

Nurses Practice and Influencing Factors regarding Physical Restraint use in the Intensive Care Units in Northwest Ethiopia

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Abstract

Background: Physical restraint is a common clinical practice in intensive care units. Even though physical restraint is used to prevent the removal of life support tubes and risk of a patient's falling injury; complications such as edema, laceration, and pain at the restrained site, restricted circulation, worsening of agitation or delirium that may end with death are frequently encountered. Despite the sensitivity of the problem, there are gaps in nurses' evidence-based practice in Ethiopia. Before developing protocols and guidelines relevant evidence-based practices of nurses are required. So, this study aimed to assess the practice and influencing factors of nurses regarding physical restraint use in the intensive care units in northwest Ethiopia.

Methods: An institution-based cross-sectional study was conducted from July to August 2019 at Amhara regional state referral hospitals, Northwest Ethiopia. A total of 260 nurses in the intensive care units were invited to take part in the study by a convenience sampling technique. The Level of Knowledge, Attitudes, and Practices of Staff Regarding Physical Restraints Questionnaire was used to assess the nurses' knowledge, attitude, and practice. Linear regression analysis was computed to examine the influencing factors of nurses' practice. An adjusted unstandardized beta (β) coefficient with a 95% confidence interval was used to report the result of association. Statistical significance was declared at p -value <0.05 .

Result: The mean score of the nurses' practice regarding physical restraint use among critically ill patients was 30.94 ± 5.44 . This mean score is above the scale midpoint nearer to the higher range that implies the majority of nurses have a satisfactory practice regarding physical restraint. Less than or equal to 2 years of work experience [$\beta = -1.34$, 95% CI (-2.47, -0.21)] was significantly associated with poor nurses practice; received training regarding restraints [$\beta = 1.49$, 95% CI (0.16, 2.82)], higher level of knowledge [$\beta = 0.40$, 95% CI (0.03, 0.78)] and better attitude scores [$\beta = 0.37$, 95% CI (0.27, 0.47)] were associated with good nurses practice regarding physical restraint use.

Conclusion: Nurses working in the intensive care units had a satisfactory practice regarding physical restraint use on critically ill patients. So developing and providing educational and in-service training to the nurses on the alternative strategies, complications, and risks of physical restraint are important to strengthening the quality of nursing care for critically ill patients.

Introduction

Physical restraints are any physical or mechanical tools and devices attached to or near the patient's body that restricting a person's freedom of movement, physical activity, or normal access to his/ her body that could not be controlled by the patient (1-3). It is commonly used in hospitals especially in the intensive care units when patients' are physically harmful to themselves and others, confused, and when the alternative methods are insufficient or contraindicated (4-6). Because of the questionable ethical and legal issues affecting the autonomy and dignity of patients the practice of physical restraint (PR) is controversial (5, 7, 8). Health care professionals use restraints to reduce the risk of a patient falling;

prevent removal of life support equipment and procedures, and reduce the risk of patients harming him/her or others (8, 9). Restraining of patients with delirious behavior is important to avoid danger and injure patients/ others, continue life support treatments such as mechanical ventilation, nasogastric tubes, or intravenous lines through physical activity restriction (8-10). Conversely, PR may result in impending to freedom of patients and worsening of agitated/ delirious behaviors(11, 12).

Several works of literature reported that the rate of PR use range from 3.4% to 79% worldwide (13-16). Around 80% of critically ill patients who are admitted in the intensive care units (ICUs) have agitation, confusion, sleeplessness, and disruptive behaviors (1). ICU staffs try to reduce those behaviors by using different measures like lowering bed height, raising bed rails, using the sedating medication before physical restraint (17, 18). However, some nursing staff may not follow this rule due to staff and resource restrictions, fear of disruption of medical devices, or lack of information about alternatives to restraints. The nurses play a critical role in the care of restrained patients with those behaviors: there is a need to use the least restrictive devices; frequently reassessing of the patient's response; removing the restraint every two hours, and inform relatives to the need of restraint and assistance with activities of daily living (19, 20). Modifying and focusing on care plan including frequent position changes and skin care; provision of adequate range of motion, and ongoing assessment of the underlying condition for the appropriate use of PR are the other good nursing care for restrained patients (6, 19, 20). Besides, early detection of delirium risk factors; management of pain, agitation and delirium by using medications are also required to get a good outcome (19).

Good quality of service in ICU is predicted by the nurses' practice regarding PR use on critically ill patients (21). Inappropriate nurses' practice regarding PR use is common in ICUs with the prevalence rate range 1.7%-75% (22-25). According to the different literatures report, the mean score of nurses' practices ranges from 17.08 to 45.44 (14, 24, 26). Physically restrained patients in the ICU may encounter adverse psychological and physical consequences such as skin edema, laceration and pain at the restrained site, respiratory distress, worsening of agitation or delirium, and neurovascular complications that may end with death (8, 27-29). More than half of critically ill patients were restrained and faced complications that pointed out by the improper clinical practice of nurses on it (23, 30, 31). Yet, despite these potential complications, there are insufficient guidelines and regulations on the use of PR present itself as a serious problem (20). This problem is continued up to now in the developing countries including Ethiopia.

The influencing factors for nurses' better practice on PR use were male in gender, longer year of experience, and advanced work experience at ICU, day shift work, higher academic qualification, lower number of patient care per day, and getting In-service and educational training regarding PR (16, 22, 24, 32). Nurses with a higher level of knowledge and a better attitude regarding restraining can apply good practices on PR (1, 32). Those factors may also similarly influence our nursing staff's practices on PR use in critical care settings. As far as our searching, there are no works of literature regarding the influencing factors in our country. So to ensure those factors are whether influences or not nurses practice, an evidence-based study is needed.

In developed countries such as the United States(31, 33), several European (29, 30, 34), Asian countries (23), and a few African countries (24, 35), the application of physical restraint in hospitals is investigated. Even if there are variations to PR use in the ICUs, those countries recommended evidence-based medical restraints to be used and implemented in hospitals to minimize PR related consequences and ethical and legal issues. Additionally, educational training, protocols, and policies have developed and applied for proper documentation and the use of restraints on agitated/ delirious patients (16, 36). From the researchers' clinical observations, in Amhara region public hospitals, PR is a common clinical practice of nursing care in ICUs to prevent confused patients' disruption of medical management. The usually used devices for restraining in the hospitals are ropes, chains, bed belts, gauze, and patient's cloth. These devices often associated with complications such as skin edema & laceration at the restrained site, aspiration and breathing difficulty, restricted circulation, and worsening of agitation/ delirium.

Although restraints are commonly used locally, to our knowledge, there are no clear evidence and studies present in Ethiopia to the practice, its efficacy, and risks involved in the use of restraining, or policies and guidelines concerning PR use. Before preparing and developing guidelines and educational training methods for nurses, it is better to know about nurses' clinical practice regarding PR, and then develop guidelines and strategies to reduce the use of PR or to ensure the proper practice of restraining patients. Therefore, this study aimed to assess the nurses' practice and influencing factors regarding PR use in the ICUs.

Methods

Study setting and population

Multi-centered institution based cross-sectional study was conducted among nurses working in the ICUs at Amhara Regional State Referral Hospitals (ARSRHs), Northwest Ethiopia from July to August 2019. There are five referral hospitals (Felege Hiwot, Dessie, Debre Markos, Debre Berhan, and University of Gondar referral hospitals) in which intensive care is provided for critically ill patients. These hospitals provide specialized outpatient and inpatient services in different departments including emergency, surgical, internal medicine, gynecology & obstetrics, psychiatry, intensive care units (neonatal, pediatrics, and adult surgical and medical), ophthalmology, pediatrics, and oncology. Each hospital provides services for an estimated five million population.

The hospitals have their own organized adult medical and surgical ICU with an estimated average of 60-75 critically ill patients admitted per month. But there are a limited number of beds and narrow ICU rooms that affect the care of critically ill patients. The number of ICU beds is 14, 13, 10, 7, & 9 in Felege Hiwot, Dessie, Debre Berhan, Debre Markos, and University of Gondar Referral Hospitals, respectively. Nurses who were working in neonatal and pediatric ICU, on annual leave during data collection and head nurses were excluded from the study. Since the study population was minimal for the adequacy of sample size, all nurses working in adult ICUs (n= 260) in those hospitals invited to participate in the study (60, 56, 52, 34, and 58 nurses from Felege Hiwot, Dessie, Debre Markos, Debre Berhan, and University of Gondar

referral hospitals, respectively). However, 237 nurses have participated with their willingness through convenience sampling technique, with a response rate of 91.2%.

Data collection procedure and tool

Structured self-administered questionnaires including socio-demographic, professional characteristics, and Level of Knowledge, Attitudes and Practices of Staff Regarding Physical Restraints Questionnaire were used. The questionnaire was prepared in accordance with previous works of literature (23-25, 37). Data were collected by five nurses who were the heads of each ICU ward who distributed the questionnaires to the respondents by getting their willingness and collected the filled data. Each questionnaire was accompanied by an information sheet that described the objective of the study and explained that participation was voluntary with written consent. The questionnaire format was filled in their clinical area by the respondent nurses in the presence of the data collectors.

The socio-demographic and professional characteristics of the nurses included gender, age, marital status, academic qualification, work experience in ICU, received educational training regarding PR during graduate class, reading books and articles about PR in the past year, and years of work experiences in ICU. The nurses' practice regarding PR use was measured by using the practice subscale of the Level of Knowledge, Attitudes, and Practices of Staff Regarding Physical Restraints Questionnaire. On the other hand knowledge and attitude sub-scales were used for measuring the nurses' knowledge and attitude regarding PR use respectively. The tool was initially developed by Janelli, Scherer, and Kuhn (1994) (38) and then improved by Suen LKP (1999) (39) again which adapted by Kaya et al. (2008) (40).

The knowledge subscale consists of 11 items that have 10 positively worded questions and 1 negatively worded question. The participants' responded to the questions were agree or disagree. The correct answer is scored as 1, and the wrong answer is scored as 0. The total score range of this part is 0-11; nurses with the total score closer to 0 indicate the lower level of knowledge and those with the total score closer to 11 indicate the highest level of knowledge. The attitude subscale of staff regarding PR is a 4 point likert scale that has 12 items; responses are "strongly agree"= 4 points, "agree"= 3 points, "disagree"= 2 points, and "strongly disagree"=1. The total score range of this part is 12-48. Nurses with the total score approaches to 12 revealed a very poor attitude and those with the total score approach to 48 revealed the best possible attitude regarding PR use. The practice subscale of staff regarding PR use comprised 14 items. The 10th item is negatively worded and is scored reversely. The participants responded in a 3 point scale "never"= 1, "sometimes"= 2 and "always"= 3. The total score range of the practice part is 14-42. Nurses' with a total score closer to 14 indicate very poor/ improper practices and scores closer to 42 indicate excellent/ proper practices regarding PR (38-40). The reliability coefficients for the knowledge, attitudes, and practice scales were 0.65, 0.61, and 0.94, respectively in Suen's (1999) original work (39). Cronbach's alpha coefficient of the knowledge, attitude, and practice sub-scales in this study were 0.76, 0.85 & 0.82, respectively.

Data processing and analysis

Coded variables were entered into Epi-Data version 3.1; then exported to IBM SPSS version-20 for analysis. Frequency, percentage, mean, standard deviation, and range were used to summarize and evaluate the distribution of variables. After performing assumption tests, simple linear regression was performed to determine the correlation of each independent variable with the practice score. Variables with a p-value ≤ 0.1 during simple linear regression such as sex, age, academic qualification, reading books about PR in the past year, received training about PR during graduate class, work experience at ICU, working time type, knowledge and attitude scores were selected for further analysis in multiple linear regression, and model fitness test (adjusted R^2) was also checked. Factors associated with the nurses' practice regarding PR use were reported as adjusted unstandardized β coefficient with a 95% confidence interval at a p-value < 0.05 statistical significance level.

Results

A total of 237 participants took part in the study, with a response rate of 91.2%. The mean age of the participants was 30.50 (SD, 9.93) with a range of 23-40 years. The majority of the participants, i.e. n=148 (62.8%) were married and 129 (54.4%) were males. Nearly two-thirds of the study participants, i.e. n=159 (67.1%) were bachelor's degrees by their academic qualification. Nearly half of the participants n=118 (49.8%) had 6-10 years of experience as a nurse and nearly half of the participants (49.8%) were read books/ articles about PR in the past year. Eighty-one (34.1%) of the study participants were received educational training during their graduate class, but no one had gotten In-service training regarding restraining. More than half of the participants (57.6%) were observed complications associated with PR. The most frequent complication observed by nurses was edema and bruising (49.3%), and pain (38.2%) around the restrained part. Fatigue (30.9%), agitation (11%), and aspiration (5.9%) were the other types of reported complications associated with PR use among critically ill patients (**Table 1**).

Table 1: Socio-demographic and professional characteristics of nurses working in the ICUs at Amhara regional state referral hospitals, 2019 (n=237)

Variables		Frequency	Percent (%)
Sex	Male	129	54.4
	Female	108	45.6
Participants religion	Orthodox	181	76.4
	Muslim	43	18.1
	Protestant	13	5.5
Marital status	Unmarried	71	30.0
	Married	148	62.4
	Divorced	18	7.6
Academic qualification	Diploma	25	10.5
	Bachelor's	159	67.1
	Master's	53	22.4
Experience as a nurse	≤ 5 years	94	39.7
	6-10 years	118	49.8
	>10 years	25	10.5
Work experience at ICU	≤ 2 years	105	44.3
	3-5 years	87	36.7
	≥ 6years	45	19.0
Use of PR in the past month	Yes	96	40.5
	No	141	59.5
Reading books about PR in the past year	Yes	118	49.8
	No	119	50.2
Received educational training during graduate class about PR	Yes	81	34.2
	No	156	65.8
Use of alternative methods before PR	Yes	125	52.7
	No	112	47.3
Number of patients care per day	2 patients	59	24.9
	3-4 patients	122	51.5
	≥5 patients	56	23.6
Working shift time	Day shift	66	27.8
	Night shift	35	14.8
	Day and/ night Shift	136	57.4
Observe complications from PR	Yes	136	57.4
	No	101	42.6
If yes, which type of complication is observed?	Edema and bruising	67	49.3
	Pain	52	38.2
	Fatigue	42	30.9
	Agitation-anger	15	11.0
	Respiratory distress	10	7.4
	Aspiration	8	5.9
Age	Range =23-40	Mean=30.5	SD= 9.93

Knowledge, attitude, and practice of nurses working in ICU regarding PR use

The mean score of knowledge regarding PR among nurses working in the ICUs was 7.81 ± 1.89 (95% CI 7.56, 8.05), ranged from 4-11. The mean score of nurses' attitude regarding PR was 33.73 ± 6.50 (95% CI 32.89, 34.56), ranged from 18-47. Also, the mean score of the nurses' practice regarding PR use was 30.94 ± 5.44 (95% CI 30.25, 31.64), ranged from 19-40. The proportion of the participant nurses' who have

scored above the practice scale midpoint was 71.7%; this indicated that the majority of nurses' had a satisfactory practice regarding PR (**Table 2**).

Table 2: The total mean score of participant nurses knowledge, attitude, and practice regarding physical restraint, 2019 (n=237)

Sub-scales	Mean \pm SD (95% CI)	Score range	Above scale midpoint (%)
Knowledge	7.81 \pm 1.89; (7.56, 8.05)	4-11	80.9
Attitude	33.73 \pm 6.50; (32.89, 34.56)	18-47	68.8
Practice	30.94 \pm 5.44; (30.25, 31.64)	19-40	71.7

More than half of the nurses (57%) responded "always" to the question "I try alternative nursing methods before physically restraining the patient" and nearly half of the nurses (48.9%) also gave answer "always" for the question "I frequently evaluate and record the effect of physical restraint when it is applied to a patient". Half of the participants (49.8%) responded "sometimes" to the question "When physical restraint is applied. I record on the nursing charts the type of restraint used, the reason for adopting it, the time when the application commences, and the related nursing care required". Whereas 81 (34.2%) of the nurses responded: "never" to the question "I explain to the patient why the restraint is being applied" (**Table 3**).

Table 3: The participant nurses practice response regarding physical restraint use at Amhara regional state referral hospitals, 2019 (n=237)

Items	Responses n (%)		
	Always	Sometimes	Never
1. I try alternative nursing methods before physically restraining the patient	135 (57.0)	87 (36.7)	15 (6.3)
2. When I restrain a patient, I make this decision only with a physician's order.	77 (32.5)	130 (54.9)	30 (12.7)
3. When I feel that the patient does not need to be restrained. I make this suggestion to the doctor	65 (27.4)	118 (49.8)	54 (22.8)
4. I answer the call for the patient who is restrained as soon as possible.	98 (41.4)	90 (38.0)	49 (20.7)
5. I check the restraint every two hours to make sure they are in the proper position.	98 (41.4)	96 (40.5)	43 (18.1)
6. I inspect the skin of the patient for abrasions or skin tears if I bath the Patient who is restrained.	90 (38.0)	104 (43.9)	43 (18.1)
7. I tell family members why the patient is being restrained.	82 (34.6)	114 (48.1)	41 (17.3)
8. I explain to the patient why the restraint is being applied	55 (23.2)	101 (42.6)	81(34.2)
9. I tell the patient when the restraints will be removed.	75 (31.6)	107 (45.1)	55 (23.2)
10. More patients are restrained when we are short of staff than when we are fully staffed.	44 (18.6)	130 (54.9)	63 (26.6)
11. In our hospital staff members work together to discover ways to control patients' behavior other than the use of physical restraints.	99 (41.8)	106 (44.7)	32 (13.5)
12. I frequently assess if the restraint should be removed	67 (28.3)	147 (62.0)	23 (9.7)
13. When physical restraint is applied; I record on the nursing charts the type of restraint used, the reason for adopting it, the time when the application commences, and the related nursing care required.	97 (40.9)	118 (49.8)	22 (9.3)
14. I frequently evaluate and record the effect of physical restraint when it is applied to a patient	116 (48.9)	91 (38.4)	30 (12.7)

Factors associated with the nurses' practice regarding PR use

The simple linear regression analysis showed that age, sex, academic qualification, reading books about PR in the past year, received educational training about PR during graduate class; years of work experience at ICU, knowledge and attitude scores were the variables found to be associated with practice regarding PR at p-value ≤ 0.1 . The result of the multiple linear regression indicated that received educational training during graduate class, ≤ 2 years' work experience at ICU, knowledge, and attitude score were the factors significantly associated with the nurses' practice regarding PR use at p-value < 0.05 .

Nurses who had ≤ 2 years' work experience at ICU, their knowledge regarding PR use is lower by 1.34 [95% CI= -2.47, -0.21] units, compared to nurses with ≥ 6 years' work experience at ICU. The Nurses' practice regarding PR use is higher by 1.49 units [95% CI= 0.16, 2.82] among nurses who had received training during graduate class compared to those who hadn't received educational training. The Nurses' practice regarding PR use is increased by 0.40 [95% CI= 0.03, 0.78] units as their knowledge score higher by a unit. Furthermore, a unit increase in the nurses' attitude score results in 0.37 units [95% CI= 0.27, 0.47] higher the nurses' practice regarding PR use (**Table 4**).

Table 4: Factors associated with nurses practice regarding physical restraint use in multiple linear regression analysis, 2019 (n=237)

Variables	Crude unstandardized β coefficient (95% CI)	Adjusted unstandardized β coefficient (95% CI)	t-value	P-value
Sex				
Male	0	0		
Female	-3.29 (-4.62, -1.96)	-0.53 (-1.66, 0.60)	-0.896	0.371
Age of nurses	0.36 (0.16, 0.56)	-0.03 (-0.21, 0.14)	-0.272	0.768
academic qualification				
Master's	0	0		
Bachelor's	-1.39 (-2.86, 0.09)	0.48 (-1.01, 1.97)	0.769	0.443
Diploma	-5.66 (-7.81, -3.51)	-0.47 (-2.90, 1.95)	-0.230	0.542
Reading about PR in the last year				
No	0	0		
Yes	5.22 (3.99, 6.44)	1.09 (-0.26, 2.44)	1.853	0.115
Received training about PR during graduate class				
No	0	0		
Yes	5.14 (3.82, 6.45)	<i>1.49 (0.16, 2.82)</i>	2.312	0.020
Work Experience at ICU				
≥ 6 years	0	0		
3-5 years	0.02 (-1.43, 1.47)	-0.72 (-2.23, 0.79)	-1.116	0.266
≤ 2 years	-2.73 (-4.09, -1.37)	<i>-1.34 (-2.47, -0.21)</i>	-2.314	0.022
Working time type				
Regular day	0	0		
Shift day or night	-2.32 (-3.69, -0.94)	-1.06 (-2.74, 0.60)	-0.946	0.271
Shift day and night	0.30 (-1.66, 2.27)	-0.38 (-1.97, 1.21)	-0.503	0.615
Knowledge	1.52 (1.21, 1.83)	<i>0.40 (0.03, 0.78)</i>	2.306	0.022
Attitude	0.57 (0.49, 0.65)	<i>0.37 (0.27, 0.47)</i>	7.225	<0.001

Note: *Italic style=statistical significant results*
Adjusted $R^2 = 50.2\%$, F -test= 22.53, P -value<0.001).

Discussion

This study carried out to reveal the level of nurses' practice and influencing factors regarding PR in the ICUs. Even though PR is used to prevent removal of life support tubes and falling injure of agitated

patients in the critical care, complications such as skin edema and laceration at the restrained site, respiratory distress, worsening of agitation or delirium are encountered (8, 27, 28). Usually, this caused by the nurses' improper clinical practice on restraining. Due to this, alternative strategies such as lowering bed height, raising bed rails, settling a family with patients, early detection of delirium risk factors, and using medications are important to reduce the application of PR in the ICUs (17-19). If it is used, the nurses should practice it by considering ethical issues based on policies & guidelines of restraining to reduce the adverse events and enhancing the quality of ICU care services.

This study reflected that majority of the nurses' had a satisfactory practice regarding PR use in which greater than 71% of the participants had a certain important good clinical practice and application of restraints. This result is agreed with the studies held in Jordan and India (14, 37); but the mean score of this study is higher than other studies done in Sudan, Egypt and Malaysia (22-24). The possible reason for the variation might be attributed to the difference in sample size and participants' characteristics. In those studies, most of the participants were diploma in their educational qualification and small in number (below 100) but 89.5% of the nurses from the total (237) in this study were bachelors and masters in their educational qualification. So this finding supposed to increase the mean score of practice regarding PR use as the nurses' educational level was higher.

On the other hand, the level of nurses' practice in this study is lower than those of other studies done in Sakarya and Konya, Turkey, and the United States (25, 26, 41). The reason for the variation might be the participants in those studies were got ongoing in-service training and the hospitals have guideline regarding restraining; on the opposite in our setting, there are insufficient policies and guidelines on restraint use, and no one has received in-service training that results in a certain improper clinical practice. This shortage of in-service training and guidelines causes a lower level of nurses' knowledge, frequent and improper application, and extending of misperception/ poor attitude on restraining (23, 25, 35). Again it may lead to a negative impact on nursing care of patients; complications to the patients, and legal problems to the nurse providing the care. However, educational training can improve nurses' knowledge, attitude, and practice through changing their perceptions on the preference of alternative methods and reduction PR use to prevent the complications and ethical problems associated with restraining (16, 24, 36, 42).

Half of the nurses (49.8%) responded "sometimes" to the question "When physical restraint is applied, I record on the nursing charts the type of restraint used, the reason for adopting it, the time when the application commences, and the related nursing care required"; and (34.2%) of the nurses responded "never" to the question "I explain to the patient why the restraint is being applied". These results indicated that the nurses had a poor practice of restraining. Because recording nursing activities on the charts and informing the reason why patients are restrained are important to avoid legal and ethical issues associated with PR (25, 43). This may be due to ICUs staff and resource restrictions, insufficient policy, and management issues, nurses' insufficient information about restraints use related ethical or legal issues.

Skin edema, bruising, and pain around the restrained part were the most frequent complications of PR application as observed by the participant nurses. This finding is in agreement with the study done in Egypt as reported that skin complications are the most frequent (22). This may be due to faulty technique, prolonged use of restraining or unsuitable equipment since the usually used devices for restraining in the hospitals are ropes, chains, bed belts, gauzes, and patient's cloth. Furthermore, fatigue, agitation, and respiratory distress are the other types of complications reported by the nurses in this study. This may be due to prolonged use of restraining, insufficient monitoring patients, insufficient range of motion, and position changing (19). This indicates the need for integration of standard protocol for application of PR in ICU with sufficient training of nursing staff.

Regarding predictor variables: ≤ 2 years' work experience at ICU was significantly associated with poor practice regarding PR use. This finding was consistent with another previous study (24) that found fewer years of work experiences correlated with poor practice on restraint use. The possible reason might be when the nurses had short years of experience; they challenged a difficulty to apply the best nursing activities properly regarding physical restraints than long years of experienced nurses (42, 44). Received educational training about PR during graduate class was significantly associated with good nurses' practice regarding PR use. This finding was consistent with those of other studies (22, 23) that showed nurses who had got training in their graduate class had a proper practice regarding PR use. Because training is the process of transforming information and skills through learning regarding the restraining of patients that influences the nurses to have better awareness, attitude, and clinical practice (16, 35, 36). This emphasizes developing guidelines, and providing effective educational training is necessary for nurses concerning PR use on agitated and delirious patients to maximizing the good clinical practice on the aspects of restraining (22, 42).

Nurses with a higher level of knowledge score were significantly associated with better nurses' practice score regarding PR use. This result is in agreement with other previous studies (22, 23, 30), those found that adequate nurses' knowledge had a positive effect on good staff practice regarding restraint use. The possible reason might be: based on the theory of planned behavior (45, 46), adequate knowledge is essential for the basis of nurses' behavior to affect their subjective feelings regarding restraint use on critically ill patients, and to perform appropriate nursing activities during constraints.

Additionally, our study revealed that a higher attitude score was significantly associated with better nurses' practice regarding restraining. This result is consistent with the findings of other studies (22, 23, 30); those reported that better nurse's attitude has a positive effect on the nurses' practice regarding PR. This might be due to nurses with better subjective feelings and beliefs about restraint use put themselves in place of patients and their families on the use of PR. This feeling and thought can guide nurses to prefer alternative methods and performs them appropriately when used (23). Whereas our finding was not in agreement with the finding of another study (47), it reported that attitude has no effect on nurses' practice regarding restraining.

The participants were nurses' who were motivated by their willingness to participate in the study, which limits the external generalizability of the result. Practices regarding PR use were assessed via a self-report questionnaire, which might not reflect the actual behavior of nurses. Besides, since the study design was cross-sectional, as a result of its nature; it is difficult to show the cause-effect relationship between predictors and nurses' practice regarding PR use.

Conclusion

The nurses' working in the ICUs had a satisfactory practice regarding PR use among critically ill patients. However, a better practice of nurses regarding the subject is required. Less than or equal to 2 years' work experience at ICU was significantly associated with the poor practice and received training regarding PR during graduate class, a higher level of knowledge and attitude scores were associated with good nurses practice regarding PR use.

Recommendations

Based on the findings of this study, the researchers recommended, there is a need to develop clear hospital policies and guidelines to guide and support the nursing staff regarding restraints used. Educational and in-service training programs should be provided to nurses especially for those with fewer years of work experience at ICUs on the alternative strategies, complications, and risks of PR use. It is crucial to strengthen the good quality of care for critically ill patients by improving nurses' knowledge, attitude, and practice regarding PR use. Our study also recommended that conducting an observational study is necessary to notice whether nurses' years of work experience; educational and in-service training can improve the staff's practice regarding PR use.

Abbreviations

ARSRHs Amhara Regional State Referral Hospitals

ICU Intensive Care Unit

PR Physical Restraint

SPSS Statistical Packages of Social Sciences

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Institutions Review Board (IRB) of the University of Gondar (Reference no: V/P/RCS/05/2034/2019). The Official letter of cooperation was submitted to all referral hospitals and then a formal letter of permission was obtained from each hospital. Before data collection, the aim of the study was explained verbally to the participants and after their willingness, written

permission was obtained before filling the questionnaire. So an informed written consent was obtained from the participants and confidentiality was maintained by omitting their identification.

Consent for publication

Not applicable

Availability of data and material

The data sets used for the current study are available from the corresponding author on reasonable request (tilahunkassew123@gmail.com).

Competing interests

The authors declare that they have no competing interests

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Authors, contribution

TK developed the proposal, supervised the data collection, analyzed the data, and wrote the draft manuscript. ADT revised the proposal and assisted the data analysis. BL revised the proposal and revised and approved the manuscript. Finally, all authors have read and approved the manuscript.

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