

Impact of ICU physical restraint care standards on critical care nurse's knowledge, performance and patient outcome among critically ill Adult and older adult

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Abstract

In critical care settings, physical restraint is, popular nursing procedure performed by critical care nurses to prevent delirious or irritable patients from disconnecting tubes and lines and to maintain patient safety. However, inappropriate physical restraint performance causes many adverse effects on patient outcomes. **Aim:** to evaluate the impact of ICU physical restraint standards on critical care nurse's knowledge, practice, and outcome among critically ill Adult and older adult patient outcome. **Design:** Quasi-experimental research designs and observational design pre-post assessment were used to assess nurse's knowledge and to observe their practices of PR use in ICUs at two-time intervals: before the intervention, at its completion, and 12 weeks after completion, whereas the effect on patients' complications was assessed before and after implementation. **Tools for data collection:** Three tools were used for collect data of this study. **Tool I: Pre / Post-test A structured interview questionnaire for nurses:** It was developed by the researchers. It consisted of three parts: **part 1** Socio-demographic characteristics of critical care nurses, as age, sex, marital status, qualification etc. **Part 2:** Assess nurse's level of knowledge as regard with PR care standards. This part involves 31-items of multiple-choice questions to assess nurses' knowledge regarding patient restrain. **Tool II:** pre/post the critical care nursing practice observational checklist sheet for nurses: It included 17 steps divided into four domains: Assessment and preparation phase (6 items), application phase (5 items), post care and maintenance phase (5 items). and documentation (1 item). **Tool III:** Consequences of restraining in the form of problems or complications outcome sheet: consists of two parts: **Part 1:** Socio- demographic characteristics of adult and older adult. **Part 2:** Consequences of PR in the form of problems or complications (outcome). **Results:** the results showed marked deficiencies in nurses' knowledge and practices before the physical restraint standard with significant improvements at the post and follow-up evaluations. Additionally, significantly improvement in patient outcomes (complication decreased) after the study intervention. **Recommendation:** this study suggests that a continuous training package in nursing standards can significantly improve nurses' knowledge and practice regarding physical restraining of ICU patients, with subsequent decreases in the rate of adverse effects of PR complications among these patients.

Keyword: Physical restraints, care standards, ICU, Critical care nurse's, knowledge, performance, Patient outcome, adult and older adult patient.

Introduction

Intensive care unit (ICU) clients are hospitalized with serious health conditions and are under the effect of several kinds of sedation that can disturb their level of consciousness and lead to agitation and delirium. They are connected to equipment with many tubes and lines, making them prone to accidental self-removal of the medical devices (Acevedo et al., 2022).

Critically adult and older adult patients frequently suffer from multiorgan disturbance

and most of them have poor health status, use numerous medications, or may suffer from deterioration level of consciousness or functional disorders, hence, they have a higher probability for falling and injury to themselves or others. Therefore, for nurses one of the most public procedures used to confirm critically ill adults and older adult patient's safety in ICU settings is physical Restraints (PR) to ensure their safety. (Lao, et al., 2023, Gonçalves, et al., 2023 & Tresfon et al., 2023).

Physical restraint (PR) recognized as any physical technique of restricting body movement, in hospitals, physical restraints are used mainly to prevent falls and stop confused patients from wandering and harming themselves (Zhou, et al., 2024). During hospitalization, 80% of patients in critical care settings may experience some degree of confusion and agitation, which may lead to the accidental removal of their invasive tubes and devices (Chong, et al., 2024)

There are several methods of PR, such as ankle, wrist, chest, and waist (Franks, et al., 2021). PR is commonly performed, especially in the care of the ICU patients, to maintain safety and to protect the patient from the hazards related to untimely patient-initiated removal of indwelling devices such as endotracheal tubes, protect them from fall, injury, and/or unintended harm (& Nomali, et al., 2021; Dauvergne, et al., 2023).

However, the literature reports a wealth of evidence on the detrimental effects of physical restraint on adult older adult patients has been accompanied by several psychological, physical, and social adverse effects (Sharifi, et al., 2021). Among the adverse physical effects such as impaired balance and mobility, muscle function deterioration, constipation, incontinence, pressure ulcers, infections, and physical restraint have occasionally been responsible for patient deaths (Berger, S., & Grzonka, 2023 & Omotosho, et al., 2023). Restraints cause clients and their families sense ashamed in remember this experience (Hamid, et al., 2023). In addition, emotional and social adverse effects include low self-esteem, anxiety, depression, impaired socialization, disorientation agitation, and withdrawal (Younis & Sayed Ahmed, (2017). & Kassew, et al., 2020)

Physical restrain care standards provide a guide to the knowledge, practices, judgment and attitudes of critical care nurses that are needed to practice safely, used to advocate by means of the minimum restraining device required, reassessing the adult and older adult patient's responses frequently, eliminating the restraint intermittently, and changing the orders restraint devices every twenty-four hours. only after appraisal. (Puškaš, & Novković, (2023),

the importance of employing appropriate and standard guideline for avoiding its complications and negative effects, (Gandhi, et al., 2018).

Physical restrains care standers need care plan adjustment to recompense for restraint practice, with skin care, and providing sufficient range of motion, regular positioning and help to meet patients demands. Continuing monitor of the risk factors that encouraged restraint practice, holistic and a multidisciplinary care, and nursing training programmes are vital to proper restraint performance (Abraham, et al., 2020 & Thomann, et al., 2021).

So, the dignity of the adult and older adult patients should be maintained if the physical restraint device is used by actively patient, patient's family members should be informed of the needs, risks, and benefits of physical restraint before applying, as should alternative decision makers and the broader health care team. (Kassew, et al., 2020). Critical care nurses are also responsible for recording nursing care intervention. (Malone, et al., 2022),

At the end, critical care nurses are closely in contact with critically ill-restrained patients and responsible for caring for them. Therefore, clinical practice standards and instruction must be given for critical care nurses to develop a good practice in physical restraint (Ertuğrul, & Özden, 2020).

Significance

In Egypt, physical restraint is a more traditional and public procedure in (ICUs) nurses were responsible for 58.2% of the decide to practice PR, while 41.1% was decided by both physicians and nurses (Kandeel & Attia, 2013), in critical care setting, the main cause of perform the restrain technique is to avoid dislodgement of invasive tubes or medical devices, and for this cause critical care nurses have positive attitudes towards restraining. However, the physical restraining skills and equipment (such as; Vest, Belt, Restraining Net, Wristlet, Jacket, Mittens, Geri Chair, Merry Walker, Water mattress, and Helmet) used in ICUs. On the other view, devices used for the physical restraint utilized

in ICUs is not implemented correctly and inappropriate patient care (Kavumpurath, 2023).

Especially in Sohag University there are no guidelines or policies for this practice. Most of the critically adult and older adult patients were restrained due to they may had disturbed level of consciousness or agitated and may remove medical tubes Several studies showed that, nurses' knowledge about the practice of physical restraint was inadequate (Tsai, et al., 2022). Since nurses' knowledge and practice play a vital role in care of physically restrained patients. Therefore, the aim of the current study is to evaluate the effect of ICU physical restrains care standard on critical care nurse's knowledge, practice, and outcome among adults and older adult patient in ICU at Sohag university hospital.

Aim of the study:

The aim of the current study was to evaluate the impact of ICU physical restraint standards on critical care nurse's knowledge, practice, and outcome among critically ill adult and older adult patient.

Research hypothesis:

The application of ICU physical restraint care standards on critical care nurses among critically ill adult and older adult patients will lead to statistically significant

- 1- Improvements in critical care nurses' knowledge and post implementation physical restraints care standards.
- 2- Reduce the adverse effect of physical restraints on critically ill adult and older adults (Improve patient outcomes).

Subjects and methods

Research design:

A quantitative descriptive research designs and observational design pre-post assessment were used to assess nurses' knowledge and to observe their practices of PR use in ICUs at two-time intervals: before the implementation, at its completion, and 12 weeks after completion, whereas the effect on patients' complications (patients' outcome) was assessed before and after implementation.

Setting:

The study was conducted at four intensive care units at Sohag University hospital (Sohag university hospital) critical care setting include; (trauma, neurological, general and post-operative intensive care units).

Subjects:

- The study subjects consisted of all nurse's t whom allocated to work in ICU, and patients. The nurses consisted of all 117 (22 males and 95 females) currently working in the previously mentioned ICUs, 84 of adult and older adult patients who were physically restrained in the previous mentioned ICUs setting.
- All available nurses that dealing with physically restrained critically adult, older adult patient in intensive care unit (117 nurses), according to the following inclusion criteria includes: all nurses both sex (male and female), and nurses with all level of education.

Sampling criteria:

The Nonprobability study, a convenience sampling of nurses and adult and older adult patients were eligible to be selected in the study sample according to the following eligibility criteria.

Inclusion criteria:

- Nurses currently working in the ICU have at least 1 year of experience in the ICU.
- Age 30 years and older adults 65 years and over.
- Nurses provide direct adult and older adult patient care.
- Nurses dealt with physically restrained patients before the program.

Exclusion criteria:

- Patients with physical or mental disabilities were excluded

Data collection tools:

The researchers developed a self-administered questionnaire to assess nurses' knowledge, an observational checklist for their

practice, and a physical assessment sheet for patients.

Three tools were utilized to collect data for this study:

Tool I: Pre-Post test a structured interview questionnaire for nurses: It was used prior to implementation of physical restraint (PR) care standard to measure the critical care nurse's knowledge regarding PR care standard. Structured interview questionnaire tool was developed by the researchers to collect the necessary data for the study. It consisted of two parts:

Part 1: Socio-demographic characteristics of critical care nurses, it included data related to subjects' characteristics such as name; age, sex, marital status, years of experience, qualification, and number of years of clinical experience in ICUs, in addition to questions regarding awareness of physical restraints and related policies in hospital, and the sources of their information.

Part 2: The nurse's knowledge with regard to the PR care standard questionnaire: was developed by the researcher to assess basic nurses' knowledge. The questionnaire was based on pertinent literature (Black, 2009, , Cartledge, et al., 2012, and Lei (2022) It consisted of closed questions to evaluate the nurse's basic knowledge regarding physical restraining This part involves 31-items of multiple-choice questions to measure nurses' knowledge regarding elderly patient restraint such as; definitions, indications, types, alternatives, procedures, precautions, contraindications, complications. and barriers to using it.

The Scoring system for the questionnaire was as follows; the correct answer was given the score of "ONE" and the wrong answer was given the score of "ZERO. Based upon the scoring system utilized, the nurse's knowledge was categorized as follows: All questions were measured and divided by the number of questions to get the mean knowledge of each nurse. Knowledge below 75% was measured unsatisfactory while those equal to or above 75% was measured satisfactory.

Tool II: pre/post, and follow-up The Critical care nursing practice observational checklist sheet for nurses

This tool was developed by the researcher based on the current international literature on the physical restraint care standard checklist, was adapted by (Eser, et al., 2007) & (Spennato, et al., 2023) to assess the performance of critical care nurses who introduce care for critically ill, physically restrained adult and older adult patients. This tool was used before and after the implementation of the ventilator associated pneumonia care bundle to assess the nurses' practice. It included 17 steps, divided into four domains:

1. Assessment and preparation phase (6 items).
2. Application phase (5 items).
3. Post care and maintenance phase (5 items).
4. Documentation (1 item).

Scoring system: for the developed observational checklist had two responses, 'done' response was given the score of "ONE" and 'not done' response was given the score of "ZERO". Based upon scoring system utilized, every step performance was measured as follows All procedure steps were measured and divided by the number of checklist procedure steps to get the mean practice of each nurse. Below 75% was measured unsatisfactory while those equal to or above 75% was measured satisfactory.

Tool III: Consequences of restraining in the form of problems or complications outcome sheet (Chou, M. Y., et, al 2020) and (Azizpour et, al 2017): developed and modified by the researchers, it consists of two parts:

Part 1: Socio-demographic characteristics of adults and older adults, it included data related to subjects' characteristics such as name; age, sex, ICU admission date, and ICU discharge date.

Part 2: the ramification of PR in the form of problems or complications (outcome):

This tool dealt with the consequences of PR in the form of complications such as direct injury (ischemic injury, nerve injury, strangulation, and unexpected death), and indirect injury (pulmonary

embolism, nosocomial infection, thrombophlebitis, falls, pressure sores, or failure to be discharged home. The possible effects included skin abrasions, urinary retention or incontinence, dehydration, and/or bruising, orthostatic hypotension, restricted circulation, lower-extremity edema, and constipation, while the negative psychological effects included anger, agitation, depression, and no sense of humanity. Any present complication was scored one.

Validity of the tool:

The content and aspect validity of the instruments and tools were established by a panel of five experts in critical and geriatric nursing and members of the medical staff to test their face and content validity. They examined the tool for clarity, relevance, comprehensiveness, applicability, and ease of administration. All their recommendations were done.

Pilot study

Before performing the core study, a pilot study was performed on 10% of the study sample (nurses and patients). It served to evaluate the applicability of the tools. It helped in the detection of difficulties in some items and in the estimating the time needed for carrying out the interview. As some adjustments were performed in some items, nurses and patients who participated in the pilot study were not encompassed in the main study sample.

Also, a pilot study helped in testing the reliability of the Lawton scale. This was done by examining its internal consistency. It demonstrated a high level of reliability with a Cronbach's alpha coefficient of 0.928.

Field Work:

The study was implemented through three sequential phases: assessment and planning, implementation, and evaluation phases. The study lasted from September 2023 to April 2024, and the researchers were available two days a week.

Assessment phase:

- Upon confirmation of the tools and an official letter were issued from the Faculty of Nursing, Aswan University, to the directors of study settings to obtain approval to implement the study, the researchers started to recruit the samples. A sample of 84 restrained adult and

older adult patients was recruited according to eligibility and exclusion criteria.

- The researchers visited the study setting two days a week (Sundays and Thursdays) from 10 a.m. to 2 p.m.
- The researchers implemented the standards of care in a waiting area outside the ICU unit and interviewed the studied samples individually.
- The researcher explained to each one the purpose of the study and the method of gathering data. They also written consent from each nurse to share in the study after clarifying the procedure of the study. Nurses were informed about their right to reject participation and to separation at any time without any consequences. Confidentiality of data was ensured.
- After that, the researcher was assessed for physical signs and complications of restraining using the physical assessment sheet.
- The nurse's basic knowledge was assessed using a structured interview questionnaire. After that, observe nursing practice with restrained patients in different shifts using the observation checklist.

Planning phase:

- The ICU physical restraint standard was conveyed to nurses in seven teaching sessions. The teaching and training methods involved questioning, discussions, demonstrations, and re-demonstrations.
- The teaching media included illustrative pictures, videotapes, and handouts. Each session took 30 -45 minutes.
- The ICU physical restraint standard was designed and presented in Arabic.
- At the initiation of the first session, an orientation to the ICU physical restraint stander and its purpose was presented. Each session started with a summary of what had been trained in the previous session and the objectives of the new one, taking into consideration the use of simple language to outfit the level of nurses.
- The researchers used motivation and reinforcement during the educational sessions to improve learning. Direct

reinforcement in the form of a copy of the ICU physical restraint standard was offered for each nurse to use as future reference.

Evaluation phase:

- The evaluation of the ICU physical restraint standers effects on nurses' knowledge, practice, and consequently, on patients' complications was carried out using the same assessment tools.
- Each nurse was evaluated immediately after implementation of the ICU physical restraint (post-test), and two months after implementation of the ICU physical restraint stander (follow-up), and these were compared to pre-test levels.
- For patients, the evaluation was done by comparing the assessment done after applying the ICU physical restraint stander' implementation with the pre-guideline complications.

Administrative Design:

Permissions to carry out this study, the necessary approvals were obtained from the directors of the Sohag University Hospitals and the head of the Critical Care Unit. This was done through the submission of a formal letter from the Dean of the Faculty of Nursing at Sohag University explaining the aim of the study, side by side copies of the data collection tool. Meetings and discussions were held between the researcher and the hospital management to make them aware of the objectives of the study and gain their cooperation.

Ethical considerations

The study protocol was approved by the research and ethics committee. written permission to participate, (from nurses and patients) was obtained from each participant after a simple and full explanation of the purpose of the study and its procedures. They were given the chance to refuse or withdraw at any point without any reason being given. They were reassured that the information obtained would be confidential and used for research purposes only and to improve patients' health. No harm could be anticipated from any

movement in the application of the research study.

Statistical design

Data entry and statistical analysis were done using the SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means, standard deviations, and medians for quantitative variables. The cronbach alpha coefficient was calculated to assess the reliability of the scale used through its internal consistency. Qualitative categorical variables were compared using the chi-square test. Whenever the expected values in one or more of the cells in a 2x2 table were less than 5, the fisher exact test was used instead. Pearson correlation analysis was used for calculation of the inter-relationships among quantitative variables, and Spearman rank correlation for ranked ones. In order to identify the independent predictors of knowledge and practice scores and the number of complications, multiple linear regression analysis was used after testing for normality and homoscedasticity, and analysis of variance for the full regression models was done. Statistical significance was considered at a p-value <0.05.

Results

Table 1: illustrates that, of the nurses participating in the study mean age rate was 29.32 ± 4.36 (23.0-37.0) and 81.2% were female, 55.6 % were married. Slightly more than half of them were diploma of nurses 61.5% of nurses working in neurological care units constitute 32.5%, and 48.7% of nurses have ≥ 6 years of working experience. Moreover, it was observed that only 33.3 % of the nurses had enough knowledge about physical restraint, and approximately three quarters of the nurses were aware of physical restraint policies in hospitals.

Table 2: Illustrates the mean scores of study subjects' knowledge regarding physical restraint towards critically ill adult and older adult patients. There were statistically significant differences among study subjects knowledge in pre-test, post-test, and follow-up

tests regarding physical restraining at a P value of 0.000*

Table 3: shows that; the majority of critical care nurses (10.52 ± 1.57 , 29.19 ± 1.72 , and 25.29 ± 3.65) whose age ≥ 30 years had an increased mean score of knowledge in post and follow-up of implementing physical restraint care standards, respectively. (28.87 ± 2.30 , and 25.07 ± 3.84) in Bachelor nurses had satisfactory level of knowledge in post, and Follow-up implementing physical restraint care standards, respectively. (27.40 ± 3.62 and 23.89 ± 4.17) of nurses their years of experience ≥ 6 years had satisfactory their level of knowledge in post and Follow-up of implementing physical restrain care standards, respectively.

Fig 1: shows correlations between domains of knowledge and age of study subject According to the figure, there were statistically significant positive correlations between age of the nurses and knowledge in pre-test, post-test, and follow-up ($r = 0.636$, $P = 0.000$), ($r = 0.729$, $P = 0.000$), and ($r = 0.591$, $P = 0.000$) respectively.

Table 4: displays the mean score of practice of nurses in intensive care units between groups pre-test, post-test and follow-up test were (13.77 ± 3.89 , 23.97 ± 4.92 , 23.08 ± 4.35), respectively. It represented that there was no statistical significance difference between total mean practice score with p value = 0.000*.

Table 5: shows a highly significant difference between nurses practice in relation to age, Nursing qualification and Years of experience in ICU with $p < 0.000$ in there was non-significant difference between Considering

themselves as having enough knowledge and Awareness of physical restraint policies in hospital in pretest and follow up for physical restrain care standers.

Figure 2: demonstrates correlations between nurse's knowledge score and practice score in pre-test, post-test and follow-up test. There was statistical significance positive correlation between nurses' knowledge and practice score ($r = + 0.346$, p value = 0.000*), ($r = + 0.436$, p value = 0.000*), ($r = + 0.419$, p value = 0.000* respectively).

Table 6: shows characteristics of restrained adults and older adult patients. It was established that patients' ages ranged between 30 and 75 years old; 63.1% of them were male and 36.9% were female, more than half (61.9 %) were married, one third of them had secondary education (34.5%). Regarding the study subject occupation 29.8% were not working, 36.9% were working in neurological care units.

Table 7: also points to statistically significant improvements in the total complications of physical restraining after the study intervention. The improvements were noticed in all types of direct ($p = 0.000^*$), indirect ($p = 0.000^*$), potential ($p = 0.000^*$), and psychological ($p = 0.000^*$) complications. The most prominent improvement was in potential complications, where there were significant improvements in constipation, orthostatic hypotension, skin laceration, restricted circulations, and limb edema. In the direct complications, the nerve injury and ischemia significantly improved, whereas in the indirect complications bed sores, failure to be discharged and home, acquired- infections also showed significant improvement.

Table 1: Distribution of socio-demographic characteristics of studied nurses N = (117)

	No. (117)	%
Age: (years)		
< 30	69	59.0
≥ 30	48	41.0
Mean ± SD (Range)	29.32 ± 4.36 (23.0-37.0)	
Gender:		
Male	22	18.8
Female	95	81.2
Marital status:		
Single	37	31.6
Married	65	55.6
Divorced	7	6.0
Widowed	8	6.8
Type of unit where currently working:		
Trauma unit	35	29.9
Neurological care units	38	32.5
General ICU	19	16.2
Post-operative intensive care units	25	21.4
Nursing qualification:		
Diploma	72	61.5
Bachelor	45	38.5
Years of experience in ICU:		
< 3	15	12.8
3 – 6	45	38.5
≥ 6	57	48.7
Considering themselves to have enough knowledge about physical restraint:		
Yes	39	33.3
No	78	66.7
Awareness of physical restraint policies in hospital:		
Yes	86	73.5
No	31	26.5

Table 2: Total mean knowledge scores obtained by nurses' pre - post and follow up implementing nursing care standard for physical restraint patients:

Knowledge score	Pre-test (n= 117)	Post-test (n= 117)	Follow-up (n= 117)	P-value ¹	P-value ²
Mean ± SD	8.42 ± 2.33	25.50 ± 3.66	22.30 ± 3.96	0.000*	0.000*
Range	5.0-12.0	20.0-31.0	16.0-29.0		

Table 3: Relation between the score of knowledge in the pre-test, post-test, follow-up test, and the socio-demographic characteristics of nurses

Items	Knowledge score		
	Pre-test	Post-test	Follow-up
	Mean \pm SD	Mean \pm SD	Mean \pm SD
Age: (years)			
< 30	6.96 \pm 1.50	22.93 \pm 2.12	20.22 \pm 2.62
\geq 30	10.52 \pm 1.57	29.19 \pm 1.72	25.29 \pm 3.65
P-value	0.000*	0.000*	0.000*
Sex:			
Male	8.36 \pm 2.61	25.50 \pm 3.99	22.05 \pm 3.87
Female	8.43 \pm 2.27	25.49 \pm 3.60	22.36 \pm 4.00
P-value	0.902	0.995	0.741
Marital status:			
Single	9.03 \pm 2.32	26.59 \pm 3.52	23.00 \pm 3.82
Married	8.05 \pm 2.33	24.89 \pm 3.59	21.72 \pm 4.03
Divorced	8.57 \pm 2.23	25.71 \pm 4.35	21.86 \pm 4.06
Widow	8.50 \pm 2.20	25.13 \pm 3.72	24.13 \pm 3.56
P-value	0.239	0.157	0.231
Type of unit where currently working:			
Trauma unit	7.80 \pm 2.15	24.69 \pm 3.18	20.94 \pm 3.49
Neurological care units	8.74 \pm 2.32	26.13 \pm 3.68	23.63 \pm 3.50
General ICU	8.63 \pm 2.56	26.42 \pm 3.19	22.32 \pm 4.08
Post-operative	8.64 \pm 2.36	24.96 \pm 4.39	22.16 \pm 4.67
P-value	0.315	0.203	0.036*
Nursing qualification:			
Diploma	7.24 \pm 1.85	23.39 \pm 2.62	20.57 \pm 2.94
Bachelor	10.31 \pm 1.68	28.87 \pm 2.30	25.07 \pm 3.84
P-value	0.000*	0.000*	0.000*
Years of experience in ICU:			
< 3	6.27 \pm 1.28	23.33 \pm 2.13	19.80 \pm 2.65
3 – 6	7.58 \pm 2.05	23.80 \pm 2.81	21.11 \pm 3.19
\geq 6	9.65 \pm 2.04	27.40 \pm 3.62	23.89 \pm 4.17
P-value	0.000*	0.000*	0.000*
Considering themselves as having enough knowledge:			
Yes	8.67 \pm 2.26	26.26 \pm 3.66	22.62 \pm 4.24
No	8.29 \pm 2.36	25.12 \pm 3.62	22.14 \pm 3.84
P-value	0.418	0.112	0.544
Awareness of physical restraint policies in hospital:			
Yes	8.31 \pm 2.36	25.45 \pm 3.65	22.20 \pm 3.81
No	8.71 \pm 2.24	25.61 \pm 3.76	22.58 \pm 4.41
P-value	0.419	0.836	0.647

Fig. (1): Correlation between the score of knowledge and the age of the study subject

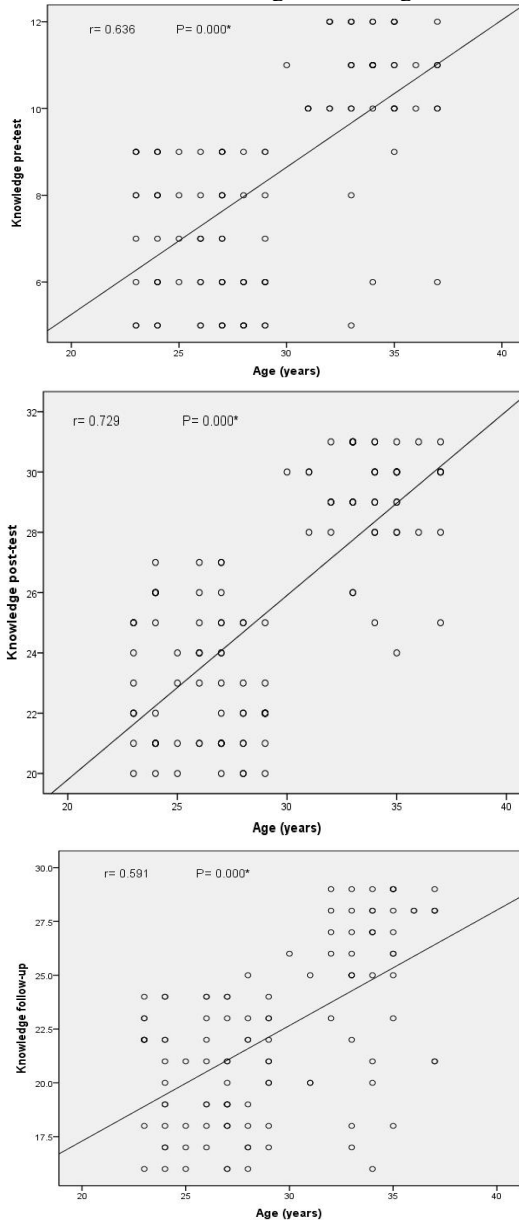


Table 4: Total mean practice scores pre, post and follow up implementing nursing care standards for critically ill Adults and older adults’ patients

Practice score	Pre-test (n= 117)	Post-test (n= 117)	Follow-up (n= 117)	P-value ¹	P-value ²
Mean ± SD	13.77 ± 3.89	23.97 ± 4.92	23.08 ± 4.35	0.000*	0.000*
Range	7.0-19.0	16.0-32.0	17.0-31.0		

Table 5: Relation between mean scores of practice in pre-test, post-test, and follow-up tests and socio-demographic characteristics of nurses

	Practice score		
	Pre-test	Post-test	Follow-up
	Mean \pm SD	Mean \pm SD	Mean \pm SD
Age: (years)			
< 30	12.46 \pm 3.20	22.06 \pm 3.78	21.52 \pm 2.96
\geq 30	15.65 \pm 4.05	26.71 \pm 5.09	25.31 \pm 5.03
P-value	0.000*	0.000*	0.000*
Sex:			
Male	13.73 \pm 4.06	23.27 \pm 5.11	23.14 \pm 4.39
Female	13.78 \pm 3.87	24.13 \pm 4.88	23.06 \pm 4.36
P-value	0.955	0.465	0.944
Marital status:			
Single	15.05 \pm 3.53	24.62 \pm 5.24	23.43 \pm 5.04
Married	13.08 \pm 3.83	23.92 \pm 4.55	22.78 \pm 4.06
Divorced	13.43 \pm 4.65	24.29 \pm 4.82	22.43 \pm 4.58
Widow	13.75 \pm 4.53	21.00 \pm 6.12	24.38 \pm 3.16
P-value	0.103	0.310	0.708
Type of unit where currently working:			
Trauma unit	13.09 \pm 3.73	22.74 \pm 4.77	22.54 \pm 3.90
Neurological care units	14.55 \pm 3.59	24.66 \pm 5.10	23.97 \pm 4.52
General ICU	13.58 \pm 4.00	23.89 \pm 4.70	21.89 \pm 4.78
Post-operative	13.68 \pm 4.44	24.68 \pm 4.96	23.36 \pm 4.28
P-value	0.448	0.330	0.304
Nursing qualification:			
Diploma	12.53 \pm 3.30	22.22 \pm 3.99	21.61 \pm 3.43
Bachelor	15.76 \pm 3.96	26.76 \pm 5.01	25.42 \pm 4.66
P-value	0.000*	0.000*	0.000*
Years of experience in ICU:			
< 3	10.47 \pm 2.75	22.40 \pm 4.21	20.20 \pm 2.62
3 – 6	12.98 \pm 3.37	22.24 \pm 4.25	22.07 \pm 3.36
\geq 6	15.26 \pm 3.84	25.74 \pm 5.02	24.63 \pm 4.80
P-value	0.000*	0.001*	0.000*
Considering themselves as having enough knowledge:			
Yes	14.18 \pm 3.89	25.33 \pm 5.33	23.49 \pm 4.80
No	13.56 \pm 3.90	23.28 \pm 4.58	22.87 \pm 4.12
P-value	0.422	0.033*	0.473
Awareness of physical restraint policies in hospital:			
Yes	13.88 \pm 3.86	23.41 \pm 4.82	22.77 \pm 4.28
No	13.45 \pm 4.00	25.52 \pm 4.91	23.94 \pm 4.49
P-value	0.598	0.040*	0.201

Fig. 2: Correlation between nurse’s knowledge score and practice score in pre-test, post-test and follow-up tests

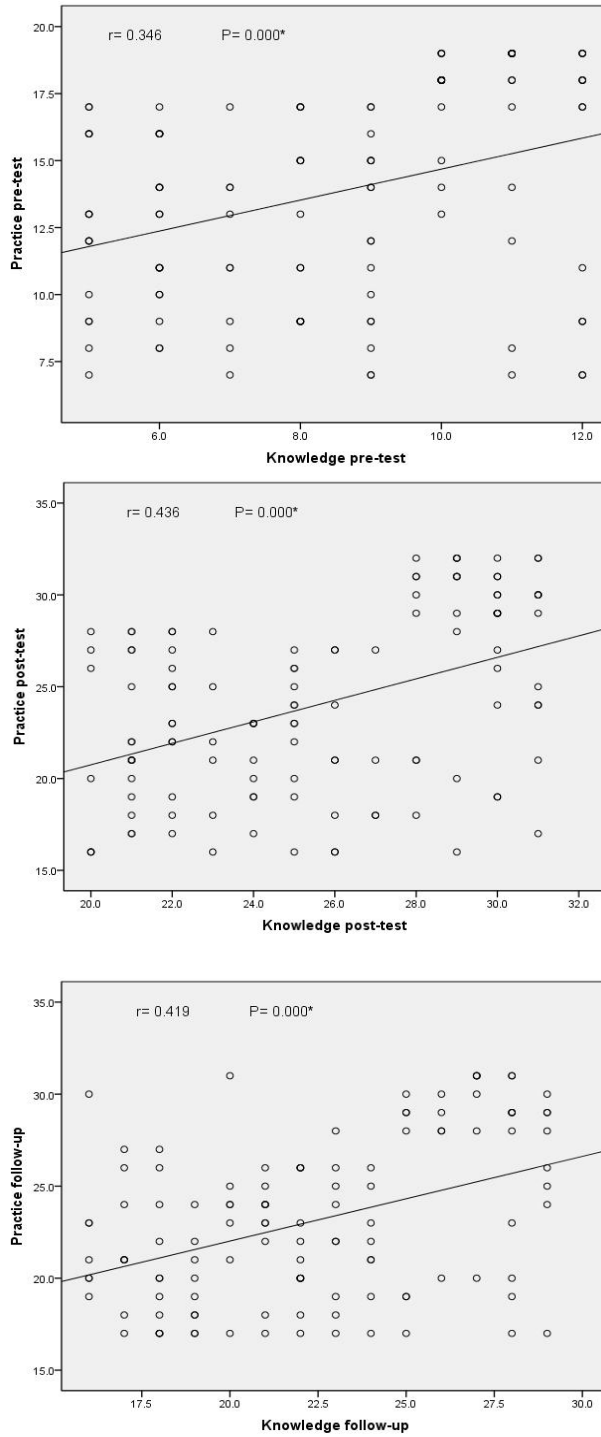


Table 6: Socio-demographic characteristics of studied adult and older adult patients

Items	No. (84)	%
Age: (years)		
< 30	26	31.0
30 - < 45	19	22.6
45 - < 65	21	25.0
≥ 65	18	21.4
Gender:		
Male	53	63.1
Female	31	36.9
Marital status:		
Single	24	28.6
Married	52	61.9
Divorced	5	6.0
Widowed	3	3.6
Educational level:		
Illiterate	13	15.5
Read and write	7	8.3
Basic education	16	19.0
Secondary	29	34.5
University	19	22.6
Occupation:		
Not working	25	29.8
Farmer	16	19.0
Employee	13	15.5
Professional	18	21.4
Others	12	14.3
ICU type:		
Trauma unit	25	29.8
Neurological care units	31	36.9
General ICU	12	14.3
Post-operative ICU	16	19.0

Table 7: Total complications of physical restraining among adult and older adult patients pre -post the study intervention (Patients outcome)

Total complications	Pre-test (n= 84)		Post-test (n= 84)		P-value
	No.	%	No.	%	
Direct:					
Nerve injury	32	38.1	7	8.3	0.000*
Ischemia	47	56.0	13	15.5	0.000*
Strangulation	11	13.1	2	2.4	0.009*
Sudden death	3	3.6	0	0.0	0.246
Indirect:					
Acquired infection	55	65.5	16	19.0	0.000*
Pulmonary embolism	2	2.4	0	0.0	0.497
Thrombosis	4	4.8	1	1.2	0.367
Declining social behavior	21	25.0	9	10.7	0.016*
Bed sores	67	79.8	12	14.3	0.000*
Falling	33	39.3	2	2.4	0.000*
Failure to be discharged home	68	81.0	9	10.7	0.000*
Potential:					
Urine retention	15	17.9	3	3.6	0.003*
Constipation	54	64.3	17	20.2	0.000*
Incontinence	13	15.5	5	6.0	0.046*
Dehydration	9	10.7	1	1.2	0.009*
Skin laceration	77	91.7	12	14.3	0.000*
Orthostatic hypotension	52	61.9	13	15.5	0.000*
Restricted circulation	49	58.3	10	11.9	0.000*
Limb edema	78	92.9	22	26.2	0.000*
Psychological:					
Anger	32	38.1	11	13.1	0.000*
Agitation	47	56.0	14	16.7	0.000*
Depression	36	42.9	23	27.4	0.036*
Frustration	50	59.5	34	40.5	0.014*

Discussion

Critical care nursing is an extremely specialized field that involves caring for patients with life-threatening condition. **Karaca, & Ā-Zkan, (2018)**. Physical restraint is a common nursing practice in ICU. Physical restraint is usually linked with many adverse effects (**Penelo, et al., (2018)**). Physical restraint utilized with adults, elderly and patients is accompanied with poor outcomes such as a decline in psychological and functional status, dignity loss, patient rights violation, and even death (**Swickhamer, et al., (2013) & Strout, T.D. (2010)**). Furthermore, the literature showed that many studies performed in Egypt address physical restraint nursing practice in general, but it is rare to find a study that assesses nurses' performance on PR among adult and older adult patients. Consequently,

application of evidence nursing care standards on physical restraint are as essential for the critical care nurses in clinical practice.

A current study was carried out to test the hypothesis that implementing ICU physical restraints standards on critical care nurses among critically ill adult and older adult patients would lead to Improvement in their knowledge, and practice, which has a beneficial impact on the frequency of complications among critically ill adult and older adult patient in intensive care units. The results support the set of hypotheses and provide evidence for the efficacy of applying current physical restrain standards.

Regarding the socio-demographic characteristics of the studied critical care nurses, the current study revealed that most of the sample

was female and mostly middle-aged, the research, however, was unable to find any evidence that the gender of nurses had an impact on their practice of physical restraint. In addition, the majority of them had more than six years of experience. Slightly more than half of them were diploma nurses and most of them worked in neurological care units constitutes. These results are in line with **Younis G and Ahmed S (2017)**. Who stated in their study that the majority of their sample was female their ages ranged from 20-30 years and had years of experience from 1 to 5 years. While **Taha & Ali (2013)** mentioned that all the studied nurses have less than five years of work experience in the unit.

Moreover, nurses in the present study sample reported slightly more than a quarter of nurses had enough knowledge about physical restraint, and approximately three-quarters of the nurses were aware of physical restraint policies in the hospitals. This in agreement with this, **Cannon et al (2001)**, and **Hafez EM (2011)** found in their studies that majority of the nurses did not receive any special education or in-service training about physical restraint practices. Also, these findings are congruent with the findings of several studies that nurses lack knowledge regarding PR use and have a low level of practice as well (**Al-Khaled et al., 2011; Fariña-López et al., 2014; Taha & Ali, 2013**). There is incongruence between their perception and real knowledge of PR. This result may be due to their everyday experiences of using PR rather than evidence-based (**Hantikainen & Kappeli, 2000**).

Sujata and Kaur (2015) found that, in India, 43.3% of patients were restrained without written consent and all without written doctors' orders. These unacceptable practices might expose nurses to legal/ethical problems with families and hospitals. Although there is no policy in Jordan for obtaining family consent, nurses are still obliged to explain to the family the rationale for the patient being restrained. As we can argue that the lack of knowledge among nurses is due to the absence of in-service training and the lack of clearly written policies and procedures regarding PR in the different hospitals in different hospitals. (**Nasrate, et al., 2017; Suleiman et al., 2018; Taha and Ali, 2013**).

This study demonstrates a significantly difference in nurses' pre- and post-implementation knowledge of physical restraint towards adult and geriatric patients ($p < 0.000$). This significant difference in the mean of nurses' knowledge would be negatively impacted to these adult and elderly patients. Furthermore, it might result in patient difficulties that put the nurse giving the care in legal problem. The results are consistent with research conducted by **Mamun and Lim (2005)** to evaluate Singaporean nurses' knowledge of physical restraints.

In light of the aforementioned, this was observed in every knowledge level that was put to the test. The nursing care given to these patients would be negatively impacted by this lack of knowledge. Furthermore, it might lead to patient adverse effects it might cause the nurse giving the care to run into legal issues.

Enhancing the quality of patient care for adults and older adults is thought to start with nursing staff enforcement of the knowledge base about the use of restraints. Concerning knowledge scores of knowledges in the pre-test, post-test, and follow-up tests regarding physical restraining the result revealed statistically significant differences among study subject knowledge in the pre-test, post-test, and follow-up test regarding physical restraining. Studies carried out in India by **Gandhi et al. (2018)** and **Balci et al. (2018)** reported the same outcome. Conversely, additional research by **Orhan & Yakut (2012) & Hakverdioglu et al. (2006)** showed that nurses' knowledge of the application of physical restraints was insufficient.

From the researcher's insight, the training increases understanding of and enhances the application of physical restraints. This training should include a variety of approaches, such as senior nurses discussing their experiences with physical restraint and leading discussions on pertinent cases.

Also, the findings of the present investigation also revealed a significant positive correlation between the age of the nurses and knowledge in pre-test, post-test, and follow-up this indicates that the intervention program was beneficial to all nurses regardless of their age or experience. Our findings are in agreement with **Azab, and Abu Negm (2013)** who found that

there were no significant differences in knowledge scores between nurses with a diploma in nursing and those with higher qualifications.

According to the current study, there is a substantial difference in the mean of nurses' knowledge regarding physical restraint before and after care standards are implemented in all care standard stages. **Al-Khaled et al, (2011)** revealed that there was a moderate level of knowledge and practice among nurses regarding physical restraints. The absence of written policies and procedures governing physical restraints, insufficient supervision, and a lack of training for nurses on physical restraints, particularly in technical nursing institutes and secondary nursing schools, could be the cause of this. It was also discovered that nurses with greater qualifications practice better than others. Thus, rather of just being related to their educational background, the low level of knowledge among the nurses in this study may also be the cause of their subpar practice.

Nurses' knowledge formulates their practice level in a critical care setting. *The researchers suggest that*, if the knowledge gap is closed, nurses will have a high level of practice that will enable them to improve the performance of physical restraint standards.

According to the present study findings, there were the mean scores of the practice of nurses in intensive care units between groups pre-test, post-test and follow-up test were no statistically significant difference between total practice score with p-value. These findings were in agreement with. This finding is in line with (**Nasrate et al., 2017; Suliman et al., 2017**) who reported a few nurses in Jordan had received previous in-service education or training regarding PR use.

The findings of the existing study represented a highly significant difference between nurses' practice in relation to age, Nursing qualification, and Years of experience in the ICU there was a non-significant difference between considering themselves as having enough knowledge and awareness of physical restraint policies in hospitals in pretest and follow up for physical restrain care standers. This is in agreement with a study conducted by **Azab & Abu Negm (2013)** who found significant positive correlations between nurses' practice scores and knowledge scores concerning the usage of physical restraints.

These differences may be due to different populations, settings, and socio-demographic data. On the opposite side **Terpstra, et al., (1998)** found that a statistically significant negative correlation was found between years of nursing experience and knowledge score.

In addition, the present study found a significant demonstrated correlation between nurses' knowledge scores and practice scores in pre-test, post-test, and follow-up tests. Between nurses' knowledge and practice ratings, there was a statistically significant positive correlation. **Elsatar, A., and El-latief, O. M. A. (2015)** provided similar results. who found that there was a positive correlation between the knowledge level score and the practice of physical restraints score.

It was noticed from the results of the current study found that adult and geriatric patients' ages ranged between 30 and 75 years old and most of them were male, of them, barely one-third had completed secondary education, and over half were married. The results of **Al-Khaled, Zahran, and El Soussi (2011)** support this conclusion. They discovered that the majority of the patients under restraint were in the 45–70 age range. This may be because aging is causing agitation and putting the patients at risk of pulling the life support devices and catheters. Data analysis revealed that the patient in restraint was not functioning and was being treated in neurological care units. This could be the case due to the possibility of traumatic brain injury in elderly and severely ill patients who have experienced many traumas. Agitation is the most common behavioral issue in these patients, and physical restrictions are sometimes necessary to manage it.

The results of the current study also revealed significant improvements in the total complications of physical restraining after the study intervention. And this improvement was noticed in all types of direct, indirect, potential, and psychological complications. Among the most notable of these improvements in potential complications, were significant improvements in constipation, orthostatic hypotension, skin laceration, restricted circulation, and limb edema, In the direct complications were nerve injury and ischemia significantly improved, also in the indirect complication of bed sores, failure to be discharged home acquired infection showed

significant improvement. Similar problems were reported by Mamun et al. (2005), and Bassi and Ceresola (2011) with emphasis on skin lacerations, incontinence of urine and stool, fecal impaction, decreased functional status, limb edema, and psychological problems. Also, the findings are in agreement with Maccioli et al. (2003) who demonstrated that such nursing care procedures led to significant improvements in physically restrained patients.

It is clear from discussing the result of this study that, accurate and adequate knowledge is an essential facet of any attempt to critical care nurses. Improve knowledge, practice, and outcomes among critically ill adult and elderly patients. This improvement is required in the care of adult and geriatric patients in a timely fashion to meet regulatory requirements and possible improvement in care in critical care settings.

Conclusions:

The application of the physical restraint care standards in ICUs is significantly enhance knowledge and performance of the critical care nurses. also, is related to decrease PR complication that reflected to patient outcome among adult and older adult.

Recommendations:

ICU periodic training service on advanced and new trend nursing care standards based on best practice guidelines for critical care nurses is crucial to improve nurses' performance, knowledge, and patient outcome among PR adult and older adult critically ill patient.

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