Migration Letters

Volume: 20, No: S1 (2023), pp. 2318-2331

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Association Between The Knowledge And Practice Regarding Pressure Injury Prevention Among Nurses At Major Hospitals In Makkah City At Saudi Arabia 2023

Abdulaziz Ali H Alhamami[1], Abdullah Ali Abdulrahman Alahmari[1], Safar Abdullah Mohammed Alosaimi[1], Turkey Muklied Mubairk Alotaibi[1], Ahmed Saad Mohmmed Al Shehri[1], Yaseer Jameel Saleh Alotaibi[1], Ibrahiem Osahib Aish Al osaimi[1], Nawal Mohsen Altheyabi[1], Meead Othman Alshwaiman[2], Meaad Salim Almotairy[3]

Abstract

Background: *Lately, the numbers of pressure injury rate have increased phonetically throughout the world, more than hundreds of people in Saudi Arabia developing PI per months and years. Moreover, the hospital acquired pressure injury prevention presents an important challenge in tertiary service hospitals. Hospital-acquired pressure injuries (HAPI) are a significant cause of morbidity and mortality and represent a major health concern worldwide. Patients suffering from HAPI report a poor quality of life that may lead to serious consequence on several dimensions on patients' health including physical, social, psychological, and financial aspects. PIs harms patients by a longer recovery period, causing pain, potential risk of infections, mobility impairment and increase in healthcare cost to both the patient and the hospital/healthcare setting . Moreover, HAPI is reported to lengthen in-hospital stay in the acute setting, posing significant healthcare resource utilizations and costs. On another hand, the study found that there are several barriers to implementing the practice of prevention of pressure injury. The main barriers are the lack of knowledge among nurses, the lack of resources, the lack of support from superiors, and the lack of incentives for implementing the practice of prevention of pressure injury. Insufficient supply of linen causes patients' pressure to mount more on the tissues supporting the body parts of the body.* ***Aim of the study:*** *To determine the level of knowledge regarding pressure injury among nurses at Major hospitals, to determine the prevailing practice regarding pressure injury among nurses at Major hospitals, to identify the barriers and factors associated with nurses regarding to prevention and management 2023.* ***Method:*** *Cross-sectional descriptive research design was utilized in the current study.* ***Result:*** *Participants (n= 152) were mostly women (93.4%) who had a bachelor degree (88.8%). The mean score of nurses' knowledge about PI prevention is 6.82 out of 10 (60.8%), the mean score of nurses' practices about PI prevention is 23.48 out of 27 and there is a significant difference in th[1]e mean score of participants' knowledge about PI prevention with regard to their education.* ***Conclusion :*** *The findings indicate that more than half of the nurses had a moderate level of knowledge about PI prevention but a high level of engagement in good PI prevention practices. Finally, monitoring and follow-up are important to ensure the nurses' compliance.*

Keywords: *Association, Knowledge, Practice, Pressure, Injury, Nurses, Major hospitals ,Makah .*

[1]Nursing specialist, The second health cluster in the central region, Saudi Arabia.
[1]GENERAL NURSING, NIFI GENERAL HOSPITAL, Saudi Arabia.

Introduction:

With an aging patient population, high acuity and comorbidities, and changes in government-mandated payment incentives, hospital-acquired pressure injury (HAPI) remains one of the biggest challenges faced by healthcare organizations locally, nationally, and globally. Length of Stay (LOS) and cost of care for patient with PIs are found to be higher compared to other hospitalized patients without any PI (1). Increased attention has been focused on HAPI prevention (2)

In April 2016 Commission on Patient Safety estimates that more than 2.5 million patients in acute care facilities suffer from PIs and that 60,000 dies from PI-related complications each year (3). The PI incidence was 10.3% in surgical ICUs and 12.1% in the medical ICUs, with severe PUs developing in 3.3% of ICU patients. Another study reported that 9.8% of ICU patients had PU on ICU admission with an incidence of 7.8% during ICU stay (4)

Published data from Saudi Arabia on PU epidemiology are scarce. Two studies showed high PU burden in hospitals. One prospective study conducted at Riyadh Military Hospital in 2006–2007 with follow-up for 8 weeks in the hospital reported a PU prevalence of 44.4% and incidence of 38.6% in hospitalized patients. These high rates were, at least in part, attributed to unusually prolonged hospital stay. In a prospective cohort study conducted in two 24-bed ICUs at two tertiary care Ministry of Health hospitals in 2013, 84 patients were regularly screened until discharge or death (censored at 30 days) and the hospital-acquired PU incidence was 39.3% (5)

The National Pressure Ulcer Advisory Panel (NPUAP) redefines the definition of pressure injury (PI) to reflect “localized damage to the skin and/or underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear. The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities, and condition of the soft tissue (6). In April 2016 replaced the term pressure ulcer with pressure injury in the NPUAP Injury Staging System to reflect injuries in both intact and ulcerated skin (7). They are six classes of pressure injury, grades 1-4, unshakeable and deep tissue injury.

Hospital-acquired pressure injuries (HAPI) are a significant cause of morbidity and mortality and represent a major health concern worldwide. Patients suffering from HAPI report a poor quality of life that may lead to serious consequence on several dimensions on patients’ health including physical, social, psychological, and financial aspects. PIs harms patients by a longer recovery period, causing pain, potential risk of infections, mobility impairment and increase in healthcare cost to both the patient and the hospital/healthcare setting (8). Moreover, HAPI is reported to lengthen in-hospital stay in the acute setting, posing significant healthcare resource utilizations and costs.

Research has shown that pressure injuries may be preventable. The strategy for preventing pressures injuries relies on two interdependent domains: pressure injury risk identification and pressure injury risk mitigation. Numerous risk assessment tools are being used to assess patients’ risk for developing a pressure injury. These tools include Norton, Water low, Braden and the inter RAI Pressure Injury Risk Scale. Current research does not seem to show that any given tool is superior to the others (9). The Braden and Norton risk assessment tools seem to be more accurate than nurses’ clinical judgment in predicting pressure injury risk (10)

Numerous interventions have been studied with varying degree of efficacy. Interventions should address risk factors that were identified using the risk assessment and tailored to the patient’s individual needs. Interventions include pressure relief, specialized mattresses, dressing over bony prominences, monitoring devices, nutritional support, and use of skin moisturizers. There are many policies and guidelines on pressure injury prevention and management (11). Regrettably, studies have shown that many qualified staff

nurses do not adhere to these guidelines or evidence-based practice, leading to insufficient pressure ulcer prevention practice (12)

Aim of the study:
To determine the level of knowledge regarding pressure injury among nurses at Major hospitals, to determine the prevailing practice regarding pressure injury among nurses at Major hospitals, to identify the barriers and factors associated with nurses regarding to prevention and management 2023

Objectives of the study:
- To determine the level of knowledge regarding pressure injury among nurses at Major hospitals.
- One of the almost universal goals of improved patient care is continuous practice improvement of nurses. The outcomes may not be appropriately measured through the patient directly but may be indirect such as nursing knowledge and competent in order to provide high quality of care including pressure injury prevention (13). Besides, the prevention and management of PI need a multidisciplinary health provider team, but a lot of literature indicate that nurses are the principal implementer of PI prevention. Therefore, nurses must be competent & highly educated to prevent and manage PI. Accordingly, this research would be a valuable contribution to understand prevailing nurses' knowledge and practice about PI prevention.

Stage 1 pressure injury: Non-blanch able redness (erythema) of unbroken skin. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area (May indicate "at risk" individuals). The erythema area may be painful, firm, soft, warmer or cooler as compared to surrounding tissue. The discoloration of a deeper shade, such as purple or maroon, may be an indication of a serious injury to the tissues beneath the skin and not considered as stage one PI (14).

Stage 2 pressure injury: Exposed dermis and a loss of partial skin thickness. The area lacks granulation tissue, slough, or Escher. The wound bed is healthy, pink or red, moist, and may look like a blister filled with serum that is either intact or has ruptured. There is no evidence of subcutaneous fat, and the underlying tissues are similarly obscured. Microclimate changes and skin shear across the pelvis and heel are major causes of these injuries. Incontinence-associated dermatitis (IAD), intertriginous dermatitis (ITD), medical adhesive-related skin injury (MARSI), (MASD) (skin tears, burns, abrasions) and traumatic wounds are not considered to be at this stage (15).

Stage 3 pressure injury: Total skin attrition (Full-thickness skin loss) characterized by the presence of adipose (fat) in the ulcer, as well as granulation tissue and epiboly (rolled wound margins). In some cases, Escher and slough will be obvious. Tissue damage is localized, with deeper wounds occurring in locations with more body fat. Subterranean intrusions like digging and mining are possible. Not one bit of fascia, muscle, tendon, ligament, cartilage, or bone is showing. It is an Unshakeable Pressure Injury if the level of tissue loss is not clear due to sloughing or Escher (14).

Stage 4 pressure injury: Totally destroying all of the skin and tissue Full-thickness tissue loss with visible or palpable underlying fascia, muscle, tendon, ligament, cartilage, or bone in the ulcer. Possible slough and Escher formations . Common occurrences include epibole (rolling edges), undermining, and tunneling. Depending on where in the body you're measuring, depths will be different. Unshakeable pressure injuries are those in which the extent of tissue loss is obscured by slough or Escher (15).

- **Materials and Methods**
  Research Design:

Cross- sectional descriptive research design was utilized in the current study.

Research Setting:

The research conducted at Major hospitals Makah . Major hospitals is operated by the MOH and consider one of the major governmental hospitals in the city. It has 500 beds capacity across departments that provide tertiary health services to patients both inside and outside city (16). Around 250 nurses' professionals working in inpatient and critical areas out of 603 working in the hospital .

Sample & Sampling:

- The target population was nurses who work in (ICU, CCU, HDU, ONCOLOGY, FEMALE MEDICAL & SURGICAL, MALE MEDICAL & SURGICAL and PYSCHARTRIC) at KAASH and who met the inclusion and exclusion criteria.
- A convenience sampling technique was used in the present study to recruit the sample. The sample size was 152 staff nurses and calculated from the whole target population electronically by using the Raosoft software which is calculated the sample size with the following inputs: 5.0% margin of error (95.0% confidence level) and 250 staff nurses and based on the next equations
- **Inclusion criteria:** nurses who working in the units as mentioned above. They have more than 6 months of work experience and pass the orientation period after recruitment.
- **Exclusion criteria:** nurses who are working in other unit as ER, OPD, DIALYSIS, OR, CCL, ENDOSCOPY and OPTHA.
- **Tool of Data Collection:**
- The questionnaire was developed by the researchers. It was used to assess nursing staff' perceptions of knowledge and attitude regarding to pressure injury management as well as, barriers affecting it through 26 items grouped under 4 parts. The first part of the questionnaire included (6) items (open-ended and close-ended questions) about demographic data and additionally related previous pressure injury training (gender, unit, level of education, work experience, source of PI education, last attended training on PI).

The second part of the questionnaire was about the level of nurses' knowledge about the prevention of pressure injury and includes 10 items rated on a 3-point Likert-type scale, the question responses were either "true", "false" or "maybe" options. The correct answer was given a 1 score, while the incorrect answer and the response for " I don't know " were given "zero". The maximum score for this tool was 10, this score was multiplied by 10 to get 100, then categorized . The third part included (9) items rated related to the existing nurses' practice toward PI prevention. It is a 3-point Likert-type scale rates each item with rarely (1), sometime (2) and always (3). The possible range of scores is between 9 to 27 . The highest scores indicate better engagement in good PI preventive practices and vice versa. The fourth part of the questionnaire was a multiple choice regarding the existing barriers of PI prevention that the nurses may face during their work.

Data Collection Procedure

- After taking the approval to conduct the study from the Research and Studies Department in Makah
- Health Affaire the researchers met the assigned person in the research department, then the nursing director in Major hospitals to discuss the aim of the study and gain her support.
- Data were collected through a questionnaire shared by link. The questionnaire was distributed to all participants by head nurses and managers in the Whats App group, which accompanied by a cover letter providing information about the topic of study, the significance of the study, aim, benefits, risks, as well as the process for disseminating results, and the right to withdraw from the study.
- The participants were informed the average time needed to fill the questionnaire was 10 to 20 minutes and were asked to fill up the link and send it directly. The questionnaire was completed within 2 weeks approximately (1 Aug 2023 to 30 Aug 2023) with 251participants.

- **Pilot Study**

  A pilot study was conducted on 16 participants. It was conducted to ensure the validity and reliability of the questionnaire.

Ethical Considerations

For this study, ethics approval obtained from the Major hospitals in 2023 approvals were also sought from the Director of Health Affairs, and (Human Ethics Certificate approval from Protecting Human Research Participants online was successfully completed .

Data Analysis

Statistical package for social sciences (SPSS version 24) was used for data analysis. Different statistical procedures were done to achieve study objectives (Statistical Package for the Social Sciences (SPSS) Frequencies, means, SD, were used to describe the level of participants' knowledge and practices of pressure injury prevention. Frequencies and percentages for true and false answers of participants were described. The total mean score of knowledge was calculated, in which the lowest possible score is zero, while the highest possible score is 10. One-way ANOVA was used to investigate the differences in the level of participants' knowledge and practices .

Results

Part I: Assessment of the nurses' demographic data.

Table 1: Frequency distribution of the demographic variables of the sample (n = 251)

Variables	Number	Percentage (%)
Gender		
Male	10	6.6
Female	142	93.4
Education		
Diploma	8	5.3
Bachelor	135	88.8
Master or more	9	5.9
Experience		
Below 1 year	20	13.2
1-5 years	59	38.8
6-10 years	51	33.6
>10 years	22	14.5

According to the table, the majority (93.4%) of participants are females, while 6.6% of them are males. Regarding education of participants, those who have a bachelor degree constitute 88.8% of the study sample, those who have master degree or more constitute 5.9%, while those who have diploma constitute 5.3% of the study sample. Furthermore, those who have 1-5 years of experience constitute 38.8% of the study sample, those who have 6-10 years of experience constitute 33.6% of the study sample, while 14.5% of them have more than 10 years of experience.

Table 2: Sample distribution according to PI education and training (n= 251)

Variables	Number	Percentage (%)
Source of PI education		
In-service education	54	35.5
University	85	55.9
Conference	6	3.9

Others	7	4.6
Last time attended PI training		
Less than 1 year	81	53.3
1-2 years	37	24.3
More than 2 years	22	14.5
Never	12	7.9

The table shows that, the source of PI education for more than half (55.9%) of participants is university, the source of PI education for 35.5% of them is in-service education, while the source of PI education for 3.9% of them is conferences.

Part II: Assessments of the nurses' knowledge, and practice regarding PI.

Table 3: Nurses' knowledge regarding prevention of pressure injury (n= 251)

Item	True (%)	False (%)
In bedridden patients immobility is the most important factor for pressure injury formation	115 (75.7)	37 (24.3)
Only nurses can prevent developing PI	128 (84.2)	24 (15.8)
Pain assessment scale is the risk assessment scale for pressure injury development	120 (78.9)	32 (21.1)
Partial skin loss with blister is correct answer for the sign of stage 3 pressure injury	114 (75.0)	38 (25.0)
There are more than 3 positions can usually be used when repositioning a patient	84 (55.3)	68 (44.7)
Topical cream only is the appropriate method for skin care	108 (71.1)	44 (28.9)
Air mattress can prevent developing PI without positioning	123 (80.9)	29 (19.1)
Cleansing soil and using skin barrier cream activity is appropriate for preventing maceration	37 (24.3)	115 (75.7)
Use pillow under the patient's leg to prevent heel injury	106 (69.7)	46 (30.3)
High protein and high calorie need to be offered to a bedridden patient who has BMI < 18.5	102 (67.1)	50 (32.9)
Total Mean± SD (Range)	6.82± 1.89 (0-10)	

The table shows the frequency and percentage of true and false answers for each item in the knowledge domain about PI prevention. The lowest possible score for each item is zero (false answer), while the highest possible score is 1 (true answer). The mean score of nurses' knowledge about PI prevention is 6.82 out of 10 (60.8%). The table shows that, 84.2% of nurses answered the question of "Only nurses can prevent developing PI" correctly, while 15.8% of them answered it incorrectly. In addition, 80.9% of nurses answered the question of " Air mattress can prevent developing PI without positioning" correctly, while 19.1% of them answered it incorrectly. On the other hand, only 24.3% of nurses answered the question of "Cleansing soil and using skin barrier cream activity is appropriate for preventing maceration" correctly, while 75.7% of them answered it incorrectly.

Table 4: Nurses' practices on pressure injury prevention (n= 251)

Item	Always		Sometimes		Rarely		Mean	SD
	NO.	%	NO.	%	NO.	%		
I assess the patient's skin and observe the risk factors	121	79.6 %	31	20.4 %	0	0%	2.79	0.40
I document all data	124	81.6 %	28	18.4 %	0	0%	2.81	0.38
I assess and provide management of pain	120	78.9 %	32	21.1 %	0	0%	2.78	0.40
I perform skin care as a routine work	120	78.9 %	31	20.4 %	1	0.7%	2.78	0.42
I use water filled glove under the patient's leg	32	21.1 %	75	49.3 %	45	29.6%	1.91	0.70
I use or advice caregiver to use creams or oils	58	38.2 %	82	53.9 %	12	7.9%	2.30	0.60
I pay more attention to pressure points	119	78.3 %	32	21.1 %	1	0.7%	2.77	0.43
I turn a patient position every two hours	100	65.8 %	51	33.6 %	1	0.7%	2.65	0.49
I Give advice to the patient or caregiver	104	68.4 %	43	28.3 %	5	3.3%	2.65	0.54
Total Mean± SD (Range)							23.48± 2.81 (9-27)	

The table shows the highest main percentage were in nurses practice regarding to prevention of PI was 81.6% of nurses choose always in (I document all data). While the lowest main percentage was 21.1% of nurses choose always in (I use water filled glove under the patient's leg). Moreover, the mean score and standard deviation (SD) of each

item in the practices domain of PI prevention . The lowest possible score for each item is 1, while the highest possible score is 3. The mean score of nurses' practices about PI prevention is 23.48 out of 27. Also, shows that the mean score of documentation all data is 2.81, and the mean score for assessment of the patient's skin and observing the risk factors is 2.79. The mean score of assessment and providing management of pain and performing skin care as a routine work is 2.78. On the other hand, the mean score of using water filled glove under the patient's leg is 1.91.

Part III: The association between demographic data and nurses' knowledge, and practice regarding PI.

Table 5: Association between nurses' knowledge regarding PI prevention and other factors (n = 251)

Nurses' knowledge	N	Mean	SD	t/f statistics	p value[1]
Gender					
Male	10	59.00	29.60	-1.604 (150)	0.111[a]
Female	142	68.87	17.90		
Education					

Diploma	8	55.00	30.70	3.198 (2, 149)	0.044[b]
Bachelor	135	68.37	17.83		
Master	9	77.77	17.87		
Experience					
Below 1 year	20	53.00	12.18	5.568 (3, 148)	0.001[b]
1-5 years	59	69.49	18.60		
6-10	51	70.98	21.00		
>10 years	22	72.27	13.06		
Source of PI education					
In-service education	54	72.59	16.95	2.674 (3, 148)	0.049[b]
University	85	64.47	20.38		
Conference	6	73.33	12.11		
Others	7	75.71	7.86		
Last time attended PI training					
Less than 1 year	81	70.98	17.57	6.786 (3, 148)	0.000[b]
1-2 years	37	67.02	15.78		
More than 2 years	22	71.81	19.18		
Never	12	46.66	23.48		

[a] Independent sample t test, [b] One-Way ANOVA

The table shows that there is no significant difference in the mean score of participants' knowledge about PI prevention with regard to their gender ($p>0.05$). In addition, there is a significant difference in the mean score of participants' knowledge about PI prevention with regard to their education ($p<0.05$). Tukey post hoc test showed that the difference is between diploma and master degree in favour of participants who have master degree. Meaning that, nurses' who have master degree have significantly higher level of knowledge about PI prevention. Furthermore, there is a significant difference in the mean score of participants' knowledge about PI prevention with regard to their experience ($p<0.05$).

The table also shows that, there is a significant difference in the mean score of participants' knowledge about PI prevention with regard to their last time attended PI training ($p<0.05$). Tukey post hoc test showed that the difference is between participants who attended training since less than 1 year

Table 6: Association between nurses' practices regarding PI prevention and other factors (n = 251)

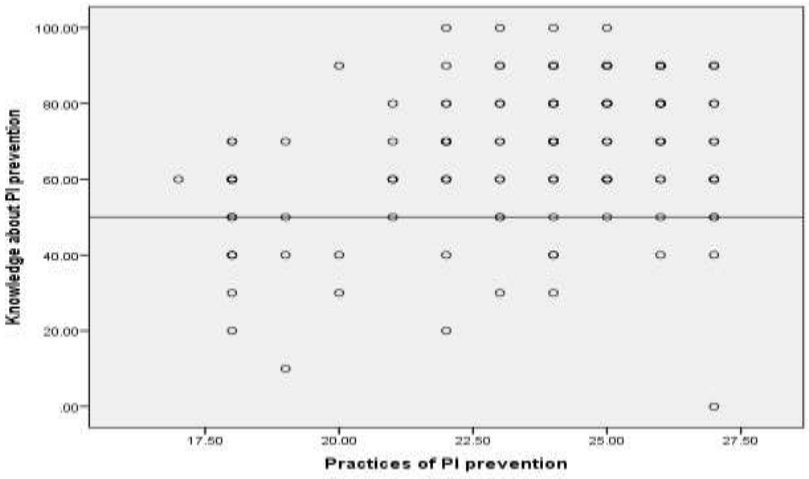
Nurses' practices	N	Mean	SD	t/f statistics	p value[1]
Gender					
Male	10	23.70	3.02	0.254 (150)	0.800[a]
Female	142	23.46	2.81		
Education					
Diploma	8	24.62	1.92	0.698 (2, 149)	0.499[b]
Bachelor	135	23.42	2.87		
Master	9	23.33	2.64		
Experience					
Below 1 year	20	19.45	2.41	22.940 (3, 148)	0.000[b]
1-5 years	59	24.15	2.58		

6-10	51	24.23	2.13		
>10 years	22	23.59	2.10		
Source of PI education					
In-service education	54	24.07	1.94	2.167 (3, 148)	0.094[b]
University	85	22.98	3.30		
Conference	6	23.66	2.33		
Others	7	24.71	1.11		
Last time attended PI training					
Less than 1 year	81	23.82	2.70	0.955 (3, 148)	0.416[b]
1-2 years	37	22.94	3.23		
More than 2 years	22	23.31	2.43		
Never	12	23.08	2.84		

[a] Independent sample t test, [b] One-Way ANOVA

The table shows that there is no significant difference in the mean score of participants' practices about PI prevention with regard to their gender ($p>0.05$). In addition, there is no significant difference in the mean score of participants' practices about PI prevention with regard to their education ($p>0.05$). Furthermore, there is a significant difference in the mean score of participants' practices about PI prevention with regard to their experience ($p<0.05$). Tukey post hoc test showed that the difference is between participants who have experience below 1 year and participants who have experience more than 10 years in favour of participants who have experience more than 10 years. Meaning that, nurses' who have experience more than 10 years have significantly higher level of practices about PI prevention. Moreover, there is no significant difference in the mean score of participants' practices about PI prevention with regard to their source of PI education ($p>0.05$). The table also shows that, there is no significant difference in the mean score of participants' practices about PI prevention with regard to their last time attended PI training ($p>0.05$).

Part IV: Correlation between nurses' knowledge of PI prevention and their and practices.



r =0.387 **p value[1]** =0.000

[1]Pearson Correlation

Figure 1: Spearman rho Correlation between Nurses' Knowledge of PI Prevention and Their and Practices.

The figure shows that there is a significant positive correlation between participants' knowledge and their practices about PI prevention (**r** =0.387, $p<0.05$); with increase in the participants' knowledge about PI prevention, their practices of prevention of PI are increased.

Part V: the existing barrier to implementing the practice of pressure injury prevention according to the participants.

Table 7: Barriers to implementing the practice of prevention of pressure injury

Barrier	Frequency	%
Lack of time	86	56.57
Unstable patient	76	50.0
Lack of training resources	45	29.60
Shortage of staff (lack of aids)	130	85.52
Inadequate facilities and equipment	105	69.07
Forget	22	14.47
Lack of Support & monitoring from heads & managers	28	18.42

The table shows that the most common barrier of implementing practices of prevention of pressure injury is shortage of staff (85.52%), followed by Inadequate facilities and equipment (69.07%), followed by lack of time (56.57%). On the other hand, the least common barrier is forgot (14.47%).

Other barriers of implementing practice of prevention of pressure injury which identified by the staff nurses

- Insufficient supply of linens to change soiled ones
- Insufficient & Inconsistent supply of dressing material and skin barriers
- Insufficient & Inconsistent supply of appropriate creams, ointments, etc.
- Inconsistent monitoring of repositioning.
- Work overload, some cases are contraindicated for positioning
- Lack of knowledge when dealing pressure injury assessment.

Discussion

Discussion of this study will be presented in the following four parts: **Part I:** Assessments of the nurses' knowledge, and practice regarding PI prevention. **Part II:** The association between demographic data and nurses' knowledge, and practice regarding PI prevention. **Part III:** Correlation between nurses' knowledge and practices of PI prevention. **Part IV:** the existing barrier to implementing the practice of pressure injury prevention according to the participants.

Interpretation of the results:

This study explored the context of nurses' knowledge and practices of PI prevention. Barriers to implementing the practice of prevention of pressure injury Within king Abdul Aziz specialist hospital, nurses department. Throughout the process of providing professional and effective care, nurses must have the appropriate knowledge, competencies, and critical thinking functionality. Because of this, and based on their background knowledge, they are able to determine not only which patients should have preventative procedures, but also which patients should undergo preventive precautions.

Part I: Assessments of the Nurses' Knowledge, And Practice Regarding PI.

Concerning the level of nurses' knowledge about PI prevention, the findings of the current study revealed that the mean score was about 60.8% (6.82 out of 10), with about 60 % of them having a moderate level of knowledge, 20.4% of them have high knowledge level, while 19.7% have low knowledge level. This finding is almost similar to Cross-sectional, descriptive study done by (17); and recruited 347 nurses who attended the 2013 and 2015 Wound Management Congresses to participate in the study. The results showed that the mean score of pressure injury knowledge and practice was 57.37 ± 14.26 out of 100 points. However, (18) conducts a clinical trial and recruit a total of 950 critical care nurses in 15 hospitals from six provinces of China, to identify the knowledge, attitudes, and practices of pressure injury prevention in Chinese critical care nurses. These results were higher than this study result regarding PI prevention knowledge with a mean score of 6.27 ± 1.37 out of 9 points (69.6% ± 15.2%).

Several studies findings displayed that, the knowledge means score among 212 Ethiopian nurses was 11.31 ± 5.97 (43.5%) out of 26 with 91.5% having inadequate knowledge of PI prevention (19) and among 89 Iranian, critical care nurses was 11.61 ± 3.32 out of 26 (44.65%) (20) . Furthermore, 282 Korean nurses have demonstrated a moderate level of knowledge of pressure ulcer prevention (60.1%) (21). While 1,806 Chinese nurses showed a higher mean score about PI prevention knowledge with 77.45% (31.76 ± 2.58 out of 41) with 58.3% of the participants having adequate PI-prevention knowledge (22).

In addition, many studies used the Pressure Ulcer Prevention Knowledge Assessment Tool major hospital . The finding revealed that the Mean scores of 510 Chinese ICU nurses' knowledge were 65.82 ± 9.29 out of 100%. Besides, only 5.1% of participants showed sufficient (80/100) PI prevention knowledge (23). And 406 Turkish nurses had 11.80 ± 3.28 out of 26 with 9.4% of participants having sufficient scores (score < 16; 60%) (24). Similarly, (25) who reported that 390 Turkish ICUs nurses had 11.54 ± 2.91 (44.3%) out of 26 with 5.9% having sufficient scores (≥ 60 %). All results were either inadequate or moderate reason may be the differences in sample size, region, and cutoff point for classifying satisfactory knowledge. Also, may probably attributable to variability in region, nurse education, professional experience, and other unknown factors.

The results indicate that the mean score of nurses' practices about PI prevention is 23.48 out of 27 (86.9%). The higher the score the better engagement in these preventive practices . The findings were congruent with the previous study done by (26), who reported that the mean score for self-reported PI prevention practices among 510 Chinese nurses working in ICU was 83.35 ± 13.55. Almost similar to another study conducted in China by Jiang et al. (2020) who reported that the mean score for nurses' PI behavior was 154.91 ± 17.63 (86.06%, range = 67.00–180.00) among nurse (N = 1,806). On the whole, over two-thirds of participants (78.2%) had good PI-prevention practices (≥144 points = 80%).

Part II: The Association Between Demographic Data and Nurses' Knowledge, And Practice Regarding PI.

In relation to the association between nurses' knowledge regarding PI prevention and the Participants' Demographic Factors, the finding indicates that there is a significant difference in the mean score of participants' knowledge about PI prevention with regard to their education ($p<0.05$). As the level of the highest education/training program increased, the nurses' mean score also increased Meaning that; nurses' who have master degree have a significantly higher level of knowledge about PI prevention than those who completed diplomas. This finding is similar to the outcomes of several studies (28,29) found the mean score of the nurses with bachelor's degrees to be higher than the mean score of the nurses who completed an associate degree program

Furthermore, there is a significant difference in the mean score of participants' knowledge about PI prevention with regard to their experience ($p<0.05$). Meaning that nurses' who have experience more than 10 years have significantly higher levels of

knowledge about PI prevention than the junior nurse's staff . This finding is similar to (30) who found that nurses with more than 10 years of service scored higher in a total of score. While, in contrary to (28,29) who reported no significant differences in knowledge scores among nurses with regard to their experience.

With regard to the significant difference in the mean score of participants' knowledge about PI prevention with regard to their last time attended PI training ($p<0.05$). Meaning that, nurses who attended training for less than 1 year have a significantly higher level of knowledge about PI prevention. Similarly, (28, 29) and (31) indicate that nurses who had received training on PI prevention had better knowledge than those who had not received such training. Which highlighted the importance of continuing education or in-service training in PI prevention . Whereas, on the other hand, (32,33), found no significant differences between the PI prevention knowledge scores and attending previous training.

Lastly, work overload and lack of knowledge when dealing with injury assessment prevent the healing process of the patients. Work overload among nurses makes it challenging for nurses and doctors to maintain a strict relocation schedule for the patients in the hospital. Similarly, when the patient does not have a caregiver, it becomes challenging to follow a relocation routine. According to (34), lack of knowledge worsens when the nurse's caregiver lacks the appropriate preventive mechanisms for pressure injury. As a result, a continual increase in pressure on the affected tissue or bone causes the condition of the patient to worsen.(35) Nurses must ensure they have the best medical training to provide quality patient care. Therefore, work overload ensures no time-scheduled procedure for following a treatment plan.(36)

Conclusion

In conclusion, 95% of PIs are preventable. The findings indicate that about 60% of the nurses who participated in this study had a moderate level of knowledge about PI prevention. While, they showed a high level of engagement in good PI prevention practices . Because of the significant correlation between knowledge and practice, it's essential for nursing administrators to develop continuous PI prevention and management training programs to enhance nurses' knowledge and reflect in their practice. Moreover, the most reported barriers were shortage of staff (lack of aids), and inadequate facilities and equipment.

References

1. Alanazi, F. K., Sim, J., & Lapkin, S. (2021). Systematic review: Nurses' safety attitudes and their impact on patient outcomes in acute-care hospitals. Nursing Open, 9(1), 30–43.
2. Al-Otaibi, Y. K., Al-Nowaiser, N., & Rahman, A. (2019). Reducing hospital-acquired pressure injuries. BMJ Open Quality, 8(1).
3. Al-Hashemi, H., Alqurashi, K., Jan, R., Farran, A., Al-Sabban, B., & Thomson, J. (2019). Incidence, prevalence, and complications of pressure ulcers in general medical and surgical units using a multidisciplinary model (prospective cohort). Biomedical Journal of Scientific & Technical Research, 18(1).
4. Avsar, P., Patton, D., O'Connor, T., & Moore, Z. (2019). Do we still need to assess nurses' attitudes towards pressure ulcer prevention? A systematic review. Journal of Wound Care, 28(12), 795–806.
5. Awoke, N., Tekalign, T., Arba, A., & Lenjebo, T. L. (2022). Pressure injury prevention practice and associated factors among nurses at Wolaita Sodo University Teaching and Referral Hospital, South Ethiopia: A cross-sectional study. BMJ Open, 12(3).
6. Aydın, A. K., Karadağ, A., Gül, Ş., Avşar, P., & Baykara, Z. G. (2019). Nurses' knowledge and practices related to pressure injury. Journal of Wound, Ostomy & Continence Nursing, 46(2), 117–123.
7. Aydogan, S., & Caliskan, N. (2019). A descriptive study of Turkish Intensive Care Nurses' pressure ulcer prevention knowledge, attitudes, and perceived barriers to care. Wound Management & Prevention, 65(2), 39–47. https://doi.org/10.25270/wmp.2019.2.3947
8. Ayello, E. A., Lobo, G. M., & Sibbald, R. G. (2017). Survey results from Canada and some Latin America countries: 2016 national pressure ulcer advisory panel changes in terminology and definitions. Advances in Skin & Wound Care, 30(2), 71–76.

9. Boyko, T. V., Longaker, M. T., & Yang, G. P. (2018). Review of the current management of pressure ulcers. Advances in Wound Care, 7(2), 57–67.
10. Bradford, N. K. (2018). Repositioning for pressure ulcer prevention in adults-A Cochrane review. International Journal of Nursing Practice, 22(1), 108-109.
11. Dirgar, E., Tosun, B., Dokumuş, H., & Bülbül, T. (2022). Evaluating nurses' knowledge of pressure injury prevention: A descriptive study. Advances in Skin; Wound Care, 35(4), 1–6.
12. Ebi, W. E., Hirko, G. F., & Mijena, D. A. (2019). Nurses' knowledge to pressure ulcer prevention in public hospitals in WOLLEGA: A cross-sectional study design. BMC Nursing, 18(1).
13. Etafa, W., Argaw, Z., Gemechu, E., & Melese, B. (2018). Nurses' attitude and perceived barriers to pressure ulcer prevention. BMC Nursing, 17(1).
14. Kottner, J., Cuddigan, J., Carville, K., Balzer, K., Berlowitz, D., Law, S., Litchford, M., Mitchell, P., Moore, Z., Pittman, J., Sigaudo-Roussel, D., Yee, C. Y., & Haesler, E. (2019). Prevention and treatment of pressure ulcers/injuries: The protocol for the second update of the international Clinical Practice Guideline 2019. Journal of tissue viability, 28(2), 51–58
15. Freundlich, K. (2017). Pressure injuries in medically complex children: A Review. Children, 4(4), 25.
16. Gebre, B. B., & Assefa, Z. M. (2019). Magnitude and associated factors of diabetic complication among diabetic patients attending Gurage zone hospitals, south west Ethiopia. BMC Research Notes, 12(1)
17. Getie, A., Baylie, A., Bante, A., Geda, B., & Mesfin, F. (2020). Pressure ulcer prevention practices and associated factors among nurses in public hospitals of Harari Regional State and dire dawa city administration, Eastern Ethiopia. PLOS ONE, 15(12).
18. Hu, L., Sae-Sia, W., & Kitrungrote, L. (2021). Intensive Care Nurses' knowledge, attitude, and practice of Pressure Injury Prevention in China: A cross-sectional study. Risk Management and Healthcare Policy, 14, 4257–4267.
19. Ingwu, J. A., Nwaordu, A. H., Opara, H., Israel, O. E., & Ogbogu, C. (2019). Caregivers' knowledge and practice toward pressure ulcer prevention in National Orthopedic Hospital, Enugu, Nigeria. Nigerian Journal of Clinical Practice, 22(7), 1014.
20. Jiang, L., Li, L., & Lommel, L. (2020). Nurses' knowledge, attitudes, and behaviours related to pressure injury prevention: A large-scale cross-sectional survey in Mainland China. Journal of Clinical Nursing, 29(17-18), 3311–3324.
21. Kim, G., Park, M., & Kim, K. (2020). The effect of pressure injury training for nurses: A systematic review and meta-analysis. Advances in Skin & Wound Care, 33(3), 1–11.
22. Kim, J. Y., & Lee, Y. J. (2019). A study on the nursing knowledge, attitude, and performance towards pressure ulcer prevention among nurses in Korea long-term care facilities. International Wound Journal, 16, 29–35.
23. Köse, I., Yeşil, P., Öztunç, G., & Eskimez, Z. (2016). Knowledge of Nurses Working in Intensive Care Units in Relation to Preventive Interventions for Pressure Ulcer. International Journal of Caring Sciences, 9(2), 677- 686.
24. Labeau, S.O., Afonso, E., Benbenishty, J(2021). Prevalence, associated factors and outcomes of pressure injuries in adult intensive care unit patients: the DecubICUs study. Intensive Care Med **47**, 160–169 .
25. Latimer, S., Chaboyer, W., & Gillespie, B. (2016). Pressure Injury Prevention Strategies in Acute Medical Inpatients: An observational study. Contemporary Nurse, 52(2-3), 326–340.
26. Lavallée, J. F., Gray, T. A., Dumville, J., & Cullum, N. (2018). Barriers and facilitators to preventing pressure ulcers in nursing home residents: A qualitative analysis informed by the theoretical domains framework. International Journal of Nursing Studies, 82, 79–89. 5
27. Li, Z., Lin, F., Thalib, L., & Chaboyer, W. (2020). Global prevalence and incidence of pressure injuries in hospitalised adult patients: A systematic review and meta-analysis. International Journal of Nursing Studies, 105, 103546.
28. Li, J., Yang, L., Fan, L., & Wang, Y. (2017). Awareness and preventive behavior of pressure injury in perioperative patients by 226 nurses. Journal of Nursing (China), 24(18), 48–52. (in Chinese).
29. Li, J., Zhu, C., Liu, Y., Li, Z., Sun, X., Bai, Y., Song, B., Jin, J., Liu, Y., Wen, X., Cheng, S., & Wu, X. (2022). Critical Care Nurses' knowledge, attitudes, and practices of Pressure Injury Prevention in China: A multicentric cross-sectional survey. International Wound Journal.

30. Li, Z., Marshall, A. P., Lin, F., Ding, Y., & Chaboyer, W. (2021). Pressure injury prevention practices among medical-surgical nurses in a tertiary hospital: An observational and chart audit study. International Wound Journal.
31. Lim, M. L., & Ang, S. Y. (2017). Impact of hospital-acquired pressure injuries on hospital costs-experience of a tertiary hospital in Singapore. Wound Practice & Research: Journal of the Australian Wound Management Association, 25(1), 42-47.(9)
32. Liu, Y. (2016). The knowledge, attitude and practice and influence factors of pressure ulcer care of junior clinical nurses in Corps hospital, Xinjiang (Master's thesis, Shihezi University, Xinjiang, China) (in Chinese). Retrieved from
33. Lotfi, M., Aghazadeh, A. M., Asgarpour, H., &Nobakht, A. (2019). Iranian nurses' knowledge, attitude and behaviour on skin care, prevention and management of pressure injury: A descriptive cross-sectional study. Nursing Open, 6(4), 1600–1605.
34. Padula, W. V., & Delarmente, B. A. (2019). The national cost of hospital-acquired pressure injuries in the United States. International Wound Journal, 16(3), 634–640.
35. Raynaldo, M. C. (2020). Implementing hospital-acquired pressure injury (HAPI) prevention program. [Doctoral project, University of St Augustine for Health Sciences]. SOAR @ USA: Student Scholarly Projects Collection.
36. Tesfa Mengist, S., Abebe Geletie, H., Zewudie, B. T., Mewahegn, A. A., Terefe, T. F., Tsegaye Amlak, B., Tadesse, B., GebreEyesus, F. A., Tsehay, T., Solomon, M., Chekole Temere, B., Geze Tenaw, S., & Mesfin, Y. (2022). Pressure ulcer prevention knowledge, practices, and their associated factors among nurses in Gurage zone hospitals, south Ethiopia, 2021. SAGE Open Medicine, 10, 205031212211055