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Nurses' knowledge to pressure ulcer prevention at Hail hospitals in Saudi Arabia: A cross-sectional study

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ABSTRACT

Background: Routine knowledge assessment ensures that nurses are guided on relevant and recent evidence-based practices to consistently provide efficient and safe patient care. *Methods*: This descriptive, cross-sectional study was conducted among nurses

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assigned in the intensive care unit, male intermediate care unit, female intermediate care unit, and convalescent ward. The Pressure Ulcer Knowledge Assessment Tool (PUKAT) 2.0 was used in the study. *Results*: The total mean knowledge score was 40.53% (SD 9.72). Of the 114 participants, only 1.8% (2) scored a satisfactory rate of ≥60%. Analysis by theme showed that the highest score was from 'risk assessment' with a mean score of 52.63%, while the least score was from 'prevention of pressure ulcers' with 23.68%. There were no significant differences found on mean scores when samples were grouped according to characteristics. *Conclusions*: Findings of the study demonstrate knowledge gaps of nurses on pressure ulcer prevention. Unsatisfactory scores were noted specifically on the guidelines of preventing pressure ulcers, particularly in the effective techniques of positioning and repositioning, and the use of preventive devices.

Keywords: Nurses' knowledge, pressure ulcer, pressure ulcer prevention, PUKAT 2.0

1. INTRODUCTION

Pressure ulcer or known as "pressure injury" is established as a common and costly public health issue that influences population in all ages and all health care milieus. It is one of the most perennial causes of affliction to patients and is increasingly delineated as an indicator of excellent nursing care. In a concept analysis of nursing-sensitive indicators, it was found that pressure ulcers and falls were the two most frequently specified outcome attributes of nursing-sensitive indicators (Heslop et al., 2014). Nearly 10% of hospital patients and 5% of community nursing patients are inflicted with pressure ulcers at any moment (European Pressure Ulcer Advisory Panel, 2019). The occurrence of pressure ulcers is a marker of poor general prognosis and may result in premature death in some patients. Globally, prevalence rates of pressure ulcers range from 3.4- 32.4% (Anthony et al., 2019). In Saudi Arabia, prevalence and incidence rate of 5.7% and 1.6 ulcer/1000 patient-days respectively were noted in general medical and surgical units (Hashem, et al., 2019). Tayyib et al. in their prospective cohort study reported an incidence rate in adult intensive care units of two hospitals at 39.3%, which is significantly higher than the worldwide rates.

The associated cost in dealing with pressure ulcers is also substantial. In the US, the regular 300-bed acute facility with a 2.4% incidence rate shells out $14 million a year to allocate for preventing and managing pressure ulcers. As emphasized by Demarre et al, (2015) the costing system of prevention and treatment differs considerably. But basically, managing severe pressure ulcers is more costly over the cost of prevention. It is important to put into the picture that pressure ulcer imposes high cost of charges directly related to management and indirectly on the costs of distress brought on to patients and their caregivers (Silva et al., 2013; Thorat et al. 2020). Furthermore, pressure ulcers result in increased morbidity and the risk of nosocomial infections from extended hospital stays. A recent study found that the average length of stay for patients afflicted with pressure ulcers is 25 days in contrast to 6 days for patients without pressure ulcers (Hashem et al., 2019). As nurses who spent more time with patients, knowledge, and skills on decision-making are factors that are significant in the prevention and management of pressure ulcers. The standard of care being rendered is substantially associated with the knowledge level to pressure ulcer prevention. Nurses' level of knowledge is illuminated particularly as an important element to discern who among patients necessitate prevention, which interventions are efficacious, and in what manner these interventions must be implemented (Manderlier et al., 2017). Several studies found that a significant positive correlation exists between knowledge and attitude (Charalambous et al., 2019; Tirgari et al., 2018). Consequently, insufficient knowledge and negative attitudes adversely influence prevention approaches to pressure ulcers (Simonetti et al., 2015).

Numerous studies were undertaken to get insights into the nurses' level of knowledge about pressure ulcer prevention. In a systematic review and meta-analysis of eight studies that used the Pressure Ulcer Knowledge Assessment Tool (PUKAT) from 2010 to March 2018 revealed that the average total pressure ulcer prevention knowledge was 53.1% (Dalyand et al., 2018). This result was below the recommended level which is more than or equal to 60% (Charalambous et al., 2019). A probable reason for inferior knowledge was that nurses are not cognizant of standard care procedures and may not be oriented on the recent evidence-based practices. They added further that occasionally, nurses' interventions are guided by instincts, experience, or routines instead of knowledge (Qaddumi and Khawaldeh, 2014). Routine knowledge assessment ensures that nurses are guided on relevant and recent evidence-based practices to consistently provide efficient and safe patient care.

Various knowledge assessment tools are available internationally yet such tools have limited tests on psychometric attributes (Manderlier et al., 2017). The Pressure Ulcer Knowledge Assessment Tool (PUKAT) 2.0 is deemed most recent as it is based on contemporary guidelines related to pressure ulcer prevention. In Saudi Arabia, limited studies were found on the assessment of the level of nurses' knowledge in in-patient units and there is a scarce of published literature that used the PUKAT 2.0, hence prompted this study. This facilitates the identification of educational gaps, development of new strategies, and subsequently upgrades the kind of nursing care toward pressure ulcer in the country.

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2. MATERIALS AND METHODS

A cross-sectional, descriptive study was conducted in four government hospitals in Hail, Saudi Arabia. Nurses working as full-time in intensive care units (ICU), male intermediate care unit (MICU), female intermediate care unit (FICU), and convalescent ward were purposively selected to participate. Data collection procedures started after gaining approval from the Research Ethics Committee of the College of Nursing, University of Hail and respective Nursing Directors (Figure 1). Nurses that were on their off-duty, on leave, and vacation during the data collection were excluded.

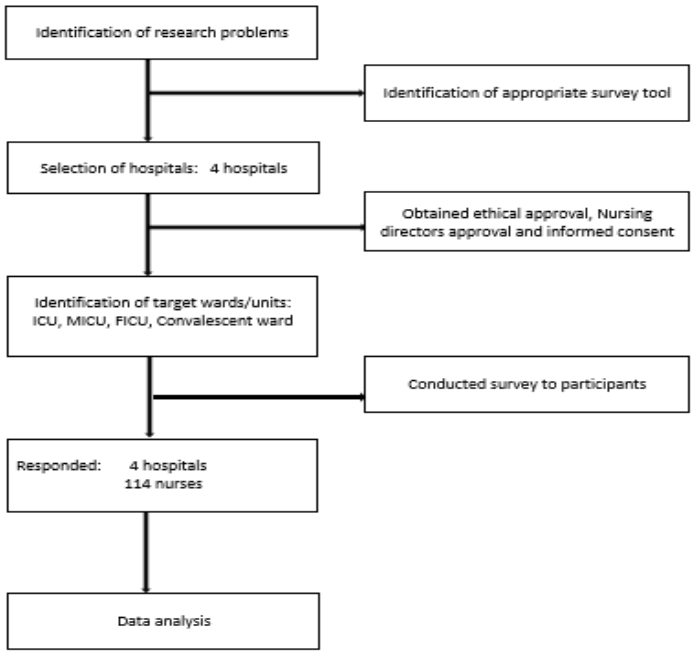

Figure 1 Flow chart of the study methodology

Data collection was conducted between September through October 2019. Nurses were provided with a printed copy of the survey tool by the researchers and given a maximum of 30 minutes to answer. Participation was not coerced and was anonymous. The consent to participate was implied by the completion and submission of the questionnaire. The first part of the questionnaire includes general information of the respondents such as age, gender, educational attainment, years of experience, clinical unit, and years from the last pressure ulcer training attended. The second part of the questionnaire includes the Pressure Ulcer Knowledge Assessment Tool 2.0, a revised and updated version developed at Ghent University, Belgium. The tool was validated and is reliable in assessing knowledge of pressure ulcer prevention (Kielo et al., 2020). The researchers were granted the permission by the corresponding author (Manderlier et al., 2017) to adopt and utilize the assessment tool in this study. Content validity is good, moderate difficulty level, and tool stability is sufficient (Intraclass Correlation Coefficient = 0.69). It showed plausible psychometric attributes and can be utilized and circulated globally to evaluate the knowledge in pressure ulcer prevention in nursing education, research and practice (Manderlier et al., 2017).

The tool is a 25 multiple-choice items, reflecting themes expressing the most critical aspect of pressure ulcer prevention namely: (1) etiology; (2) classification and observation; (3) nutrition; (4) risk assessment; (5) prevention of pressure ulcer, and (6) specific patient groups. The maximum score value was 25 and a mean knowledge score of ≥60% (15 and higher) is weighed to be satisfactory. For this study, the maximum score was 24 as one question was omitted, with permission from the author, due to inapplicability in the context.

Statistical Analysis

Data analyses were performed using SPSS v. 21.0. Descriptive statistics were utilized to summarize the characteristics of the respondents. The responses from the PUKAT 2.0 questionnaire were coded as dichotomous variables. If the answer was correct, it was coded as "1", while if it's not correct, it was coded as "0". The result was coded the same as "not correct "if the option 'I do not know the answer', blank answer, or multiple answers were marked. For the total score, each participant's correct answers were added and divided with the total items and converted to a percentage. To test for differences in scores among groups, independent sample t-test, and ANOVA were performed. A significance level of $p<0.05$ was set.

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3. RESULTS

Characteristics of the Sample

In total, 114 nurses participated and the majorities were females (97.4%). Participants were mainly (67.5%) working or assigned in the intensive care unit (ICU), and least commonly in male/female intermediate care units. Most of the participants had a bachelor's degree (90.4%) and were mainly from 20-39 years of age group. Nearly 44% had working experience of 5 to 10 years, while 37% worked for less than 5 years. Only 2% (2) of the participants worked for more than 20 years. In respect to pressure ulcer training received, 43% of the participants did not complete any training (Table 1).

Table 1 Demographic Profile of the Respondents

Variable		Frequency	Percentage
Clinical Unit			
	ICU	77	67.5
	MICU/FICU	14	12.3
	Convalescent Ward	23	20.2
Sex			
	Male	3	2.6
	Female	111	97.4
Age			
	20-39 years old	93	81.6
	40 years old and above	21	18.4
Educational Attainment			
	Diploma	11	9.6
	BSN	103	90.4
Work Experience			
	Less than 5 years	42	36.8
	5- 10 years	50	43.9
	11- 20 years	20	17.5
	more than 20 years	2	1.8
Last Pressure Ulcer Training Attended			
	Less than 1 year	29	25.4
	1-2 years	33	28.9
	More than 3 years	3	2.6
	Never	49	43.0

Knowledge Scores on PUKAT 2.0

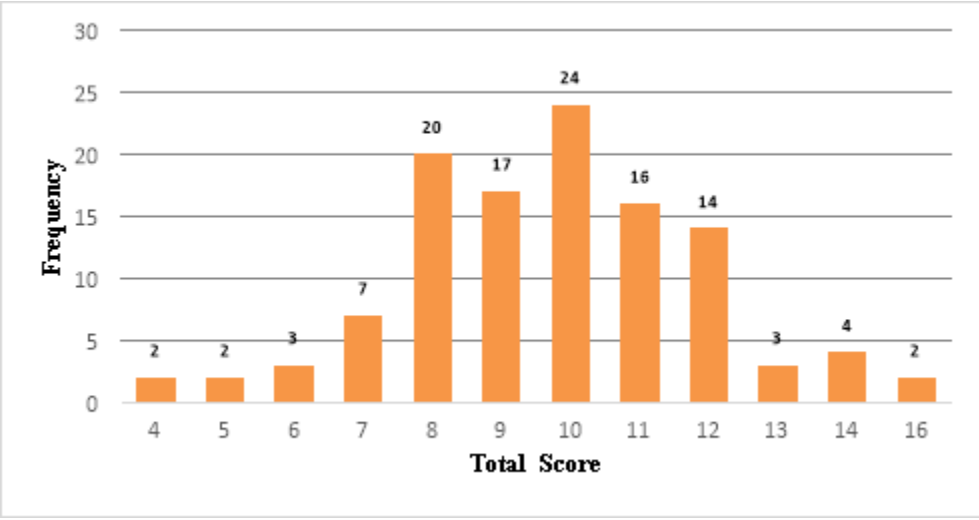

Figure 2 Bar chart representing the frequency of knowledge scores

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The overall knowledge and theme scores were calculated as percentage values. Scores were obtained by the sum of correct answers, divided by the total number of items, and multiplied by 100 (score/24*100). The overall and theme scores revealed a normal distribution (Kolmogorov-Smirnov p>.001). The scores obtained from nurses' responses varied between 16.67% (4 items correct) and 66.67% (16 items correct) of a maximum of 24 items (Figure 2).

The total mean knowledge score was 40.53% (SD 9.72) or 10/24 (SD 2.21). Only two (1.8%) of the 114 nurses had a mean score of ≥60%, which is the recommended satisfactory score (Table 2). This implicates that majority of the participants had an unsatisfactory level of knowledge on pressure ulcer prevention. When analyzed by theme, the highest score was obtained from the theme "risk assessment" with a mean score of 52.63% (SD 21.90) (Table 3). This theme covers questions on the frequency of skin assessment and the use of the risk assessment tool. In contrast, the theme "prevention of pressure ulcers" had the lowest rate with 23.68% (SD 12.60) (Figure 3). The theme includes questions on positioning patients on bed and chair, repositioning, and effective use of devices (e.g pressure redistributing foam mattress, ring cushions, linens) to prevent pressure ulcer development.

Table 2 Frequency of total scores

Score (%)	Frequency	Percent (%)
4 (16.67)	2	1.8
5 (20.83)	2	1.8
6 (25.00)	3	2.6.
7 (29.17)	7	6.1
8 (33.33)	20	17.5
9 (37.50)	17	14.9
10 (41.67)	24	21.1
11 (45.83)	16	14.0
12 (50.00)	14	12.3
13 (54.17)	3	2.6
14 (58.33)	4	3.5
16 (66.67)	2	1.8
Total	114	100%

Table 3 Mean Knowledge Scores by Theme

Theme	Mean Score % (Items)	SD	Minimum Score % (items)	Maximum Score % (items)
1-Etiology (5 items)	46.10 (2.3)	15.08 (0.75)	20 (1)	100 (5)
2-Classification & Observation (4 items)	50.20 (2.0)	21.68 (0.87)	0 (0)	75 (3)
3-Risk Assessment (2 items)	52.63 (1.1)	21.90 (0.49)	0 (0)	100 (2)
4-Nutrition (3 items)	47.96 (1.45)	27.70 (0.86)	0 (0)	100 (3)
5-Prevention of Pressure Ulcer (8 items)	23.68 (1.96)	12.60 (1.00)	0 (0)	50 (4)
6-Specific-Patient Groups (2 items)	46.49 (0.9)	15.90 (0.35)	0 (0)	100 (2)
Total (24 items/100%)	40.53 (9.72)	9.25 (2.21)	16.67 (4)	66.67(16)

Analysis by item showed that 'item 24' had the highest correct rate with 87.7% (100/114) (Figure 4). Item 24 pertains to the body part in which babies could have the highest risk for pressure ulcers to develop. On the other hand, item 23 which queried on how pressure ulcer develops in the operating room had the lowest correct rate of 2.6% (3/114). This result was expected since all the respondents were assigned in in-patient units. Individual items were analyzed to determine those that were incorrectly answered by the majority (<50% correct). Table 4 summarizes the fourteen (14) items identified as low-scoring items.

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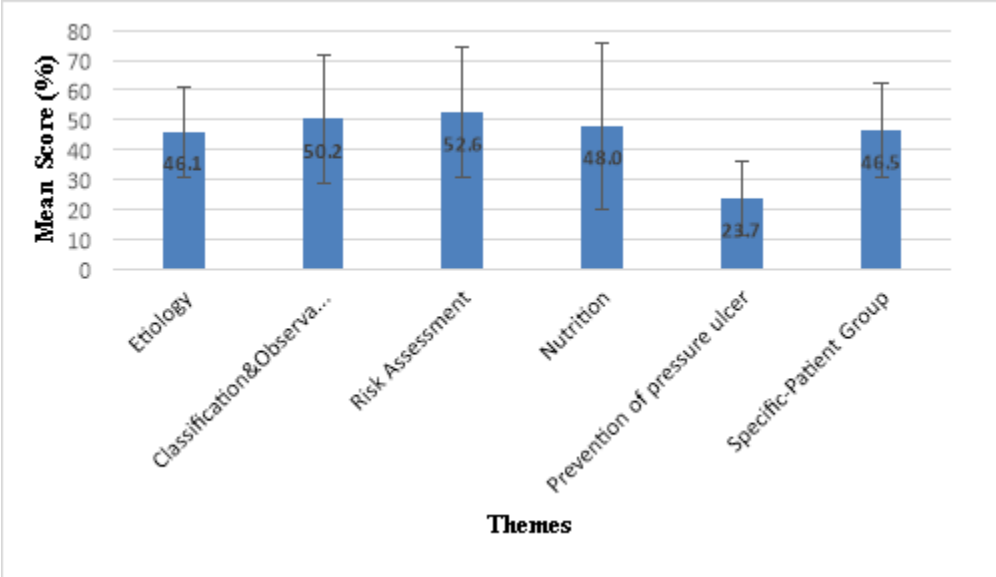

Figure 3 Bar chart representing the mean scores among the different themes

Table 4 PUKAT 2.0 tool † with Low-scoring items (n=114)

Theme	Item No.	Question Statement	Correct Rate n (%)
1-Etiology	2	A patient sits with the head of the bed elevated to 60◦. What happens when his skin sticks to the underlying surface when he slides down in bed? a. The pressure increases. b. Problems with the microclimate occur (temperature and relative humidity). c. Shear increases.* d. Friction/rubbing increases. e. I do not know the answer	32 (28.1)
	4	A patient is sitting in a chair in the morning and in the afternoon, each time 2 hours. The rest of the day he spends in bed. He cannot mobilize himself. When does this patient have the highest risk to develop a pressure ulcer (if no prevention is applied)? a. There is no higher risk to develop a pressure ulcer if a seated position in chair is combined with a lying position in bed. b. The risk to develop a pressure ulcer is highest when he is seated in a chair because high pressure is applied during a short period of time. c. The risk to develop a pressure ulcer is highest when he is lying in bed because lower pressure is applied during a longer period of time. d. The risk to develop a pressure ulcer is high in this specific case, both when seated in a chair and lying in bed. A short-term high pressure can have the same effect as a long-term low pressure.* e. I do not know the answer.	41 (36.0)

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	5	Which statement is correct? a. The use of moisture-absorbing pads decreases the risk of pressure ulcers. b. The use of water and soap can erode the skin barrier, thereby increasing the risk of superficial skin damage.* c. Massaging the skin (during washing and drying) is effective to prevent pressure ulcers. d. Dressing the heels (with a bandage) will decrease the risk of heel pressure ulcer development. e. I do not know the answer	15 (13.2)
2-Classification & Observation	6	CASE: You observe a new blister on the heel of a patient who can reposition himself in bed. You take a look at his file, but you colleagues never reported a non-blanchable erythema or a wound. Which statement is correct? a. The blister is not a pressure ulcer. b. The blister is a Category II pressure ulcer. c. The blister is a Category I pressure ulcer as long as it remains intact. d. There is insufficient information to know if this is a pressure ulcer or not.* e. I do not know the answer.	17 (14.9)
	8	In which of these categories can necrotic tissue be present? a. Category I, II, III and IV. b. Category II, III and IV. c. Category III and IV.* d. Category IV only e. I do not know the answer.	48 (42.1)
3-Risk Assessment	10	CASE: A patient is recently admitted to your nursing unit. The patient has no signs of skin redness (blanchable/non-blanchable), but is bedridden. When completing the Braden risk assessment tool, the score indicates that there is no risk for pressure ulcer development. No prevention is needed. However, you are very surprised because your clinical experience tells you that this patient is at risk. What are you going to do now? a. You do not implement a prevention plan because both the skin assessment and the scoring tool indicated that there is no increased risk. b. You do not implement a prevention plan because risk assessment instruments are developed to replace clinical judgment. c. You take preventive measures because your clinical judgment is as important as the result of the risk screening using the tool.* d. You decide to reassess the patient on a daily basis (using the instrument) and to start prevention if the	33 (28.9)

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		Braden risk assessment instrument indicates an increased risk to develop a pressure ulcer. e. I do not know the answer	
4-Nutrition	12	CASE: A 23-year-old previously healthy male was recently admitted to the hospital with a spinal cord injury (car accident). He is immobile and has no problems eating of drinking. Is nutritional supplementation needed to reduce the risk for pressure ulcers? a. Yes, I provide nutritional supplementations (vitamin tablets) to prevent pressure ulcers. b. Yes, I provide nutritional supplementations (drinks enriched with the amino acid arginine) to prevent pressure ulcers. c. No, I will not change the nutrition of this patient as long as no signs of pressure ulcers are observed (redness or skin breakdown). d. No, I will not change the nutrition of this patient as long as nutritional intake is adequate.* e. I do not know the answer.	21 (18.4)
	15	What is the percentage of patients with an increased risk to develop pressure ulcers that receive adequate prevention in a chair and in bed in hospitals? a. <20%* b. Between 20% and 50% c. Between 50% and 70% d. >70% e. I do not know the answer.	37 (32.5)
5-Prevention of Pressure Ulcer	16	CASE: Your colleague informs you that she positioned a patient in bed in a semi Fowler position. What does this mean? a. The patient lies on his side in an angle of 30◦. b. The patient lies on his side in an angle of 45◦. c. The patient lies in a supine position, with both head of bed and upper legs elevated up to an angle of 30◦.* d. The patient lies in a supine position, with the head of bed elevated up to an angle of 45◦ e. I do not know the answer.	6 (5.3)
	18	The use of a ring cushion (donuts) is effective to prevent pressure ulcers when patients are seated in a chair of wheelchair. Is this statement correct? a. Yes, because the pressure near the bony prominence is reduced. b. Yes, because it redistributes pressure and shear effectively around the area at risk. c. No, because the contact surface between the patient's skin and the surface is smaller.* d. No, as it is only effective if a patient had a pressure	16 (14)

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		ulcer in the past. e. I do not know the answer	
	19	How should bed linen be used to prevent pressure ulcers? a. Do not secure the sheets under the mattress, so they can move along with the patient. b. Do not secure the blanket under the mattress, so it can move along with the patient. * c. Make sure the sheets are stretched tight. d. Put moisture-absorbing pads under the patient. e. I do not know the answer.	4 (3.5)
	20	Which is the most effective technique to position a patient when seated? a. In an upright position with the knees in a 90◦ angle and the feet not touching the ground. b. In an upright position with the legs being supported so that an angle of more than 90◦ is created at the knees. c. In a semi-reclined position with the knees in a 90◦ angle with the feet not touching the ground.* d. In a semi-reclined position with the legs being supported so that an angle of more than 90◦ is created at the knees. e. I do not know the answer.	7 (6.1)
			14(12.3)
	22	How does repositioning prevent pressure ulcers? a. The amount of pressure and shear will be reduced. b. The amount and duration of pressure and shear will be reduced. c. The duration of pressure and shear will be reduced.* d. It reduces friction at the bony prominences. e. I do not know the answer.	
6-Specific-Patient Groups	23	Which of these statements is correct about the development of pressure ulcers in the operating room? a. Pressure ulcers are not likely to occur during surgery. If redness is observed just after surgery, it is most likely to be a burn wound. b. Immobilization after surgery causes pressure ulcers to develop, not the immobilization during the surgery itself. c. When pressure ulcers develop during surgery the first visible signs appear a few days later; making people think they developed after surgery.* d. A pressure ulcer appearing postoperatively is always the result of immobilization during surgery. e. I do not know the answer.	3(2.6)

**Correct Answer*

† Developed by Manderlier et al., 2017

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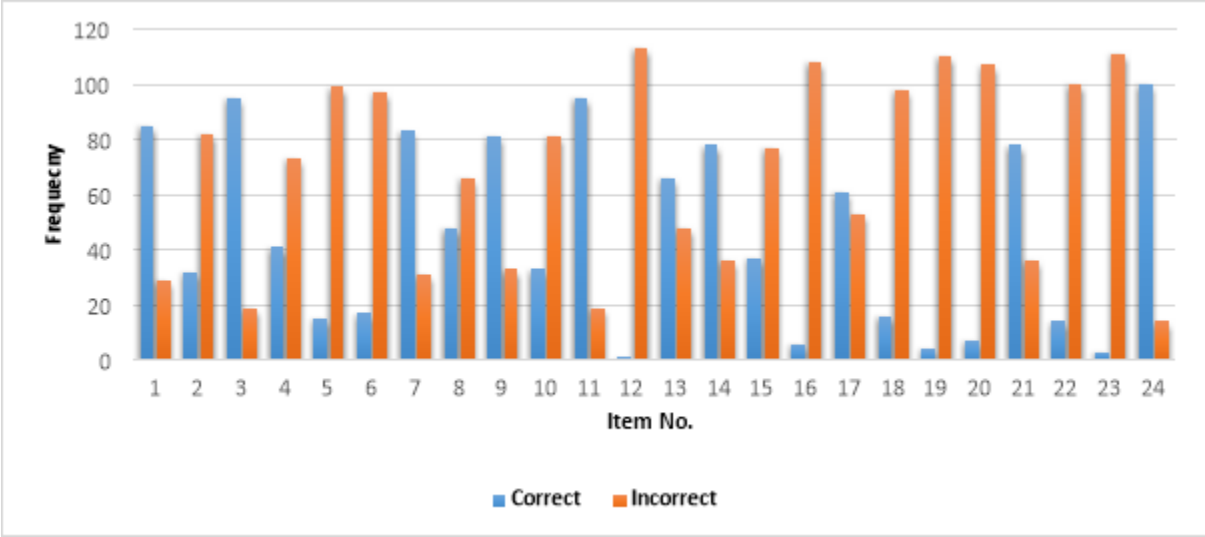

Figure 4 Bar graph showing the frequency of correct and incorrect responses per item

Knowledge scores between groups were compared using Independent T-Test and One-way ANOVA (Table 5). Analysis of the statistics implies that no significant differences exist on the level of knowledge of participants when classified or grouped according to sex, age, educational attainment, clinical unit, work experience, and years from last pressure ulcer training attended.

Table 5 The difference in the level of knowledge of the respondents towards pressure ulcer prevention when grouped according to characteristics.

Variable	Mean Score (%)	*p-value*
Sex		
Male	44.5	0.47
Female	40.7	
Age		
20-39 years	40.8	0.96
40 years and above	40.9	
Educational Attainment		
General Nursing/ Diploma	41.3	0.85
BSN	40.7	
Clinical Unit		
ICU	40.0	0.17
FICU/MICU	44.9	
Convalescent Ward	40.8	
Work Experience		
Less than 1 year	40.9	0.89
5- 10 years	41.2	
11- 20 years	39.8	
more than 20 years	37.5	
Last Pressure Ulcer Training Attended		
Less than 1 year	38.8	0.56
1-2 years	41.0	
More than 3 years	41.7	
Never	41.7	

4. DISCUSSION

Considering the significance of enhancing the knowledge of pressure ulcer prevention among nurses, it is imperative to have adequate insight in the current level of knowledge. Routine assessment of nurses' knowledge by utilizing a dependable and verified assessment tool is advocated by global standards for pressure ulcer management (National Pressure Ulcer Advisory Panel, 2017).

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This study gained a perception on the level of knowledge on pressure ulcer prevention among nurses in government hospitals in Hail, Saudi Arabia. The assessment revealed that participants in this study have an unsatisfactory level of knowledge with a mean score of 40.53% which is below the cut-off point of at least 60%. Only 1.8% of the participants had a satisfactory mean knowledge score. This result was relatively lower than the findings of corresponding studies conducted in 16 Belgian Hospitals which revealed a mean score of 50.7% (De Meyer et al., 2019), and in a multicenter study of Swedish hospitals that reported a mean score of 58.9% (Gunningberg et al., 2015). In addition, a recent study in Singapore wherein operating room nurses' knowledge and attitude on pressure injury was assessed, noted a 47.8% mean score (Khong et al., 2020). Knowledge deficits were also reported in other studies that utilized the initial version of the instrument, the PUKAT. These include studies from Ethiopia, Turkey, and Jordan which obtained mean scores of 43%, 44%, and 42% respectively (Qaddumi and Khawaldeh, 2014; Aydogan and Caliskan, 2019; Ebi et al., 2019).

In the contrary, some studies have given an account in nurses having an adequate level of knowledge on pressure ulcer prevention. One of which was a study that transpired in a public hospital in Cyprus wherein the mean knowledge score was 77% (Charalambou et al., 2019). In another study conducted in Australia, a satisfactory knowledge (70%) was reported among registered and enrolled nurses working in acute, medical, and rehabilitation units in hospitals and community health centers (Barakat-Johnson et al., 2018). The study of Tolulope et al. also reported a mean score of 64.4% among nurses working in a tertiary hospital in Nigeria. In Saudi Arabia, there were no published studies that utilized the PUKAT 2.0 as it is relatively new, hence the lack of basis for comparison nationally. However, studies evaluating the level of knowledge regarding the prevention of pressure ulcers had been conducted among nurses assigned in home-care and rehabilitation hospitals using the original version of PUKAT. The results of these studies reported that home-care nurses in the Western region have a mean score of 51.5% (Abdulkarem et al., 2018), while nurses and other health personnel in a rehabilitation hospital had a mean score of 71.5% (Kaddourah et al., 2016).

This study explored the knowledge of nurses specifically in terms of the essential aspects of pressure ulcer prevention that were classified by themes namely etiology, classification and observation, nutrition, risk assessment, prevention of pressure ulcer, and specific patient groups. All the mean scores from the various themes were below the recommended level, 60%. The highest mean score among the six themes was on "risk assessment" (56.1%), though considered as unsatisfactory. Similarly, a descriptive and comparative multi-center study in four Swedish county councils noted the themes 'nutrition' (83.1%) and 'risk assessment' (75.7%) as having the highest mean scores (Khong et al., 2020). On the other hand, the theme 'measures of pressure ulcer prevention' had the lowest correct rate (24.5%). This finding is consistent with various studies worldwide that reported the theme "preventive measures to reduce the duration of pressure" having the lowest mean score (Qaddumi and Khawaldeh, 2014; De Meyer et al., 2019; Gunningberg et al., 2015; Ebi et al., 2019; Abdulkarem et al., 2018. Furthermore, the participants in the present study had low correct rates in items 16 and 20 which pertains to appropriate techniques of positioning patients to semi-fowler's (5.3%) and seating position (6.1%), respectively. Whereas, the statement that queried on the rationale of repositioning (item 22) had a correct rate of 12.3%. This reflects that the general participants were not cognizant of the recent guidelines on the use of preventive devices. Noticeably, only 14% (16/114) of the participants were aware that ring cushions are not recommended anymore (item 18) and only 3.5% (4/114 nurses) knew the proper use of linens/sheets (item 19). These gaps need immediate action. According to a recent systematic review of 30 literatures, interventions associated with position change and pressure reduction devices reduced the occurrence of pressure sores and were important for prevention (Yun and Park, 2020). In order to maintain knowledge on pressure ulcer prevention, a quarterly education is crucial.

This study found that no significant difference exists on the mean scores of nurses when grouped according to age, gender, educational attainment, clinical unit, years of working experience, and years from last pressure ulcer training attended. This is in contrast with some studies conducted recently. The study of De Meyer et al., found that nurses with higher educational levels and attended further training on pressure ulcers or wound care, overall, yielded significantly higher total knowledge scores. Similarly, a handful of studies reported that a history of pressure ulcer training raised the scores on pressure ulcer prevention (Lofti et al., 2019; Fullbrook et al., 2019). Further studies noted that those with higher educational levels, like having a bachelors' degree, were high likely to have satisfactory knowledge of pressure ulcer prevention (Lofti et al., 2019; Jiang et al., 2020; Ghosh et al., 2019). We also found lone study accounting that gender (Khojastehfa et al., 2020), and clinical unit is associated with the level of nurses' knowledge (Ghosh et al., 2019).

Limitations of the study

This study explored the level of knowledge alone. Further studies are necessary to determine the relationship between knowledge, attitudes, and practices of pressure ulcer prevention. Moreover, the dynamic and evolving worldwide guidelines and recommendations on pressure ulcer preventions need to be considered when assessing the reliability of the tool being utilized.

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5. CONCLUSION

The findings of the study demonstrate knowledge gaps of nurses on pressure ulcers prevention. Low and unsatisfactory scores were noted specifically on the guidelines of preventing pressure ulcer particularly in the effective techniques of positioning and repositioning, and the use of preventive devices. These are areas where nurses could benefit from focused educational augmentations. As knowledge is considerably correlated with the attitude and practices of nurses on pressure ulcer prevention, appropriate educational approach is imperative. A greater focus on prevention will help decrease the occurrence of pressure ulcers and ease the direct and indirect costs of management.

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Author Contributions

SAS, JCA: Conception, design, data analysis, manuscript preparation, approval of the final version

LLD, AMV, AAP, MLD: Conception, design, data acquisition, manuscript preparation, approval of the final version

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Conflict of Interest

The authors declare that there are no conflicts of interests.

Informed consent

Written informed consent was taken first from the Nursing Directors of the participating hospitals. Further written & oral informed consent was obtained from all individual participants included in the study.

Ethical approval:

The study was approved by the Research Ethics Committee (RCBC) of the College of Nursing, University of Hail, Saudi Arabia.

Data and materials availability

All data associated with this study are available upon request to the corresponding author.

Peer-review

External peer-review was done through double-blind method.

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