Effect of Applying Nursing Guidelines Regarding Physical Restraint on Reducing Local Injuries among Critical Patients

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Abstract

Background: Critically ill patients admitted to the intensive care unit (ICU) around 80 % of them may need to be physically restrained due to agitation, confusion, insomnia, and other disruptive behaviors. Maintaining a secure environment and protecting patients from secondary injuries are some of the main legal and ethical responsibilities of nurses. **Aim:** Assess the effect of applying nursing guidelines (NG) regarding physical restraint (PR) on reducing local injuries (LI) among critical patients (CP). **Sampling:** A purposive sample of 60 adult patients of both sexes. **Tools:** Two tools were used: **The First Tool:** Patient Health Assessment, included three parts. **First Part:** Patient Socio-Demographic Data **Second Part:** Patient's Medical Data. Third Part: **Restraint Characteristics. Second Tool:** Pitting Edema Scale. **Results:** The current study confirmed that the application of physical restraint nursing guidelines (PRNG) reduces the presence of local injuries and edema post-application of physical restraint among the study group (SG), which reflects the effect of the implemented nursing guidelines for physical restraint on critical patients. **Conclusion:** Based on the findings of the present study, it could be concluded that the use of PR in critical units (CU) is very common, and the application of physical restraint nursing guidelines leads to a decrease in the presence of LI and edema among CP. **Recommendations**: Replication of the current study on a larger probability sample from dissimilar national critical care settings is needed to generalize the finding.

.***Keywords:*** Nursing Guidelines, Physical Restraint, Local Injuries, Critical Patients

Introduction

Physical restraint (PR) is any device, method, or equipment that reduces or immobilizes the ability of the patient to move their body, legs, arms, or head freely. Although evidence indicates that restraint can be harmful, health care professionals continue to use PR in the name of safety. The main reasons for their use are to reduce the risk of falls, prevent the removal of medical devices, and control disruptive or other behaviors (**Abd Elhameed & Elemam 2020**).

Physical restraint is divided into three phases: evaluating the patient's condition and anticipating its progression; identifying the defining moments; and continuous monitoring of the situation. (Guenna et al., 2021). There was a greater use of physical restraints when there was a lower nurse-to-patient ratio for critical care and no protocol in place to direct decision-making. (Freeman, et al., 2019).

Regulations and protocols should include applying restraint effectively to prevent errors and complications that may develop (Balci & Arslan, 2019). Most common type of PR commonly used in Egypt involved restraining the upper and lower limbs, followed by bilateral wrist restraints, and then bedside restraints. Gauze and dressings were the types of restraint materials commonly used in both shifts**.** PR used may cause different physical and mental complications for the patient. Recent studies reported edema, bruising, pressure ulcers, and death as the physical restraint complications of PR use (**Salehi et al., 2021).**

Restraint is the direct application of physical force to restrict a patient's freedom of movement. Physical force can be human, mechanical, or a combination of both. It should be used only when essential to prevent the patient from harming himself or others (JCAHO, 2019). Restraint is the act of preventing anything from doing, showing, or expressing anything. Up to 75% of the mechanically ventilated patients (MVP) admitted to an ICU are restrained to control the patient (Philips, 2020).

Nurses can make appropriate judgments and decisions regarding the application of PR. In nursing practice, consider the severity of the disease, treatment intensity, individual characteristics of the patient, work environment, ward atmosphere, and nursing staff size. Nurses should know and understand the correct procedure for applying PR to reduce various issues and side effects that may occur in patients (**Kim & Yang, 2024**).

The nurses play a critical role in the care of ICU restrained patients (RP). There is a need to use the least restrictive devices, frequently reassess the patient's response, remove the restraint every two hours, and inform relatives of the need for restraint and assistance with activities of daily living. Modifying and focusing on the care plan, including frequent position changes and skin care; providing adequate range of motion; and ongoing assessment of the underlying condition for the appropriate use of PR are the other good nursing cares for RP (**Kassew et al, 2020**).

Significance of the Study

Observational studies have revealed the current state of PR use in several countries. Its prevalence in the ICU was 6.2–46.2% in Egypt, 23.0% in the Netherlands, 36.4% in Germany, 46.4% in South Korea, and 48.4% in South Africa **(Kawai et al., 2021).** The researcher from her practice in the ICU found that about 4 patients per week are exposed to PR, which means about 16 patients perform the restraint, and the researcher observed that those patients suffer from different complications. Due to this reason, the researcher applied physical restraint nursing guidelines to overcome the local complications of restraint (LCR).

Patient and Methods

Aim of the Study

The aim of current study was to assess the effect of applying nursing guidelines regarding PR on reducing local injuries among critical patients

Research Hypothesis:

Applying nursing guidelines regarding PR will reduce local injuries among critical patients

Patients and Methods

Research Design

A quasi-experimental research design (study/control) was utilized in the present study.

Research Setting

The present study was conducted in three critical care units (CCU): **ICU which is** located on the ground floor and consists of two sectors; the first sector contains 12 beds and the second sector contains **10** beds; **Medical Intensive Care Unit (MICU),** which is located on the second floor and consists of two sectors; the first sector contains 5 beds and the second sector contains 2 beds; and **Stroke Unit (SU),** which is located on the first floor and consists of three sectors; the first sector contains 5 beds; the second sector contains 5 beds; and the third sector contains 5 beds at Minia University Hospital (MUH), Minia City (MC), Egypt

Subjects

A purposive sample of 60 adult patients of both sexes was collected from March 2020 to March 2021. The sample size was estimated by using the (**Isaac and Michael 1995**) formula, which is computed as (N = nx30/100). Where N= Sample Size, n= Total and n is the total number of 200 adult patients with physical restraint admitted to critical care units at Main Minia University Hospital during the period 2020–2021.

The estimated required sample size was 60 patients, and they were classified equally and conveniently into two groups. 30 study groups (SG) and 30 control groups (CG), the SG (n =30) who were willing to participate in the current study and the CG (n =30) who were subjected to routine hospital nursing care. Both groups in the current study were selected according to the following inclusion and exclusion criteria.

Inclusion Criteria:

Adult patients aged 18–65 years and patients newly restrained by using direct physical restraint.

Exclusion Criteria:

Patients' restraint for less than two hours.

Data Collection Tools:

Tools of data collection: Two tools were developed by the researcher based on a review of recent relevant literature and used to assess the effect of nursing guidelines regarding physical restraint on reducing local injuries among critical patients.

First Tool: Patient Health Assessment (PHA):

This tool was developed by the investigator and it consisted of three parts:

First Part: Socio-Demographic Data of critical patients. This part involved data about the patient's age, gender, occupation, residence, educational level, and marital status.

Second Part: Medical Data, including the patient's current diagnosis, previous medical diagnosis, unit of admission, length of stay in the hospital, level of consciousness, and sedated patient.

Third Part: **Restraints Characteristics: Order of Restraint, Methods of Restraint that** include gauze rolls or bandages, restraint devices such as mittens, vests, limb restraints, chest restraints, and roll belts. **Locations of restraints**: four limbs, wrists, fingers, and feet only. **Reason for restraint**: to prevent self-extubation, to prevent self-removing intravascular lines, undefined. **Local Injuries**: pain, redness, bruising, limb edema, and nerve injury and **Order of restraint**.

Second Tool: Pitting Edema Scale, adopted from: (Gasparis et al., 2020)

The items of the tool was observed, categorized, and scored into

1+ Trace pitting edema 2 or less millimeters (mm) depression that disappears rapidly.
2+ Mild pitting edema 2 mm to 4 mm depression disappears up to 15 seconds
3+ Moderate pitting edema 4 mm to 6 mm depression disappears up to 30 seconds
4+ Severe pitting edema 6 mm to 8 mm depression disappears more than 30 seconds

Scoring System:

The scoring system imposes assignments: one indicates depth (2 millimeters (mm), depression, or barely visible, **and rebound** time is immediate; **two indicates depth (**3–4 mm depression, or a slight indentation**, and rebound time is 15** seconds or less**); three indicates depth (**5–6 mm depression, and **rebound time is 10–30** seconds; and **four indicates depth (**8 mm depression, or a very deep indentation, **and rebound time** is more than 20 seconds**).**

Tools Validity and Reliability:-

Tools Validity

The content validity of the tools was established by a panel of five experts specializing in Medical Surgical Nursing (MSN) and Critical Care Nursing (CCN). This panel included one Professor from the Nursing Faculty (NF) at Ain-Shams University and two Assistant Professors from NF Assuit University's specializing in CCN, as well as two Assistant Professors from NF Minia University (MU) specializing in MSN. The panel members concurred that the instruments used in the study were valid and aligned with the study's objectives.

Tools Reliability:

Reliability for the study tools was estimated using the Cronbach's alpha test to measure their internal consistency and evaluate how well the tools consistently measure what they were designed to measure. The reliability of the patient assessment sheet and pitting edema scale was (0.766 and 0.826) respectively.

Pilot Study

The study was conducted with 10% (n = 6) of the total ICU patient sample, meeting the defined criteria to test the feasibility, objectivity, and applicability of the study tools and to estimate the needed time to complete the data

collection. The necessary modifications were carried out, and the patients weren't included in the total study sample.

Ethical Consideration

Official permission to conduct the study was obtained from the Nursing Faculty Research Ethics Committee at MU in Egypt. Approval to conduct the study was obtained from the research ethics committees in NF at MU. Additionally, permission was secured from the director of the ICU to collect data for research purposes. The patient's families provided written informed consent after a comprehensive explanation of the study's objectives, methods, and nature.

Fieldwork of the Research:

Study Procedure

After obtaining permission and an introduction letter from the Ethics Committee of Minia University Hospital (MUH), we referred to the study setting, explained the aim of the study to the eligible participants, and gained informed consent from the patients' families.

The current study was achieved through four phases: the assessment, the implementation, and the evaluation phase:

1. Preparatory Phase

The current study was conducted by preparing different data collection tools by reviewing the current and relevant related literature and theoretical knowledge of the various related aspects using articles, and periodical magazines.

2. Assessment Phase:

Data collection tools and official permission being granted. The patient health assessment was filled out by the researcher. The total sample of 60 was divided into two groups: 30 for each study and a control group. The researcher started to recruit the subjects according to inclusion criteria after obtaining consent from their guardians to participate and taking socio-demographic data using the first part of the first tool and medical data using the second part. Then, patients were assessed for local injuries from physical restraint using the third part of the first tool and the second tool. While the control group received routine care from ICU nurses.

The Implementation Phase:

Data collection for this study was (started in March 2020 and ended in March 2021) by the researcher to achieve the aim of this study. Researcher cares individually for physical restraint patients throughout their stay in the ICU in the above-mentioned setting to detect the presence of local injuries from physical restraint. They were observed within approximately 30-45 minutes. Patients were divided into two equal groups. 30 patients were made up of the study group, and 30 patients represented the control group. Using two tools, the researcher initially collected data from the control group before moving on to the study group. The first tool took 15–30 minutes to be collected, while the second tool took 10–20 minutes.

The study group received care from the researcher according to nursing guidelines for physical restraint, which included: 1-patient assessment before applying restraints; 2-preparation of restraining procedures; 3-nursing care after application of PR; and 4-documentation. As well, post-restraint care involves range-of-motion exercise, a neurovascular check, capillary refill, and hygienic care of the restricted parts. While the control group received routine nursing care from hospital nurses regarding physical restraint without any assistance from the researcher and only received observation from the researcher for the presence of local injuries.

Evaluation Phase:

This phase was carried out after implementing the nursing guidelines. Each critically ill patient's physical restraint was evaluated to determine the effect of nursing guidelines on reducing local injuries from physical restraint using the third part of the first tool. Then compare the findings of the study with those of the control group.

Study Limitations

Limited national and international studies have been conducted regarding the correlation between the application of physical restraint nursing guidelines and the prevention of local complications from physical restraint.

A limited number of diverse studies were conducted worldwide to assess potential associations between the use of physical restraints and local complications among critically ill patients during their ICU stay.

Statistical Analysis

The collected data were organized, tabulated, categorized, and analyzed, and data entry was performed using the Statistical Package of Social Science **(SPSS)** version **(20)**. Descriptive statistics were applied (e.g., mean, standard deviation, frequency, and percentage). Pearson's correlation coefficient was applied between quantitative variables. A significant level value was considered when $p<0.05$. The smaller the p-value obtained, the more significant the result (*); less than (0.001) was considered highly significant (**). The P-value is the probability of error of the conclusion

Results

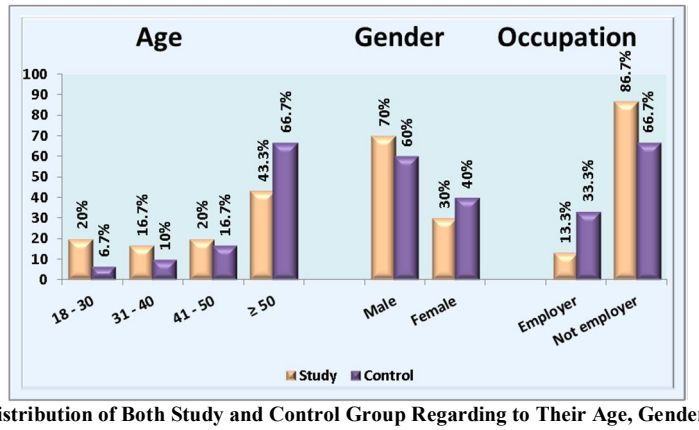

Figure (1): Percentage Distribution of Both Study and Control Group Regarding to Their Age, Gender and Occupation (n=60)

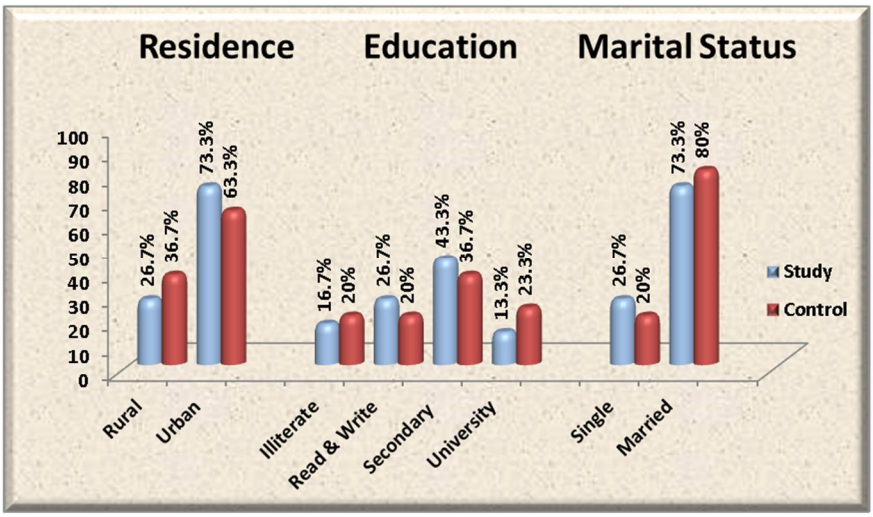

Figure (2): Percentage Distribution of Both Study and Control Group Regarding to Their Residence, Education and Marital Status (n=60)

Figure (1): Reveals the distribution of the studied sample according to its socio-demographic characteristics. It was found that (4.33% and 66.7%) of the study and control groups' ages, respectively, were more than 50 years, and the highest percentage among them were males (70% and 60%), respectively. Regarding occupation, it was found that the highest percentage among the study and control groups were not employers (86.7% and 66.7%), respectively.

Figure (2): Shows that the highest percentage among study and control group lived in urban areas (73.3% & 63.3%) respectively. In relation to level of education, it was found that the highest percentage among study and control group were secondary educated (43.3% & 36.7%) respectively also, (73.3% & 80%) respectively among them were married.

Table (1): Percentage Distribution of Both Study and Control Group Regarding to Their Medical Data (MD) (n=60)

Medical Data	Study (n=30)		Control (n=30)		Sig. test	P-value
	No.	%	No.	%		
Current Medical Diagnosis						
- Acute Liver Failure	0	0	2	6.7		
- Stroke	10	33.3	10	33.3		
- Diabetic Coma	0	0	5	16.7		
- Acute Renal Failure	0	0	2	6.7	X^2 (1.36)	0.٧١٥
- Chronic Renal Failure	0	0	0	0		
- Trauma	20	66.7	11	36.7		
- Cardiac Disease	0	0	0	0		
- Chest Infection	0	0	0	0		
Length of Stay						
- 1 day > 5 day	10	33.3	2	6.7		
- 5 day > 10 day	12	40	11	36.7	5.16	0.043*
- ≥ 10 day	8	26.7	17	56.6		
Mean ± SD	**7.56 ± 3.73**		**10.8 ± 3.38**		**t** (2.32)	0.024*
Unit of Admission						
- ICU	20	66.7	20	66.7		
- MICU	0	0	0	0	…..	…..
- Neuro ICU (Stroke)	10	33.3	10	33.3		
Level of Consciousness According GCS (Glasgow Coma Scale)						
- Coma (3 – 8)	20	66.7	17	56.7		
- Confused (9 – 12)	10	33.3	10	33.3	X^2 (1.٦٥)	0.٤١٧
- Conscious (13 – 15)	0	0	3	10		
Patient Taken Sedation						
- Yes	20	66.7	17	56.7	X^2 (1.٣٧)	0.٥٤٢
- No	10	33.3	13	43.3		

*** P = ≤ .05 (Statistical Significance)**

Table (1): Clarify the frequency distribution of the studied groups according to their medical data. Concerning the current medical diagnosis, it was found that 33.3% of the study and control groups were diagnosed with stroke. Also, it was observed that 66.7 % of the study group, compared to 36.7 % of the control group, was diagnosed with trauma. And also, 16.7% of the control group was diagnosed with diabetic coma.

As regard the length of hospital stay, it was noticed that the mean score among the study and control groups was 7.56 ± 3.73 and 10.8 ± 3.38, respectively. Regarding the unit of admission, it was observed that 66.7% of the study and control groups were admitted to the ICU. With highly statistically significant differences.

Concerning level of consciousness, it was found that 66.7% of the SG, compared to 56.7% of the CG, had a coma, according to the GCS. While 33.3 percent of the studied groups had a confused level of consciousness based on GCS. Regarding patient taken sedation it was found that 66.7% of the SG, compared to 56.7% of the CG, had sedated. With no statistically significant differences

Table (2): Percentage Distribution of Studied Groups Regarding to Physical Restraints Characteristics (n=60)

Restraints Characteristics	Study (n=30)		Control (n=30)		X^2	P-value
	No.	%	No.	%		
Order of Restraint						
- Doctor	30	100	11	36.7	27.8	0.001**
- Nurse	0	0	19	63.3		
Methods of Restraint						
- Gauze Roll	0	0	30	100	60	0.001**
- Restraint Devices	30	100	0	0		
Location of Restraint						
- Four Limbs	0	0	9	30	1.36	0.٧١٥
- Wrists	28	93.3	12	40		
- Fingers	2	6.7	9	30		
- Foots only	0	0	0	0		
Reason of Restraint						
- Prevent self extubation	12	40	9	30	12.00	0.٢٤١
- Prevent removing IV lines	18	60	9	30		
- Undefined	0	0	12	40		
Local Injuries						
- None	27	90	0	0	٢٢.٢	0.001**
- Redness	0	0	10	33.3		
- Bruising	0	0	5	16.7		
- Limb Edema	3	10	15	50		
- Pain	0	0	0	0		

*** P = ≤ .05 (Statistical Significance)** **** P = ≤.01 (Highly Statistical Significance).**

Table (2): Reveals the percentage distribution of the studied groups according to the restraint characteristics. Regarding the order of restraint, it was noticed that the highest percentage (100%) of the study group had an order for restraint from a doctor, while (63.3 percent of the control group had an order for restraint from a nurse. With highly statistically significant differences.

Regarding methods of restraint, it was found that (100%) of the study group used a restraint device, while (100%) of the control group used a gauze roll for restraint. The majority (93.3%) of the SG, compared to (40%) of the CG, had a wrist restraint. It was also noticed that (30%) of CG had four-limb restraint. With highly statistically significant differences among studied groups.

Concerning the reason for applying physical restraint, it was found that (60 % and 30 %) of the study and control groups, respectively, had been physical restrained to prevent removing IV lines. It can also be seen that (40%) of SG, compared to (30%) of CG, had been physical restrained to prevent self-extubation. With no statistically significant differences.

Regarding local injuries from restraint, it was noticed that (90 %) of the SG hadn't sustained any injuries from using physical restraint. It can also show that (10 percent) of the SG, compared to (50 percent of the CG, had limb edema as an injury from physical restraint. With highly statistically significant differences among studied groups

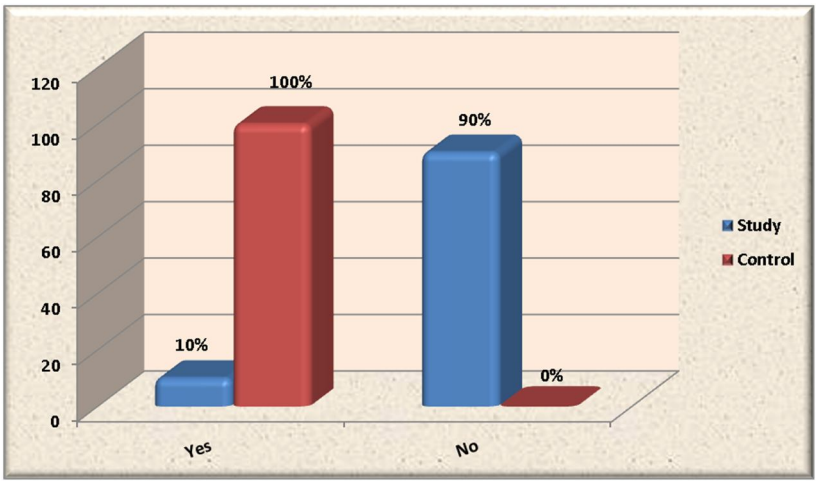

Figure (3): Percentage Distribution of Both the Study and Control Group Regarding the Presence of Local Injuries after Applying Physical Restraints (n=60)

Figure (3): Illustrated that (10 %) of the SG, compared to (100%) of the CG, had local injuries.

Table (3): Percentage Distribution of Studied Groups Regarding the Limb Edema Assessment Scale (n=60)

Grads of Edema	Study (n=30)		Control (n=30)		X^2 (P-value)
	No.	%	No.	%	
- **None**	27	90	15	50	**11.24 (0.003**)**
- **Grade 1:** (2 millimeter depression, or barely visible) with immediate rebound time	2	6.7	8	26.7	
- **Grade 2:** (3-4 mm depression, or a slight indentation) with rebound time 15 seconds or less	1	3.3	7	23.3	
- **Grade 3:** (5-6 mm depression) with	0	0	0	0	

Grads of Edema	Study (n=30)		Control (n=30)		X^2 (P-value)
	No.	%	No.	%	
rebound time 10-30 seconds					
- **Grade 4:** (8 mm depression ,or a very deep indentation) with rebound time more than 20 seconds	0	0	0	0	

**** P = ≤.01 (Highly Statistical Significance)**

Table (3): Clarifies the distribution of the study and control groups according to the presence of limb edema during the application of physical restraint. It was found that (90% and 50%) of the study and control groups had no grade of edema, and also, (6.7 %) of SG compared to (26.7 percent of CG had grade I edema, while (3.3%) of SG compared to (23.3 percent of CG had grade II edema, with highly statistically significant differences between the two groups

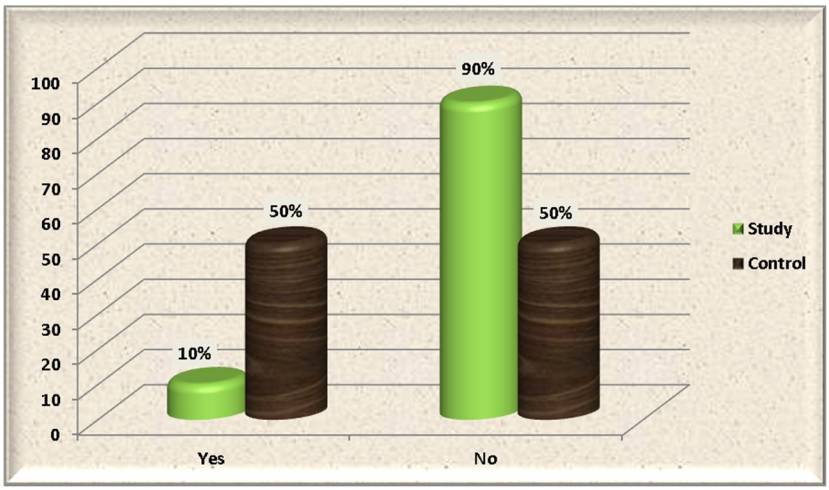

Figure (4): Percentage Distribution of Studied Groups Regarding Presence of Edema from Application of Physical Restraints (n=60)

Figure (4): Illustrates that (10 %) of the SG, compared to (50%) of the CG, had **edema** from physical restraint with statistically significant differences

Table (4): Percentage Distribution of Studied Groups Regarding the Application of Nursing Guidelines for Physical Restraint (n=60)

Clinical Guidelines	Study (n=30)				Control (n=30)				X^2	P value
	Done		Not done		Done		Not done			
	No.	%	No.	%	No.	%	No.	%		
1. Assessment of Patient Before Applying Restrains:										
- Indication of applying restraint	٣٠	١٠٠	٠	٠	5	16.7	25	83.3	٤٢,٨	0.001**
- Review physician's order for application of the restraints	٣٠	١٠٠	٠	٠	5	16.7	25	83.3	٤٢,٨	0.001**
- Assess the site of restraint	٣٠	١٠٠	٠	٠	5	16.7	25	83.3	٤٢,٨	0.001**
2. Preparation for Restraining:										
- Prepare of equipment	٣٠	١٠٠	٠	٠	1	3.3	29	97.7	56.1	0.001**
- Prepare of patient	٣٠	١٠٠	٠	٠	0	0	30	100	60	0.001**
- Prepare of environment	٣٠	١٠٠	٠	٠	3	10	27	90	40.1	0.001**
3. Application of Physical Restraint										
- Padding bony prominences, and securing the restraint accurately.	٣٠	١٠٠	٠	٠	5	16.7	25	83.3	٤٢,٨	0.001**
- Didn't restrain patient while lying flat position	٣٠	١٠٠	٠	٠	3	10	27	90	40.1	0.001**
- Make sure that restraint is not over an IV line or other device.	٣٠	١٠٠	٠	٠	3	10	27	90	40.1	0.001**
- Attach the restraint to bed frame, not side rails	٣٠	١٠٠	٠	٠	0	0	30	100	60	0.001**
- Secure restraints with a quick release	٣٠	١٠٠	٠	٠	0	0	30	100	60	0.001**
4.Care after PR Application:										
- Assess of proper placement of restraint	٣٠	١٠٠	٠	٠	3	10	27	90	40.1	0.001**
- Assess the color of the skin	٣٠	١٠٠	٠	٠	5	16.7	25	83.3	40.1	0.001**
- Assess peripheral circulation	٣٠	١٠٠	٠	٠	5	16.7	25	83.3	52.5	0.001**
- Assess movement and sensation	٣٠	١٠٠	٠	٠	2	6.7	28	93.3	52.5	0.001**
- Inspect the skin for abrasions or skin tears	٣٠	١٠٠	٠	٠	0	0	30	100	60	0.001**
- Remove restraints for 30 min. every 2 hours	٣٠	١٠٠	٠	٠	1	3.3	29	97.7	56.1	0.001**
- Renew orders every 24 hours	٣٠	١٠٠	٠	٠	2	6.7	28		52.5	0.001**
- Evaluate of restrained body part every 2 hours	٣٠	١٠٠	٠	٠	3	10	27	90	56.1	0.001**
- Change position frequent	٣٠	١٠٠	٠	٠	1	3.3	29	97.7	56.1	0.001**
- Provide adequate range of motion	٣٠	١٠٠	٠	٠	1	3.3	29	97.7	56.1	0.001**
- Tell the family the rational of restraint(s) when will be removed.	٣٠	١٠٠	٠	٠	3	10	27	90	56.1	0.001**
- When the patients do not need to be restrained, nurse makes this suggestion to the doctor.	٣٠	١٠٠	٠	٠	1	3.3	29	97.7	56.1	0.001**
5. Documentation:										

Clinical Guidelines	Study (n=30)				Control (n=30)				X^2	P value
	Done		Not done		Done		Not done			
	No.	%	No.	%	No.	%	No.	%		
- Record on the kardex the type of restraint used	٣٠	١٠٠	٠	٠	1	3.3	29	97.7	56.1	0.001**
- Record the time, indications, and unexpected outcomes for restraining.	٣٠	١٠٠	٠	٠	٠	٠	30	100	60	0.001**

*** P = ≤ .05 (Statistical Significance)** **** P = ≤.01 (Highly Statistical Significance).**

Table (4): Reveals distribution of the studied groups regarding the application of nursing guidelines for physical restraint. The results showed that all items of the physical restraint nursing guidelines were applied to (100%) of the study group compared to a lower percentage in the control group, with highly statistically significant differences between the two groups.

Table (5): Correlation between the Application of Physical Restraint Nursing Guidelines and the Presence of Local Injuries and Edema among the Studied Groups (n=60)

Variables	Physical Restraints Nursing Guidelines			
	Study (n=30)		Control (n=30)	
	r	*P*	*R*	*P*
Local Injuries	- 0.415	**0.023***	0.٢٨٩	0.١٢١
Edema	- 0.2٩٥	**0.٠٢***	0.١٤٧	0.٤٤٠

*** P = ≤ .05 (Statistical Significance)** **** P = ≤.01 (Highly Statistical Significance).**

Table (5): Revealed a statistically significant negative correlation between the application of physical restraint nursing guidelines and the presence of local injuries after applying physical restraint. There is also a statistically significant negative correlation between the application of physical restraint nursing guidelines and the presence of edema

Discussion

Restraint is defined as 'a measure or condition that keeps an individual or thing under control'. In health care, physical (use of force or equipment) and chemical (medication) restraints are frequently used in critical care. Many patients may be restrained at least once throughout their stay in a critical care setting. **(Smithard & Randhawa 2022).**

Physical restraints are considered a protective nursing measure that the medical staff of the intensive care unit (ICU) uses to prevent accidental extubation, falls, and other unanticipated catastrophes.. Despite the fact that physical restraints can help nurses prevent immediate risks, they can also cause patients a great degree of physical and/or psychological problems, such as cutaneous, vascular, and musculoskeletal injuries. **(Lei et al 2022).**

The current study was conducted to assess the effect of applying PRNG on reducing local injuries among critical patients.

Regarding socio-demographic data, the current study reveals that the highest percentage of studied groups were older than 50 years, and the highest percentage among them were males. This is in accordance with **(Cui et al 2023)** who found that more than two-thirds of the studied groups were male, with a mean age of 53 years.

Regarding marital status, the current study shows that the highest percentage of studied groups were married. This finding was agreed upon by **(CHOU et al 2020)** whose study documented that more than half of the studied groups were married.

Regarding medical diagnosis, the present study found that the majority of SGs diagnoses were trauma. This result is contrary to (KISACIK & ÇOŞĞUN 2019) who found that 30.8% of the patients had a respiratory diagnosis while more than a quarter of them (27.5%) had a neurological diagnosis.

Regarding the length of ICU stay, the current study shows that slightly more than one-third of the studied group's had a length of stay of about 5 days to > 10 days, with a statistically significant difference. The present study finding was consistent with (Chen et al 2022) who found that in half of the studied groups, the mean length of stay in the ICU was more than 5 days.

As regards the patients' conscious level, the current finding revealed that the highest percentage among the SG were comatose; while more than fifty percent of the CG were comatose. The recent result contradicts **(Ji et al. 2022),** who reported that the majority of physical restraint patients have mild-to-moderate disturbances of consciousness (GCS 9–14).

Concerning the unit of admission, the recent finding showed that the majority of the studied groups were admitted to the ICU with no statistically significant difference between the study and control groups. Similar findings have been reported by (Ertuğrul & Özden 2020, who revealed that the majority of the patients were admitted to the anesthesia unit.

Regarding patient sedation, it was found that more than half of the studied groups had sedated, with no statistically significant difference among them. A similar study was reported by (Ertuğrul & Özden 2020, who established that more than half of the study sample were sedated.

As regards order of restraint as one of the characteristics of restraint, the present study revealed that all SG had an order for restraint from a doctor, while a minority of the CG had an order for restraint from a doctor. From the researcher's point of view, most of the ICU's physical restraint decisions are made by nurses, which may be to reduce their workload or when there is insufficient manpower. The current study showed that the restraint devices were used in all SG. These findings were disagreed with (**Ertuğrul & Özden 2020**) who mentioned that the majority of patients had a gauze roll restraint

Concerning the reason for applying physical restraint, the current study found that nearly one-third of the SG had been restrained to prevent self-extubation. In addition, the majority of SG had been restrained to prevent removing IV lines. Also, it can be seen that a minority of CG had been restrained to prevent removing IV lines. This finding was supported by (Acevedo-Nuevo et al., 2022) whose study showed that the most frequent indications of use were agitation (61.40%) and attempted self-removal of artificial airways (50.88%). Also, a similar study was reported by (Fawzy et al., 2021) who mentioned that more than half of the studied sample was restricted due to the removal of medical devices linked to them.

Regarding local injuries, the present study revealed that the majority of the SG hadn't sustained any injuries from using physical restraint. The findings of this study are explained by the researcher's perspective, which may be due to applying PRNG, which leads to reduced local injuries among SG. A similar finding was concluded by (Franks et al 2021) who reported that patients who were physically restrained during their ICU admission suffered from local injuries such as erythema, bruising, and edema. The present finding was similar to a study conducted by (2019), who reported that studied patients complain of some local complications such as edema and color change resulting from the use of inappropriate restraining materials.

Finally, the researcher could confirm that the present discussion of the current study supports the hypothesis that patients who received physical restraint nursing guidelines have fewer local injuries compared with patients who did not receive nursing guidelines.

Conclusion

Based on the findings of the present study, it was concluded that the use of physical restraints in critical units is very common. The results showed that the application of physical restraint nursing guidelines reduced the presence of local injuries and edema among the study group.

Recommendations

Based on the results of the current study, the researcher suggested that:

- Designing an in-service training educational program for nurses to upgrade nurses' knowledge and practice regarding reducing local complications from physical restraint
- Replication of the current study on a larger probability sample from dissimilar national critical care settings is needed to generalize the finding.

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