Title: Jordanian Nurses' Knowledge, Attitudes, and Practices Regarding the Use of Physical Restraint and its Alternatives in the ICU

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Abstract

Background: Physical restraint (PR) is one of the most common methods used by nurses to reduce patient movement, especially in Intensive Care Units (ICUs). However, PR is considered one of the undesirable methods due to its related clinical and ethical issues. This study aims to investigate Jordanian nurses' knowledge, attitudes, and practices regarding using PR and its alternatives in different ICUs, as well as its associated factors.

Methods: This is a descriptive-cross-sectional study, conducted in the ICUs of four different hospitals in Jordan from October 2013- March 2024. A Convenience sample of 240 ICU nurses was recruited to fill out a self-administered Physical Restraint Questionnaire (PRQ). Data were analyzed using independent sample t-test, ANOVA, or person-correlation as appropriate using SPSS 25.0. All conducted tests were two-tailed and considered significant when p-value <0.05.

Results: The results revealed moderate knowledge (11.1 ± 2.46), positive attitude (27.04 ± 3.35), and good practice (37.19 ± 3.33) regarding the use of PR. Receiving training on the use of PR had a direct significant relationship with the use of alternative methods before PR the patients ($p < 0.001$) and the total practice score ($p = 0.049$). The presence of PR as part of the new hire orientation program and the number of times of using PR had a significant association with the use of alternatives before PR the patients ($p < 0.0001$ & $p = 0.043$, respectively). In terms of total knowledge (p=0.01), use of alternatives (p=0.025) and practice (p<0.001) regarding the use of physical restraints, accredited hospitals were at a higher level, but the difference in nurses' attitudes was not significant (p=0.839). There was a significant difference in terms of total alternatives (p=0.016), attitude (p<0.001) and practice (p=0.02) depending on the type of ICU. There were other significant relationships between the main variables among which the relationship between total knowledge and total practice (r = .434, p < .01), and total use of alternatives and total practice (r = .43, p < .01) were more powerful.

Conclusion: The current study indicates variations in nurses' knowledge levels, attitudes, and practice across different ICUs and hospital types. These findings emphasize the importance of in-service education as a golden role in improving nurses' knowledge levels and practices toward PR. The journey to accreditation in the management of hospital by nursing managers & policymakers has a positive impact on improving nursing knowledge and their skills regarding PR application and enhancing patient safety and care outcomes.

Keywords: Physical restraint, Intensive care units, Accreditation, Nursing practice, Restraint alternatives

Highlights

- Physical restraint (PR) is a common practice among intensive care nurses due to patient confusion and agitated behaviors.
- PR training program has a golden role in improving nurses' practices and using alternatives before applying PR.
- Using alternative methods before applying PR was significantly higher among private hospitals than nurses in government hospitals.
- Knowledge, practice, and using alternatives regarding PR among the nurses were higher in accredited hospitals.
- There are variations in nurses' knowledge levels, attitudes, and practice toward PR across different areas and ICU types.

Plain Language Summary

Physical restraint (PR) is one of the most common methods used by nurses to reduce patient movements, especially in the ICU. It is a simple solution for protecting agitated patients from harming themselves and others. The findings of the current study indicated that Jordanian nurses working in different government hospitals possess a significant high level of total knowledge of using PR; On the contrary, the nurses in private hospitals scored a significant higher level of using alternatives before applying PR to the patients. It seems that implementation of in-service education, unit-specific orientation programs, and accreditation process improves nursing knowledge, using PR alternatives, and practice toward PR application.

1. Introduction

Physical restraint (PR) has been defined as any physical technique or action used to constraint a patient's independent movement, physical activity, or normal access to his or her body. (Bleijlevens et al., 2016; Allen and Close, 2010). PR is usually done using manual technique, physical tools, or mechanical equipment that immobilizes or restricts movement of the patient's body (Freeman et al., 2016; Nirmalan et al., 2004). It is part of patient-centered holistic approach used by nurses to ensure patient safety and compliance to therapy (e.g. limiting patient mobility, preventing falls, prevent therapy discontinuation, and prevent confused patients from wandering and harming themselves and others), especially in acute and long-term care (Freeman et al., 2016; Azizpour et al., 2017; Scheepmans et al., 2017; Jiang et al., 2015; Raguan et al., 2015; Dolan and Dolan Looby, 2017; Cunha et al., 2016).

PR is one of the most unpleasant methods of treatment and has many moral, psychological, and legal dilemmas especially when it comes to elderly patients (Chuang and Huang, 2007; Mitchell et al., 2018). Despite family request and nurse preference, the use of physical restraint is associated with many direct and indirect negative and positive effects (Lan et al., 2017; Luk et al., 2015; Hamers et al., 2009).

PR is a common practice in healthcare with a variant prevalence in intensive care units (ICUs) (Benbenbishty et al., 2010; Birgili and İzan, 2019). Luk et al. reported that agitation and delirium are the most common problems among patients during their ICU stay, where the use of physical and chemical restraints (e.g. anxiolytics and sedatives drugs) are often seen as a simple solution for such patients (Luk et al., 2015; Benbenbishty et al., 2010; De Bellis et al., 2013). In addition, concerns about greater patient restraint in ICUs than other wards are related to confusion and agitated behaviors associated with ICU patients and life-threatening treatment in such units (mechanical ventilation, hemodialysis, central venous catheters, and intra-aortic balloon pumps (Rose et al., 2016;Unoki et al., 2019; Hevener et al., 2016).

In Jordan, Suleiman reported the use of PR in 35.8% of patients admitted to the ICU. However, this rate is varied by unit type with the highest percentage seen in surgical intensive units (57.1%) (Suliman, 2018).

On the other hand, some studies reported the use of restraints for staff-centered reasons (e.g. nurses' perceptions of patient harm and workload pressures) (Jiang et al., 2015). In a mixed-methods study in China, Jiang et al. reported that in units with larger patient-to-nurse ratios, the nurses felt it was necessary to use PR due to the enormous demand on their workload, the sense of their responsibility

toward patients safety, and assisting in nursing care management in situations of patient confusion and wandering with a shortage of nursing staff (Jiang et al., 2015).

PR may have different physical consequences (e.g. harm to the skin, pressure sores, muscular atrophy, and limb injury), medical consequences (e.g. increase in blood pressure & heart rate, decrease in circulation, nosocomial infection, constipation, contractures, and incontinence), and psychological and emotional consequences (e.g. loss of individuality, depression, anger, detention, cognitive problems, reduced self–esteem and increased agitation, delirium, anxiety and loneliness) (Suliman, 2018; Kandeel and Attia, 2013; Chang et al., 2008; Burk et al., 2014; Mehta et al., 2015; Jiang et al., 2015; Bray et al., 2004). In addition, patients' families may be affected by this experience, as they are often at the patient's bedside and witness PR (Fink et al., 2015). On the other hand, restraining a patient may lead to some unpleasant experiences such as unpleasant feelings and feelings of guilt and frustration in nurses (Al-Khaled et al., 2011; Möhler and Meyer, 2014).

The ICU nurses are the key decision-makers in the application of physical restraints for patient safety (Lane and Harrington, 2011; Möhler and Meyer, 2014). Therefore, researchers have pointed out to identifying nurses understanding of restraint and to assess their knowledge and attitudes toward PR which may have a direct or indirect impact on their practice in different settings, such as ICUs, psychiatric settings, and nursing homes (Suen et al., 2006; Azab and Negm, 2013; Gürdoğan et al., 2017; Almomani et al., 2021; Gandhi et al., 2018; Hofmann et al., 2015). Proper use of PR based on adequate knowledge can affect optimal patient care (Christensen, 2011), so that Spilsbury et al. reported the use of PR as one of the most frequently used quality indicators of healthcare organization (Spilsbury et al., 2011). Adequate knowledge and proper clinical practice has the benefit of the reduction of patients' complications related to PR (Kandeel and Attia, 2013). Lim & Fong investigated nurses' perceptions toward using restraint in ICUs by using the Perceptions of Restraint Use Questionnaire (PRUQ). The results revealed that the majority of critical care nurses had moderate knowledge, a positive attitude, and satisfactory PR practice (Lim & Fong, 2021). Another study on Malaysian nurses which assessed their knowledge, attitudes, and behaviors regarding the use of PR, found that all were deficient on these abilities, less than half of the nurses considered alternatives before using PR, and the majority did not understand the reasons for the PR (Eskandari et al., 2017). In Jordan, limited studies have been conducted regarding the use of PR in acute care settings (Suliman et al., 2017; Almomani et al., 2021). So, in this study, we aim to (i) assess the Jordanian nurses' knowledge, attitudes, and practice regarding the proper use of PR and its alternatives in different ICUs, and to (ii)

determine the contributing factors (such as accreditation) that may affect Jordanian nurses' knowledge, attitudes, and practice toward the proper use of PR in different ICUs.

2. Materials and Methods

2.1 *Study Design and Setting:*

This is a descriptive cross-sectional study that was conducted in four hospitals representing two healthcare sectors (private & governmental) in Jordan, from October 2023 to January 2024. The selected hospitals are also considered the largest educational hospital in Jordan with a total capacity of 1935 beds, among which 160 beds are in ICUs. It is worth mentioning that two of the hospitals are accredited (one nationally by Health Care Accreditation Council (HCAC), and the other internationally by Accreditation Canada (AC)).

2.2 Sample size and sampling techniques:

A Convenience sample of 241 ICU registered nurses employed in the selected hospital was utilized to collect the data. Inclusion criteria were: (i) willingness to participate in the study, (ii) ICU nurses with at least a diploma in nursing, (iii) having work experience of more than three months. The exclusion criteria were (i) part time nurses, or (ii) those who did not complete the distributed questionnaire. Using sample size calculator (Wang and Ji, 2020), considering power analysis (small to medium effect size (0.35), statistical power of 0.8, and probability level of 0.05) and depending on the number of ICUs registered nurses in the four hospitals, a minimum of 110 samples estimated. As more nurses showed willingness to participate, the final sample was 241.

2.3 Data collection tools and procedure:

The study used a self-administered Physical Restraint Questionnaire (PRQ) to collect the data. The utilized questionnaire was originally developed by Janelli et al. and tested for reliability and validity by different authors in different countries (Janelli et al., 1992). It is translated into Arabic by Azab and Negm and Cronbach's alphas of the knowledge, attitude, and practice sections were calculated to be 0.75, 0.79, and 0.77, respectively (Azab and Negm, 2013). Although the original content validity index score of the questionnaire is 86% (Janelli et al., 2006), it was not assessed numerically for the translated form. However, the translated form of the questionnaire was assessed by a group of 5 nursing experts

and 2 medical consultants to assure its validity (Azab and Negm, 2013). The conceptual model of the study is shown below (Figure 1).

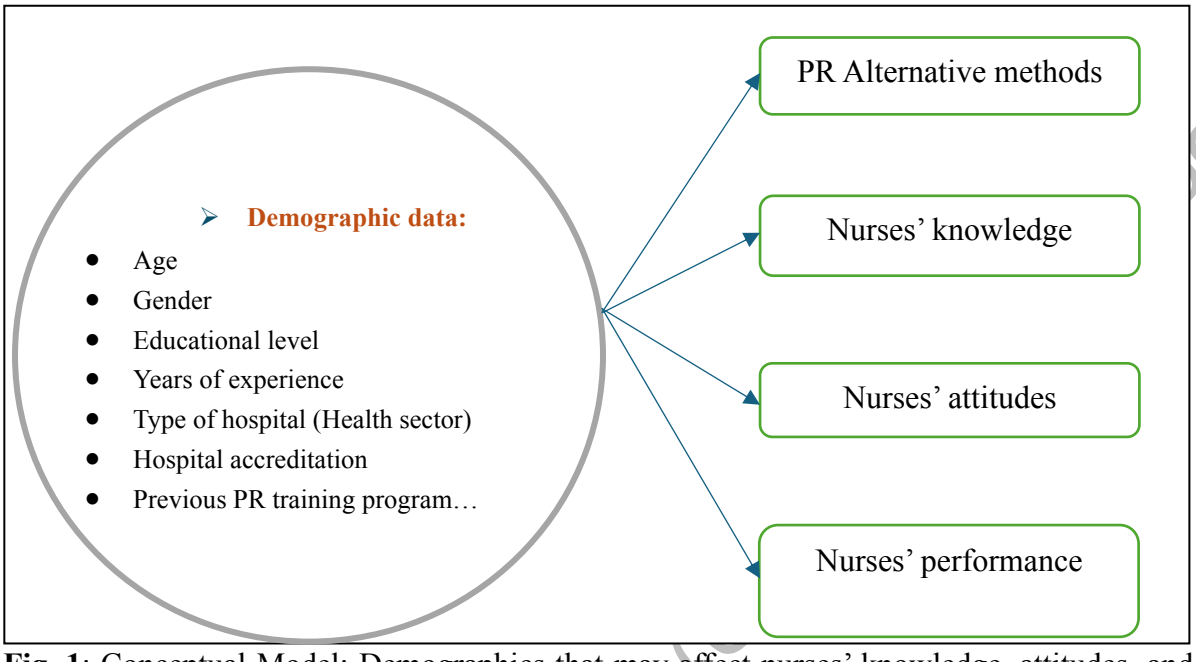

Fig. 1: Conceptual Model; Demographics that may affect nurses' knowledge, attitudes, and practice regarding using PR and its alternatives in the ICUs

The PRQ consists of four sections; **section I:** 13 questions assessing nurses' demographics and previous use of PR alternatives including: age, gender, level of education, total years of experience, type of working sector, receiving any educational programs regarding PR and type of received program, hospital accreditation, presence of PR topic in the new hire orientation program, number of times that the nurse used PR in the last month, the type of devices used to PR the patient, if the patient faced any complication due to PR, the existence of PR-related policy in the hospital, if the nurse used any alternative method before applying PR to the patient, and type of the alternatives used. **Section II:** 15 YES, NO, or DON'T KNOW items to measure nurses' knowledge regarding the use of PR. e.g. definition, purposes, indications, methods, alternatives, etc. The scores of section II range from 0-15 (NO or DON'T KNOW=0, YES=1). with higher scores indicating better knowledge of using PR. **Section III:** 11 items measure nurses' attitudes toward the use of PR. The nurse responds to each item using a 3-point rating scale (agree=3, no idea=2, or don't agree=1). The range of scores of section III varies from 11-33, with higher scores indicating a more positive attitude toward the use of PR. **Section IV:** 14 items to measure nurses' practice during applying PR, e.g. compliance to unit policy and

recommended practices of PR, monitoring the patient during PR, preventing complications, and availability to take off the restraint, etc. The nurse responds to each item using a 3-point Likert scale (always= 3, sometimes= 2, or never= 1). The scores range from 14-42, with higher scores indicating more favorite attitude toward the use of PR. Some items of this questionnaire are scored in reverse; Like item number 5 in the attitude section and item number 10 in the practice section. A pilot study was done before distribution of the questionnaires and starting data collection to evaluate its simplicity, and ease of application in clinical setting. Fifteen nurses participated in the pilot phase and no issue has been raised. It is worth mentioning that the nurses who participated in the pilot phase were excluded from data analysis.

2.4 Data analysis:

The categorical variables are presented as frequencies and percentages. Continuous variables are presented as mean and standard deviation (M±SD) or median values with Interquartile Range (IQR) depending on their distribution. Normality of data distribution was assessed using Kolmogorov–Smirnov test. The differences of the studied continuous variables were assessed by independent sample t-test or analysis of variance (ANOVA) as appropriate. The correlation between different continuous variables was assessed by Pearson correlation coefficient (r). All conducted tests were two-tailed and considered significant when p-value <0.05. No imputations were made for missing data points. All data used in the study were analyzed using SPSS 25.0 (IBM SPSS Statistics for Windows, Version 25.0 IBM Corp., Armonk, NY, USA).

3. Results

A total of 261 questionnaires was distributed and 241 were retrieved with a response rate equal to 92.3%. Among retrieved questionnaires, 11 were excluded due to incomplete data. Finally, 230 questionnaires were analyzed.

Demographical data of the sample:

Training on PR was reported by nearly half of the nurses across hospital types (n= 120, 52.2%) with the most common type of training being “training from a more experienced person” (n= 55, 45.8%). A total of 70% (n= 161) of nurses reported their awareness of the availability of PR policy in their hospitals, while 41% (n= 94) of the nurses reported incidence of complications which was higher in

the government hospitals vs. private settings (56.4% and 43.6%, respectively). Table 1 summarizes the demographic characteristics of the subjects.

Table 1: demographic data of the nurses according to the hospital type

Demographical Data (N = 230)				
Variables		N (%)	Hospital type	
			Government (N, %)	Private (N, %)
Gender	Male	85 (37%)	43 (50.6%)	42 (49.4%)
	Female	145 (63%)	80 (55.2%)	65 (44.8%)
Unit type	ICU	137 (59.6%)	74 (54%)	63 (46%)
	CCU*	39 (17%)	27 (69.2%)	12 (30.8%)
	SICU*	22 (9.6%)	6 (27.3%)	16 (72.7%)
	NICU*	21 (9.1%)	13 (61.9%)	8 (38.1%)
	MICU*	9 (3.9%)	1 (11.1%)	8 (88.9%)
	PICU*	2 (0.9%)	2 (100%)	0 (0%)
Nurse to patient ratio	1:2	102 (44.3%)	2 (2%)	100 (98%)
	1:3	128 (55.7%)	121 (94.5%)	7 (5.5%)
nurse education	Diploma (3 years program)	9 (3.9%)	6 (66.7%)	3 (33.3%)
	B.Sc.	210 (91.3%)	107 (51%)	103 (49%)
	Postgraduate	11 (4.8%)	10 (90.9%)	1 (9.1%)
nurse experience	less than 5 years	124 (53.9%)	51 (41.1%)	73 (58.9%)
	from 5 to less than 10	59 (25.7%)	43 (72.9%)	16 (27.1%)
	from 10 to less than 15	28 (12.2%)	18 (64.3%)	10 (35.7%)
	15 and above	19 (8.3%)	11 (57.9%)	8 (42.1%)
Training on physical restraint	yes	120 (52.2%)	55 (45.8%)	65 (54.2%)
	no	110 (47.8%)	68(61.8%)	42 (38.2%)
Training type	lectures	47 (39.2%)	23 (48.9%)	24 (51.1%)
	training course	15 (12.5%)	10 (66.7%)	5 (33.3%)
	video show	3 (2.5%)	1 (33.3%)	2 (66.7%)
	from a more experienced person	55 (45.8%)	21 (38.2%)	34 (61.8%)
Patient restraint topic in the orientation program	yes	67 (46.2%)	21 (31.3%)	46 (68.7%)
	no	67 (46.2%)	56 (83.6%)	11 (16.4%)
physical restraint frequency of use	zero times	59 (25.7%)	46 (78%)	13 (22%)
	less than 5 times	124 (53.9%)	54 (43.5%)	70 (56.5%)
	from 5 to 10 times	32 (13.9%)	15 (64.9%)	17 (53.1%)
	more than 10 times	15 (6.5%)	8 (53.3%)	7 (46.7%)
type of tool used	Gauze bandage	67 (37%)	63 (94%)	4 (6%)
	restraint kit	114 (63%)	16 (98%)	98 (86%)
complication incidence	yes	94 (40.9%)	53 (56.4%)	41 (43.6%)
	no	136 (59.1%)	70 (51.5%)	66 (48.5%)
knowing about availability of policy	yes	161 (70%)	66 (41%)	95 (59%)
	no	69 (30%)	57 (82.6%)	12 (17.4%)
Read the policy	yes	140 (61.7%)	55 (39.3%)	85 (60.7%)
	no	87 (38.3%)	86 (78.2%)	19 (21.8%)

*CCU: coronary care unit, SICU: surgical intensive care unit, NICU: neonatal intensive care unit, MICU: medical intensive care unit, PICU: pediatric intensive care unit

Among the reported complications due to PR (n= 94, 40.9%), skin ulceration and nervousness were reported equally in 58.5% of patients, followed by an increase in blood pressure, and muscle atrophy (5. 20 % and 5.3%, respectively).

3.1 Nurses' knowledge regarding the Use of PR and alternative methods:

Table 2 (section I) illustrates the distribution of nurses' knowledge levels among different hospital types (knowledge 1-15). Both male and female nurses displayed varying levels of knowledge across different questions. However, the number of females who answered correctly is higher than males (not shown in table 2).

The total knowledge scores ranged from 0 to 15, with a mean and standard deviation of 11.1 ± 2.46. The patterns of knowledge levels varied across hospital types. Although government hospitals (11.18 ±2.7) scored a higher level of nursing knowledge in comparison to private hospitals (11.00 ±2.16), this difference was not statistically significant (p= 0.563). Detailed results related to nursing knowledge level are shown in Table 2 (Section I).

In terms of using alternative methods before applying the PR, family participation in calming the patient was the most commonly used method (18%), followed by trying to calm the patient by using a sedatives (16%) (Figure 2)

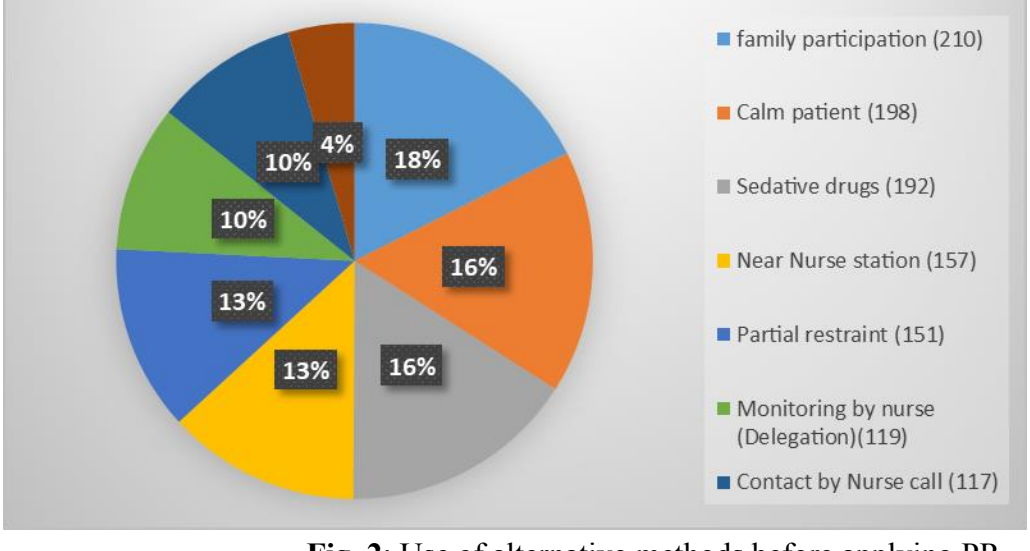

Fig. 2: Use of alternative methods before applying PR

3.2 Nurses' Attitudes Regarding the Use of Physical Restraints:

Table 2 (Section II) displays the distribution of nurses' attitudes. The total attitude scores ranged from 17 to 33, with a mean and standard deviation of 27.04 ± 3.35. There was no significant difference in attitude between nurses working in government and private hospitals (27.1 ±3.54 vs. 26.97 ±3.14, p= 0.778). Detailed results related to nurses' attitudes are shown in Table 2 (Section II).

3.3 Nurses' Practices Regarding the Use of Physical Restraints:

Table 2 (Section III) illustrates the distribution of nurses' practices. The total practice scores ranged from 26 to 42, with a mean and standard deviation of 37.19± 3.33. It is worth mentioning that there was no significant difference in the level of practice between nurses working in government and private hospitals (36.8 ±3.87 vs. 37.58 ±2.54, p= 0.096). Detailed results related to nurses' practices are shown in Table 2 (Section III).

Table 2: Nurses' knowledge, attitude, and practice levels based on hospital types

Section I: Nurses' knowledge level toward PR (Only correct answers presented) (N = 230)				
Knowledge Item		Correct answers N (%)	Hospital type	
			Government N (%)	Private N (%)
1-PR Definition		216 (93.9%)	117 (54.2%)	99 (45.8%)
2- PR implementation to protect Pt*.& surrounding		210 (91.3%)	118 (56.2%)	92 (43.8%)
3- pt. right to refuse		138 (60%)	81 (58.7%)	57 (41.3%)
4- PR needs Dr*. order		184 (80%)	89 (48.4%)	95 (51.6%)
5- the main cause is pt. confusion		183 (79.6%)	95 (51.9%)	88 (48.1%)
6-nurse should check every 2 hours		169 (73.5%)	97 (57.4%)	72 (42.6%)
7- PR should be fixed around the target body part		140 (60.9%)	75 (53.6%)	65 (46.4%)
8- pt. should be in an upright position during the restrain		189 (82.2%)	105 (55.6%)	84 (44.4%)
9- PR has some complication		202 (87.8%)	106 (52.5%)	96 (47.5%)
10- PR should not be fixed to side rails		126 (54.8%)	62 (49.2%)	64 (50.8%)
11- PR should have a special form		195 (84.8%)	101 (51.8%)	94 (48.2%)
12- Using PR without cause has legal issues		201 (87.4%)	106 (52.7%)	95 (47.3%)
13- the nurse can apply PR without an order in an emergency		162 (70.4%)	81 (50%)	81 (50%)
14- There are alternative methods before applying PR		144 (62.6%)	84 (58.3%)	60 (41.7%)
15- PR may cause complications &death		139 (60.4%)	66 (47.5%)	73 (52.5%)
Section II: Nurses' attitude toward PR (N = 230)				
Attitude items (I believe that….		Total N (%)	Hospital type	
			Government N (%)	Private N (%)
1-family members have the right to refuse PR	Disagree	59 (25.7%)	37(62.7%)	22 (37.3%)
	Don't have an opinion	15 (6.5%)	7 (46.7%)	8 (53.3%)
	Agree	156 (67.8%)	79 (50.6%)	77 (49.4%)
2-nurses have the right to refuse to use PR	Disagree	53 (23%)	26 (49.1%)	27 (50.9%)
	Don't have an pinion	45 (19.6%)	20 (44.4%)	25 (55.6 %)
	Agree	131 (57%)	76 (58%)	55 (42%)
3- If I were a patient, I feel that I had the right to refuse to be restrained	Disagree	38 (16.5%)	17 (44.7%)	21 (55.3%)
	Don't have an opinion	18 (7.8%)	9 (50%)	9 (50%)
	Agree	174 (75.7%)	97 (55.7%)	77 (44.3%)
4-I feel guilty when placing a restrainer	Disagree	80 (34.8%)	45 (56.3%)	35 (43.8%)
	Don't have an opinion	31 (13.5%)	12 (38.7%)	19 (61.3%)
	Agree	119 (51.7%)	66 (55.5%)	53 (44.5%)
5- Shortage of the staff is not a cause to restraint the patient	Disagree	124 (53.9%)	57 (46%)	67 (54%)
	Don't have an opinion	20 (8.7%)	10 (50%)	10 (50%)
	Agree	86 (37.4%)	56 (65.1%)	30 (34.9%)
6- I feel embarrassed when family members enter the restrained patient's room and they have not been informed	Disagree	103 (44.8%)	56 (54.4%)	47 (45.6%)
	Don't have an opinion	25 (10.9%)	12 (48%)	13 (52%)
	Agree	102 (44.3%)	55 (53.9%)	47 (46.1%)
7- The hospital is responsible to adhere to the laws on the use of restraints	Disagree	17 (7.4%)	4 (23.5%)	13 (76.5%)
	Don't have an opinion	12 (5.2%)	8 (66.7%)	4 (33.3%)
	Agree	201(87.4%)	111 (55.2%)	90 (44.8%)
	Disagree	10 (4.3%)	8 (80%)	2 (20%)

8- I will feel a little uncomfortable if a pt. becomes more upset after being restrained	Don't have an opinion	13 (5.7%)	7 (53.8%)	6 (46.2%)
	Agree	207 (90%)	108 (52.2%)	99 (47.8%)
9- I feel that it is important to tell the restrained patients that I am concerned about.	Disagree	5 (2.2%)	2 (40%)	3 (60%)
	Don't have an opinion	7 (3%)	5 (71.4%)	2 (28.6%)
	Agree	218 (94.8%)	116 (53.2%)	102 (46.8%)
10- Patients suffer from feeling inferior when they are restrained	Disagree	60 (26.1%)	37 (61.7%)	23 (38.3%)
	Don't have an opinion	36 (15.7%)	19 (52.8%)	17 (47.2%)
	Agree	134 (58.3%)	67 (50%)	67 (50%)
11- Generally, I feel confident to perform physical restraint for Patients	Don't have an pinion	15 (6.5%)	13 (86.7%)	2 (13.3%)
	Agree	21 (9.1%)	13 (61.9%)	8 (38.1%)
	Disagree	194 (84.3%)	97 (50%)	97 (50%)

Section III: Nurses' practice regarding the use of PR (N = 230)				
Practice items		Total N (%)	Hospital type	
			Government N (%)	Private N (%)
1-I try alternative methods before Physically restraining the patient	Never	2 (0.9%)	1 (50%)	2 (0.9%)
	Sometimes	65 (28.3%)	36 (55.4%)	65 (28.3%)
	Always	16 (70.9%)	86 (52.8%)	163 (70.9%)
2- I restrain the patient after the order	Never	25 (10.9%)	20 (80%)	25 (10.9%)
	Sometimes	80 (34.8%)	36 (45%)	80 (34.8%)
	Always	125 (54.3%)	67 (53.6%)	125 (54.3%)
3-When felt that the patient did not need to be restrained, I informed the doctor	Never	25 (10.9%)	15 (60%)	25 (10.9%)
	Sometimes	51 (22.2%)	27 (52.9%)	51 (22.2%)
	Always	154 (67%)	81 (52.6%)	54 (67%)
4-I respond to the call for 'help' from a restrained patient immediately	Never	5 (2.2%)	2 (40%)	5 (2.2%)
	Sometimes	35 (15.2%)	14 (40%)	35 (15.2%)
	Always	190 (82.6%)	107 (56.3%)	190 (82.6%)
5-I examine restrained patients at least on a two-hour basis.	Never	3 (1.3%)	2 (66.7%)	3 (1.3%)
	Sometimes	35 (15.2%)	26 (74.3%)	35 (15.2%)
	Always	192 (83.5%)	95 (49.5%)	192 (83.5%)
6-When giving personal care to the restrained patients, I examine their skin to find red parts or bruised	Never	4 (1.7%)	2 (50%)	4 (1.7%)
	Sometimes	22 (9.6%)	15 (68.2%)	22 (9.6%)
	Always	204 (88.7%)	106 (52%)	204 (88.7%)
7-I tell the patients why they are restrained	Never	2 (0.9%)	1 (50%)	1 (50%)
	Sometimes	18 (7.8%)	9 (50%)	9 (50%)
	Always	210 (91.3%)	113 (53.8%)	97 (46.2%)
8-I inform the patient when the restraint will be removed	Never	3 (1.3%)	0 (0%)	3 (100%)
	Sometimes	29 (12.6%)	16 (55.2%)	13 (44.8%)
	Always	198 (86.1%)	107 (54%)	91 (46%)
9-Nurses reassure the patients that the restraints will be removed when their condition improves	Never	4 (1.7%)	1 (25%)	3 (75%)
	Sometimes	26 (11.3%)	16 (61.5%)	10 (38.5%)
	Always	200 (87%)	106 (53%)	94 (47%)
10-Shortage of the staff is not a cause to restrain pt.	Never	134 (58.3%)	64 (47.8%)	70 (52.2%)
	Sometimes	52 (22.6%)	30 (57.7%)	22 (42.3%)
	Always	44 (19.1%)	29 (65.9%)	15 (34.1%)
11-All staff will strive together to find other ways to control the Pt. behavior of violence.	Never	2 (0.9%)	1 (50%)	1 (50%)
	Sometimes	89 (38.7%)	51 (57.3%)	38 (42.7%)
	Always	139 (60.4%)	71 (51.1%)	68 (48.9%)
12- I continuously monitor the condition of the restrained patient until I can remove the restraint	Never	4 (1.7%)	3 (75%)	1 (25%)
	Sometimes	34 (14.8%)	24 (70.6%)	10 (29.4%)
	Always	192 (83.5%)	96 (50%)	96 (50%)

13-During restraining the patient I record all of this data in his file (when, type, causes…)	Never	22 (9.6%)	20 (90.9%)	2 (9.1%)
	Sometimes	50 (21.7%)	33 (66%)	17 (34%)
	Always	158 (68.7%)	70 (44.3%)	88 (55.7%)
14-I always follow up with restrained patients to prevent complications	Never	3 (1.3%)	2 (66.7%)	1 (33.3%)
	Sometimes	45 (19.6%)	33 (73.3%)	12 (26.7%)
	Always	182 (79.1%)	88 (48.4%)	94 (51.6%)

Pt.: Patient, Dr.: Doctor

3.4 Factors Associated with Nurses' Knowledge levels, attitudes, and practices regarding PR use

3.4.1 Demographic data:

An independent samples t-test or ANOVA test was conducted (as appropriate) to compare nurses' knowledge, alternative methods, attitudes, and practice in relation to different demographics. The results revealed that nurses' gender, educational level, experience, and type of training program received by the nurse on PR have no statistically significant relationship with the four different aspects of PR. Receiving training on the use of PR had a positive significant relationship with the use of alternative methods before PR the patients and the total practice score (5.61±1.5 vs. 4.76±1.88 $p<0.001$; 37.60±3.11 vs. 36.73±3.51 $p=0.049$, respectively) with no significant relationship with total knowledge and total attitude score. Furthermore, the presence of PR as part of the new hire orientation program and the number of times of PR procedure possessed a significant relationship with the use of alternatives before PR the patients ($p<0.00$ and $p=0.43$, respectively). However, there were no significant relationships between the use of alternatives before PR and total knowledge, attitude, and practice ($p=0.43$) (Table 3) (only significant relationships are shown).

Table 3: Comparison of nurses' total knowledge, attitude, and practice and use of alternatives in relation to different demographics (only significant relationships are shown in the table)

Indicator	Main variables	Responses	M	SD	Test statistics	P value
Receive training on the use of PR	Total alternatives	Yes	5.61	1.50	3.803	<0.001[a]
		No	4.76	1.88		
	Total practice	Yes	37.60	3.11	1.977	0.049[a]
		No	36.73	3.51		
PR as part of new hire orientation program or Unit orientation program	Total alternatives	Yes	6.29	1.34	5.109	<0.001[a]
		No	4.82	1.94		
frequencies of using PR	Total alternatives	Zero times	5.11	1.66	2.768	0.043[b]
		Less than 5 times	5.45	1.63		
		From 5 to 10 times	4.81	1.82		
		More than 10 times	4.33	2.43		

a: independent t-test; b: ANOVA

3.4.2 work-related characteristics

Using an independent samples t-test or ANOVA (as appropriate) it was fond that the nurses who are working in private hospitals scored a significantly higher level of using alternatives before PR the patient than those in government hospitals (p= 0.003), but there was no significant correlation in terms of total knowledge, attitude, and practice. Nurses in accredited hospitals showed a significantly higher level of total knowledge (p= 0.01), using alternatives (p= 0.025), and practice (p< 0.001) but there was no significant correlation between hospital accreditation and nurses' attitudes toward using PR. On the other hand, the type of ICU where the nurse is working showed a statistically significant correlation with the total use of alternatives (p= 0.016), attitude (p< 0.001), and practice (p= 0.002) but not total knowledge (Table 4).

Table 4: Comparison of nurses' total knowledge, attitude, practice and use of alternatives, in relation to the type of hospital, accreditation, and type of ICUs

Indicator	Main variables	Hospital/ward type	M	SD	Test statistics	P value
Type of hospital	Total knowledge	Governmental	11.26	2.89	0.476	0.634
		Private	11.09	2.32		
	Total alternative	Governmental	4.88	1.85	-3.054	0.003[a]
		Private	5.57	1.54		
	Total attitude	Governmental	27.34	4.55	0.706	0.481[a]
		Private	26.97	3.13		
	Total practice	Governmental	36.84	3.87	-1.673	0.096[a]
		Private	37.57	2.53		
Accreditation	Total knowledge	Not accredited	10.73	2.43	-2.605-	.010[a]
		Accredited	11.58	2.43		
	Total alternatives	Not accredited	4.98	1.66	-2.255-	.025[a]
		Accredited	5.51	1.83		
	Total attitude	Not accredited	27.00	3.60	-.203-	.839[a]
		Accredited	27.09	3.00		
	Total practice	Not accredited	36.44	3.61	-4.025-	<0.001[a]
		Accredited	38.17	2.64		
Type of ICUs	Total knowledge	ICU	10.99	2.66	1.814	0.111[b]
		CCU	11.61	2.43		
		SICU	11.27	1.83		
		NICU	12.19	2.44		
		MICU	9.44	4.30		
		PICU	12	2.82		
	Total alternatives	ICU	4.89	1.79	2.849	0.016[b]
		CCU	5.84	1.28		
		SICU	5.90	1.30		
		NICU	5.33	1.90		
		MICU	5	2.23		
		PICU	6	2.82		
	Total attitude	ICU	26.94	3.21	6.117	< 0.001[b]
		CCU	27.76	2.82		
		SICU	25.50	3.06		
		NICU	30.66	7.49		
		MICU	25.11	3.62		
		PICU	22	4.24		
	Total practice	ICU	36.56	3.48	3.886	0.002[b**]
		CCU	38.64	2.47		
		SICU	37.40	2.75		
		NICU	38.80	3.14		
		MICU	36.11	3.48		
		PICU	37	1.41		

a: independent t-test; b: ANOVA

3.6 The relationship between nurses' knowledge, using alternatives before PR the patient, attitudes, and practices:

Correlations among the main variables revealed several significant associations. e.g., a significant weak positive correlation was found between total knowledge and use of alternatives before physically restrain the patient ($r = .275$, $p < .01$), total knowledge and total attitude ($r = .225$, $p < .001$), total knowledge and patient age ($r = .173$, $p < .01$), total alternatives and total attitude ($r = .199$, $p < .01$), total attitude and total practice ($r = .142$, $p < .05$), and age and total practice ($r = .134$, $p < .05$), indicating that older nurses tended to engage in a higher level of PR practice. On the other hand, a significant moderate positive correlation was observed between total knowledge and total practice ($r = .434$, $p < .01$), total alternatives and total practice ($r = .43$, $p < .01$). In contrast, there was no correlation between nurses' age and total use of alternatives ($r = -.071$, $p = .284$). Table 5

Table 5: Correlations among the variables

Variables	Total knowledge	Total alternatives	Total attitude	Total practice	Age
Total knowledge	-				
Total alternatives	0.275**	-			
Total attitude	0.225**	0.199**	-		
Total practice	0.434**	0.430**	0.142*	-	
Age	0.173**	-0.071	0.080	0.134*	-

r= Pearson correlation coefficient; *. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

4. Discussion:

The purpose of the current study was (I) to assess the Jordanian nurses' knowledge, attitudes, and practice regarding the proper use of PR and its alternatives in different hospital sectors and ICU types, and (II) to determine the contributing factors that may affect Jordanian nurses' knowledge, attitudes, and practice toward the proper use of PR. This study is one of the limited studies to examine Jordanian nurses' attitudes, knowledge, and practices toward the use of PR among different critical care units and different types of hospitals (government vs. private and accredited vs. non-accredited hospitals). On the other side, it provides important information to the literature that can guide future educational and interventional programs in this area.

4.1 Nurses' knowledge, Attitudes, and practices regarding the Use of Physical Restraints:

The findings showed that the total knowledge of the nurses was at a moderate level. These finding is slightly different from Azab and Negm's study when they screened 131 nurses working in different critical care units and found that the total knowledge score varied from 6 to 14 which was considered a low knowledge score (Azab and Negam, 2013). Also, the findings showed that the subjects displayed a moderate level of attitude overall. In terms of total practice, the current cohort exhibited a high level of practice engagement. These findings are consistent with the previous studies (Al-Khaled et al., 2011; Taha, 2013).

Although there is still a deficit in the total knowledge regarding PR, the researchers hypothesize that the nurses will adopt a more improving level and use PR more safely if the information gap is closed as there is a significant weak relationship between total knowledge and total attitude, indicating that as total knowledge increases, the total attitude also tend to increase. Furthermore, a significant weak association was observed between total practice and total attitude, indicating that nurses with higher levels of total practice tended to have more positive attitudes. In this regard, Janelli *et. al*. in their study reported that programs for in-service education should emphasize the advantages and disadvantages of restraint, alternate methods, safe practices, legal and ethical concerns, and the significance of documentation as well as the rights of patients and their families (Janelli et al., 2006).

4.2 Effect of different demographics:

The current study showed no significant relationship between nurses' gender, educational level, or years of experience and the total knowledge, attitudes, and practice scores and use of alternatives before PR the patient which are incongruent with the findings of former researches indicating that the level of academic education and years of experience are associated with the appropriate PR use and could be the cause of a lack of knowledge regarding PR (Almomani et al., 2021: Azab and Negam, 2013; Al-Khaled et al., 2011; Suliman et al., 2017).

The current study reported that most subjects knew about the presence of PR policy at their respective hospitals, but some of them had not read it. According to previous studies, lack of written policies and procedures regarding PR can be the main cause of lack of knowledge (Azab and Negam, 2013; Cannon et al., 2001; Nasrate et al., 2017; Suliman et al., 2017; Taha, 2013).

Unlike previous studies, the present study focused on the use of alternative methods before applying PR to the patients. PR alternative methods are very important to prevent agitated patients from making

unsafe movements. Our study indicated that 62.6% of ICU nurses knew about PR alternative methods and the majority of them were in government hospitals. Regarding alternative methods utilized before applying the PR, ICU nurses reported family participation to help in calming the patient followed by nurses trying to calm the patient and using sedative drugs. Other studies also reported that nurses should think about these alternatives (e.g. massage or music therapy) before PR the patients (Bray et al., 2004; Kandeel and Attia, 2013). Accordingly, we suggest that all nurses should think about the use of alternatives before applying PR to the patient which may help in calming the patient and protect nurses from exposure to ethical issues. Suliman *et. al.* believe that inappropriate practices & techniques while applying PR, expose nurses to moral or legal dilemmas with families and hospitals (Suliman et al., 2017). Also, our study reported a significant difference among ICUs in terms of total attitude, practice scores, and alternative techniques used before applying PR which may be associated with different types of patients, patient' condition, and consciousness state among different units.

4.3 Nurses' knowledge, attitudes, and practices based on type of hospitals & accreditation status:

Descriptive statistics revealed that participants from private hospitals had significant higher mean scores in using PR alternatives than nurses from government hospitals. No other significant difference was found between government and private hospitals.

Accreditation is considered as a source of competition between hospitals (Al-Sayedahmed et al., 2023). The present study showed a significant difference in total knowledge, use of alternatives and practice between accredited and non-accredited hospitals. A previous study reported after analysis of pre-and post-accreditation questions filled by sixty-seven nurses that the accreditation process improves perceptions of patient safety and care quality and promotes the use of safe methods (Al-Awa et al., 2010). In this regard, our study showed that most of the subjects knew about the presence of PR policy at their respective hospitals but only 61.7% of them had read it which may have happened at the time of starting the accreditation process. This result is in alignment with another study which reported that most hospitals have a PR policy. However, there is still an inadequate in-service training program on the use of PR in the ICU, and more than half of staff nurses neither knew nor had studied the policy in the absence of accreditation (Nasrate et al., 2017).

4.4 Nurses' knowledge, Attitudes, and practices regarding PR training program

The findings revealed a significant relationship between receiving training on the use of PR and the nurses' practice and the possibility of using alternatives before PR the patient. While the presence of PR as part of new hire orientation program or unit-specific orientation program had a significant association with the possibility of using alternatives before PR the patient only. These findings are congruent with The literature demonstrating that implementing in-service education programs will improve the knowledge of nurses and reduce restraint-related malpractices (Pellfolk et al., 2010; Huang et al., 2009).

This study has some limitations. Nurses' practice was assessed using a self-reported questionnaire which might lack observation methods that are more reliable and accurate. The cross-sectional nature of the study does not allow for causal conclusions. Also the convenience sampling method just in Jordan ICUs could affect the generalizability of the results. Therefore, the findings should be used with caution.

5. Conclusion:

The current study indicates variations in nurses' knowledge levels, attitudes, and practices across different areas and hospital types. These findings emphasize the importance of PR as an essential element in the new hire orientation program, unit-specific training program, and targeted in-service educational programs to address knowledge gaps and ensure consistent delivery of high-quality care across diverse healthcare settings. In-service education unit in private or government hospitals has a golden role in improving nurses' knowledge levels and practices which has a positive impact on promoting a conducive work environment and enhancing patient safety and care outcomes. In addition to that, the journey of accreditation has a radical impact on improvement among different hospitals which eliminates the differences and differentiation between private and government hospitals. Assessing the correlations among variables revealed several significant associations between nurses' knowledge, attitude, practice, and use of PR alternatives, though none of them was considered a strong correlation. Hospital nursing managers & policymakers should offer more encouragement to clinical nurses to help improvement in nursing knowledge and their skills regarding PR application and decrease the preventative use of it. Meanwhile, the related alternative methods and ethical issues

regarding PR use should be informed and discussed with clinical nursing staff by the ethical committee and nursing educators.

Ethical Considerations

Complying with ethical guidelines

Ethical approval was obtained from the institutional review board (IRB) of Al-Balqa Applied University and registered under (NO: 26/03/01/2089). Also, ethical approvals were obtained from IRB committees of all participating hospitals before the questionnaire distribution and data collection process. Furthermore, informed consent was signed and obtained from each nurse before participation. All participants were informed that their participation was completely voluntary and they had the liability to withdraw from the study without any reason. The confidentiality of the nurses' information was confirmed and all collected information in this study was anonymous.

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