

## Nurses' related factors influencing the use of physical restraint in critical care units

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**Abstract:** Although physical restraints are used commonly to maintain the safety of critically ill patient, the use of physical restraints is associated with many adverse effects. Therefore, several attempts have been made to identify and control factors affecting restraint utilization in critical care units (CCUs). This study aims to identify nurses' related factors influencing the use of physical restraints in CCUs. This study was conducted in three of the CCUs of Alexandria Main University Hospital. Fifty critical care nurses, working in the above mentioned settings, who apply physical restraints, were recruited sequentially in this study. Fifty patients who were restrained and assigned to the observed nurses were included in this study. Patients who were restrained for a period of less than two hours were excluded. Two tools were used to collect the required data; nurses' restraint performance checklist, and nurses' related factors influencing the use of physical restraint questionnaire. It can be concluded from this study that older nurses and those with higher qualification and years of experience have better restraint related performance than others. Nurses' knowledge and performance are in need for improvement. Therefore, it is recommended to conduct in-service training programs for nurses working in CCUs on restraint utilization and restraint alternatives. The hospital should develop evidence based guideline on physical restraining to be available for all nurses and physicians in order to follow.

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### 1. Introduction:

Critically ill patients are characterized by the presence of actual and/or potential life-threatening health problems, requiring continuous observation, intervention and an extraordinary dependence on the health care providers and possibly technology<sup>(1-3)</sup>. Maintaining an optimal level of patient's comfort and safety while providing monitoring and treatment to critically ill is essential<sup>(4)</sup>. Agitation is a major problem for critically ill patients in intensive care units (ICUs). Agitation is not a diagnosis but, rather, a symptom of many diseases and disorders. It might result from pain, adverse effects of medications or fluid and electrolyte imbalance, environmental or psychosocial stressors, or psychiatric syndromes. Physical restraints have been used to ensure the safety of agitated patients through preventing their interference with their treatment, limiting physical hyperactivity, facilitating necessary care, and avoiding harming themselves or others. However, the use of physical restraints is a controversial issue and may present nurses with practical, legal, and ethical dilemmas<sup>(5)</sup>.

In relation to the practical dilemmas driven from the restraint use, two broad categories of restraints related injuries are reported in a number of studies; direct and indirect injuries. Direct injuries

involve physical injuries caused by external pressure from the restraining device, including; lacerations, bruising, and/or strangulation. On the other side, indirect injuries include adverse outcomes related to the enforced immobility of a person, and included increased mortality rate, development of pressure sores, falls, or failure to be discharged home<sup>(2,6,7)</sup>. Regarding ethical and legal dilemmas related to restraints' use, critical care nurses are usually faced by these types of dilemmas when restraining a patient unless there is an appropriate and adequate clinical justification and that prior alternative interventions have been tried and deemed unsuccessful. A number of researchers indicated that it is unacceptable and unethical to use restraints because of low staffing levels or to control disruptive patient's behaviours and they indicated that if nurses are caring enough to decide what is best for their patients, they should take into account the needs and desires of patients, and consequently the patient's autonomy<sup>(8,9)</sup>.

Given the evidence of practical, legal, and ethical dilemmas associated with the restraint use, critical care nurses continue to use physical restraints in ICUs. Studies have shown that decisions to use physical restraints and their application are affected by a number of factors such as; nurses' number,

qualification, experience, and knowledge regarding restraint use<sup>(5)</sup>.

In order to understand why nurses choose to use physical restraints, and what are the most common malpractices associated with their use, nurses' related factors influencing their decision to initiate a restrain and their practices while applying or maintaining physical restraining have to be examined. Once factors and malpractices are identified, strategies can be made toward finding safe alternative choices for restraining and corrective measures for malpractices, which are more consistent with professional practice and quality care. Thus, this study was conducted to identify nurses' related factors influencing the use of physical restraints in CCUs.

## 2. Material and Methods

**Research design:** descriptive study design.

**Study aim:** Identify nurses' related factors influencing the use of physical restraints in CCUs

**Research questions:** What are nurses' related factors influencing the use of physical restraints in CCUs?

### Materials

#### Setting:

This study was conducted in three of the CCUs of Alexandria Main University Hospital, namely; the Casualty Intensive Care Unit (Unit I), the General Intensive Care Unit (Unit III), and the Recovery Care Unit.

#### Subjects:

Fifty critical care nurses, working in the above mentioned settings, who apply physical restraints, were recruited sequentially in this study. Intern nurses were excluded from the study sample. Fifty patients who were restrained and assigned to the observed nurses were included in this study. Patients who were restrained for a period less than two hours were excluded.

#### Tools:

Two tools were used to collect the required data; nurses' restraint performance checklist, and nurses' related factors influencing the use of physical restraint questionnaire

#### Tool (I): Nurses' restraint performance observational checklist:

This tool was adapted from **Potter et al.**<sup>(10)</sup>. It is used to assess nursing performance while applying and providing maintenance care of physical restraint. It consists of three parts. Part "1" includes type of the ICU, the shift (morning, evening or night) when the observation was taken, and nurse to patient ratio. Part "2" involves restrained patients' related characteristics, such as; age, medical diagnosis, and past history. Part "3" was used to observe nurses' practices while applying and maintaining the physical

restraint. It contains five main sections covering the main steps of restraint use and care; assessment, preparation, application, post care and maintenance, and documentation. First section is for assessment, which involves items to be assessed before the application of a physical restraint, such as; indication of applying restraint, physician's order, and the site of restraint. Second section is concerned with the preparation for restraining which involves; preparation of equipment, patient, and environment. Third section is for the application of the physical restraint including practices such as; padding bony prominences, and securing the restraint accurately. Section four involves post care practices such as; washing hands, and performing regular care while the restraint is maintained. Finally, section five is for documentation, which includes items such as; documentation of the type, location, time, indications, and unexpected outcomes for restraining.

The total score for this observational performance checklist is 30 points, in which; each practice performed completely and accurately is graded as one point. Incorrect, incomplete or not done practice is graded as zero. The maximum possible score for the physical restraint check list is 30. The cut point for "Good" is greater than 80% of total scores, "Moderate" is between 60% to 80% of total scores and "Poor" is less than 60% of total scores.

#### Tool (II): Nurses' related factors influencing the use of physical restraint questionnaire:

It was developed by the researchers after reviewing the related literature<sup>(1-4,10)</sup> and is used to identify nurses' related factors influencing the use of physical restraints in CCUs. It includes four parts. Part 1 is for nurses' characteristics, such as; age, length of clinical experience, qualification, and level of education. Part 2 assesses nurses' knowledge regarding physical restraint in general, such as; indications for application and removal of restraint, and complications of physical restraining. Part 3 assess nurses' knowledge concerning physical restraining related practices; including; knowledge regarding assessment, preparation, application, post care and maintenance, and documentation of restraining. Eventually, part 4 assesses nurses' knowledge regarding legal and ethical factors related to the use of physical restraint.

For parts 2-4, the answer for each question is scored by the same method, as in tool I. The correct response is scored as "1" and incorrect response or do not know as "0". The maximum possible score for the questionnaire was 45. Also, the cut point for "Good" is greater than 80% of total scores, "Moderate" is between 60% to 80% of total scores, and "Poor" is less than 60% of total scores.

**Methods:**

Permission was obtained from the hospital administrative authority to collect the necessary data. Validation of the study tools was assessed by presenting them to five experts from the critical care nursing field. A pilot study was carried out on 5 nurses and their assigned patients who were restrained by those nurses to evaluate the clarity and applicability of the study tools. They were excluded from the total sample, and the necessary modifications were done.

The Kuder-Richardson reliability coefficient of the questionnaire was 0.63 for all items. An informed consent was obtained from each nurse included in the study. The anonymity and confidentiality of responses, voluntary participation and right to refuse to participate in the study were emphasized. The researcher explained to the nurses the objectives of the study orally, additionally to the written explanations on the covering letter of the questionnaire.

Data collection: Data was collected over the period from 15/1/2009 to 30/4/ 2009. Nurses' restraint performance observational checklist (tool I) was used

**3. Results:**

Table (1): presents personal characteristics of the studied nurses. It is found that 58.0% of the nurses have a bachelor degree, 22.0% are graduated from the technical nursing institute, and only 20.0% are graduated from the secondary nursing school. As for nurses' years of experience at the CCUs, about two thirds of the nurses (66.0 %) have an experience of less than 5 years. Regarding nurses age, it is found that 26.0% are aged below 20 years, and 56.0% are between 20-29 years.

**Table 1: Personal characteristics of the studied nurses at the critical care units:**

Characteristics	Nurses (n=50)	
	No.	%
<b>Nurses' qualification</b>		
B.Sc. Nurses	29	58.0
Technical Institute of Nursing	11	22.0
Diploma secondary nursing School	10	20.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
<b>Years of experience at the CCUs</b>		
< 5 years of experience	33	66.0
5 – 10 years of experience	10	20.0
10 + years of experience	7	14.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
Mean ± S.D.	4.16±3.803	
Minimum	1	
Maximum	15	
<b>Age (Years)</b>		
< 20	13	26.0
20-29	28	56.0
30-39	9	18.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

to assess the performance of each nurse while applying physical restraint and providing its maintenance care. The researchers observed each nurse during applying physical restraints over different three shifts. Nurses' related factors influencing the use of physical restraint questionnaire (Tool II) was distributed to the nurses, who applied physical restraints and providing their maintenance care to identify nurses' related factors affecting the utilization of physical restraint. Nurses were asked to answer the questionnaire and to bring it back to the researchers (at the end of the shift). The questionnaire completion time was about 15 minutes.

Statistical Analysis: Statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 13.0. Results were illustrated in cross tabulation. Descriptive statistics (frequencies, percentages, means and standard deviations) were used to describe the study sample. F test was used to compare means of groups within the same sample. Pearson correlation coefficient was used to assess association between nurses' performance and their knowledge. Statistical significance was set at p value <0.05.

**Table (2):** Shows characteristics of the restrained patients. It is found that patients' ages are ranged between 15 and 85 years old; most of them are more than 45 years old (86%), with a mean of  $59.24 \pm 16.400$  years. The study includes 35 males (70%) and 15 females (30%) patients. Regarding the medical diagnosis, 21 (42%) patients has respiratory disorders and 14(28%) had Neurological disorders.

**Table 2: Characteristics of the restrained patients**

Characteristics	Restrained patients (n=50)	
	No.	%
<b>Age (Years)</b>		
15-44	7	14.0
45-75	32	64.0
>75	11	22.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
Mean age (Years) $\pm$ S.D.	59.24 $\pm$ 16.400	
Minimum	16 years	
Maximum	85 years	
<b>Gender</b>		
Male	35	70.0
Female	15	30.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
<b>Diagnosis</b>		
Trauma	3	6.0
Metabolic disorder	2	4.0
Endocrine disorder	2	4.0
Renal disorder	2	4.0
Cardiac disorder	6	12.0
Respiratory disorder	21	42.0
Neurological disorder	14	28.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

Table (3) displays distribution of the restrained patients according to time shifts, and nurses to patients' ratio. It demonstrates that 13 patients (26%) are restrained in the morning shift, 18 (36%) in the evening shift, while 19 (38%) of them were restrained in the night shift. In relation to the nurse: patient ratio, it is found that 13 (26%) of the patients are restrained when nurse patient ratio is one to one,

and percentage of all restrained patient in the unit is 20%, 35(70%) were restrained when nurse patient ratio was one to two, and percentage of all restrained patient is 32%, 2(4%) of them are restrained when nurse patient ratio is one to three, and percentage of all restrained patient was 50%. This means that the percentage of restrained patient increases with increasing nurse to patient ratio.

**Table3: Distribution of the restrained patients according to time shifts, and nursing staff to their ratio.**

Characteristics	Restrained patients included in the study n = 50		Percentage of all restrained patient in the unit
	No.	%	
<b>Shift</b>			
Morning	13	26.0	
Evening	18	36.0	
Night	19	38.0	
<b>Total</b>	<b>50</b>	<b>100.0</b>	
<b>Nurse to patient ratio</b>			
One nurse to one patient	13	26.0	20%
One nurse to two patients	35	70.0	32%
One nurse to three patients	2	4.0	50%
<b>Total</b>	<b>50</b>	<b>100.0</b>	

Table (4) represents nurses' performance and knowledge regarding physical restraints. Regarding nurses performance, it is found that 45 (90%) nurses have moderate performance, 3 (6%) have good performance, and 2

(4%) of them have poor performance. Concerning their knowledge, it is found that 32 (64%) of nurses had moderate knowledge, 14 (28%) has poor knowledge, while, only 4 (8%) of them had good knowledge.

**Table 4: Nurses' performance and knowledge regarding physical restraints:**

Rating	Frequency (n=50)	%
<b>Performance</b>		
Poor	2	4.0
Moderate	45	90.0
Good	3	6.0
<b>Total</b>	<b>50</b>	<b>100.0</b>
<b>Knowledge</b>		
Poor	14	28.0
Moderate	32	64.0
Good	4	8.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

Table (5) shows the relationship between nurses' restraint related performance and their qualification. It presents that there are statistical significant relationships between all phases of nurses' performance, except for the preparation phase, and with the exclusion of the documentation because none of nurses document anything. It was found that increasing the performance score is associated with

higher nurses' qualification related to restraining. p values for the assessment, procedure, post care phases of performance are 0.005, 0.038, and 0.001, respectively. Also, there is a statistical significant relationship between total performance score and qualification, where ( $F = 10.669$ ,  $p = 0.000$ ), in which mean performance scores seem better with higher qualifications

**Table 5: The relationship between nurses' restraint related performance and their qualification**

Physical restraint practices	Critical care units			Performance score (Mean $\pm$ SD)	F test
	Nurses' qualification	No. & %			
		No.	%		
Assessment	B.Sc. Nurses	29	58.0	4.00 $\pm$ 0.000	F = 5.866, p = 0.005*
	Technical Institute of Nursing	11	22.0	4.00 $\pm$ 0.000	
	Diploma (Secondary nursing School)	10	20.0	3.64 $\pm$ 0.674	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>3.92<math>\pm</math>0.340</b>	
Preparation	B.Sc. Nurses	29	58.0	2.50 $\pm$ 0.527	F = 0.018, p = 0.982
	Technical Institute of Nursing	11	22.0	2.48 $\pm$ 0.574	
	Diploma (Secondary nursing School)	10	20.0	2.45 $\pm$ 0.522	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>2.48<math>\pm</math>0.544</b>	
Procedure	B.Sc. Nurses	29	58.0	5.00 $\pm$ 0.00	F = 3.523, p = 0.038*
	Technical Institute of nursing	11	22.0	4.90 $\pm$ 0.310	
	Diploma (Secondary nursing School)	10	20.0	4.64 $\pm$ 0.505	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>4.86<math>\pm</math>0.351</b>	
Post care	B.Sc. Nurses	29	58.0	9.70 $\pm$ 1.059	F = 8.499, p = .0001*
	Technical Institute of Nursing	11	22.0	7.64 $\pm$ 2.920	
	Diploma (Secondary nursing School)	10	20.0	9.62 $\pm$ 1.083	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>9.20<math>\pm</math>1.629</b>	
Documentation	B.Sc. Nurses	29	58.0	0.00 $\pm$ 0.000	-
	Technical Institute of Nursing	11	22.0	0.00 $\pm$ 0.000	
	Diploma (Secondary nursing) School)	10	20.0	0.00 $\pm$ 0.000	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>0.00<math>\pm</math>0.000</b>	
<b>Total</b>	B.Sc. Nurses	29	58.0	21.70 $\pm$ 1.567	F = 10.669, p = 0.000*
	Technical Institute of Nursing	11	22.0	21.48 $\pm$ 1.526	
	Diploma (Secondary nursing School)	10	20.0	18.55 $\pm$ 2.876	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>20.88<math>\pm</math>2.246</b>	

F: Fisher's Exact Test

\*p value <0.05.

Table (6): The relationship between nurses' restraint related performance and their years of experience. Regarding total score there is statistically significant relationship between nurse's performance and their years of experience, in which increasing years of experience is associated with an improvement with nurses performance, where ( $F = 4.045$ ,  $p = 0.024$ ).

Table (7): shows the relationship between nurses' restraint related performance and their age. Regarding total score of performance, there is statistically significant relationship between nurse's performance and their age, in which increasing age is associated with an improvement in nursing performance, ( $F = 5.246$ ,  $p = 0.009$ ).

Table (8): demonstrates Nurses' knowledge concerning restraining performance and their observed performance score. Regarding the assessment of physical restraints, it is found that, 50 nurses (100%) know how to assess the need for restraint and they do it. In relation to checking physician's order, no one 0 (0.00%) perform, 29 (58%) recognize that they have to do. Regarding the

procedure, most of nurses 49(98%) who apply restraint, 36(72%) of them know how to apply restraints. For making sure it is not over an IV line or other device 49(98%) performed, 11(22%) know. Regarding attaching the restraint to bed frame, not side rails, all of them 50(100%) perform, 36(72%) know. According to Secure restraints with a quick release site 48(96%) performed, while 12(24%) know.

Regarding post care, assessment of proper placement of restraint and condition of patient's restrained body part at least every 30m minutes, only 33(66%) performed, although 40(80%) of them were know. Remove restraints for 30 minutes every 2 hours, 34(68%) performed, and 9(18%) of them know. In relation to documentation all of them 50(100%) do not perform, 44(88%) but they know.

Table (9): shows nurses' knowledge score concerning restraining performance and their observed performance score. There is no statistical significant relationship is found ( $r = 0.227$ ,  $p = 0.112$ ), in which the mean of the performance score =  $6.56 \pm 1.013$ , and for knowledge score =  $8.86 \pm 2.222$ .

**Table 6: The relationship between nurses' restraint related performance and their years of experience**

Physical restraint practices	Critical care units			Performance score (Mean $\pm$ SD)	F test
	Nurses' experience	No.&%			
		No.	%		
Assessment	< 5 years of experience	35	70.0	3.89 $\pm$ 0.404	F = 0.581, p = 0.563
	5 – 10 years of experience	10	20.0	4.00 $\pm$ 0.000	
	10 + years of experience	5	10.0	4.00 $\pm$ 0.00	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>3.92<math>\pm</math>0.340</b>	
Preparation	< 5 years of experience	35	70.0	2.43 $\pm$ 0.558	F = 0.512, p = 0.603
	5 – 10 years of experience	10	20.0	2.60 $\pm$ 0.516	
	10 + years of experience	5	10.0	2.60 $\pm$ 0.548	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>2.48<math>\pm</math>0.544</b>	
Procedure	< 5 years of experience	35	70.0	4.83 $\pm$ 0.382	F = 0.595, p = 0.556
	5 – 10 years of experience	10	20.0	4.90 $\pm$ 0.316	
	10 + years of experience	5	10.0	5.00 $\pm$ 0.000	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>4.86<math>\pm</math>0.350</b>	
Post care	< 5 years of experience	35	70.0	8.91 $\pm$ 1.738	F = 2.034, p = 0.142
	5 – 10 years of experience	10	20.0	9.70 $\pm$ 1.160	
	10 + years of experience	5	10.0	10.20 $\pm$ 1.095	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>9.20<math>\pm</math>1.629</b>	
Documentation	< 5 years of experience	35	70.0	0.00 $\pm$ 0.000	-
	5 – 10 years of experience	10	20.0	0.00 $\pm$ 0.000	
	10 + years of experience	5	10.0	0.00 $\pm$ 0.000	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>0.00<math>\pm</math>0.000</b>	
<b>Total</b>	< 5 years of experience	35	70.0	20.14 $\pm$ 2.522	F = 4.045, p = 0.024*
	5 – 10 years of experience	10	20.0	21.70 $\pm$ 1.494	
	10 + years of experience	5	10.0	22.80 $\pm$ 1.789	
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>20.72<math>\pm</math>2.441</b>	

F: Fisher's Exact Test

\*p value <0.05.

**Table 7: The relationship between nurses' restraint related performance and their age.**

Physical practices	restraint	Critical care units		Performance score (Mean ± SD)	F test	
		Nurses' age (Years)	No.&%			
			No.			%
Assessment	< 20	13	26.0	3.69±0.630	F = 4.488, p = 0.016*	
	20-29	28	56.0	4.00±0.000		
	30-39	9	18.0	4.00±0.000		
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>3.92±0.340</b>		
Preparation	< 20	13	26.0	2.46±0.519	F = 0.44, p = 0.957	
	20-29	28	56.0	2.50±0.577		
	30-39	9	18.0	2.44±0.527		
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>2.48±0.544</b>		
Procedure	< 20	13	26.0	4.69±0.480	F = 2.468, p = 0.096	
	20-29	28	56.0	4.89±0.315		
	30-39	9	18.0	5.00±0.000		
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>4.86±0.350</b>		
Post care	< 20	13	26.0	8.00±2.309	F = 5.759, p = 0.006*	
	20-29	28	56.0	9.57±1.136		
	30-39	9	18.0	9.78±0.833		
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>9.20±1.629</b>		
Documentation	< 20	13	26.0	0.00±0.000	-	
	20-29	28	56.0	0.00±0.000		
	30-39	9	18.0	0.00±0.000		
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>0.00±0.000</b>		
<b>Total</b>	< 20	13	26.0	19.08±3.040	F = 5.246, p = 0.009*	
	20-29	28	56.0	21.07±2.071		
	30-39	9	18.0	22.00±1.225		
	<b>Total</b>	<b>50</b>	<b>100.0</b>	<b>20.72±2.441</b>		

F: Fisher's Exact Test

\*p value &lt;0.05.

**Table 8: Nurses' knowledge concerning restraining performance and their observed performance score.**

Selected nurses' practice	Nurses who performed n=50		Nurses who Knew n=50	
	No.	%	No.	%
<b>Assessment of physical restraints</b>				
• Assess the need for restraints.	50	100.0	50	100.0
• Check physician's order	0	0.0	29	58.0
<b>Procedure</b>				
• Apply restraint	49	98.0	36	72.0
• Making sure it is not over an IV line or other device	48	96.0	11	22.0
• Attach restraints to bed frame , not side rails	50	100.0	36	72.0
• Secure restraints with a quick release site	48	96.0	12	24.0
<b>Post Care</b>				
• Assess proper placement of restraint and condition of patient's restrained body part at least every 30m minutes	33	66.0	40	80.0
• Remove restraints for 30 minutes every 2 hours.	34	68.0	9	18.0
<b>Documentation</b>				
• Type and location of restraint.	0	0.0	44	88.0
• Time and reason for application.	0	0.0	44	88.0
• Condition of the skin under the restraint	0	0.0	44	88.0
• Need for continued use.	0	0.0	44	88.0
• Causes of removal restraint.	0	0.0	44	88.0

**Table (9): Nurses' knowledge score concerning restraining performance and their observed performance score**

Scores	Median	Mode	Range	Mean $\pm$ SD	Pearson correlation coefficient (r)
Performance scores	7.00	7	3	6.56 $\pm$ 1.013	r = 0.227, p = 0.112
Knowledge scores	9.00	10	10	8.86 $\pm$ 2.222	

r: correlation coefficient \*p value <0.05.

#### 4. Discussion:

Although physical restraint is used as a safety measure to prevent patients' fall, its use is usually associated with many adverse effects<sup>(11,12)</sup>. In addition, it raises many ethical and practical concerns. Therefore, several attempts have been made to reduce the number of restraints in clinical practice and encourage the use of their alternatives. One of these attempts is to control factors affecting nurses' use of physical restraints<sup>(13,14)</sup>. Therefore, this study was conducted to identify nurses' related factors influencing the use of physical restraints in CCUs.

Although the focus of this study is on nurses' related factors influencing restraint utilization, study findings shows that there are other factors related to patients' characteristics influence restraint utilization. Regarding *patients' characteristics*, it was found that most of the restrained patients were aged between 45-75 years old, and the mean age was 59 years old. This finding is supported by **Martin**<sup>(15)</sup> who found that advanced *age* is strongly associated with the use of physical restraints. This may be because aging is one of the main factors causing patients' agitation and consequently putting them into the risk of pulling the life support devices and catheters or harming themselves and others<sup>(16)</sup>.

For the *medical diagnosis*, this study showed that about half of the restrained patient had respiratory disorders. This may be because critically ill patients with respiratory disorders are always in need for monitoring and supportive respiratory devices and/or tubes. Monitoring and supportive respiratory devices and tubes may range from simple devices, such as; simple masks to the more sophisticated devices, including; mechanical ventilators which most commonly need intubation, nebulizers, or arterial catheters. Therefore, the main reason for restraining these patients may be maintaining and preventing the removal of supportive respiratory devices. This was also the case in other studies conducted in ICUs which found that the most common reason for restraint application reported by nurses was to prevent the critically ill patient from removing medical monitoring or supportive devices<sup>(17,18)</sup>.

The current study shows also that about third of the restrained patients had neurological

disorders. This may be attributed to the altered level of consciousness and/or the abnormal behaviours associated with their neurological disorders. In this case, without restraining these patients, they will be more susceptible to harming themselves or others and/or pulling out any monitoring or supportive devices or catheters. These findings are supported by **Emerson**<sup>(19)</sup> study which indicated that over half of restrained patients had challenging behaviours and intellectual disabilities; consequently, they were more exposed to the application of restraint.

Regarding *nurses' characteristics*, this section will present a description of the nurses' characteristics working as factors affecting restraining including; nurses' age, years of experience, qualification, staff level (nurse: patient ratio), and nurses' knowledge. In relation to the *staff level* (nurse: patient ratio), results of this study reveal that the number of restrained patients increased with the decrease in the number of nurses, and this usually occurs in the evening and night shifts more than the morning shift. This may be interpreted as there is a shortage of nursing staff in the evening and night shifts which increase nurses' work overload, consequently advance them to use restraint. The present study finding is in line with **Engberg et al. and Martin**, studies<sup>(15,20)</sup>. They indicated that the restraint initiation may be much higher at night, when staffing levels are lower. They indicated that staffing patterns have been cited as a factor that may influence the use of physical restraint. This result is supported also by **Magee et al.**<sup>(21)</sup> study which found that the restraint use is inversely proportional to the number of the nursing staff. However, they found that fewer restraints were used on Sundays when there was fewer staff on duty. They postulated their findings that more restraints were used during Sundays and some day shifts because more staff was available to get patients out of bed and so, these patients were then restrained in chairs.

In relation to *nurses' qualification*, the present study found that nurses' performance in applying and maintaining restraining increases with the increase in nurses' qualification. This can be explained by the fact that B.Sc. nurses received some training on restraining while they were

undergraduates as a procedure included in the nursing fundamental course. Nurses graduated from the technical institute of nursing received also training on restraining, although it is brief. While, nurses graduated from the secondary nursing school did not receive any classes or clinical training on physical restraining. In relation to *nurses' experience*, it was found that there is a significant relationship between nurses' performance and nurses' experience. This study showed that nurses with a higher experience are performing the procedure of restraining better than others. These findings are congruent with **Gillis**,<sup>(22)</sup> who argued that day to day activities enhance nurses' experience and improve their performance while applying and maintaining restraining.

The present study revealed there was a significant relationship between nurse's performance and their *ages*, in which, it was found that the level of performance of nurses concerning physical restraints increased with older nurses. These findings are generally in line with **McMillan's** study<sup>(23)</sup> which concluded that professionals mature age-wise nurses who have experience tend to make a better adjustment when compared with younger peers.

The present study demonstrated that *nurses' general knowledge* regarding the practices of applying and maintaining physical restraining as well as their performance were moderate. This could be explained by the lack of training for nurses on physical restraining, the lack of written policies and procedures in ICUs guiding physical restraining and inadequate supervision and guidance by the nurse supervisors. These results are supported by **Karlsson**,<sup>(24)</sup> who indicated that the nursing staff knowledge and attitude regarding the use of physical restraints were strongly associated with their use in practice.

In addition, nurses' performance and knowledge specifically, concerning this performance score are generally moderate and inadequate. It is clear that such low standard of performance in physical restraints practice, is due to a combination of factors, some are related to the hospital and its system, patients and the others are related to nurses themselves. For example, there is no physician order; the nurse can follow which is one of the important legal aspects. This finding may be attributed to lack of cooperation between nurse and physician or lack of physicians' knowledge regarding their role in participating in the decision of restraining a patient. In addition, nurses do not take the patient's consent to apply physical restraint. Also there was no explanation for the patient when applying physical restraints. What is obvious as well was that the absence of any nursing documentations related to

restraining. This may be attributed to their belief that restraining procedure is not ethically accepted, so, they do not document any data related to this procedure. Moreover, they may not consider restraining as an important procedure that requires documentation. Current study is in line with a **Korean** study which showed that nurse's records in a patient's chart rarely mentioned the restraint use<sup>(25)</sup>.

#### 5. Conclusion and recommendations:

In conclusion, this study reveals that there are a number of factors affecting restraint utilization in CCUs. Factors related to restrained patients include, age, and diagnosis. Elderly patients and patients with respiratory or neurological disorders usually need restraints more than others. In relation to nurses' related characteristics, it can be concluded that those older nurses and those with higher qualification and years of experience have better performance than others. Nurses' knowledge and performance are in need for improvement. Therefore, it is recommended to conduct in-service training programs for nurses working in CCUs on restraint use and its alternatives. The hospital should develop evidence based guideline on physical restraining to be available for all nurses and physicians in order to follow. Further studies have to be conducted identifying other factors that may influence restraint utilization. In addition, Identifying, developing, and testing alternatives to physical restraining is recommended to be the focus of future studies.

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