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Knowledge and Attitude Regarding Pressure Ulcer Care among Nurses in Saudi Arabia

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Abstract **Objectives: Introduction:** Nurses are responsible for the direct and indirect continuous care of pressure injuries. To achieve the highest quality care, the article discusses the knowledge and attitude of nurses during the care of pressure ulcer patients and highlights their behavior, as knowledge is important in reducing the presence and development of ulcers. **Objectives:** The purpose of this study is to evaluate Saudi Arabian nurses' attitudes and level of knowledge about caring for pressure ulcers. **Methodology:** This study is a cross-sectional study conducted from July 2024 to February 2025 in Saudi Arabia. The inclusion criteria are random nursing students in internship years and nursing staff in Saudi Arabia. All nursing students are excluded from their internship years. The minimum target sample size of 384 was calculated using a formula based on prevalence estimation, 95% confidence level and 5% acceptable error. **Results**: The study assessed the knowledge and attitudes of 394 nurses in Saudi Arabia regarding pressure ulcer care. The participants, predominantly young and well-educated, demonstrated a strong understanding of immobility as a primary risk factor for pressure injuries, with 82% recognizing its significance. However, there were notable gaps in their perceptions of comprehensive care, as 66% believed topical creams were the sole preventive measure. While 74.1% consistently assessed patients' skin, only 20.3% exhibited high knowledge levels. Overall, nurses displayed moderate attitudes towards pressure ulcer prevention, highlighting the need for enhanced education and training to improve care practices and outcomes. **Conclusion:** In conclusion, the findings of this study underscore the necessity for ongoing training and support to bridge the gaps identified in knowledge and practice regarding pressure ulcer management among nurses in Saudi Arabia.

Key Words Pressure Ulcers, Knowledge, Attitude, Saudi Arabia

INTRODUCTION

Pressure Ulcers (PU) are one of the most common hospital-acquired conditions in people with mobility limitations. Such wounds can cause pain and worsen the underlying illness. They can be life-threatening at times and treating them can be costly for both the patient's family and society [1]. A pressure ulcer, also known as a pressure injury, is a specific type of damage that occurs in the skin or underlying tissues due to prolonged pressure. These ulcers typically develop over bony areas, but can also be associated with medical devices [2]. A study conducted in April 2016 by the Commission on Patient Safety estimated that more than 2.5 million patients in acute care facilities had Pressure Injuries (PIs) and that every year, over 60,000 patients pass away from PI-related complications. 10.3% of patients in surgical Intensive Care Units (ICUs) and 12.1% in medical ICUs had Pressure Injuries (PIs), while 3.3% of patients in ICUs developed severe pressure Ulcers (PUs). According to a different Raynaldo (2020), 7.8% of ICU patients developed pressure ulcers during their stay in the ICU, on top of the 9.8% of patients who had them upon arrival [3]**.** PUs increases hospital care costs, the risk of patient-

acquired infections and the rates of morbidity and mortality [4]. The following are some of the several variables that raise the risk of pressure sores: Absence of mobility or movement restricted by a loss of Consciousness and urinary or gastrointestinal incontinence leads to excessive cutaneous wetness, which ruptures skin tissue [5]. Studies have been published on the knowledge and attitude towards pressure ulcers in 2022 by Dr. Ravindra H.N., Balram Kathaliya According to study results, nurses' knowledge of pressure ulcer prevention was extremely low (M = 57.79%, SD = 9.20) and their practice was moderate (M = 72.27%, SD = 14.49). The degree of formal training and the nurses' educational attainment were significantly correlated with their understanding of pressure ulcer prevention [6]Regarding pressure ulcer prevention, there was a positive association between nurses' knowledge and practice (r = 0.459, p>0.000121) [6]. Significant discomfort may follow a pressure ulcer and approximately 60,000 people pass away from pressure ulcers each year [7]. Pressure ulcers are difficult for nurses to properly identify and classify, which raises the risk of wound infection in hospitalized critically ill patients. The purpose of this study was to raise the knowledge of the nurses', attitudes and perceived barriers about pressure ulcer prevention [8].

Factors influencing knowledge about PI prevention and treatment resulted in conflicting results. For example, despite having more knowledge about PI prevention, nurses with bachelor's degrees were not more likely to provide PI prevention. According to one study, highly educated nurses demonstrated less knowledge than those with baccalaureate degrees. Furthermore, nurses in orthopedic, trauma and emergency departments lacked knowledge of PI prevention, categorization and management [9].

The rate of pressure injuries has decreased as more people become aware of them. Large sample size research that collected data from 2006 to 2015 reported that the total frequency of pressure injuries at all institutions decreased from 13.5% (2006) to 9.3% (2015). Each year, 0.31 to 0.7% of adults aged 65 and older who receive basic medical care develop pressure ulcers. The rate of pressure injuries has decreased as more people become aware of them. Large sample size research that collected data from 2006 to 2015 reported that the total frequency of pressure injuries at all institutions decreased from 13.5% (2006) to 9.3% (2015). Each year, 0.31 to 0.7% of adults aged 65 and older who receive basic medical care develop pressure ulcers [6].

Pressure ulcers are a major issue in patient care and they are associated with reduced quality of life, pain, depression, loss of function, lack of independence, an increased risk of infection and sepsis, as well as additional surgeries and longer hospital stays [10]. The current study aims to investigate the knowledge and attitude of nurses in the Kingdom of Saudi Arabia (KSA) regarding the prevention and treatment of pressure ulcers.

Objectives

The current study aims to assess knowledge and attitudes regarding Pressure ulcer care among nurses in Saudi Arabia.

METHODS

Study Design and Setting

This was a cross-sectional study conducted from July 2024 to February 2025 in Saudi Arabia. All staff nurses and internship-year nurses were invited to participate in the study.

Sample Size

The sample size was determined using Rao soft sample size calculator.

Data collection involved a target sample of 394 nurses (confidence level: 95%; margin of error: 5%). The sample size was estimated using the formula:

- n = P(1-P) * Zα 2/d2 with a 95% confidence level
- n: Calculated sample size
- Z: The z-value for the selected level of confidence (1- a) = 1.96
- P: An estimated prevalence of knowledge
- Q: (1 – 0.50) = 50%, i.e., 0.50
- D: The maximum acceptable error = 0.05
- So, the calculated minimum sample size was: n = (1.96)2 X 0.50 X 0.50/(0.05) 2 = 384

Inclusion and Exclusion Criteria

A basic random sample technique was used to randomly select Saudi Arabian nursing students in the internship year nursing staff and to exclude all students before the internship year.

Method for Data Collection, Instrument and Score System

A structured questionnaire was used as a study tool. This tool consists of 41 questions classified into four main sections. Two questionnaires assess self-reported practice and nursing knowledge about pressure injuries, developed by [11] and Attitude toward Pressure Ulcer Prevention instrument (APUP) [12] and demographic data questionnaire.

Scoring Systems

Section one contained 9 questions which are open-ended and close-ended as personal data such as gender, education, participant state and background, department, source of information and last attended training of pressure ulcer.

The second part asked questions on pressure ulcer knowledge and prevention practice regarding pressure ulcers including ten questions, developed by [11].

The rating using a three-point Likert scale. The participants can choose from one of three options: “true,” “false,” or “don’t know.”

The scoring mechanism of the assessment tool involved allocating a point value of 1 for each correct response, while incorrect answers and "I do not know" responses were given a score of 0. The maximum achievable score was 10, which

was then multiplied by 10 to yield a maximum total score of 100, which were subsequently categorized as low (<60%), moderate (60-80%) and high (>81%).

The third assessment tool utilized a self-reported scale to assess engagement in good preventive practices regarding pressure ulcers. The questionnaire developed by [11].

Comprising nine items related to pressure ulcer prevention practices, with a 3-point Likert scale scoring system in which "rarely" responses were assigned a score of 1, "sometimes" responses were given a score of 2 and "always" responses were awarded a score of 3, resulting in a possible total score range of 9 to 27. The highest scores indicate better engagement in good PI preventive practices, while the lower scores indicate poorer engagement. The raw score was multiplied by 10 and divided by 27 to convert it to a percentage scale out of 100.

The scores were then categorized as follows: Low, less than 60% (less than 16.2 out of 27), moderate: 60-80% (16.2 to 21.6 out of 27) and high: 81% or more (greater than 21.87 out of 27).

Section four is an APUP (Attitude toward Pressure ulcer Prevention instrument) [12] a Likert scale and it is concerned with five important measures, which are personal competency to prevent pressure ulcers, priority of pressure ulcer prevention and the impact of PI, all of them content of 3 items and a high score of 12 of each of them). And the confidence in the effectiveness of prevention and prevention responsibility, the content of 2 items in each with a high score of 8 in both.

Pilot Test

The questionnaire was distributed to 25 people and they were asked to complete it. This was done to test the questionnaire's simplicity and feasibility for the study. The pilot study data was excluded from the study's results.

Analyzes and Entry Method

The collected data was inputted using the Windows version of Microsoft Excel on a computer (2016). After that data was moved to version 20 of the Statistical Package for Social Science Software (SPSS) to be examined statistically. In this study, both descriptive statistics and the chi-square tests were used.

RESULTS

Table 1 displays various demographic parameters of the participants with a total number of (394). Participants of the study are quite young with a mean age of 32.2 Years and 29.4% of them below the age of 26 years. Most participants are staff nurses (70.3%) suggesting that the workforce specialists are those practicing and not students. Of the participants, the large majority are Saudis, as can be seen by the percentage size of 95.4%. Gender is categorized to show that females dominate the nursing profession accounting for 66.5% of the participants while males are 33.5%. Educational attainment also shows a rich variety, the largest number of employees having a bachelor's degree (53.6%), close to forty percent have postgraduate education and 4 percent have no formal education, which points at a well-educated workforce. Technical expertise also shows differences; 43.1% of the participants have over 11 years of experience, which indicates that the participants may have a great deal of insight. In addition, the majority (86.3%) of the participants have reported that they have learnt about pressure injuries in the past.

Table 1: Sociodemographic Characteristics of Participants (n = 394)

Parameter		No.	Percent
Age (Mean:32.2, STD:6.6)	26 years or less	116	29.4
	27 to 34	99	25.1
	35 to 37	90	22.8
	38 or more	89	22.6
Participant state	internship nursing student	77	19.5
	staff nurse	277	70.3
	Other	40	10.2
Nationality	Non-Saudi	18	4.6
	Saudi	376	95.4
Residential area	Northern Region	10	2.5
	Southern Region	67	17.0
	Center Region	132	33.5
	Eastern Region	38	9.6
	Western Region	147	37.3
Gender	Female	262	66.5
	Male	132	33.5
Current state	Employee	324	82.2
	Unemployed	70	17.8
Education	Diploma	53	13.5
	College student-internship year nursing	35	8.9
	Bachelor	211	53.6
	Master	75	19.0
	Doctorate	20	5.1
Years of experience?	1-4 years	150	38.1
	5-10 years	74	18.8
	11 years and more	170	43.1
Department?	ER/ Operating unit	53	13.5
	Home care	21	5.3
	ICU/CCU unit	58	14.7
	Inpatient unit	40	10.2
	Outpatient OPD	25	6.3
	PHC primary health care	50	12.7
	Other	147	37.3
Previous pressure injury education?	No	54	13.7
	Yes	340	86.3
Source of pressure injury information?	Conference	52	13.2
	In-service education	97	24.6
	University	166	42.1
	Others	79	20.1
Last time attended pressure injury training?	Less than one year	169	42.9
	1-2 years	25	6.3
	More than two years	118	29.9
	Never	82	20.8

As shown in Figure 1, Based on data collected from a total sample of 394 participants, a conspicuous agreement was witnessed on the part played by immobility in the development of pressure injuries among bedridden patients. Specifically, 323 respondents (82%) of all completed questionnaires indicated immobility was the primary factor developing

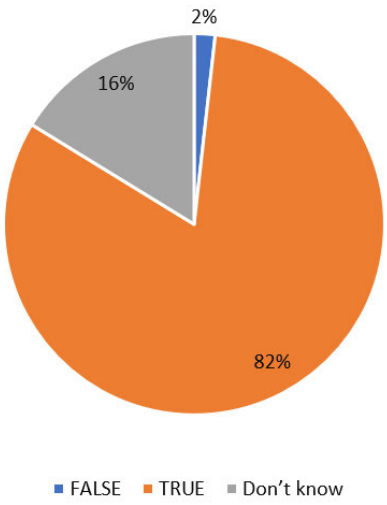

Figure 1: Illustrates patients' immobility is the most important factor for pressure injury formation among participants

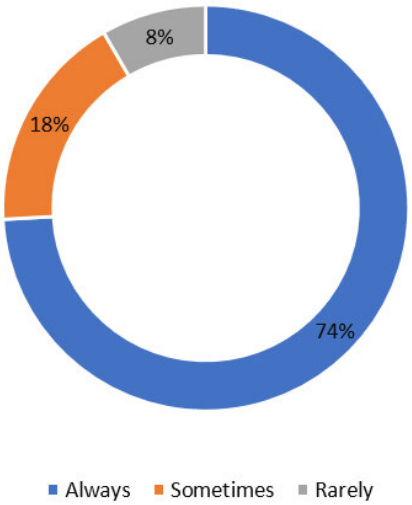

Figure 2: Illustrates assessing the patient's skin and risk factors among participants

Table 2: Parameters related to knowledge regarding pressure ulcer care among nurses in Saudi Arabia (n = 394)

Parameter		No.	Percent
In bedridden patients' immobility is the most important factor for pressure injury formation	False	7	1.8
	True	323	82.0
	Don't know	64	16.2
Only nurses can prevent the development of PI	False	243	61.7
	True	151	38.3
The pain assessment scale is the risk assessment scale tools for pressure injury development	False	132	33.5
	True	213	54.1
	Don't know	49	12.4
Partial skin loss with a blister is the correct answer for the sign of stage 3 pressure injury	False	121	30.7
	True	219	55.6
	Don't know	54	13.7
There are more than three positions can usually be used when repositioning a patient	False	69	17.5
	True	272	69.0
	Don't know	53	13.5
Topical cream only is the appropriate method for skin care	False	260	66.0
	True	134	34.0
An air mattress can prevent developing PI without positioning	False	209	53.0
	True	144	36.5
	Don't know	41	10.4
Cleansing soil and using skin barrier cream activity is appropriate for preventing maceration	False	81	20.6
	True	275	69.8
	Don't know	38	9.6
Use a pillow under the patient's leg to prevent heel injury	False	59	15.0
	True	335	85.0
High protein and high calories need to be offered to a bedridden patient who has a BMI of less than 18.5	False	47	11.9
	True	283	71.8
	Don't know	64	16.2

pressure injuries, thus validating this statement. However, only 7 individuals, or about 1.8%, disagreed with the statement, which means the minority doesn't perceive the huge significance when they cannot move. In addition, 64 who represent about 16.2% were uncertain and there is an area for educational intervention.

Table 2 shows the findings of the study conducted among 394 respondents on Saudi Arabian nurses' awareness about pressure ulcer care. Strikingly, the majority of 82,0% answered correctly identifying immobility as the most significant factor in pressure injury development in bedridden patients, which implies adequate knowledge of primary risk factors. A schism in the perception of pressure ulcer preventive measures was evidenced by 61.7% nurses who thought that only nurses could contribute to the prevention of the development of such injuries. Although 54.1% of the respondents recognised the pain assessment scale as a risk assessment tool, still a shockingly high 66.0% agreed with the statement that topical creams are the only safe way the soothe patients' skin, which indicates that participants do not understand comprehensive care plans. In addition, although most of the respondents agreed on the concept of repositioning (69.0%), 53.0% of the respondents failed to realize the need for repositioning even with the use of the air mattresses for prevention.

As shown in Figure 2, These findings detail a significant trend in the frequency with which such patients were assessed each year with data provided from the evaluation of a total sample of 394 patients. It was found that a total of 292 respondents (approximately 74.1% of the total sample), consistently assess the patient's skin and monitor for risk factors, indicating high compliance with recommended standard of care with the patient. However, 69 participants, or approximately 17.5%, replied that they do this 'Sometimes,' indicating a potential variability in the consistency by which assessments are done. In addition, 33 persons, or roughly 8.4% of the sample, stated they "Rarely" engage in this essential evaluation which may pose an opportunity for improvement within clinical practices to improve patient outcomes.

As indicated in Table 3, the study captures various practices of the Saudi Arabian sample of 394 nurses with regards to pressure ulcer care. Peculiarly, detailed assessment of the skin and observation of risk factors were admitted by nurses: 74.1% affirmed they ''always'' did this. Another element of care that voiced high compliance is the documentation of care, where 78, 7% of the respondents reported that they documented all the relevant data. Other dimensions also received comparable attention with 77.2% of the nurses stating that their organization's teaching plans include the aspect of pain assessment and management

Table 3: Participants' Practice Regarding Pressure Ulcer Care Among Nurses in Saudi Arabia (n = 394)

Parameter		No.	Percent
I assess the patient's skin and observe the risk factors	Always	292	74.1
	Sometimes	69	17.5
	Rarely	33	8.4
I document all data	Always	310	78.7
	Sometimes	61	15.5
	Rarely	23	5.8
I assess and provide management of pain	Always	304	77.2
	Sometimes	49	12.4
	Rarely	41	10.4
I perform skin care as a routine work	Always	292	74.1
	Sometimes	68	17.3
	Rarely	34	8.6
I used water filled glove under the patient's leg	Always	211	53.6
	Sometimes	102	25.9
	Rarely	81	20.6
I use or advise caregivers to use creams or oils	Always	251	63.7
	Sometimes	102	25.9
	Rarely	41	10.4
I pay more attention to pressure points	Always	285	72.3
	Sometimes	81	20.6
	Rarely	28	7.1
I turn a patient position every two hours	Always	319	81.0
	Sometimes	48	12.2
	Rarely	27	6.9
I Advise the patient or caregiver	Always	268	68.0
	Sometimes	99	25.1
	Rarely	27	6.9

where they claim to "always" address this aspect. But water-filled gloves and the application of creams or oils while caring for patients showed that practices were more diverse, with 53.6 and 63.7% of the nurses indicating they always apply the former.

Table 4 indicates the general attitude of nurses in Saudi Arabia to pressure ulcer care with participants grouped from 394. However, a vast number of the respondents show confidence in the prevention of pressure ulcers, 54.6% strongly agreed, while 38.6% agreed with the statement. However, the strength of agreement with the statement that their training is adequate for the tasks assigned is somewhat lower: Only 39.1% strongly agree and 14%. Strongly disagree. However, 28.2% of the respondents strongly agreed that pressure ulcer prevention is challenging, a notion that exists among nurses. Furthermore, the majority associate the need for advancement support with pressure ulcer prevention with 61.4% agreeing with this statement on a strong note.

Evaluating the results shown in Table 5 and referring to the role of nurses within this sphere, the authors delineate a possible decline in the level of professional knowledge concerning pressure ulcer care. However, less than one fourth of the nurses that was surveyed achieved a high level of knowledge at 20.3% with a very high proportion of 42.9% having low knowledge. In addition, 36.8% of the respondents had moderate knowledge regarding the subject.

The finding highlighted in Table 6 is impressive meaning that the nurses are practicing adequate care measures in relation to pressure ulcer in accordance to best practices. Among those of the staff with a high level of practice, 289 or 73.4%, it is safe to say

Table 4: Participants' Attitude Regarding Pressure Ulcer Care Among Nurses in Saudi Arabia (n = 394)

Parameter		No.	Percent
I feel confident in my ability to prevent pressure ulcers	Strongly agree	215	54.6
	Agree	152	38.6
	Disagree	6	1.5
	Disagree Strongly	21	5.3
I am well-trained to prevent pressure ulcers	Strongly agree	154	39.1
	Agree	158	40.1
	Disagree	26	6.6
	Disagree Strongly	56	14.2
Pressure ulcer prevention is too difficult. Others are better than I am	Strongly agree	111	28.2
	Agree	116	29.4
	Disagree	79	20.1
	Disagree Strongly	88	22.3
Too much attention is given to the prevention of pressure ulcers	Strongly agree	176	44.7
	Agree	169	42.9
	Disagree	14	3.6
	Disagree Strongly	35	8.9
Pressure ulcer prevention is not that important	Strongly agree	69	17.5
	Agree	106	26.9
	Disagree	78	19.8
	Disagree Strongly	141	35.8
Pressure ulcer prevention should be a priority	Strongly agree	242	61.4
	Agree	111	28.2
	Disagree	19	4.8
	Disagree Strongly	22	5.6
A pressure ulcer rarely causes discomfort for a patient	Strongly agree	111	28.2
	Agree	92	23.4
	Disagree	58	14.7
	Disagree Strongly	133	33.8
The financial impact of pressure ulcers on a patient should not be exaggerated	Strongly agree	72	18.3
	Agree	166	42.1
	Disagree	66	16.8
	Disagree Strongly	90	22.8
The financial impact of pressure ulcers on a patient should not be exaggerated	Strongly agree	145	36.8
	Agree	198	50.3
	Disagree	25	6.3
	Disagree Strongly	26	6.6
I am not responsible if a pressure ulcer develops in my patients	Strongly agree	112	28.4
	Agree	78	19.8
	Disagree	70	17.8
	Disagree Strongly	134	34.0
I have an important task in pressure ulcer prevention	Strongly agree	185	47.0
	Agree	156	39.6
	Disagree	19	4.8
	Disagree Strongly	34	8.6
Pressure ulcers are preventable in high-risk patients	Strongly agree	156	39.6
	Agree	206	52.3
	Disagree	13	3.3
	Disagree Strongly	19	4.8
Pressure ulcers are almost never preventable	Strongly agree	95	24.1
	Agree	113	28.7
	Disagree	60	15.2
	Disagree Strongly	126	32.0

that most of the nurses are adequately prepared in the knowledge and skills in fashioning out ways to avoid pressure ulcers and managing the same. On the other hand, the same figures depict that 84 of the nurses has a moderate level of practice, another 21 have a low level of practice.

Analysing the results shown in Table 7, the attitudes of the nurses towards pressure ulcer care can be described as mainly moderate, although the participants in the study provided higher scores. 67,5% of the surveyed nurses

Table 5: Shows Knowledge Regarding Pressure Ulcer Care Among Nurses Score Results

	Frequency	Percent
High level of knowledge	80	20.3
Moderate knowledge	145	36.8
Low knowledge level	169	42.9
Total	394	100.0

Table 6: Shows Practice Regarding Pressure Ulcer Care Among Nurses Score Results

	Frequency	Percent
High level of practice	289	73.4
Moderate practice	84	21.3
Low level of practice	21	5.3
Total	394	100.0

Table 7: Shows Attitude Regarding Pressure Ulcer Care Among Nurses Score Results

	Frequency	Percent
High level of attitude	107	27.2
Moderate attitude	266	67.5
Low attitude level	21	5.3
Total	394	100.0

demonstrated a moderate attitude, which indicates a high level of knowledge and responsiveness to the practices of pressure ulcer prevention and treatment. On the other hand, 27.2% displayed a high level of attitude suggesting that there are cracks in knowledge or departments' commitment towards the delivery of optimal care in this key subspecialty of nursing. In addition, 5.3% of respondents had a low attitude level.

Table 8 shows that knowledge regarding pressure ulcer care among nurses has statistically significant relation to participant state (p value = 0.004), age (p value = 0.0001), residential area (p value = 0.0001), current employment status (p value = 0.0001), education (p value = 0.0001), years of experience (p value = 0.0001), department (p value = 0.0001) and previous pressure injury education (p value = 0.004). It also shows statistically insignificant relation to nationality and gender. People with age 26 years or less, working in the ER or operating room, were all associated with a higher knowledge level.

Table 9 shows that practice regarding pressure ulcer care among nurses has statistically significant relation to participant state (p value = 0.006), age (p value = 0.029), residential area (p value = 0.0001), gender (p value = 0.004), education (p value = 0.022), years of experience (p value = 0.029), department (p value = 0.0001) and previous pressure injury education (p value = 0.029). It also shows a statistically insignificant relation to nationality and current employment status. People aged 35 to 37 years, of female gender, working at ER or operating room and working experience of 5 to 10 years were all associated with a higher practice level.

Table 10 shows that attitude regarding pressure ulcer care among nurses has statistically significant relation to nationality (p value = 0.008), residential area (p value = 0.0001), gender (p value = 0.0001), current employment status (p value = 0.0001),

Table 8: Relation between Knowledge Regarding Pressure Ulcer Care Among Nurses and Sociodemographic Characteristics

Parameters		Knowledge level: High or moderate knowledge	Knowledge level: Low knowledge level	Total (N=394)	P value*
Participant state	Internship nursing student	56	21	77	0.004
		24.9%	12.4%	19.5%	
	Staff nurse	151	126	277	
		67.1%	74.6%	70.3%	
	Other	18	22	40	
		8.0%	13.0%	10.2%	
Age	26 years or less	82	34	116	0.0001
		36.4%	20.1%	29.4%	
	27 to 34	61	38	99	
		27.1%	22.5%	25.1%	
	35 to 37	39	51	90	
		17.3%	30.2%	22.8%	
	38 or more	43	46	89	
		19.1%	27.2%	22.6%	
Nationality	Non-Saudi	12	6	18	0.402
		5.3%	3.6%	4.6%	
	Saudi	213	163	376	
		94.7%	96.4%	95.4%	
Residential area	Northern Region	6	4	10	0.0001
		2.7%	2.4%	2.5%	
	Southern Region	44	23	67	
		19.6%	13.6%	17.0%	
	Center Region	66	66	132	
		29.3%	39.1%	33.5%	
	Eastern Region	33	5	38	
		14.7%	3.0%	9.6%	
	Western Region	76	71	147	
		33.8%	42.0%	37.3%	
Gender	Female	145	117	262	0.319
		64.4%	69.2%	66.5%	
	Male	80	52	132	
		35.6%	30.8%	33.5%	
Current employment status	Employee	169	155	324	0.0001
		75.1%	91.7%	82.2%	
	Unemployed	56	14	70	
		24.9%	8.3%	17.8%	
Education	Diploma	39	14	53	0.0001
		17.3%	8.3%	13.5%	
	College student-internship year nursing	28	7	35	
		12.4%	4.1%	8.9%	
	Bachelor	128	83	211	
		56.9%	49.1%	53.6%	
	Master	23	52	75	
		10.2%	30.8%	19.0%	
	Doctorate	7	13	20	
		3.1%	7.7%	5.1%	
Years of experience	1-4 years	109	41	150	0.0001
		48.4%	24.3%	38.1%	
	5-10 years	42	32	74	
		18.7%	18.9%	18.8%	
	11 years or more	74	96	170	
		32.9%	56.8%	43.1%	
Department	ER/ Operating unit	46	7	53	0.0001
		20.4%	4.1%	13.5%	
	Home care	7	14	21	
		3.1%	8.3%	5.3%	
	ICU/CCU unit	20	38	58	
		8.9%	22.5%	14.7%	
	Inpatient unit	34	6	40	
		15.1%	3.6%	10.2%	
	Outpatient OPD	19	6	25	
		8.4%	3.6%	6.3%	
	PHC primary health care	18	32	50	
		8.0%	18.9%	12.7%	
	Other	81	66	147	
		36.0%	39.1%	37.3%	
Previous pressure injury education	No	21	33	54	0.004
		9.3%	19.5%	13.7%	
	Yes	204	136	340	
		90.7%	80.5%	86.3%	

*p value was considered significant if ≤0.05

Table 9: Practice Regarding Pressure Ulcer Care Among Nurses in Association with Sociodemographic Characteristics

Parameters		Practice level		Total (N=394)	P value*
		High level of practice	Moderate or low practice		
Participant state	Internship nursing student	49	28	77	0.006
		17.0%	26.7%	19.5%	
	Staff nurse	216	61	277	
		74.7%	58.1%	70.3%	
	Other	24	16	40	
		8.3%	15.2%	10.2%	
Age	26 years or less	82	34	116	0.029
		28.4%	32.4%	29.4%	
	27 to 34	69	30	99	
		23.9%	28.6%	25.1%	
	35 to 37	77	13	90	
		26.6%	12.4%	22.8%	
	38 or more	61	28	89	
		21.1%	26.7%	22.6%	
Nationality	Non-Saudi	12	6	18	0.511
		4.2%	5.7%	4.6%	
	Saudi	277	99	376	
		95.8%	94.3%	95.4%	
Residential area	Northern Region	0	10	10	0.0001
		0.0%	9.5%	2.5%	
	Southern Region	55	12	67	
		19.0%	11.4%	17.0%	
	Center Region	92	40	132	
		31.8%	38.1%	33.5%	
	Eastern Region	30	8	38	
		10.4%	7.6%	9.6%	
	Western Region	112	35	147	
		38.8%	33.3%	37.3%	
Gender	Female	204	58	262	0.004
		70.6%	55.2%	66.5%	
	Male	85	47	132	
		29.4%	44.8%	33.5%	
Current state	Employee	240	84	324	0.484
		83.0%	80.0%	82.2%	
	Unemployed	49	21	70	
		17.0%	20.0%	17.8%	
Education	Diploma	33	20	53	0.022
		11.4%	19.0%	13.5%	
	College student-internship year nursing	28	7	35	
		9.7%	6.7%	8.9%	
	Bachelor	154	57	211	
		53.3%	54.3%	53.6%	
	Master	54	21	75	
		18.7%	20.0%	19.0%	
	Doctorate	20	0	20	
		6.9%	0.0%	5.1%	
Years of experience	1-4 years	109	41	150	0.029
		37.7%	39.0%	38.1%	
	5-10 years	63	11	74	
		21.8%	10.5%	18.8%	
	11 years and more	117	53	170	
		40.5%	50.5%	43.1%	
Department	ER/ Operating unit	46	7	53	0.0001
		15.9%	6.7%	13.5%	
	Home care	21	0	21	
		7.3%	0.0%	5.3%	
	ICU/CCU unit	46	12	58	
		15.9%	11.4%	14.7%	
	Inpatient unit	40	0	40	
		13.8%	0.0%	10.2%	
	Outpatient OPD	13	12	25	
		4.5%	11.4%	6.3%	
	PHC primary health care	43	7	50	
		14.9%	6.7%	12.7%	
	Other	80	67	147	
		27.7%	63.8%	37.3%	
Previous pressure injury education	No	33	21	54	0.029
		11.4%	20.0%	13.7%	
	Yes	256	84	340	
		88.6%	80.0%	86.3%	

*p value was considered significant if ≤0.05

Table 10: Attitude Level Regarding Pressure Ulcer Care Among Nurses in Association with Sociodemographic Characteristics

Parameters		Attitude level		Total (N=394)	P value*
		High level of attitude	Moderate or low attitude		
Participant state	Internship nursing student	14	63	77	0.098
		13.1%	22.0%	19.5%	
	staff nurse	79	198	277	
		73.8%	69.0%	70.3%	
	Other	14	26	40	
		13.1%	9.1%	10.2%	
Age	26 years or less	28	88	116	0.291
		26.2%	30.7%	29.4%	
	27 to 34	33	66	99	
		30.8%	23.0%	25.1%	
	35 to 37	20	70	90	
		18.7%	24.4%	22.8%	
	38 or more	26	63	89	
		24.3%	22.0%	22.6%	
Nationality	Non-Saudi	0	18	18	0.008
		0.0%	6.3%	4.6%	
	Saudi	107	269	376	
		100.0%	93.7%	95.4%	
Residential area	Northern Region	0	10	10	0.0001
		0.0%	3.5%	2.5%	
	Southern Region	6	61	67	
		5.6%	21.3%	17.0%	
	Center Region	34	98	132	
		31.8%	34.1%	33.5%	
	Eastern Region	5	33	38	
		4.7%	11.5%	9.6%	
	Western Region	62	85	147	
		57.9%	29.6%	37.3%	
Gender	Female	87	175	262	0.0001
		81.3%	61.0%	66.5%	
	Male	20	112	132	
		18.7%	39.0%	33.5%	
Current state	Employee	100	224	324	0.0001
		93.5%	78.0%	82.2%	
	Unemployed	7	63	70	
		6.5%	22.0%	17.8%	
Education	Diploma	0	53	53	0.0001
		0.0%	18.5%	13.5%	
	College student-internship year nursing	14	21	35	
		13.1%	7.3%	8.9%	
	Bachelor	46	165	211	
		43.0%	57.5%	53.6%	
	Master	33	42	75	
		30.8%	14.6%	19.0%	
	Doctorate	14	6	20	
		13.1%	2.1%	5.1%	
Years of experience	1-4 years	34	116	150	0.0001
		31.8%	40.4%	38.1%	
	5-10 years	34	40	74	
		31.8%	13.9%	18.8%	
	11 years and more	39	131	170	
		36.4%	45.6%	43.1%	
Department	ER/ Operating unit	7	46	53	0.0001
		6.5%	16.0%	13.5%	
	Home care	14	7	21	
		13.1%	2.4%	5.3%	
	ICU/CCU unit	39	19	58	
		36.4%	6.6%	14.7%	
	Inpatient unit	6	34	40	
		5.6%	11.8%	10.2%	
	Outpatient OPD	0	25	25	
		0.0%	8.7%	6.3%	
	PHC primary health care	7	43	50	
		6.5%	15.0%	12.7%	
	Other	34	113	147	
		31.8%	39.4%	37.3%	
Previous pressure injury education	No	14	40	54	0.827
		13.1%	13.9%	13.7%	
	Yes	93	247	340	
		86.9%	86.1%	86.3%	

*p value was considered significant if ≤0.05

education (p value = 0.0001), years of experience (p value = 0.0001) and department (p value = 0.0001). It also shows statistically insignificant relation to participant state, age and previous pressure injury education. People with age 27 to 34 years, of female gender, working at ICU or CCU and working experience of 5 to 10 years were all associated with a higher attitude level.

DISCUSSION

The purpose of the present study was to explore the nurses' knowledge and attitudes about pressure ulcer care in Saudi Arabia because pressure ulcer care is an important aspect of nursing practice closely related to the intra and post operative patients that pose a threat to the patient outcome. Pressure ulcers (also called bed sores) are major healthcare problem that can lead to greater morbidity, prolonged hospital stays and higher healthcare costs. What this study finds is a complex relationship between knowledge, attitude and actual practice, strengths and weaknesses in pressure ulcer management by nurses.

This study shows that a majority of nurses in this study had awareness of immobility as a cause of pressure injury and 82% recognize immobility as a principal risk factor. This finding also fits with previous research substantiating the need for knowledge of risk factors for effective prevention strategies. For example, Bulut *et al.* [13] has highlighted the fact that risk factors understood by nurses are key to identifying the time appropriate interventions to limit pressure ulcers. However, there was a considerable gap in knowledge regarding the sorts of lesson and safety awareness and 61.7% of respondents thought only nurses could prevent these injuries. This may be because of a lack of interdisciplinary collaboration, which is vital to managing complex patient needs, that Kim and Lee [14] underscored that effective prevention of pressure ulcers necessitates a team approach involving a variety of healthcare professionals.

Furthermore, it was found that nurses did recognize the pain assessment scale as a risk assessment tool (54.1%), yet also held the belief (66%) that topical cream application is the only form of skin care. These findings corroborate the findings of Demarré *et al.* [15]. who found that nurses fell back on superficial practices instead of the comprehensive care strategies. Additionally, although 69 percent of respondents agreed that patients need to be repositioned, 53 percent did not realize that they had to reposition even when using air mattresses. This disconnect between knowledge and practice is also a common theme in the literature, according to Gunningberg, where good theoretical knowledge was found to fail to be translated into adequate preventive measures actually used in practice [16].

For assessment, the study shows that 74.1% of nurses always check patients' skin for risk factors and hence adhere to care standards. Though the variability of practice, 17.5% reporting inconsistent evaluations, underscores the need for standardized protocols to standardize care delivery. Findings of Nuru *et al.* [17] corroborate with this inconsistency, finding that the adherence to assessment protocols by nurses can have significant impact on the pressure ulcer prevention outcomes. High too, was documentation of care, 78.7% of respondents documenting that all pertinent data was recorded. Despite this, practices around the use of water filled gloves and creams were more diverse; only 53.6% of nurses report always using these and 63.7% always apply creams. The variability evidenced in this pilot study suggests an opportunity for targeted educational efforts aimed at reinforcing best practices in pressure ulcer care.

Fifty four point six per cent of nurses were attitudinally confident that they could prevent pressure ulcers and 54.6% strongly agreed with this comment. Yet only 39.1 percent felt well trained for their tasks and a quarter admitted pressure ulcer prevention was difficult. Such sentiment is echoed in the work of Yilmazer *et al.* [18] who found that despite high confidence levels, many nurses said they did not feel prepared to manage prevention of pressure ulcers effectively due to inadequate training. The overwhelming evidence of the need for continued training and professional development programs, supported by 61.4 percent of the participants, also supported the need of further support to develop skills in this area.

The findings of the study showed apparently, only 20.3% of the nurses had high knowledge for pressure ulcer care while 42.9% had low knowledge level. This finding is analogous to the findings from Kopuz and Karaca, who found out that despite their educational qualification, significant number of the nurses had inadequate knowledge about prevention of pressure ulcer [19]. In spite of that knowledge gap, 73.4% of nurses reported high levels of practice in pressure ulcer prevention, which indicates a separation between the knowledge and the practical application of it. It has been documented in many studiesecute such as Moore and Price [20] describe how nurses' theoretical knowledge may not match their actual behavior in the prevention or management of pressure ulcers.

It was found that age, gender, education and years of experience were significant for related demographic factors in relation to knowledge, practice and attitude towards pressure ulcer care on the basis of statistical analysis. Younger nurses, those working in emergency or operating room sites and female nurses were also found to have higher knowledge levels, whereas nurses with 5 to 10 years' experience reported higher practice levels. The findings of Vrachni *et al.* [21] contradict with our findings in that they found demographic variables significantly impacted nurses' knowledge and attitudes to pressure ulcer prevention. Overall attitudes of nurses were predominantly moderate with 67.5% of nurses having a moderate attitude towards pressure ulcer care resulting in need of targeted educational interventions for nurses to improve their knowledge and practice in critical area of nursing care.

It should be acknowledged that the limitations of the present study should also be acknowledged. However, the fact that this is a cross-sectional design precludes drawing causal inferences about knowledge, attitudes and practices

being related to one another. It also may be based on self reported data and may be biased because people may overestimate their knowledge and practices. Additionally, the study may limit the generalizability of the findings to other contexts because of its focus on a limited geographical region.

CONCLUSION

Finally, this study's findings emphasize the need for continuing education and support to close gaps of what nurses know and do about pressure ulcer care in Saudi Arabia. Improving patient outcomes and reducing pressure ulcers through higher standards of care in nursing practice is partly accomplished through increased nurses' understanding and ability in this critical area.

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Conflicts of Interest

The authors declare that there are no conflicts of interest:

- **Informed Consent:** Written informed consent was obtained from all individual participants included in the study
- **Data and Materials Availability:** All data associated with this study are present in the paper

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Ethical Statement

An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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