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Effect of implementing evidence based nursing practice to improve outcomes for patients with spinal cord injuries

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Abstract

Implementing evidence based nursing practice in the ICU for patients with Spinal Cord injurie has been shown to enhance patient outcomes by reducing the risk of complications such as infections, improving pain management, promoting early mobilization, and ensuring better overall coordination of care, leading to faster recovery and improved quality of life. This study aimed to determine the Effect of Implementing Evidence based nursing practice to Improve Outcomes for Patients with Spinal Cord Injurie in ICU. Quasi experimental research design (study - control). this study was conducted on 90 adult patients with Spinal Cord injuries divided equally into study and control groups, who were admitted in trauma department at Main Assiut University Hospital in ICU. the study and control groups had comparable demographic characteristics, with no significant differences in age, gender, marital status, diagnosis, or ICU stay duration. APACHE II scores, patient health status on discharge had a significant improvements and BRADEN scale, Nursing Delirium Screening Scale (NDSS) but there were no significant differences between groups in pain assessment, SPEED score, ISS. The study group demonstrated significant improvements in clinical outcomes, including APACHE II scores, health status on discharge, and reduced complications, compared to the control group, despite similar demographic characteristics and ICU stay durations. Provide patients with clear education on the benefits of early mobilization and pain management to encourage active participation in recovery strategies.

Keywords: Evidence based nursing practice and outcomes

Introduction

The patient with Spinal Cord is someone who has suffered a serious or life threatening injury as a result of an event such as a car accident, gunshot wound or fall. Traumatic injuries may affect many parts of the body, including the brain, the extremities and internal organs. The severity of injuries can range from minor to life-threatening. Trauma obviously affects the patient physically, but it can have lasting effects on the patient and those close to the patient emotionally (Hassan, 2023)

Traumatic Spinal Cord Injuries (SCI) have a tremendous impact on the quality of life of patients and families. Incidence follows a bimodal distribution with varying mechanisms of injury in each peak from high-energy impacts (eg, Motor Vehicle Accidents, sport-related injuries) in adolescents and young adults to low-energy injuries (eg, falls from standing in the context of preexisting stenosis) in older individuals (Thoral et al., 2021)

One major risk for the patients with orthopedic injuries is the development of pressure ulcers during hospitalization due to limited mobilization. A pressure ulcer is well-defined as local injury to the skin with or without underlying tissue over a bony prominence, due to pressure. Hazard factors include pressure for a long time, friction, restricted mobility, nutrition, and obesity Frequent patient turning, close monitoring, and frequent skin checks are important factors in the prevention of pressure ulcer. The furthermost used risk assessment tool in most care settings, including the orthopedic units, and current clinical practice guidelines was Braden Scale which designed by Braden and Bergstrom ((Fathy Amr et al., 2022)

Complications of spinal cord injuries include pulmonary edema, respiratory failure, neurogenic shock, and paralysis below the injury site. In the long term, the loss of muscle function can have additional effects from disuse, including atrophy of the muscle. Immobility can lead to pressure sores, particularly in bony areas, requiring precautions such as extra cushioning and turning in bed every two hours (in the acute setting) to relieve pressure. In the long term, people in wheelchairs must shift periodically to

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relieve pressure (Smith et al., 2022)

Nurses have a significant role in providing nursing care to patients and should be aware about the adverse effects and preventive measures. The initial step in managing the actual or potential health hazards caused by immobility is to make an accurate assessment of a patient's mobility status. These assessment data are a necessary baseline for the establishment of patient care goals. The nurse' interventional care should support the normal functions of the body and preserving the strength and flexibility of the musculoskeletal system. All nursing actions are directed at providing a safe environment and preventing injury and complications (Fathy Amr et al., 2022)

Improvements in science and in the quality of nursing care provided by healthcare professionals are reflected in decreases in mortality rates due to multiple trauma, increases in survival rates, and improvements in functional outcomes for trauma victims. Recovery from traumatic injury can be lengthy and complex. Understanding the factors that impact recovery is necessary to identify patients at risk for a poor prognosis and develop durable procedures and approaches to reduce the potential for disability (Saad Soliman et al., 2022)

Methodology

The aim of this study was to determine the effect of implementing evidence based nursing practice to improve outcomes for patients with spinal cord injuries in intensive care unit.

A quasi experimental research design was utilized to fulfill the aim of this study. A purposive sample of 90 male and female adult patients was taken; Patients with spinal cord trauma. classified into two equal groups, 45 patients for each group. Study group received the nursing care bundle and control group who received the routine hospital care. The study was carried out in trauma ICU at Assiut university hospital.

The researcher assess the patient's demographic data of orthopedic trauma as patient code, age, sex, marital status, past history, cause of admission, diagnosis, date of admission, date of discharge, and patient's health status on discharge. APACHE II Scoring System ("Acute Physiology and Chronic Health Evaluation II") which originated from (Kirkpatrick et al., 2020) and adopted from (Akavipat et al., 2019) and APACHE II was aimed to assess the severity of disease classification system, one of several ICU scoring systems. It was applied within 24 hours of admission of a patient to an intensive care unit. APACHE II assesses physiological variables within the first 24 hours of ICU admission. Each variable is scored from 0 to 4, with higher scores indicating greater abnormality. The score ranges from 0 to 71, with higher scores indicating a more critical condition and a higher risk of mortality. For example: Score < 10: Lower mortality risk; Score 10–20: Moderate mortality risk; Score > 20: High mortality risk; Score > 30: Very high mortality risk

Trauma scale for assessment the level of spinal cord fracture adopted from (Smith et al., 2022) which includes motor, sensory and reflexes in addition to injury severity score ISS.

Hemodynamic assessment as vital signs as temperature, cough and respiratory secretion, Fluid balance chart which include fluid intake and output, CVP, urine analysis.

Skin assessment, Braden Scale for Predicting Pressure Sore Risk was developed to foster early identification of patients at risk for forming pressure sore (Bergstrom, et al., 1988). .

An official and non-official permission to conduct the study was obtained by the researcher from the head of intensive care units where the study was conducted after explanation of aim and nature of the study.

The research proposal was approved by the ethical committee at the Faculty of Nursing, Assiut University. There was no risk to study subjects during the study's implementation. Common ethical principles in clinical research were followed throughout the study. Written consent was obtained from patients or their guardians who were willing to participate after the nature and purpose of the study were explained. Patients were assured that the data collected would not be reused without additional permission, and confidentiality and anonymity were

maintained. Participants were informed of their right to refuse participation or withdraw from the study at any time without needing to provide a reason.

After getting ethical clearance patients were enrolled in the study, the patients was selected based on the inclusion and exclusion criteria. The researcher followed an initial assessment, the patients was assigned to one of the two groups by block randomization.

Both group were evaluated three times (firstly on admission, the second after 3days of admission and last time on discharge) by compare between both .

The researcher assessed the patient's outcome through assessing complications, assess the effect of trauma care bundle and Fluid intake and output assessment was carried on admission then every 6 h. daily for 3 days.

Statistical design: The statistical package for (SPSS) version (23) was used to analyze data. Descriptive statistics was used for the quantitative data in all questions and the demographic data. Descriptive statistics included: means, standard division, frequencies, percentages, use Pearson Chi –Square (Cross tabulation) for relationship were done, independent-t test for mean scores and one way a nova test. The level of significance for this study was set at ($p \leq 0.05$) to detect any indication of differences found in the data available.

Results

Table (1): Distribution of Demographic data of study and control groups (total patients' number=90)

P-value	Study (n= 45)		Control (n= 45)		Demographic data
	%	No.	%	No.	
					Sex:
1.000	93.3%	42	93.3%	42	Male
	6.7%	3	6.7%	3	Female
					Age:
0.546	38.24 ± 15.27		40.16 ± 14.66		Mean ± SD
					Marital status:
0.827	37.8%	17	35.6%	16	Single
	62.2%	28	64.4%	29	Married

Results

Table (1) illustrates the Demographic data of study and control groups. Regarding to gender, it was noticed that more than one half of both groups were male. As regard age, it was noticed that the mean age in the study and control groups are nearly similar (40.16 ± 14.66& 38.24 ± 15.27) respectively. No significant statistical difference was put into evidence between the two studied groups in relation to sex and age. No, a statistically significant difference between study and control groups regarding Marital status.

Table (2): Distribution of clinical data of study and control groups (total patients' number=90)

P-value	Study (n= 45)		Control (n= 45)		Clinical data
	%	No.	%	No.	
					Cause of admission:
	64.4%	29	33.3%	15	MCA (Motor car accident)
	26.7%	12	26.7%	12	MBA (Motor bike accident)
0.002*	8.9%	4	11.1%	5	FFH (Fall from height)
	0.0%	0	17.8%	8	FDS (Fall down stairs)
	0.0%	0	11.1%	5	AFO (Assault from others)
					Diagnosis:
	53.3%	24	53.3%	24	Cervical fracture
0.459	15.6%	7	24.4%	11	Hip fracture
	31.1%	14	22.2%	10	Quadriplegia
					Patient health status on discharge:
0.016*	75.6%	34	51.1%	23	Transferred to another ward
	24.4%	11	48.9%	22	Died
					APACH II score on admission:
0.001*	14.31 ± 4.31		17.96 ± 5.97		Mean ± SD
					ICU stay: (days)
0.149	22.00 ± 13.94		18.20 ± 10.57		Mean ± SD
					Past medical history:
0.002*	77.8%	35	46.7%	21	None
0.001*	15.6%	7	48.9%	22	Diabetes mellitus
0.025*	13.3%	6	33.3%	15	Hypertension
0.494	0.0%	0	4.4%	2	Asthma

Table (2): It can be noted from this table that there was statistically significant difference between the study and control groups regarding the causes of

admission it was (P=0.002), As regards to patient health status on discharge, it was found that there was statistically significant difference between study and control groups (P=0.016). As regards APACH II score on admission it was found that there was statistically significant difference between study and control groups (P=0.001), and there was statistically significant difference between study and control group in past medical history except in Asthma, and no a statistical significant difference in diagnosis and ICU stay.

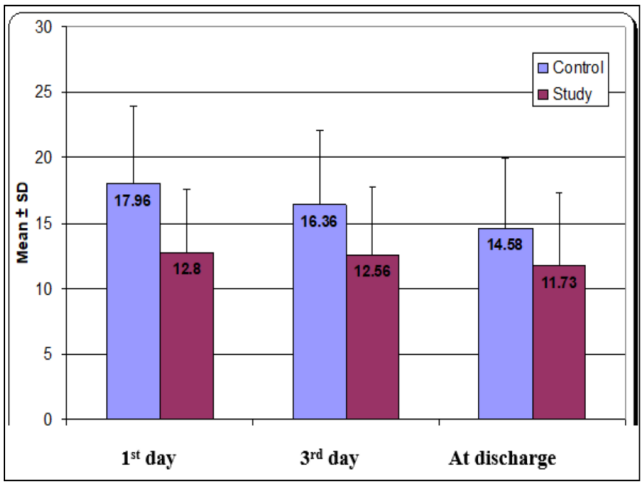

Figure (1): Comparison between the two studied groups in relation to APACHE II score

Figure (1): shows that there was a highly statistically significant difference between the two groups in relation to APACHE II score on the first, third and at discharge.

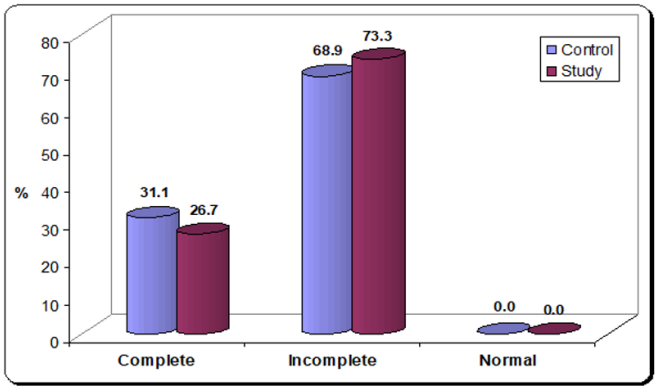

Figure (2): Comparison between the two studied groups in relation to spinal emergency evaluation of deficits (SPEED).

Figure (2): shows that there was no statistically significant difference between the two groups in relation to SPEED score on the first day of the study.

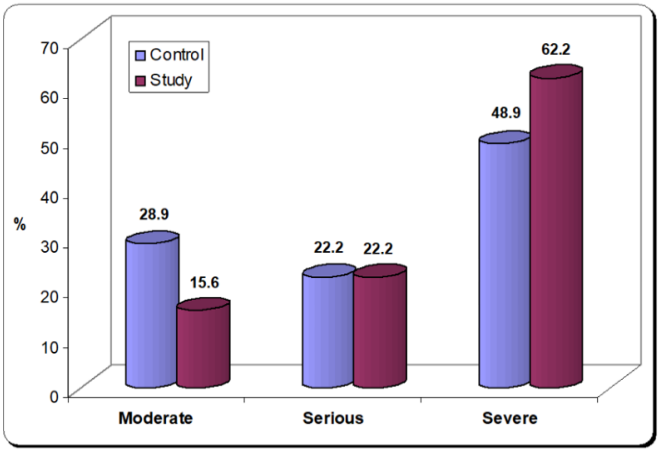

Figure (3): Comparison between the two studied groups in relation to injury severity score.

Figure (3): shows that there was no statistically significant difference between the two groups in relation to ISS on the first day of the study.

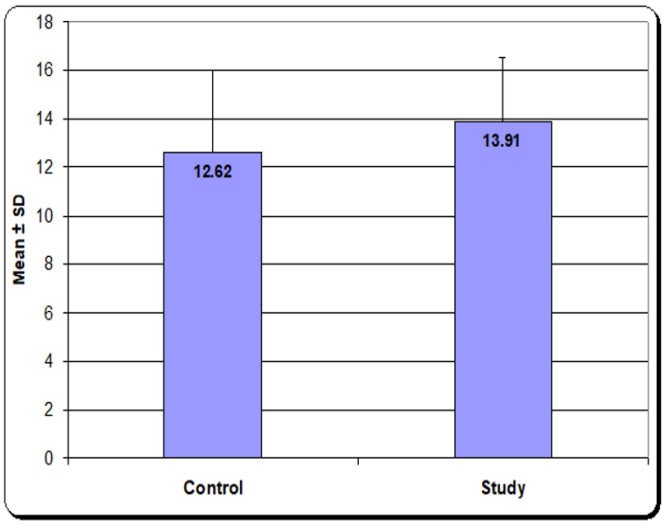

Figure (4): Comparison between the two studied groups in relation to BRADEN scale.

Figure (4): shows that there was statistically significant difference between the two groups in relation to BRADEN scale at discharge.

Table (3): Distribution of study and control groups in relation to complications at discharge, (total patients' number = 90)

P-value	Study (n= 45)		Control (n= 45)		Complications
	%	No.	%	No.	
0.000*	91.1%	41	40.0%	18	Homodynamic stability
0.001*	26.7%	12	62.2%	28	Respiratory Complications
0.250	24.4%	11	35.6%	16	Mortality rate
0.512	33.3%	15	40.0%	18	Occurrences of skin ulcer
0.000*	17.8%	8	60.0%	27	Urinary tract infection
0.015*	8.9%	4	28.9%	13	Deep vein thrombosis

Ns: Data is represented as number (percentage)
MV: mechanical ventilation -There is no significant difference P-value >0.05
*Significant difference at P-value <0.05 samples t-test

Table (3) shows that there were no statistically significant differences between the study and control group regarding some items of complications (P-value > 0.05). However, statistically significant difference was found between both groups regarding homodynamic stability, respiratory complication, complication associated to MV, urinary tract infection and deep vein thrombosis (P= 0.000& p= 0.001& p=0.001& p=0.000&p=0.015) respectively.

Table (4): Distribution of study and control groups in relation to ICU stay and number of ventilator days at discharge, (total patients' number = 90)

P-value	Study (n= 45)	Control (n= 45)	Complications
			Duration of ICU stay: (days)
0.149	22.00 ± 13.94	18.20 ± 10.57	Mean ± SD
			Number of ventilator-supported days:
0.167	21.29 ± 14.41	17.60 ± 10.35	Mean ± SD

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Table (4) shows that there were no statistically significant differences between the study and control group regarding of duration of ICU stay and number of ventilator support days (P-value > 0.05).

Discussion

Implementing evidence based nursing practice for patients with spinal cord injuries in the ICU has been shown to improve clinical outcomes by reducing complications such as infections, pain, and immobility. These evidence-based practices like early mobilization, pain management, infection prevention, and multidisciplinary collaboration, which collectively contribute to faster recovery, shorter ICU stays, and enhanced patient satisfaction. By focusing on coordinated care and addressing the patient's physical and emotional needs, evidence based nursing practice can also decrease the risk of issues like deep vein thrombosis, pressure ulcers, and delayed recovery, leading to better overall functional outcomes and a quicker return to baseline health (Smith et al., 2022)

So, this study aimed to assess the effect of implementing evidence based nursing practice to improve outcomes for patients with spinal cord injuries in ICU.

Regarding demographic data, the results of the present study suggested that the two groups are demographically similar, which is important for ensuring that any outcomes observed in the study are not influenced by these factors. The lack of significant differences in sex, age, and marital status strengthens the internal validity of the study, making it more likely that any differences in outcomes are attributable to the interventions being tested rather than demographic variables. The similar distribution of gender and marital status also helps ensure that the sample is representative and that the findings can be generalized to similar populations.

Also, showed that the studied patients were male married aged 40.16 ± 14.66 , 38.24 ± 15.27for study and control groups. This demographic information suggests that the sample represents individuals who likely have family support, which could affect recovery and emotional well-being.

(Lat et al., 2021) supported the finding that married patients tend to recover faster from surgery. This is likely due to the emotional and logistical support that married individuals may receive, which can improve adherence to post-operative care and reduce stress.

In the other hand, (Alosoufe et al., 2024) found that marital status had little to no effect on recovery outcomes in surgical patients. (Hassan, 2023) pointed out that factors such as socioeconomic status and individual health behaviors (e.g., smoking, diet, physical activity) were more influential in determining recovery than marital status.

While, (Abdelfattah et al., 2022) found that older patients often experience slower recovery after orthopedic surgery due to age-related physiological changes such as reduced muscle mass, bone density, and slower tissue regeneration. These factors may lead to an increased risk of postoperative complications and delayed recovery.

In the other hand, (Diab et al., 2022) suggested that age did not significantly impact recovery rates in orthopedic surgery when other factors like preoperative health were optimized. Likewise, demonstrated that with appropriate preoperative management, elderly patients could recover at rates comparable to younger patients.

Regarding the medical data of the studied patients; The study group had a significantly higher proportion of admissions due to Motor Car Accidents (MCA) compared to the control group. This suggests that the study group may have experienced more severe trauma from high-impact accidents. No significant difference between the two groups in diagnosis distribution and the cervical fractures were the most common diagnosis in both groups, suggesting that the clinical burden was fairly similar across both groups.

In this line, (Rodriguez et al., 2023) found that motor car accidents (MCA) are associated with a higher likelihood of severe injuries, particularly spinal and cervical fractures, due to the high-impact nature of these accidents. Also, (Abosadegh & Rahman, 2018) highlighted that patients admitted following MCAs often required more intensive care and longer recovery times compared to those admitted for falls or assaults.

Likewise, (Moran et al., 2021) demonstrated that cervical fractures are one of the most frequent diagnoses in patients admitted to ICUs following trauma. (Cakin et al., 2023) showed that irrespective of the mechanism of injury, cervical fractures are a critical clinical concern due to their potential for neurological complications, (Ravikanth, 2021) analyzed trauma cases across multiple ICUs and concluded that when the diagnosis distribution is similar between groups, it indicates a comparable clinical burden. This reinforces the observation that despite differences in trauma mechanisms, the control and study groups faced similar overall clinical challenges, as cervical fractures dominated in both.

While, (Kahar et al., 2023) argued that the mechanism of injury does not always predict the severity of trauma or recovery outcomes. (Elsamadicy et al., 2021) indicated that factors like pre-hospital care, age, and preexisting comorbidities play a more significant role in determining trauma severity and patient outcomes than the mechanism of injury alone.

(Shah et al., 2022) suggested that the prevalence of specific diagnoses, such as cervical fractures, varies significantly based on the population studied and the healthcare system's trauma triage protocols. (Häske et al., 2022) showed that other injuries, like hip fractures or traumatic brain injuries, can sometimes overshadow cervical fractures, particularly in older populations. (Marchesini et al., 2024) argued that even with similar diagnoses, the overall clinical burden might differ due to variations in injury severity, associated complications, and patient comorbidities. This perspective suggests that the similar diagnosis distribution observed between the study and control groups does not necessarily imply an equivalent clinical burden, as other factors like injury extent and systemic complications could differ.

A higher percentage of study group patients were transferred to another ward, while fewer patients in the study group died. The P-value (0.016) indicates a significant difference, which may reflect improved survival rates or recovery in the study group, possibly influenced by the interventions implemented during ICU care.

in this regards, (Hasler et al., 2012) found that implementing evidence-based care bundles in ICUs significantly reduced mortality rates by addressing key patient safety concerns, including infection prevention and timely interventions. (Liu et al., 2024) demonstrated that using bundles to prevent catheter-related bloodstream infections improved

patient survival and facilitated transfers to less intensive care settings. Also, (Mühlenfeld et al., 2022) showed that ICU patients receiving early mobilization and rehabilitation interventions experienced shorter ICU stays, better functional recovery, and increased transfer rates to lower-acuity wards.

In the opposite side, (Harrison et al., 2021) reported no significant differences in mortality rates or recovery when using care bundles, suggesting variability in implementation or patient population as potential factors.

The present study indicated no significant difference in the length of ICU stay between the two groups (mean ± SD: 18.20 ± 10.57 vs. 22.00 ± 13.94, P = 0.149). However, a significantly higher percentage of patients in the control group had no past medical history (P = 0.002). The study group showed a higher prevalence of diabetes mellitus and hypertension. These findings suggest that patients in the study group had more comorbid conditions, potentially influencing their ICU care needs and outcomes.

So, (Cenko et al., 2021) emphasized that preexisting comorbidities, such as diabetes and hypertension, increase the complexity of ICU care and can impact recovery times, while, (Brunker et al., 2023) showed that patients with chronic conditions like diabetes are more prone to ICU admission complications, further supporting the observed differences in past medical history between the groups.

Also, (Stewart et al., 2023) found that diabetic patients tend to experience longer and more complicated ICU stays, which could explain the higher comorbidity rates in the study group and their associated outcomes. (Marchesini et al., 2024) reported that hypertensive patients in ICUs are at increased risk for organ dysfunction, supporting the study group's profile with more hypertensive cases.

However, (Abosadegh & Rahman, 2018) found that while comorbidities play a role in determining ICU admission, their influence on outcomes is less significant when standardized protocols are implemented, challenging the assertion that higher comorbidity rates directly influence outcomes. (Shah et al., 2022) argued that advanced ICU interventions mitigate disparities caused by underlying conditions, suggesting that the impact of comorbidities may not always lead to outcome differences.

Regarding the APACHE II score, the present study results indicated a significant improvement in the study group compared to the control group. Intra-group comparisons (P-value2) show significant reductions in scores over time within both groups, but the improvement was more pronounced in the study group, particularly between days 1 and 3. These findings highlight the potential effectiveness of the interventions in improving patient outcomes in the study group. The researcher view that these results strongly suggest that the implementation of evidence based nursing practice can play a critical role in improving patient outcomes, as evidenced by significant reductions in APACHE II scores in the study group. The findings underscore the importance of early, targeted interventions in ICU care

In this line, (Ekong et al., 2024) found that implementing structured care bundles in ICUs significantly improved patient outcomes, leading to reduced APACHE II scores over time. Likewise, (Theresa et al., 2022) reported that early and consistent use of evidence-based protocols in ICU care led to faster patient stabilization, reflected by improved APACHE II scores, particularly within the first 48 hours. demonstrated that holistic ICU care, focusing on pain control, early mobilization, and infection prevention, correlated with better APACHE II trajectories.

In the other hand, (Liu et al., 2024) cautioned that while care quality improves outcomes, it may not always translate to rapid reductions in APACHE II scores, as these scores reflect underlying physiological derangements that may persist despite interventions.

However, (Mogyoródi et al., 2023) argued that ICU patient outcomes and severity scores are influenced by factors like hospital resources, staffing ratios, and patient demographics, which may overshadow the impact of specific interventions.

Nevertheless, (Kahar et al., 2023) noted that some reductions in APACHE II scores over time could reflect the natural course of recovery rather than the effect of specific care strategies, suggesting caution in attributing the improvement solely to interventions.

The present study revealed that The SPEED score results show no significant difference between the control and study groups in terms of incomplete outcomes which consider that major percentage, with no cases achieving a normal score (P = 0.642). This suggests that while interventions may have influenced recovery in other areas, they did not result in a significant difference in the severity of spinal cord injuries as measured by the SPEED score. The researcher opinion that it highlighted the complex nature of spinal cord injury recovery, where factors like injury completeness, severity, and individualized care plans are crucial. However, studies that disagree with this conclusion suggest that with the right interventions—particularly more intensive or advanced rehabilitation—improvements in both functional recovery and the level of injury might be possible.

In this line, (Perrouin-Verbe et al., 2021) highlighted that spinal cord injury (SCI) severity, such as complete or incomplete injuries, significantly impacts recovery outcomes and that the level of injury is often a more determining factor than the type of care provided. In addition, (Wasiak et al., 2024) emphasized that incomplete spinal cord injuries have better recovery potential compared to complete injuries. The fact that a high percentage of both groups had incomplete injuries is consistent with the broader literature that incomplete injuries tend to be more common and may show some recovery with time, but not necessarily due to interventions alone.

In the other hand, (Bin-Alamer et al., 2022) argued that targeted interventions, including early rehabilitation, can lead to improvements in functional recovery even in patients with severe spinal cord injuries. These studies suggest that more structured or specific interventions might yield better outcomes in terms of injury severity or recovery classification than what was observed in this study.

Nevertheless, (Lewis et al., 2022) showed that intensive rehabilitation programs can lead to significant functional improvements, even in patients with severe spinal cord injuries. The absence of any significant differences in the SPEED scores in this study could be questioned based on such findings, suggesting that either the intervention was insufficient or not tailored to the specific needs of the patients.

The present study found that the ISS data suggests that the study group, despite having a higher percentage of severe cases, potentially benefited from evidence based nursing practice in managing critical injuries. The researcher point of view, that findings highlight the potential effectiveness of evidence based nursing practice in improving outcomes for patients with higher Injury Severity Scores (ISS). Despite the study group having a higher proportion of severe injuries, their outcomes suggest that structured interventions might mitigate the challenges associated with critical cases. This emphasizes the value of comprehensive care strategies in trauma management. However, the lack of statistical significance in the mean ISS difference calls for further investigation to confirm the robustness of these interventions and their impact on diverse patient populations.

This supported by (Thoral et al., 2021) who showed that patients with higher ISS benefit from structured ICU care interventions. Also, (Rousseau et al., 2021) emphasized that a higher ISS often necessitates advanced care strategies, supporting the study group's inclusion of more severe cases yet achieving favorable outcomes.

In the other hand, (Moynihan et al., 2021) found no difference in ISS severity distribution between control and intervention groups. While, (Wang et al., 2022) argued that higher ISS scores directly correlate with poorer outcomes regardless of interventions, which contrasts with the study group showing better survival despite having more severe cases.

Regarding the Functional mobility scale, the present study revealed that there was a significant impact on preventing wheelchair confinement in the study group. However, both groups exhibited a high prevalence of bedridden status, particularly in the study group, which might indicate a specific focus or limitation in functional mobility progression for this condition.

In aligns with the reduction in wheelchair confinement observed in the study group, (Chaboyer

et al., 2024) found that mobility-focused evidence based nursing practice reduced the incidence of wheelchair dependency in ICU patients recovering from orthopedic injuries.

(Curtis et al., 2021) shows that bedridden patients, especially those in the ICU with severe orthopedic injuries, often require intensive rehabilitation programs beyond standard care bundles.in the other hand, (Paul et al., 2023) reported that evidence based nursing practice showed no significant change in mobility for bedridden ICU patients unless combined with personalized physiotherapy and nutritional support. Similarly, (Allum et al., 2024) emphasized the importance of interdisciplinary care, suggesting that evidence based nursing practice must integrate efforts from rehabilitation specialists, dietitians, and family Regarding, the complications, the present study demonstrated a strong impact on improving critical ICU outcomes, such as hemodynamic stability, the resolution of complications, and the reduction of common complications like UTIs and DVTs. However, no significant differences were observed in ICU stay duration or mortality. The researcher opinion that the intervention's impact on reducing complications and improving hemodynamic stability could help speed up recovery and reduce the overall burden of ICU care. This can lead to shorter ICU stays and potentially lower healthcare costs, as patients might recover more quickly and require less intensive monitoring.

Similar, (Cantor et al., 2022) demonstrated that interventions targeting ICU-associated complications, such as infections and thrombosis, can significantly improve patient outcomes. Also, (Philipp et al., 2024) supported the importance of maintaining hemodynamic stability in ICU patients, noting that stability is associated with improved recovery and fewer complications. In the opposite side, (Cillóniz et al., 2021) suggested that more aggressive or comprehensive interventions can reduce both ICU stay and mortality significantly. The lack of significant differences in these outcomes in this study might point to the need for even more intensive interventions or a longer follow-up period to fully assess these impacts.

While the study showed improvements in certain complications, (Wang et al., 2022) suggested that even with improvements in specific complications, the overall impact on other health outcomes (e.g., occurrence of new complications) could be greater with additional interventions focused on comprehensive patient care.caregivers to achieve meaningful improvements in bedridden patients.

Conclusion & Recommendations

The findings reveal that a statistically significant differences were observed in key clinical parameters, including APACHE II scores, patient health status on discharge, and certain complications such as hemodynamic stability, respiratory complications, mechanical ventilation-associated complications, urinary tract infections, and deep vein thrombosis, favoring the study group. Additionally, significant improvements were noted in the study group regarding the BRADEN scale at discharge. Despite these findings, there were no significant differences between groups in SPEED score, ISS, or some complications, underscoring the targeted benefits of early interventions while highlighting areas requiring further investigation. Prioritize early interventions to address respiratory complications and ensure hemodynamic stability, as these factors significantly influence recovery in spinal cord injuries patients.

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