

Use of Physical Restraint in Intensive Care Units (ICUs) at Ain Shams University Hospitals, Cairo

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Abstract: There is still great controversy about the potential benefits, side effects and ethical issues associated with physical restraint (PR) use in critical care settings. Nurses' views and attitudes toward the use of PR in controlling patients' behavior and ensuring patient safety may create conflicts with patients' rights, including their autonomy in making decisions for their own care. **This study aimed to** assess ICU nurses' knowledge, attitude and practice regarding use of PR in the ICU settings at Ain Shams University Hospitals and factors influencing it. **Method:** A convenience sample of 131 nurses working in ICU settings in Ain Shams University Hospitals was selected for this study. A self administered structured questionnaire was used to determine ICU nurses' knowledge, attitude and practice regarding use of PR and factors influencing it. **Results:** The respondents in this study were 110 nurses. Their total scores ranged from 6 to 14 (median: 10) for knowledge, 17 to 30 (median: 23) for attitude and 18 to 39 (median: 28) for practice regarding use of PR. There was significant positive correlation between respondent nurses' practice score and both of knowledge and attitude scores. Frequency of use of PR by the respondent nurses showed positive correlation with both of patient/nurse ratio and period of experience in ICU while there was negative correlation between it and educational background of the participant nurses. **Conclusions:** Practice of the participant nurses regarding use of physical restraint is related to their knowledge and attitude towards it. Also, use of PR was found to be affected by patient/nurse ratio as well as nurses' qualifications and duration of clinical experience. **Recommendations:** Development of local policies for PR use and periodic in service – training of ICU nurses on best practice guidelines are essential to improve nurses' practice regarding use of PR.

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1. Introduction

Physical restraint (PR) refers to any physical method of restricting a person's freedom of movement, physical activity or normal access to his or her body. In hospitals, physical restraints were used primarily to prevent falls and stop confused patients from wandering and harming themselves (Martin, 2002).

Preventing and protecting the patient from harm are central nursing responsibilities for individuals who are temporarily incapacitated. Jacobi *et al.* (2002) suggested that 80% of intensive care unit (ICU) patients may experience some degree of agitation during their stay. The use of physical and chemical restraint may be seen as a simple solution to this problem (Reigle, 1996), but the use of chemical restraint is associated with the risk of sedation-related psychosis (Nirmalan *et al.*, 2004). Therefore, in this environment, the use of physical restraint (PR) is generally seen as a mean of protection and to prevent interference in treatment (Sullivan-Marx & Strumpf, 1996; Happ, 2000).

Although often considered an acceptable standard of practice, the use of physical restraints is associated

with physical, psychological, ethical and legal problems (Martin & Mathisen, 2005).

There are reports of the adverse effects of PR, which can culminate in death (Miles and Irvine, 1992; Ruben *et al.*, 1993; Parker and Miles, 1997). The Food and Drug Administration (FDA) estimated that at least 100 deaths occurred annually from improper use of restraints (Milliken, 1998). Previous studies have evidenced adverse effects of PR as: skin trauma, pressure sores, muscular atrophy, nosocomial infection, constipation, incontinence, limb injury, contractures, depression, anger, a decline in functional and cognitive state and increasing agitation (Evans *et al.*, 2002a; Royal College of Nursing, 2004). Also, it was reported that use of PR resulted in negative effects on patients and their families, with patients feeling disgraced and embarrassed in remembering the experience (Bray *et al.*, 2004). This is due to negative feelings towards it, such as feeling of confinement, loss of dignity and identity, aggression, social isolation and anxiety. On the other hand, nursing staff may have feelings of guilt and frustration when they have to restrain patients (Gastmans and Milisen, 2006).

Ethical concerns are related to patients' right to autonomy and dignity, whereas the right to a safe working environment has been raised as an ethical justification for restraining disoriented and aggressive patients (Maccioli *et al.*, 2003). Nurses are most intimately involved in the decision to restrain and in its implementation. At the same time, the nurses have a moral obligation to do no harm (non-maleficence) and to promote good (beneficence). This implies that health care professionals must ensure that they have satisfied all the legal and ethical implications; otherwise they may face allegations of assault (Hine, 2007).

Despite the controversy about the potential benefits, side effects and ethical issues associated with PR, there is lack in local studies which investigate use of physical restraint by nursing staff in ICU settings in Egypt.

The aim of this study was to assess ICU nurses' knowledge, attitude and practice regarding use of PR in the ICU settings at Ain Shams University Hospitals and factors influencing it.

2. Subjects and Methods

Design: This descriptive exploratory study was conducted in Ain Shams University Hospitals. It included five adults ICU settings at the governmental sector (El Demerdash Hospital) and three ICU settings at the private sector (Ain Shams Specialized Hospital).

Subjects: A convenience sample of 131 nurses working in these ICU settings was selected for this study; 12 from surgery ICU, 13 from geriatric ICU, 9 from cardiothoracic ICU, 5 from chest ICU, 20 from neurosurgery ICU, 44 from two general ICUs (A & B) and 28 from cardiac ICU. The study included nurses from both genders, with different ages, educational background and years of experience.

Tool for data collection:

A Self Administered structured Questionnaire was used to determine ICU nurses' knowledge, attitude and practice regarding use of PR and factors influencing it. It was designed based on the questionnaire that was developed by Janelli *et al.* (1992). The questionnaire was prepared by the researchers in Arabic language to suit the nurses' level of understanding. Then, it was revised by a group of five experts in medical surgical nursing department, Faculty of Nursing and two professional consultant experts, Faculty of Medicine at Ain Shams University for the content validity. It included five parts;

The first part was concerned with demographic characteristics of the respondent nurses such as age, gender, educational background and years of experience.

The second part: comprised 15 items to assess nurses' knowledge regarding use of PR (definition, purposes, indications, methods, alternatives, precautions, the need for physician's order before patient restraint, complications, ethical issues, nursing care for restrained patient).

Scoring system: Correct responses were given a score of 1 and incorrect responses were given a score of 0, with 'undecided' answers included in the incorrect category (potential range: 0–15).

The third part: contained items measuring nurses' attitude towards the use of PR (11 items). Participants were asked to respond on a 3-point Likert Scale about whether they 'agree', 'don't have an opinion' or 'disagree'.

Scoring system: Each item was given a score of 3 for 'agree' to 1 for 'disagree' and vice versa for negatively phrased items. Thus, high scores reflected positive attitudes and low scores reflected negative attitudes (potential range: 11-33).

The fourth part: consisted of 14 items to assess nurses' practice regarding use of PR. This section addresses the use of alternative measures before the application of restraints, staffing levels (physician's order before use), report of the indications of restraint to the patient and the relatives and documentation in addition to issues in nursing care for patients immediately before and during restraint (observation every 2 hours, documentation of restraint data, follow up to detect any complications of restraint and to assess if the restraint should be removed). Participants were asked to respond to each of the items on a 3-point Likert Scale about whether they 'always', 'sometimes' or 'never' performed these practices.

Scoring system: Most of the items were reflective of more favorable practices towards caring for restrained patients, with scores of 3 for 'always' to 1 for 'never' having adopted such practices. The negative item was reverse-scored. Thus, a score of 14 indicated the most undesirable practice while 42 indicated the best practice in use of restraints.

The fifth part: ask about self-reporting of the frequency of use of PR in the prior month in addition to factors which may influence use of PR by nursing staff; the instruments, patient/nurse ratio in the ICU, previous knowledge about use of PR, alternative methods that were often used before patient's restraint.

Each questionnaire was accompanied by an information sheet that described the purpose of the study and explained that participation was voluntary. Responses were anonymous and staff was assured that confidentiality would be maintained.

Procedures of the study: A pilot study was conducted on 20 nurses who were excluded from the study sample. Based on the opinion of a panel of

expertise and the result of the pilot study, some modifications were done; and then the final forms were developed.

- The Cronbach's alpha coefficients of Parts 2-4 were 0.75, 0.79 and 0.77 respectively.
- The questionnaire format was filled in the clinical area by the respondent nurses in the presence of the researchers.

Administrative design and ethical consideration:

An official permission was obtained from the director of Ain Shams University Hospital and the heads of the departments in which the study was conducted. The aim of the research was explained to the participants. Verbal consent was obtained from each nurse to participate in the study after clarifying the procedure of the study. Participants were informed about their right to refuse participation and to withdraw at any time without any consequences. Confidentiality of data was ensured.

Statistical analysis: Collected data were tabulated and soft ware IBM SPSS statistics, version 19 was used to calculate frequencies and percentages of the responses to the items on knowledge, attitudes and practices. Mann-Whitney-Wilcoxon test was used to test significant differences of the measured scores between two groups. Pearson correlation test was used to test association between total practice score and both of knowledge and attitude scores. Spearman correlation test was used to test association between ordered categorical variables (frequency of use of physical restraint by the respondent nurses and other studied variables). Chi square test was used for statistical comparison of frequencies between the different groups. All reported P values are two-sided ($P > 0.05$: non-significant, $P < 0.05$: significant).

3. Results:

The respondents in this study were 110 nurses, they represented (84%) of the total number (131). Table (1) describes the study participants according to age, gender, educational background, years of nursing experience in ICU and previous knowledge about use of PR. Regarding the gender; 90% of the participant nurses were females. The largest proportion of the participant nurses (76.4%) were between 20 and 35 years of age. The largest group of the respondent nurses ($n=54$; 49.1%) obtained a diploma in nursing. The largest proportion of the respondent nurses had period of experience in ICU ≥ 5 years ($n= 71$; 64.5%). Only 38.2% ($n= 42$) acknowledged that they had previous knowledge about use of PR either through lectures, training courses or educational videos.

Level of knowledge of the participant nurses:

The numbers and percentages of correct and incorrect responses of the participant nurses to each

of the 15 questions are listed in table (2). Their knowledge scores ranged from 6 to 14 (median: 10). Percentages of correct responses to the 15 questions ranged from 35.5% to 94.5%. More than half of them disagreed with the statements that 'Patients are allowed to refuse to be placed in a restraint', 'Deaths have been linked to the use of vest restraints' and 'When a patient is restrained in a bed, the restraint should not be attached to the side rails'. 60% of them (66) believed that 'Confusion or disorientation is the main reason for using a restraint'.

Attitudes towards use of restraints:

As shown in table (3), the attitude scores of the respondent nurses ranged from 17 to 30 (median: 23). The majority of them disagreed with the statements that 'The hospital is legally responsible to use restraints to keep the patient safe' (97, 88%) and 'Family members have the right to refuse the use of restraints' (78, 71%). In general, about 64% (70) of the participant nurses felt that they were 'knowledgeable about caring for a restrained patient'.

Nursing care of patients immediately before or during restraint:

Table (4) shows the frequencies and percentages of the responses to the statements regarding the nursing care provided for patients immediately before or during PR. The total score ranged from 18 to 39 (median: 28). Less than half of the nurses (45, 41%) indicated that they would 'always ... try alternative nursing measures before restraining the resident'. Bar chart (1) shows the alternative methods attempted by the respondent nursing staff before applying PR; use of sedatives was the most frequent method (81%) while diversional activities (TV, magazines, music) were the least frequent method (17%).

Only a few indicated that they would 'always ... decide to restrain a resident only with a physician's order' (20, 18.2%). More than half of them (61, 55.5%) indicated that they never '... tell family members why the resident is being restrained' or '...explain to the resident why the restraint is being applied'.

Table (5) shows that, there were none significant differences in the overall scores for knowledge, attitude or practice between male and female nurses, nurses who had previous knowledge about use of PR and those who didn't have, nurses with diploma in nursing and those with higher qualifications, nurses with less than 5 years of clinical experience and those who have ≥ 5 years of clinical experience in ICU. There was significant difference in the total practice score between nurses working in the public sector and those working in the private sector in Ain Shams University Hospitals while knowledge and attitude scores showed none significant differences between both groups.

Bar chart (2) shows frequency of use of PR by the respondent nurses during the prior month; only (22, 20%) of the respondent nurses reported that, they didn't use PR in the prior month. The majority of nurses who reported use of PR (51, 47%) reported that, they used PR less than 5 times. Only 12.7% of the respondent nurses (n: 14) reported use of special equipments for PR while the remaining proportion (96, 87.3%) reported use of gauze and cotton for restraint.

Bar chart (3) shows common complications of PR reported by the respondent nurses; about half of them (56, 51%) reported occurrence of skin complications (skin abrasions, edema and contusions) while small proportion reported occurrence of agitation (8, 7.2%). Chi square test showed none significant difference in the proportions of nurses who reported occurrence of complications between group of nurses with previous knowledge about use of PR and group of nurses without previous knowledge (χ^2 : 0.21, d.f.= 1, *P* value: 0.7).

Table (6) shows significant positive correlation between respondent nurses' practice score and both of knowledge and attitude scores regarding use of physical restraint.

Table (7) shows significant positive correlations between ordered categories of frequency of use of PR by the respondent nurses and both of patient/nurse ratio and period of experience in ICU. There was significant negative correlation between ordered categories of frequency of use of PR by the respondent nurses and educational background.

Table (1): Sociodemographic characteristics of the respondent nurses.

Items	Total Nurses	
	No.	%
Age (years)		
< 20 years old	15	13.6
20 to 35 years old	84	76.4
> 35 years old	11	10
Gender		
- Female	99	90
- Male	11	10
Educational background		
- Diploma nurse	54	49.1
- Diploma + speciality	9	8.2
- Technician	16	14.5
- Bachelor	31	28.2
Years of experience in ICU		
< 5 years.	39	35.5
5 : 10 years.	40	36.4
10 : 15 years.	22	20
>15 years.	9	8.1
Previous knowledge about physical restraint:		
- Yes	42	38.2
- No	68	61.8
Knowledge source from other colleague	23	20.9

Table (2): Respondent nurses' knowledge about use of physical restraint.

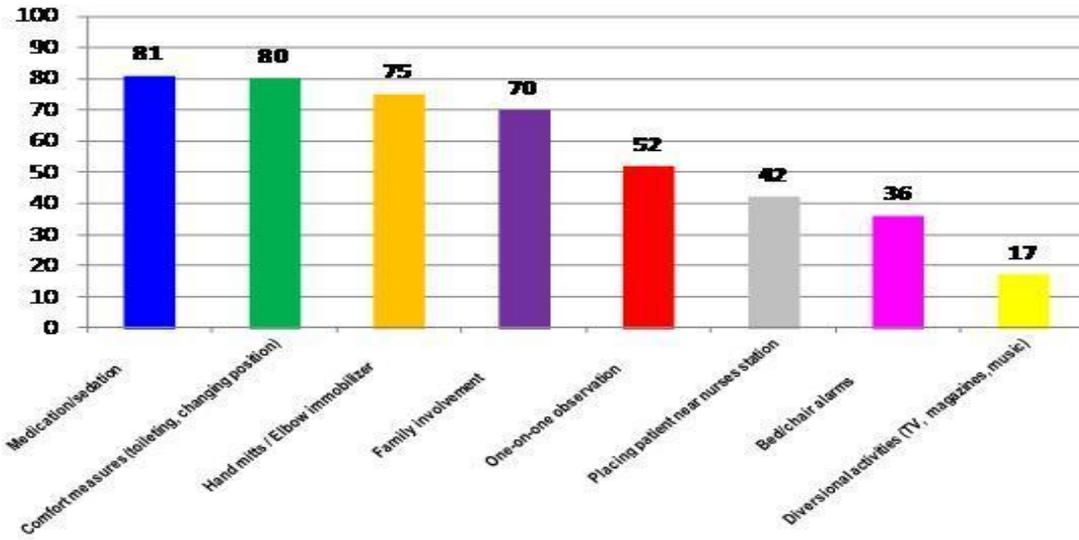
Items of knowledge	Correct		Incorrect	
	No.	%	No.	%
- When a patient is restrained, skin can break down or restlessness can increase	104	94.5	6	5.5
- Physical restraints are safety vests or garments designed to prevent injury	101	91.8	9	8.2
- In an emergency a nurse can legally restrain a patient without a physician's order	100	90.9	10	9.1
- A nurse can be charged with assault if he/she applies restraints when they are not needed	98	89.1	12	10.9
- A restraint should be released every 2 hours if the patient is awake	88	80	22	20
- A patient should never be restrained while lying flat in bed because of the danger of choking.	86	78.2	24	21.8
- A restraint is legal only if it is necessary to protect the patient or others from harm	85	77.3	25	22.7
- A physical restraint requires a physician's order	76	69.1	34	30.9
- Good alternatives to restraints do not exist	71	64.5	39	35.5
- A record should be kept on every shift of patients in restraints	66	60	44	40
- Restraints should be put on snugly	63	57.3	47	42.7
- Deaths have been linked to the use of vest restraints	45	40.9	65	59.1
- Confusion or disorientation is the main reason for using a restraint	44	40	66	60
- Patients are allowed to refuse to be placed in a restraint	43	39.1	67	60.9
- When a patient is restrained in bed, the restraint should not be attached to the side rails	39	35.5	71	64.5

Table (3): Respondent nurses' attitude towards use of PR

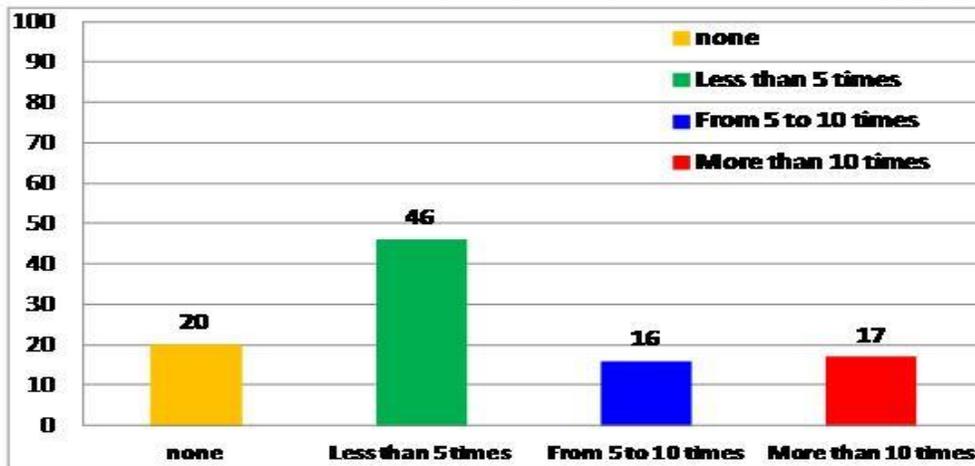
Item	Agree		Disagree		Undecided	
	No.	%	No.	%	No.	%
- I feel that it is more important to let the patient in restraints know that I care about him or her.	98	89.1	12	10.9	0	0
- It makes me feel bad if the patient gets more upset after restraints are applied.	92	83.6	14	12.7	4	3.6
- In general, I feel knowledgeable about caring for a restrained patient	70	63.6	33	30	7	6.4
- A patient suffers a loss of dignity when placed in restraints.	67	60.9	38	34.5	5	4.5
- If I were the patient, I feel I should have the right to refuse/ resist when restraints are placed on me.	66	60	36	32.7	8	7.3
- I feel that nurses have the right to refuse to place patient in restraints.	63	57.3	42	38.2	5	4.5
- I feel guilty placing a patient in restraints.	52	47.3	53	48.2	5	4.5
- I feel that the main reason restraints are used is that the hospital is short staffed.	38	34.5	64	58.2	8	7.3
- I feel that family members have the right to refuse the use of restraints.	30	27.3	78	70.9	2	1.8
- I feel embarrassed when the family enters the room of a patient who is restrained and they have not been notified.	17	15.5	89	80.9	4	3.6
- The hospital is legally responsible to use restraints to keep the patient safe.	11	10	97	88.2	2	1.8

Table (4): Respondent nurses' practice regarding use of physical restraint:

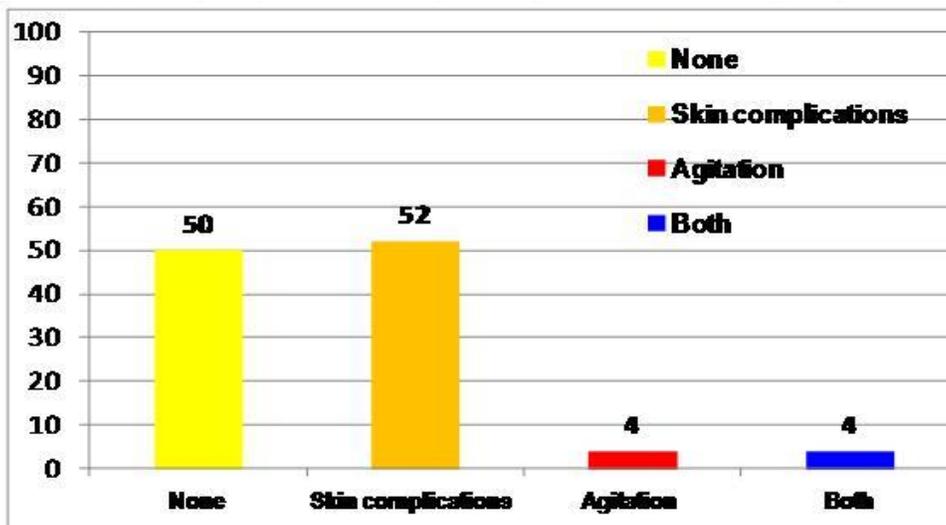
Practice Item	Always		Sometimes		Never	
	No.	%	No.	%	No.	%
- I inspect the skin of the resident for abrasions or skin tears if I bath a resident who is restrained	65	59.1	37	33.6	8	7.3
- I check the restraints at least every two hours to make sure they are in the proper position	60	54.5	25	22.7	25	22.7
- More residents are restrained when we are short of staff than when we are fully staffed	49	44.5	11	10	50	45.5
- I frequently evaluate and record the effect of physical restraint when applied to a resident	48	43.6	36	32.7	26	23.6
- I try alternative nursing measures before restraining the resident.	45	40.9	28	25.5	37	33.6
- I tell the resident when the restraint(s) will be removed	41	37.3	49	44.5	20	18.2
- When I feel that the resident does not need to be restrained, I make this suggestion to the doctor	40	36.4	38	34.5	32	29.1
- I answer the call for the resident who is restrained as soon as possible	37	33.6	17	15.5	56	50.9
- In our centre, staff members work together to discover ways to control the behaviour of residents other than by using physical restraints	34	30.9	53	48.2	23	20.9
- I frequently assess if the restraint should be removed	34	30.9	37	33.6	39	35.5
- When physical restraint are applied, I record on the kardex the type of restraint used, the reason for adopting it, the time the application commenced, and the related nursing care required	23	20.9	30	27.3	57	51.8
- When I restrain a resident, I make this decision only with a physician's order	20	18.2	56	50.9	34	30.9
- I explain to the resident why the restraint is being applied	20	18.2	29	26.4	61	55.5
- I tell family members why the resident is being restrained	14	12.7	35	31.8	61	55.5



Bar chart (1): Alternative methods attempted by the respondent nurses before applying PR.



Bar chart (2): Frequency of use of PR by the respondent nurses during the prior month.



Bar chart (3): Common complications of PR reported by the respondent nurses.

Table (5): Mann-Whitney-Wilcoxon test for comparison of knowledge, attitude and practice scores between groups of participant nurses according to socio-demographic variables:

Socio-demographic variable		Gender		Previous knowledge about use of PR		Years of experience in nursing in ICU		Educational background		Hospital sector	
		Male	Female	Yes	No	<5 years	≥5 years	Diploma	Higher qualif.	Private	Public
Participant group											
Number		11	99	42	68	39	71	54	56	72	38
Knowledge score	Median	9	10	10	10	10	10	10	10	10	10
	Min.	6	6	6	6	6	6	6	7	6	6
	Max.	14	14	13	14	14	14	14	14	13	14
	P value	0.15		0.55		0.78		0.22		0.99	
Attitude Score	Median	22	23	23	23	23	23	23	23	23	23
	Min.	17	17	17	17	17	17	17	17	17	17
	Max.	27	30	29	30	30	29	29	30	29	30
	P value	0.46		0.88		0.83		0.76		0.34	
Practice Score	Median	25	28	29	27	27	28	28	27	29	25
	Min.	21	18	18	19	22	18	18	21	21	18
	Max.	37	39	36	39	36	39	37	39	39	35
	P value	0.06		0.22		0.49		0.93		0.000*	

*: significant P value.

Table (6): Pearson correlation test between respondent nurses' practice score and both of knowledge and attitude scores regarding use of PR:

		Knowledge score	Attitude score
Practice score	N	110	110
	r	0.21*	0.36*
	P value	0.03	0.000

*: significant correlation

Table (7): Spearman correlation test between ordered categories of frequency of PR use by the respondent nurses in the prior month and patient/nurse ratio; gender and categories of educational background, periods of experience in ICU, previous knowledge about PR use, hospital sector at which the participant nurse works).

		Patient/nurse (median: 2)	Educational background	Experience	Previous knowledge about PR use	Gender	Hospital sector
Frequency of PR use	(r _s)	0.26*	- 0.36*	0.19*	- 0.06	0.02	- 0.1
	P value	0.006	0.000	0.04	0.51	0.87	0.29

*: significant correlation

4. Discussion:

The critical care setting is perhaps the last major health care setting in which PR remains a common and oftentimes unquestioned practice. Minnick *et al.* (2007) found that, whereas ICUs overall accounted for less than one fifth of the hospital beds involved in their study, they accounted for more than half of all restraint use. This is despite the numerous regulations and accrediting standards that have limited or even eliminated practitioners' use of PR in other health care settings (Mion *et al.*, 2008).

While regulatory standards related to the use of PR in acute settings have been strengthened

significantly in recent years, it is not clear from the literature whether these changes have influenced nursing practice in regard to restraint use (Janelli, 2011). Furthermore, nurses' views and attitudes toward the use of PR in controlling patients' behavior and ensuring patient safety may create conflicts with patients' rights, including their autonomy in making decisions for their own care.

This study showed that, 60% of the respondent nurses believed that if they were the clients, they should have the right to refuse or resist the placing of restraints on them despite the majority of the them disagreed with the statement that 'Patients are

allowed to refuse to be placed in a restraint'. This response suggests that the respondents might have negative thoughts about the use of restraints of which they were unaware.

About 71% of the respondent nurses disagreed with the statement that 'Family members have the right to refuse the use of restraints'. At the same time, about 56% of them indicated that they never '... tell family members why the resident is being restrained' or '...explain to the resident why the restraint is being applied'. This revealed the need to increase awareness of patient's rights and ethical issues related to use of PR to avoid allegations of assault. It is important to note that; if restraint is decided to be done for individuals without capacity, it must be the least restrictive of their basic rights and freedoms, in their best interests and after failure of other alternative non-restrictive methods (Hine, 2007).

Many alternatives to the use of PR have been suggested in the literature, such as providing companionship and supervision, offering physical and diversional activities, playing soft background music, manipulating environments, evaluating the effects of drugs that may be contributing to a patient's agitation and using care plans to meet the needs of individual clients (Suen *et al.*, 2006). The respondent nursing staff in the current study reported attempts of several alternative methods before applying PR; use of sedatives was the most frequent method (81%) while diversional activities (TV, magazines, music) were the least frequent used method (17%).

Sedation is used most commonly in critical care for patients who are being mechanically ventilated since it help to reduce patient's anxiety, facilitate care (such as ventilation) and reduce myocardial oxygen demands (Bray *et al.*, 2004). However, sedation was found to have unwanted side effects such as hypotension, reduced gastrointestinal mobility and general immobility (Intensive Care Society, 2003). Also, over sedation may result in delayed weaning and prolonged exposure to mechanical ventilation and its complications (Gehlback & Kress, 2002).

Other alternative methods are known to be effective and with less side effects since Chien, (1995) reported that; many patients are found to be more settled when their relatives are accompanying and comforting them. Lee *et al.* (1999) suggested re-formulation of hospital policy about visiting hours so as to allow this to happen since it help to reduce the unnecessary use of restraints.

Other alternatives to PR were found to be used by the participant nurses in this study but with lesser frequencies; diversional activities, bed/chair alarms and placing patient near nurses' station. This may be due to shortage of staff and other resources which

facilitate use of these methods in most of ICU settings.

An important finding in this study is that, a small proportion of the respondent nurses (18%) use PR only with a physician's order. Similar finding was reported by De Jonghe *et al.* (2013) who found that, PR was usually started and removed without written medical orders or clearly established local policies. Also, Choi and Song, (2003) found that; 94% of restraint applications were not directed by the physicians, implying that they were initiated by the nurses. This suggests that PR is often started and removed on the basis of the nurses' initiative and practical judgment which can put nurses in a difficult position when they improperly start or remove PR.

More than half of the respondent nurses (52%) in this study indicated that they never record data for PR use in patient's chart (type of restraint used, indication for use, time of application and the related nursing care). Similar findings were reported by Choi and Song, (2003) who found that; there was no documentation in nursing notes on PR in 75% of the studied restrained cases. This was attributed to the consideration of PR by health professionals as not being an important intervention that requires recording and communication (Macpherson *et al.*, 1990). However, the recent regulatory standards of PR use raised the importance of its documentation due to its legal and ethical implications.

This study found none significant differences in the total scores of knowledge, attitude and practice between nurses who had previous knowledge about use of PR and those who didn't have. Also, there was none significant difference in the proportions of nurses who reported occurrence of complication with PR application between both groups. This reveals the need for effective educational programs on PR use. Previous studies in the USA and Australia reported reduction in PR by developing educational programs aimed at enhancing understanding of patient's rights and autonomy, ethical and legal aspects of restraining patient, impact and dangers of PR and restraint alternatives (Evans *et al.*, 2002b; Martin, 2002; Vance, 2003).

Skin complications were reported by the participant nurses in this study as the most frequent complications of PR application. This may be due to faulty technique or unsuitable equipments. The majority of the respondent nurses reported use of gauze and cotton for PR. This indicates the need for integration of standard protocol for application of PR in ICU with sufficient training of nursing staff.

This study found significant positive correlations between respondent nurses' practice score and both of knowledge and attitude scores regarding use of PR. The attitude of nurses toward restraints is considered

one of the main reasons for variations in their use (Wynn, 2003). That was also reported by Karlsson *et al.*, (2001) who found nursing staff with a more positive attitude toward restraint use were more prone to using restraints.

Suen *et al.* (2006) studied factors influencing practices of staff with regard to the use of restraints in rehabilitative settings and they found that; the attitudes of staff towards the use of restraints had positive direct effects on restraint practice while the knowledge level had a positive indirect effect on staff practice through its influence on attitudes.

Previous studies on the use of PR in critical care settings revealed that; the decision to use PR in the care of critically ill patients can be complex and is influenced by characteristics of the patient, critical care personnel and the environment (Mion *et al.*, 2008).

This study found that, more than 50% of the respondent nurses indicated that their use of PR is higher when there is shortage of nursing staff. Also, use of PR in the prior month was found to increase with increasing patient/nurse ratio in the ICU setting. A relationship between patient/nurse ratio and a high restraint rate is often estimated in several studies, but findings in literature are inconsistent. While several studies did not found any relationship (Bostick, 2004; Demir, 2007; Huizing *et al.*, 2007; Meyer *et al.*, 2009 and Heinze *et al.*, 2011), others indicated a lower restraint rate with higher staff numbers (Castle *et al.*, 1997 and De Jonghe *et al.*, 2013). Heinze *et al.* (2011) stated that, this controversy may be due to different methods of calculation of the nurse staffing ratios since it may be calculated on ward level or institutional level.

It is considered that a patient right violation does not occur if PR is applied after patient conditions are evaluated properly and alternative methods are tried first. But it is still a patient right violation if PR is applied because of nurse shortages and without an expert consultation. The best decision under these critical conditions is to balance carefully the clinical realities with the ethical ideals (Juanita, 1996).

This study found that; frequency of use of PR decreased with increased nurses' qualifications. Similar findings were mentioned by Sullivan-Marx *et al.* (1999) who reported that, use of PR was less frequent by professional registered nurses and advanced practice nurses.

Contrary to these findings, those reported by Wynn, (2003) who found highly educated staff was more prone to use restraints. These differences might be attributable to the use of different measuring instruments between the studies.

This study found that; use of PR was more frequent by nurses with prolonged period of clinical

experience in ICU. Similar findings were reported by Choi and Song, (2003) who found more favourable attitude towards restraint application in the more experienced nurses.

These findings were not in agreement with Hamers *et al.* (2009) who studied the attitudes of nursing staff towards restraint use in nursing home residents and individual characteristics of nursing staff that may influence their attitude. They found that, more experienced nursing staff had a more negative attitude regarding restraints than other nursing staff.

The current study showed significant difference in practice score between nurses working in private sector and those working in public sector of the hospitals while knowledge and attitude scores showed none significant differences between both groups. This may be due to the integrated policy in the private sector since the supervisor staff in this sector following strict regulations with patient care and observe how nursing staff follow these regulations. Also, there is an access for the patient's family members to criticize any conduct that they may consider as a violation of patient's rights. Previous studies found that, changes in nurses' attitudes and practices might be influenced by the recent development of regulatory standards and nursing education related to restraint use in acute settings, and they varied a great deal in diverse clinical settings and across countries (Chien & Lee, 2007).

Rolland, (2009) reported the impact of managerial aspects on the behaviors of all employees. However the individuals are often identified as the source of ethical failure, one of the most important aspects of creating ethical behavior is the culture and environment of the organization in which these individuals function. This is due to organizational policies and procedures that should dictate ethical conducts and organizational cultures which will affect the employees' perception of the levels and limits of trust and integrity.

Conclusions:

Practice of the participant nurses regarding use of physical restraint is related to their knowledge and attitude towards it. Also, use of PR was found to be affected by patient/nurse ratio as well as nurses' qualifications and duration of clinical experience.

Recommendations:

Development of local policies for PR use including detailed descriptions of conditions requiring its use is mandatory. Also, physical conditions in ICU settings should be improved to provide adequate resources and personal staff.

Periodic in service–training advanced care programs based on best practice guidelines for nurses working in ICU is essential to improve nurses' practice regarding use of PR.

In addition, it is important to increase awareness among ICU physicians of the advantages and drawbacks, ethical implications of PR and the requirement of written physician's orders to start and remove PR since this will restrict use of PR in critical care settings.

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