ORIGINAL RESEARCH

Nursing intervention analysis: Understanding the characteristics of trauma patients in a regional emergency medical center

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ABSTRACT

Introduction: This study aims to analyze nursing interventions for trauma patients at regional emergency medical centers based on injury types, mechanisms, and sites, providing foundational data for nursing education programs. Specific goals include understanding trauma patient characteristics, determining the frequency of nursing interventions by injury types, mechanisms, and sites and identifying variations in nursing interventions based on injury characteristics.
Methods: Conducted retrospectively, this study contributes basic data for creating nursing education materials. It includes 661 eligible trauma patients out of 19,920 visits to the S city regional emergency medical center between March 1, 2019, and February 29, 2020.
Results: This research is pivotal in gathering contexts for nursing interventions among trauma patients, providing essential information for the development of nursing education resources. It emphasizes the importance of a comprehensive analysis of interventions tailored to the type, location, and mechanism of injuries to ensure effective patient care. The development and ongoing use of educational materials for nurses remain vital.
Conclusions: This investigation highlights the importance of documenting and analyzing nursing intervention strategies in trauma care, establishing a solid foundation for educational content in this field. Continuous examination of varied interventions according to injury characteristics is crucial for delivering precise and effective nursing care. The sustained development and application of educational resources in nursing are essential for improving patient outcomes.

Key Words: Trauma nursing, Nursing education, Emergency nursing, Nursing intervention classification, Hospital, Trauma care

1. INTRODUCTION

Trauma is estimated to be one of the major causes of death and disability worldwide, accounting for about 10% for global fatalities. Around 90% of trauma-related deaths and complications occur in developing countries. It is predicted that the incidence of trauma and trauma-related complications will continue to increase until 2030.[1,2] Globally, trauma-related deaths exceed 5.8 million annually, with trauma ranking as the fourth leading cause of death in Korea, following cancer and circulatory system diseases.[3] Particularly alarming is the emergence of trauma as a major cause of death among adults under 45, representing a significant societal and economic loss.[4] Responding to these staggering figures, the government initiated the Serious Trauma

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Specialization Project in 2009 and the Regional Trauma Center Establishment Support Project in 2012, with the first regional trauma center established in 2014 still operational to date.[5] The term "severe trauma" specifically describes conditions in trauma patients who, due to accidents like traffic collisions, falls, or slips, show critical symptoms such as hypotension (low blood pressure), decreased level of consciousness, or abnormal respiratory status. These symptoms should be understood as specific clinical indicators of severe trauma in the context of such accidents, not as general medical terms. Additionally, these patients can also be classified by emergency medical personnel as having severe trauma based on the 'National Fire Agency Hospital Pre-stage Severe Trauma Screening Criteria.' This classification emphasizes the acute medical response required for these specific trauma-related health alterations. According to the results of the first community-based severe trauma survey announced by the Korea Centers for Disease Control and Prevention, in 2018,[6,7] there were a total of 32,237 severe trauma patients.[8] This translates to 62.8 severe trauma patients per 100,000 population.

Time is crucial for initial treatment in trauma patients. Therefore, one of the key concepts in caring for injured patients is the Golden Hour, aiming to resuscitate and stabilize the patient.[9–11] Evidence shows that improving the quality of nursing care for severe trauma patients has been shown to reduce both mortality rates and trauma-related complications in patient.[12] The Nursing Intervention Classification (NIC) provides a comprehensive, research-based, standardized classification to assist nurses in delivering care to patients.[22] In this context, an intervention is defined as "the treatment performed by a nurse based on clinical knowledge and judgement to improve the patient's condition."[13,14] Despite the existence of various medical studies on severe trauma, there is a notable lack of resources for research on nursing interventions for severe trauma patients in South Korea. Reviewing previous studies such as Kim and Myung-Hee[15] conducted before the establishment of the National Medical Trauma Center, nursing interventions in the emergency room included consciousness assessment, GCS evaluation, vital signs and oxygen saturation monitoring, ECG monitoring, airway maintenance/oxygen supply/ventilation management, blood glucose measurement, skin and wound care, absolute rest, dietary education, sheet and ring exchange, pressure ulcer assessment and nursing, urinary care, and post-void assessment and nursing.

In this study, we aim to analyze the most frequently performed nursing interventions and their correlations with injury mechanisms, injury sites, and types. The findings from this analysis are expected to contribute to the development of an effective trauma nursing education program for nurses in emergency rooms and trauma centers.

2. METHODS

2.1 Research design

This retrospective study spanned 12 months and involved analyzing electronic medical records of trauma patients at the regional emergency medical center of a general hospital in S City. The study's objective was to identify nursing interventions administered upon the arrival of trauma patients, contributing to the understanding of effective trauma care.

2.2 General and clinical characteristics

Age, gender, drinking status, means of visit, main department, blood transfusion status, blood transfusion classification, emergency room length of stay, injury mechanism, injury site, and injury type were queried from medical records. Mechanism classifications included traffic collisions (driver), traffic collisions (pedestrian), slip down, fall, collision, cut/puncture, and others. Injury types were categorized as blunt, penetrating, and others. Injury sites included head and neck, face, chest, abdomen, extremities and pevis, and external. Blood transfusions were differentiated into O-type emergency transfusions without cross-compatibility testing and general transfusions based on the patient's blood type after compatibility testing.

2.3 Subject's clinical characteristics

Eight clinical characteristics, including physical signs (systolic blood pressure, diastolic blood pressure, pulse, respiration, oxygen saturation), state of consciousness, final ISS score, and initial KTAS, were examined. Criteria for hemorrhagic shock were used to classify physical signs.

2.4 Nursing intervention classification system

Nursing interventions were examined using the Nursing Intervention Classification System (NIC) 6th edition (2013) developed by McClosky & Bulecheck. NIC comprises seven areas: physiological (basic and complex), behavioral, safety, family, health system, and community, as well as activity and exercise management, excretion management, immobility management, nutritional support, body comfort promotion, and self-care. In total, 544 nursing interventions were included, further classified into 30 groups.

To validate the classification, the researcher initially classified patients, and agreement between experienced nurses was confirmed through discussion.

2.5 Data collection

Approval was obtained from the Institutional Review Borad (IRB) of S City General Hospital, and data on trauma pa-

tients visiting the Regional Emergency Medical Center were collected through the hospital's electronic medical records.

2.6 Data analysis

Data were analyzed using the SPSS 25.0 program. General characteristics and clinical characteristics were analyzed using frequency, percentage, mean, standard deviation, and maximum and minimum values. The distribution of nursing interventions provided to the subjects was analyzed based on frequency and percentage. Differences in nursing interventions according to the subject's type of injury, mechanism of injury, and site of injury were compared and analyzed through frequency and percentage.

2.7 Ethics

This research ensured ethicality by completing the 8th GCP (Good Clinical Practice) Basic/Advanced Course conducted by the National Institute of Clinical Trial (NICT) for ethical standards. Subsequently, the study received approval from the Institutional Review Board (IRB) of S City Hospital (IRB No. NMC-2021-04-037). Prior approval was obtained from the Medical Information Team to access electronic medical records of the subjects. Personal information was redacted, and unique identifiers were assigned in the case records. All subject data used in the study were anonymized, and to protect personal information, the collected research data was stored only on the researcher's personal computer with file access restricted by a confidential code. This retrospective observational study targeted patients who received medical care from February 2019 to March 2020 for a year. Among the subjects, those who were deceased, discharged, transferred, or no longer available for follow-up were excluded as obtaining consent was not feasible. The data from this study will be used solely for research purposes, and after the conclusion of the study, in accordance with Article 15 of the Enforcement Rules of the Bioethics and Safety Act, relevant records will be stored for three years and then disposed of.

3. Results

The general and clinical characteristics of trauma patients visiting regional emergency medical centers were presented, encompassing age, gender, means of visit, blood transfusion status, physical signs, consciousness levels, mechanism of injury, and injury sites. The Injury Severity Score (ISS) indicated that 24.2% of patients had severe trauma.

The classification of nursing interventions according to the Nursing Intervention Classification System (NIC) was discussed. The safety domain had the highest frequency, followed by health system, physiological: complex, physiological: basic, and behavioral domains. Specific nursing interventions within these domains were highlighted, emphasizing the importance of risk management, vital sign monitoring, and health system management in trauma care.

The study further explored high-frequency nursing interventions based on injury mechanism, injured part, injury type, and ISS score. Notable findings included the even distribution of vital sign monitoring, fall prevention, and screening across various categories. Differences were observed in interventions such as wound care for cut/puncture injuries, respiratory monitoring for specific mechanisms, and traction device/immobility nursing for blunt injuries.

4. Discussion

The discussion of this study's findings highlights important aspects of trauma care, especially regarding the general and clinical characteristics of patients and the implications for nursing practice. It's noted that males, particularly those involved in economic activities, tend to experience higher incidences of trauma, a trend that is supported by 2019 statistics from the Korea Trauma Data Bank. This indicates a need for targeted trauma-related education in male-dominated workplaces like construction sites and military settings.

The age distribution of trauma patients, with a significant proportion being middle-aged and older adults, suggests a crucial area for nursing education to focus on, especially given South Korea's aging population. This could involve integrating specialized care strategies for elderly patients within trauma nursing curriculums.

In terms of clinical management, the study found that direct hospital visits by trauma patients tend to result in better outcomes compared to transfers from other facilities. This supports the need for efficient emergency services and the swift transport of patients to equipped trauma centers, as well as the importance of rapid and thorough assessment and care in emergency settings.

The analysis also shed light on specific injury mechanisms and the distribution of injuries, with slips and falls accounting for a significant portion, particularly affecting the extremities and pelvis, as well as the head and neck. This underlines the necessity for nurses to have a comprehensive understanding of how to handle these common injuries, from initial assessment to specific interventions like respiratory monitoring and wound care.

Furthermore, the study emphasized the application of the Nursing Interventions Classification (NIC) system in emergency rooms, which revealed that interventions in the safety domain were most prevalent, reflecting the critical nature of trauma care. There was also a noticeable emphasis on risk

management, especially for older patients and those involved in traffic collisions, highlighting the need for continuous monitoring of vital signs and the application of advanced trauma life support protocols.

This discussion suggests that nursing interventions need to be adaptive based on the mechanism and site of injury, with specific educational components on handling penetrating injuries, blunt injuries, and burns. The findings advocate for a structured approach in nursing education to equip nurses with the skills and knowledge necessary to manage the diverse needs of trauma patients effectively.

Overall, the insights from this study could be instrumental in refining nursing protocols and educational programs, ensuring that they are well-aligned with the clinical realities faced in trauma centers and emergency medical settings. This approach not only enhances the preparedness of nursing professionals but also contributes to better patient outcomes in trauma care.

Strengths and limitations

Strengths of this study that large-scale approach enhances the statistical reliability of the findings. Moreover, by considering various variables such as injury mechanisms, injury site, and injury types, the study provides valuable insights into the diversity of nursing interventions. These insights can be effectively utilized in nursing education and clinical practice, contributing useful information. One of the major limitations of this study was conducted as a single-institution study, the generalizability of the results may be somewhat constrained. A more widespread generalization could have been achieved with data from diverse healthcare institutions. The cross-sectional design of the study makes it challenging to establish clear causation, necessitating further extensive research in the future. Additionally, the inability to clearly elucidate causative relationships underscores the need for more comprehensive and longitudinal investigations.

5. Conclusions

Based on the findings, it has been confirmed that the types of nursing interventions for trauma patients are influenced by the mechanism of injury, the specific sites affected, and the nature of the injury. Notably, interventions like monitoring vital signs, preventing falls, and conducting triage were commonly employed across various types of injuries, with a frequency exceeding 90%. In cases involving head injuries, specific interventions such as urinary catheter insertion and respiratory monitoring were particularly prevalent. Additionally, the study observed distinct variations in the types and frequencies of interventions when comparing injuries to the head, extremities, and pelvis. These differences were further accentuated when analyzing the characteristics of interventions based on the type of injury, highlighting unique approaches in managing blunt trauma compared to penetrating injuries. This emphasizes a more specialized and tailored approach in handling trauma interventions outside the typical emergency room protocols, focusing on the nuances required for different injury scenarios.

Through these findings, it is evidence that there is diversity in nursing interventions for trauma patients using the Nursing Interventions Classification (NIC). It can be concluded that future nursing education programs targeting trauma patients and training for nurses should actively incorporate and develop strategies to address this diversity. This conclusion holds particular significance in the context of nursing science, emphasizing the importance of tailoring nursing services to individual patient characteristics.

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Authors contributions

Both the author and Dr. Lee Eun-ja were involved in designing the study and revising the research plan. They played a critical role in the collection of data and participated actively in drafting and revising the manuscript. Additionally, both reviewed and approved the final manuscript, ensuring its readiness for publication.

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Conflicts of Interest Disclosure

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

DATA SHARING STATEMENT

No additional data are available.

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