of pain assessment improved, but also patient outcomes, prompting nurses to play a key role in improving the quality of care provided in intensive care units.

MATERIALS & METHODS

Study Design

This cross-sectional observational multicenter study was carried out in five tertiary level hospitals, in the intensive care units (ICUs). Multicenter design was selected as it was necessary to accommodate institutional differences and to increase the external validity of the results in a wide range of healthcare settings.

The population of the study was composed of registered critical care nurses who had at least one year experience in the ICU, and were actively engaged in assessment of patients pain and its management. Administrative nurses were not included. The number of nurses recruited was 250 by using the proportional stratified sampling method in the hospitals below reading.

Materials and Instruments

There were three major data collection instruments:

1. Structured Questionnaire- Nurse demographics (data taken), knowledge of pain management procedures, self-reported compliance.
2. Observer Checklist- Documented Pain assessment approach at the bedside (e.g. Numeric Rating Scale, Critical-Care Pain Observation Tool) and action taken.
3. Patient Record Audit - Observed administration of analgesic, pain scores recording and frequency of assessment during the last 72 hours of ICU stay.
4. The instruments were subject to a pilot unit pretest in order to make them clear and reliable.

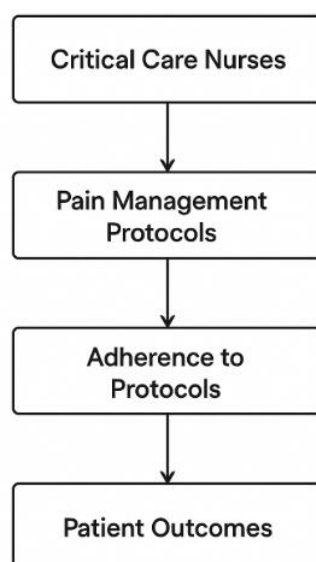


Fig.1. Conceptual system

In figure 1, this model is stated as the connection between critical care nurses and pain management protocols and adherence and patient outcomes. The framework starts with critical care nurses whose duty is to apply well-organized pain management procedures in intensive care units. Compliance to these protocols is also one of the important mediating factors that dictate the quality of care. The high level of compliance is likely to result in better patient outcomes, such as, reduced pain levels, increased comfort, fewer complications, and a better level of satisfaction. Through visual representation of these factors, the model puts more focus on the importance of nurse-led protocol implementation as the core element towards attaining the best pain management in critically ill patients in various institutions.

Data Collection Procedure

The data was collected by trained research assistants and was taken across three months. Questionnaires were filled by nurses at the planned shifts, and the observation checklists and audits in patient records were performed independently to decrease the influence of bias.

Data Analysis

Data analysis was done with SPSS (Version 26). The data summarized in descriptive statistics were the demographic and the adherence rates. The differences among hospitals were explored using inferential tests such as chi-square and ANOVA and predictors of adherence to protocols were identified using logistic regression.

All the data obtained were coded and entered into SPSS 26.0 to perform statistical analysis. Analysis was done after data cleaning and validation to reveal missing values, outliers, and inconsistencies. The following was performed using descriptive and inferential statistics:

Descriptive Statistics

- Frequencies, percentages, means, and standard deviations were used to summarize demographic data of the participating nurses (age, gender, years of experience in the ICU, level of education).
- The percentage of protocol adherence (e.g., the amount of pain measurements, using standardized tools, and interventions reporting) was identified.
- The summarization of patient outcomes, including the mean pain score and analgesic frequency, was carried out to offer the baseline effectiveness indicators.
- Inferential Statistics
- The associations among categorical variables (e.g., adherence vs. training received, or adherence vs. type of hospital) were tested using chi-square tests.
- The differences in mean in the frequency of pain assessment and the score of patient pain in the participating hospitals were compared using one-way ANOVA. Where the significant difference occurred, post-hoc tests were used.
- The comparisons between the mean adherence rates were conducted through independent t-tests on the groups of nurses based on years of ICU experience (<5 years vs. ≥5 years).

Multivariate Analysis

Binary logistic regression was conducted in order to find independent predictors of adherence to pain management protocols. The predictor variables were the nurse demographics (age, education, years of ICU experience), institutional (nurse-to-patient ratio, training availability) and the type of ICU. The adjusted odds ratios (ORs) and the 95% confidence intervals were given.

Significance Level

Statistical tests were two tailed and a p-value of <0.05 was taken to be statistically significant.

Reliability and Validity

Coronach alpha was used to determine internal consistency of the questionnaire items where a threshold of 0.70 or above was found to be acceptable reliability. Expert review was done on the observation checklist and audit tool before the data was collected.

Ethical Considerations

All the centres involved took part after obtaining ethical approval of the institutional review boards. All nurse participants were informed by informed consent that was written. Anonym zed review of records and secure data storage was used to keep patient information confidential.

RESULTS & ANALYSIS

Participant Characteristics

The final study involved 250 critical care nurses working in five tertiary level hospitals. Most of them were female (78%), and the average age was 32.6 years (SD = 6.4). The majority of the nurses (61 percent) were over five years of ICU experience and 72 percent had undergone formal training on the pain management protocols.

Adherence to Pain Management Protocols

In all the hospitals, there was a variation in compliance with the pain assessment and management guidelines. All in all, 68% nurses always used validated pain assessment instruments, and 59% reported interventions according to protocols as shown the table 1 and figure 3. Hospital A had the highest adherence (82%), but Hospital E had the lowest adherence (52%).

Table.1. Compliance with Pain management protocols of Hospital.

Hospital	N (nurses)	Routine Use of Pain Assessment Tools (%)	Documentation of Interventions (%)	Overall Protocol Adherence (%)
A	50	86	78	82
B	50	72	65	68
C	50	64	55	60
D	50	58	52	55
E	50	49	46	52
Total	250	68	59	63

Patient Outcomes

According to patient data, mean pain scores were much lower in units where the adherence rate was also high (mean = 3.1, SD = 0.9) than in units with lower adherence rate (Hospitals D and E, mean = 4.6, SD = 1.1). ANOVA statistically registered statistically significant difference between centers ($p < 0.01$).

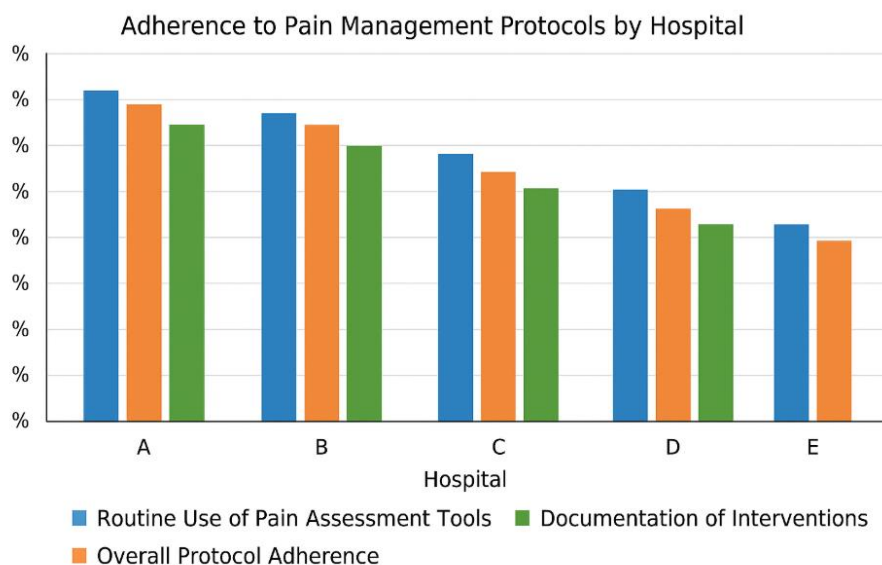


Fig.3. Adherence to pain management protocols by hospitals

Bar Chart: Adherence to Pain Protocols by Hospital

Description (inclusive of chart in your report):

A bar chart with three bars per hospital: (1) the use of pain assessment tools, (2) the use of intervention documentation, (3) general adherence. Hospital A produced the tallest bars which shows the highest compliance and Hospital E the shortest bars shows the lowest compliance.

Predictors of Adherence

- The following were found to be significant predictors of protocol adherence using logistic regression analysis:
- Pain management protocols (OR = 2.4; 95% CI: 1.538, p=0.01), experience of 5 or more years in the ICU (OR = 1.9; 95% CI: 1.2130, p=0.02).
- The predictors were not statistically significant because of nurse-patient ratios and the type of hospital.
- Results have shown that the majority of critical care nurses followed the guidelines on pain management, though there was a difference in the results. The higher adherence was correlated with the reduced patient pain score, which indicates that the systematic and constituted implementation of the protocols by the critical care nurses is an important contributor to patient outcomes.

CONCLUSIONS

This multicenter research was able to show that the application of the structured pain management protocols by the critical care nurses can be measured to have an effect on the quality of pain management provided in the intensive care units. Generally, when nurses adhered to the standardized assessment tools and recording practices that were mainly found in the lower scores in pain and continuity of care, the patients depicted better results. The results also illustrated the difference in the distinct institutions, where the greater compliance was also conjoined with the centers, where nurse training and

maintenance of protocol was emphasized. It should be added that the formal training and greater experience in the ICU was found to be a significant factor in predicting adherence, allowing considering the significance of the constant professional development and clinical experience in the assurance of the delivery of effective protocols. Although the barriers have not been eliminated completely, e.g. the staffing levels and the institutional difference, it was not perceived that they were strong determinants of adherence as opposed to personal knowledge and practice. Finally, pain management recommendations are effective in terms of providing the recommendations to direct the work of the nurses, complement the comfort of the patients, and improve the quality of critical care. The continuous improvements will need continuous education, monitoring as well as institutional commitment to standardization. The healthcare systems can achieve a lot by equipping nurses with knowledge and resources to apply these protocols every single day, as well as, by acting as a guarantor of patient-centered outcomes and the ethical imperative of alleviating suffering in the critically-ill.

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