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The effect of knowledge levels of intensive care nurses about pressure injuries on their attitude toward preventing pressure injuries

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ABSTRACT

Aim: The aim of this study was to determine the current knowledge levels of intensive care nurses about pressure injuries and their attitudes toward preventing pressure injuries, and to reveal the relationship between these variables.

Materials and methods: This descriptive cross-sectional study was conducted with 152 nurses, working in the Adult Intensive Care Units of a Training and Research Hospital. Data were collected between 10.08.2021 and 31.11.2021 with the Patient Information Form, Modified Pieper Pressure Ulcer Knowledge Test and Attitude toward Pressure Injury Prevention Scale. Frequency analysis, descriptive statistics, multiple logistic regression analysis and the structural equation modeling technique were used in the analysis of the study data.

Results: The mean age of the nurses was 25.82 ± 3.42 years, 86.2% of them were female and 67.1% of them had a bachelor's degree. Total mean score of the Modified Pieper Pressure Ulcer Knowledge Test of the intensive care nurses was found to be 32.58 ± 6.58. The knowledge score of 113 out of 152 nurses was ≥60% or above. The total mean score of the Attitude toward Pressure Injury Prevention Scale was 42.00 ± 5.70 and a total of 76.97% (117 participants) of them were found to score 75% or above on the scale. The results of the regression analysis showed that educational degree, and status of having training about pressure injuries did not affect the total mean score of the Knowledge Test and the Attitude Scale. However, it revealed that the frequency of encountering a patient with pressure injuries in the unit where they work has affected the total mean score of the scales significantly ($p < 0.05$). As per the results of the structural equation model, the Modified Pieper Pressure Ulcer Knowledge Test scores of the nurses were found to have a statistically significant effect on the scores of the Attitude toward Pressure Injury Prevention Scale ($p < 0.05$).

Conclusion: This study revealed that intensive care unit nurses had a positive attitude toward Pressure Injury Prevention and their knowledge was sufficient and that as the Modified Pieper Pressure Ulcer Knowledge Test scores increase, their positive attitude toward Pressure Injury Prevention also increases.

1. Introduction

Pressure injuries (PIs), which is considered an indicator of nursing care quality, is still an important health problem for patients, healthcare professionals and institutions despite the developments in the delivery of healthcare services [1,2].

ICU patients are at higher risk for PIs due to immobility, use of vasopressor medications, and poor perfusion [3]. The results of various studies have reported the prevalence of PIs in ICUs between 4.3% and 35.7% [2–6], while the incidence between 0.63% and 3.3% [7,8]. A recent meta-analysis study reported a cumulative prevalence of PIs of 16.9–23.8% and an incidence of 10.0–25.9% for adults in ICUs [9], which is quite high compared to the general hospital population (Prevalence: 12.8, Incidence: 5.4%) [10].

It is important to prevent PIs before it develops [11]. Because the high prevalence of PIs also brings many negative consequences for both the patient and the health institutions and health professionals such as a decrease in the quality of life [12], exposure to wound-related complications [6], and an increase in hospital stay and cost of care [6,9,12].

Although its prevention and treatment require a multidisciplinary team approach since it affects the patients in many ways, nurses who provide uninterrupted care to the patients in health care settings have a

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critical role in the prevention of PIs in ICUs [13]. The results of different studies support the fact that preventive nursing interventions have critical importance in the prevention of PIs [11-13]. Moreover, the use of PIs prevention interventions by the nurses in the clinical setting is known to be associated with their knowledge and attitudes to prevent it [14,15]. Because of the fact that nurses have a sufficient level of knowledge about PIs plays an important role in improving the quality of nursing care and reducing the incidence and prevalence rates, by enabling the implementation of preventive care strategies with conscious decision-making [1,16]. In the prevention and care of PIs, nurses' attitudes toward prevention are as important as their knowledge competency and clinical skills. Attitude is the main driving force or motivation behind an individual's actions and performance [17]. Nurses' willingness to implement new knowledge into clinical practice, their attitude toward preventing PIs, adequate equipment support and teamwork are the necessary components required to manage this process [18]. However, most studies around the world show that the knowledge, attitudes and practices of nurses to prevent PIs are not at the desired level, although nurses have an important role in the management of PIs [19–23].

Similar to the other countries, the prevalence of PIs, which is considered an important criterion in the patient safety assessment, has also been accepted as a quality indicator for the health services provided in Turkey [24]. Therefore, health institutions in Turkey, as in the rest of the world, are also trying to reduce the prevalence of PIs. However, various studies conducted in recent years reveal that PIs with a prevalence ranging between 15.9 and 59% is an ongoing problem with its prevalence in the delivery of healthcare services [25–27]. Given the fact that the prevalence of PIs can be prevented with qualified nursing care, it is important to investigate the knowledge levels of nurses, who have the primary responsibility for the care, about PIs and their attitudes toward prevention of them. However, although there are studies investigating the knowledge levels of nurses on PIs in Turkey [28–32], there are limited studies investigating the relationship between ICU nurses' knowledge levels on PIs and their attitudes toward the prevention of them [33], and it seems that there is a need for more research to be conducted on this subject. The aim of this study, planned based on this need, was to determine the current knowledge levels of ICU nurses about PIs and their attitudes toward preventing PIs, and to reveal the relationship between these variables.

1.1. Study questions

1. What is the current level of knowledge of ICU nurses regarding PIs?
2. What is the current attitude of ICU nurses toward PIs prevention?
3. What are the variables that predict the current knowledge levels of ICU nurses regarding PIs?
4. What are the variables that predict the attitude of ICU nurses toward PIs?
5. Does the knowledge level of ICU nurses about PIs affect their attitudes toward PIs prevention?

2. Material and method

2.1. Study design and setting

This is a descriptive, cross-sectional and analytical type of study. This study was carried out between 10.08.2021 and 31.11.2021 in the Adult ICUs of a Training and Research Hospital in Ankara, which is located in the Central Anatolia region of Turkey.

2.2. Sample

All the nurses (n = 183) working in the Adult ICUs of the above-mentioned hospital between 10.08.2021 and 31.11.2021 formed the population of the study. The study was conducted in 8 ICU: Internal Medicine ICU (36 nurses), Anesthesia ICU (25 nurses), Neurosurgery ICU (19 nurses), General Surgery ICU (17 nurses), Chest Diseases ICU (14 nurses), Neurology ICU (22 nurses), Cardiology ICU (37 nurses) and Cardiovascular Surgery ICU (13 nurses). Sample selection was not made from the population, and it was aimed to reach all nurses who met the research criteria. A total of 152 nurses selected with the total population sampling method, who were not on regular or sick leave when the study was conducted, had been working in Adult ICUs for more than one month and had verbally and written agreed to participate in the study, and filled out the data collection forms completely, formed the sample of the study. The participation rate of nurses in the study was 83%. We applied statistical power analysis considering the Cohen's correlation guideline [34] conventions. G*Power software was used to perform the power analysis. Considering the large effect size (r = 0.50), we reached 0.90 power with the minimum sample size is n = 123 for %95 confidence level.

2.3. Data collection

Study data were collected with the "Nurse Information Form", "Modified Pieper Pressure Ulcer Knowledge Test" and "Attitude toward Pressure Injury Prevention Scale" by using the face-to-face interview technique within a time period that would not cause disruptions to the workflow. The data collection took an average of 20–30 min.

2.4. Measuring instrument

2.4.1. Nurse Information Form

The form was developed by the researchers after reviewing the relevant literature [19,22,29] and taking the individual and occupational characteristics of nurses into account that may be related to the study subject. The form consists of 22 questions including information about nurses' sociodemographic characteristics, occupational characteristics and PIs.

2.4.2. Turkish version of the modified pieper ulcer knowledge test (PUKT)

The scale, developed by Pieper and Mott in 1995 to measure nurses' knowledge about PIs, consists of a total of 47 statements [35]. The scale was revised by Lawrence in 2015 and the number of statements was increased to 49 [36]. The scale, whose Turkish validity and reliability study was carried out by Gül et al. [28] in 2017, consists of 49 statements, 25 true and 24 false, which are answered by choosing one of the options of true-false-don't know. The statements included in the scale enable the evaluation of the three sub-dimensions related to PIs. These are Prevention and Risk (33 items), Staging (9 items), and Wound Description (7 items). While each correct answer is given one point, wrong and "do not know" answers 0 points. The number of correct answers is divided by the total number of statements, multiplied by 100 and the correct answer rate is calculated. A correct response rate of 70% (34.3 points) is considered the "cut-off" point of the test [36]. In the Turkish validity and reliability study of the scale, the cut-off point for knowledge competency was taken as 60% [28]. Cronbach's alpha coefficient of the Knowledge Test was reported as 0.814 in the Turkish validity and reliability study [28]. Permission to use the scale was obtained from the author via e-mail. In our study, Cronbach's Alpha value was found to be 0.86.

2.4.3. Attitude toward Pressure Injury Prevention (APuP)

The scale was developed by Beeckman et al. in 2010 [37] and its Turkish reliability and validity studies were carried out by Ustün and Yücel in 2013 [38]. APuP consists of a total of 13 items in 5 sub-dimensions including attitude toward individual competence to prevent PIs (3 items), attitude toward priority to prevent PIs (3 items), attitude toward the impact of PIs (3 items), attitude toward responsibility in the prevention of PIs (2 items) and attitude toward the confidence in the effectiveness of prevention of PIs (2 items). Six of the

13 items on the scale consist of positive statements and the other seven items are negative statements. Reverse scored items are 3, 5, 7, 8, 9, 10, and 13. Negative statements were reverse coded to ensure consistency in the interpretation of the scale. In the evaluation of the scale, the items of the scale were scored with Likert type scoring ranging from 1 to 4. The total score of the scale ranges from 13 to 52. The attitude is expected to be positive as the mean total score increases. A mean attitude score of ≥75% is considered satisfactory [38]. The permission to use the scale was obtained from the authors via e-mail. In our study, Cronbach's alpha value was found to be 0.79.

2.5. Data analysis

Frequency analysis, descriptive statistics, multiple logistic regression analysis and the structural equation modeling technique were used in the statistical analysis of the study. Multiple logistic regression analysis was performed to determine the factors affecting the nurses' knowledge levels about PIs and their attitudes toward preventing PIs. In study, inclusion criteria of the variables in the logistic regression was selected based on the literature. When the literature is examined, level of education [1,39], the experience of working in the intensive care unit [19], the training with pressure injuries [19,39,40], caring for patients with pressure injuries [39] are affected nurses' knowledge of pressure injuries. Similarly, it is reported in the current literature that insufficient knowledge [41,42] and work experience [43] affect the attitude towards preventing pressure injuries. In addition, when including variables in the model we based on our expert knowledge gained from our experience and observations over many years. Age and gender variables were used as adjustments in multiple logistic regression analyses. The structural equation modeling technique was used to examine the relationships between the Modified Pieper Pressure Ulcer Knowledge Test and Attitude toward Pressure Injury Prevention Scale. Structural equation models were estimated using the Diagonal Weighted Least Squares (DWLS) technique since the scale items were defined categorically. Structural equation modeling was performed with the lavaan package included in the R-Project software [44]. Graphical drawings of the models were also performed with the semPlot package. All statistical analyses were obtained using the R-Project program [45].

2.6. Ethical considerations

Ethics committee approval (13778) was obtained from the Human Research Ethics Committee of the university on 02.08.2021 to be able to conduct the study. Also, written institutional permission was obtained from the hospital management. All nurses who met the criteria for inclusion in the study were informed about the purpose of the study, and they were asked whether they wanted to be included in the study, emphasizing that voluntary participation was essential. Written and verbal consent of all nurses who agreed to participate in the study was obtained. This study was carried out in accordance with the principles of the Helsinki Declaration.

3. Results

3.1. Characteristics of the ICU nurses

The characteristics of the nurses participating in the research are given in Table 1. While the mean age of the ICU nurses participating in the study was 25.82 ± 3.43 years, 86.2% were female. The mean working duration of nurses in the ICUs was 1.75 ± 2.7 years. While 69.7% of ICU nurses stated that they find their current knowledge of PIs insufficient or partially sufficient, 64.5% wanted to participate in training on PIs (Table 1).

Table 1
Sociodemographic characteristics and mean total scores of nurses (n = 152).

	Mean ± SD	
Age	25.82 ± 3.43	
Working duration in the profession (years)	3.73 ± 3.71	
Working duration in ICU (years)	1.75 ± 2.7	
Number of patients with PIs provided care	103.88 ± 287.03	
The monthly mean number of patients with PIs provided care in the unit they work in	2.85 ± 1.73	
Variable	**n**	**%**
Gender		
Female	131	86.2
Male	21	13.8
Marital status		
Married	37	24.3
Not married	115	75.7
Educational degree		
Vocational School of Health Services	40	26.3
Associate degree	6	3.9
Bachelor degree	102	67.1
Master degree or above	4	2.6
Current unit they work		
Medical ICUs	90	59.2
Surgical ICUs	62	40.8
Working time		
During the day	9	5.9
During the night	35	23.0
Changing shifts	108	71.1
Frequency of encountering a patient with PIs in the unit they work		
Very rarely	9	5.9
Sometimes	48	31.6
Often	72	47.4
Always	23	15.1
Status of providing care for a patient with PIs before		
Yes	151	99.3
No	1	0.7
Status of carrying out interventions in the unit where they work to prevent PIs		
Yes	152	100.0
Who performs PIs care in the clinic?		
Nurse	104	68.4
Wound care nurse	31	20.4
Other	17	11.2
The status of using a risk assessment and diagnostic tool for PIs in the institution they worked		
Yes	152	100.0
Status of having a defined procedure or protocol for the prevention and care of PIs in patients in the unit where they worked		
Yes	129	84.9
No	23	15.1
Status of having training about PIs		
Yes	69	45.4
No	83	54.6
Training type		
In-service training programs	51	33.6
Congress	20	
Certification programs	17	
Courses	16	10.5
No	136	89.5
Other	5	3.3
Sources of information[a]		
Basic nursing knowledge	131	86.2
Knowledge and practices of experienced nurses	111	73.0
Requests and consents of physicians	44	28.9
Printed material	62	40.8
Mass media	53	34.9
Recommendations from the stoma and wound care unit	114	75.0
Other resources	7	4.6
Status of finding the current knowledge on PIs sufficient		
Yes	46	30.3
No	16	10.5
Partially	90	59.2
The areas where they needed information[a]		
Etiology and development of PIs	47	30.9
Diagnosis of PIs	36	23.7
Risk assessment	33	21.7

(continued on next page)

Table 1 (*continued*)

	Mean ± SD	
Staging	71	46.7
Preventive nursing interventions	52	34.2
Other	5	3.3
Status of willingness to attend training on PIs		
Yes	98	64.5
No	54	35.5

[a] More than one option has been selected SD: Standard deviation * Multiple options were selected. ICU: intensive care unit; PIs: Pressure injuries.

3.2. Knowledge and attitude score of the ICU nurses

The mean total score of ICU nurses from the PUKT was found to be 32.58 ± 6.58. Furthermore, 74.34% (n = 113) of the nurses were found to score 60% or more in the knowledge test as an indicator of knowledge competency. The mean total score of ICU nurses from the APuP was found to be 42.00 ± 5.70. In addition, 76.97% (n = 117 people) of the nurses were found to have a satisfactory attitude score (≥75%) on the scale (Table 2).

3.3. Predictors of knowledge and attitude score of the ICU nurses

According Table 3; The explanatory rate of variables for ICU nurses' knowledge about PIs being <60% and their attitude toward the prevention of PIs being <75% was found to be 12.8% and 19.7%, respectively (Table 3). As per the multiple logistic regression findings, in which gender and age were used as adjustments, the frequency of encountering a patient with PIs in the unit where they work was found to increase the risk of having PIs knowledge level of <60% 9,4 times in the ICU nurses who have very rarely encountered a patient with PIs compared to the nurses who always have encountered, while this variable contributed 6,29 times to the risk of having a negative attitude (<75%) (p = 0.036; Table 3).

3.4. Relationship between the PUKT and APuP scores of the ICU nurses

According to as per goodness of fit index values results, the fit indices were found to be at acceptable values (x^2 = 10.780, df = 0.567 GFI = 0.99, CFI = 1.00, AGFI = 0.98, NNFI = 1.050, RMSEA = 0.000, SRMR = 0.050). (Table 4) Table 5 and Fig. 1 show the regression coefficients of the model. The knowledge was determined to directly affect the attitude toward preventing PIs (β = 0.133, p = 0.042) and a positive relationship was found between PUKT scores and APuP measurement scores (Table 5).

4. Discussion

PIs management is an important indicator of patient care quality and one of the basic nursing duties which is affected by the knowledge and attitude of nurses on the subject [46]. It is important to determine the knowledge levels and attitudes of nurses in order to manage PIs [30]. This study was aimed at investigating the knowledge levels of Turkish ICU nurses about PIs and their attitudes toward preventing PIs and the factors affecting them.

4.1. Knowledge

The knowledge level of ICU nurses about PIs plays an important role in understanding the importance of PIs, improving the quality of nursing care with preventive interventions, and reducing the incidence of PIs [15]. However, previously conducted studies show that ICU nurses generally have an insufficient level of knowledge about PIs prevention, diagnosis, and staging [19,47–49]. In this study, more than half of the ICU nurses (74.34%) were found to have an acceptable (≥60%) knowledge score of PIs (32.58 ± 6.58), however, there is still a lack of knowledge about PIs management which needs improvement. Several studies to assess nurses' knowledge of PIs prevention reported that in Belgium only 23.5% nurses scored ≥60% knowledge [50] and 73% of Jordanian nurses scored lower than average knowledge of PIs prevention [51].

While there are studies, supporting the results of the current study, showing that ICU nurses have a sufficient level of knowledge about PIs [52,53], there are also studies reporting that the lack of knowledge about preventing PIs still continues as a problem among ICU nurses [19,29,46,48]. In this study, the fact that nearly half of the ICU nurses had received training on the subject and had a bachelor's degree and had a short working time after graduation may have contributed to the knowledge competency about PIs. Tirgari et al. [19] reported that training on PIs prevention significantly increased the knowledge level of ICU nurses. In another study conducted in Ethiopia, it was reported that the nurse's lack of education, being female, working less than or equal to 8 h, and low working salary contributed to the low level of PIs knowledge [40]. Therefore, providing nurses with comprehensive in-service training/courses that are structured to include new evidence and technologies on PIs can be helpful in updating their knowledge and ensuring the retention of knowledge, especially in ICU units where there is a high probability of PIs cases to occur.

4.2. Attitude

In the prevention and care of PIs, nurses' attitudes toward PIs prevention are as effective as their knowledge levels and clinical skills [17,54]. If an individual has a positive attitude toward a particular subject, this leads the individual to display positive or supportive behaviors related to the subject [54]. In a study conducted by Ayello and Meaney [55], the negative attitudes of nurses on PIs prevention were determined to increase the prevalence of PIs. In this study, nurses were found to have

Table 2
Descriptive statistics of PUKT and APuP.

Sub-dimension	Mean	SD	Median	Min	Max	≥60% (%,f)	≥75% (%,f)
PUKT	32.58	6.58	34.50	14.00	43.00	%74.34 (113)	–
Prevention/Risk	22.73	4.57	23.00	9.00	29.00	–	–
Staging	5.49	1.76	6.00	1.00	9.00	–	–
Wound description	4.36	1.44	4.00	2.00	7.00	–	–
APuP	42.00	5.70	43.50	19.00	52.00	–	%76.97 (117)
Competency	8.34	1.40	9.00	4.00	12.00	–	–
Priority	9.48	2.31	10.00	3.00	12.00	–	–
Impact	10.97	1.93	12.00	3.00	12.00	–	–
Responsibility	6.55	1.22	7.00	2.00	8.00	–	–
Confidence in the effectiveness	6.67	1.31	7.00	3.00	8.00	–	–

SD: Standard deviation, Min: Minimum, Max: Maximum, f: Frequency.
PUKT: Modified Pieper Pressure Ulcer Knowledge Test.
APuP: Attitude toward Pressure Injury Prevention.

Table 3
Summary results of multiple regression analysis Dependent Variable.

	−2 Log likelihood		Cox & Snell R Square			Nagelkerke R Square	
PUKT score <60%	122.822		0.127			0.197	
APuP score <75%	139.045		0.085			0.128	
Variable	Beta	SH	Wald	OR	p	95% CI	
						Lower bound	Upper bound
PUKT score <60% Bachelor degree							
Reference = [Master degree or above]							
Vocational School of Health Services	0.005	1.354	1.31E-05	1.005	0.997	0.071	14.267
Associate degree	0.206	1.700	0.015	1.229	0.904	0.044	34.388
Bachelor degree	0.344	1.273	0.073	1.410	0.787	0.116	17.097
Working duration in years in ICU	−0.087	0.129	0.455	0.917	0.500	0.712	1.180
Frequency of encountering a patient with PIs in ICU							
Reference = [Always]							
Very rarely	2.241	1.077	4.326	9.400	**0.038**	1.138	77.642
Sometimes	1.059	0.899	1.386	2.882	0.239	0.495	16.789
Often	1.313	0.825	2.537	3.719	0.111	0.739	18.720
Status of providing care for a patient with PIs before							
Reference = [No]							
Yes	−22.708	4.02E+04	3.19E-07	1.37E-10	1.000	0.000	–
Status of having training about PIs							
Reference = [No]							
Yes	0.682	0.451	2.291	1.978	0.130	0.818	4.782
Fixed	18.805	4.02E+04	0.000	2.87E+08	1.000	–	–
APuP score <75% Educational degree							
Reference = [Master degree or above]							
Vocational School of Health Services	19.3339	2.30E+04	7.07E-07	2.49E+08	0.999	0.000	–
Associate degree	20.7474	2.30E+04	8.15E-07	1.02E+09	0.999	0.000	–
Bachelor degree	19.3324	2.30E+04	7.07E-07	2.49E+08	0.999	0.000	–
Working duration in ICUs (in years)	0.1066	0.1489	0.512	1.112	0.474	0.831	1.490
Frequency of encountering a patient with PIs ICU							
Reference = [Always]							
Very rarely	0.482	1.362	0.125	1.620	0.723	0.112	23.390
Sometimes	1.839	0.877	4.397	6.290	**0.036**	1.128	35.093
Often	0.548	0.870	0.396	1.730	0.529	0.314	9.526
Status of providing care for a patient with PIs before							
Reference = [No]							
Yes	19.919	4.02E+04	2.46E-07	4.48E+08	1.000	0.000	–
Status of having training about PIs							
Reference = [No]							
Yes	−0.114	0.502	0.052	0.892	0.820	0.334	2.384
Fixed	−37.255	4.63E+04	6.50E-07	6.06E-17	0.999	–	–

SE: Standard error, OR: Odds Ratio, CI: 95% confidence interval.

Table 4
Goodness of fit indices related to the structural equation modeling.

Chi-square statistics	df	GFI	CFI	AGFI	NNFI	RMSEA	SRMR
10.780	19	0.990	1.000	0.980	1.050	0.000	0.050

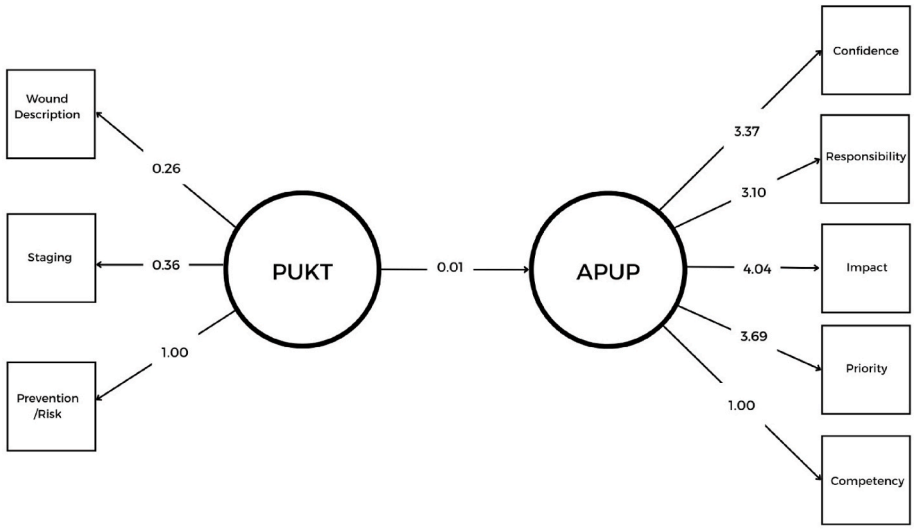
df: Degree of freedom.

Table 5
Statistical results of the path coefficients of the measurement model.

Scale	Sub-dimension	Beta	STZ (Beta)	SE (Beta)	z-value	p
PUKT	Prevention/Risk	1	0.762			
	Staging	0.363	0.717	0.084	4.321	<0.001
	Wound description	0.260	0.627	0.057	4.548	<0.001
APuP	Competence	1	0.226			
	Priority	3.694	0.505	1.153	3.203	0.001
	Impact	4.042	0.663	1.304	3.101	0.002
	Responsibility	3.101	0.806	0.966	3.212	0.001
	Confidence in the effectiveness	3.375	0.815	1.039	3.248	0.001
APuP -> PUKT		0.012	0.133	0.006	2.031	0.042

Beta: Path coefficient, STZ (Beta): Standardized beta, SE (Beta): Standard error.
PUKT: Modified Pieper Pressure Ulcer Knowledge Test.
APuP: Attitude toward Pressure Injury Prevention.

a positive attitude toward PIs prevention, albeit not at the desired level. Therefore, there is still a need for strategies to improve the attitudes of ICU nurses to prevent PIs. While some studies evaluating nurses' attitudes toward PIs prevention reported that ICU nurses had a negative attitude [1,46,48], some other studies showed that ICU nurses had a positive attitude in line with the current study findings [19,41,47,49]. The fact that the prevalence of PIs in ICUs is higher than in other units is thought to be the reason why nurses working in the ICUs have higher attitude scores. In addition, nursing education is four years in Turkey. Students who complete four years of education have a bachelor's degree. During this undergraduate education, nursing students receive detailed training on wound care within the scope of Internal Medicine and surgical nursing course. In addition, in the training and research hospital where the study was conducted, training is given to nurses, especially ICU nurses, on prevention and care of PIs regularly. It is assumed that both the undergraduate education and the education of the nurses on



PUKT: Modified Pieper Pressure Ulcer Knowledge Test
APuP: Attitude toward Pressure Injury Prevention

Fig. 1. Structural equation model graph describing the relationship between nurses' PUKT and APuP.

wound care in the hospital they work in affect attitudes of the nurses positively.

4.3. Factors associated with nurse's knowledge of pressure injuries and attitudes towards prevention

As per the results of the regression analysis, the last completed nursing program of the nurses, working duration in ICUs, the status of providing care for a patient with PIs before, and the status of having training about PIs were revealed not to have any effect on the knowledge and attitudes of the ICU nurses ($p < 0.05$). These variables have been reported in some studies to affect the knowledge and attitudes of ICU nurses [19,22,43,46,49], while there were studies in which they were shown not to affect the knowledge and attitudes of ICU nurses [18,56], similar to our study findings. In another study conducted by Etafa et al., [42] the educational status of nurses was found not to affect the attitude toward PIs prevention. In another study done in China; Nurses with a bachelor's degree or above were more likely to have adequate PIs prevention knowledge. Increased PIs prevention training frequency increased the nurses' positive attitude scores for PIs prevention; longer years of service and a higher number of PIs prevention trainings attended predicted better PIs prevention behaviors [22]. The frequency of encountering a patient with PIs in the unit where they work has been determined to be an important variable that affects both the PIs knowledge level of nurses and their attitude toward preventing PIs. As per the study findings, the risk of having insufficient knowledge level and negative attitudes was higher in ICU nurses who encounter a patient with PIs in their units "very rarely". When the studies were examined, it has been reported that the knowledge and attitudes of nurses are positively affected as the experience of working with patients with PIs in the ICUs increases [19,46,56]. Given the fact that the experience and awareness of nurses, who encounter PIs more frequently, increases, it is an expected result that the knowledge and attitude of the nurses increase with their more frequent encounters with the patient with PIs.

4.4. Correlation between knowledge and attitude

It is important that ICU nurses who encounter PIs more often have sufficient knowledge and a positive attitude about PIs prevention [57]. Knowledge and attitude are positively related to each other [39]. In a recent study with ICU nurses in Iran also, an important relationship was found between knowledge and attitude, and it was reported that the more knowledge the nurses have, the more positive attitudes they have toward the prevention of PIs [19]. In this study, a structural equation model was created in which the Attitude Toward PIs Prevention Scale was taken as the dependent variable, and it was found that the model was highly fit. Furthermore, all of the items of the Modified PUKT and APuP scales were found to be statistically significant in this study ($p < 0.05$) and as the Modified PUKT scores of the nurses increased, the positive attitude toward PIs prevention also were determined to increase. When the studies are examined, a positive significant relationship between knowledge and attitude, similar to the findings of this study, was reported and that as the knowledge increases, the positive attitude also increases [1,19,48]. Contrary to this, there are findings showing that nurses' positive attitudes decrease as the level of PIs knowledge increases [29]. It is important that nurses have a positive attitude toward the prevention of PIs since it will decrease the incidence of PIs by enabling the increase in the preventive competencies of nurses.

4.5. Strengths and limitations

Revealing the effect of PIs knowledge level of ICU nurses on their attitude through the structural equation model can be considered the strength of the study. Also, there are some limitations of the study. Firstly, the fact that the study was conducted in a single place shows the knowledge level of the nurses in that particular place only. Therefore, the study results cannot be generalized to all ICU nurses. Moreover, this was not an observational study, and the nurses' responses to the PUKT and APuP scales were based on the statements of nurses on self-reporting.

5. Conclusions and recommendations

In this study, the ICU nurses were found to have sufficient knowledge about PIs and positive attitudes. The frequency of encountering patients with PIs in the unit where they work has been determined to be a risk factor contributing to the insufficient level of knowledge and negative attitude about PIs for nurses and an increase in the positive attitude toward preventing PIs has been found, as the level of knowledge increases. Accordingly, in order to further improve their knowledge and attitudes of ICU nurses who encounter PIs more frequently, it is recommended to identify their areas of inadequacy for PIs, conduct regular in-service training in line with current information, especially in areas where there is inadequacy, and inform them about in-house protocols. In

addition to in-service training, opportunities should be provided for nurses to participate in various activities related to PIs. In conclusion, ICU nurses having a good level of knowledge about PIs and displaying positive attitudes will contribute to the decrease in PIs incidence by increasing the quality of patient care.

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Declaration of competing interest

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