

Knowledge of Nurses Regarding Pressure Ulcer Prevention in Diyala Governorate Hospitals

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ABSTRACT

Pressure ulcer is localized damage to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear. The objective is to assess nurses' knowledge towards pressure ulcer prevention and management, and to identify the factors influencing their knowledge. The study is a cross-sectional study was conducted in Diyala governorate hospitals to evaluate nurses' knowledge regarding pressure ulcers using the PUKAT 2.0 instrument. A total of 252 nurses were selected through proportional random sampling over a five months period, from December 10, 2024, to May 1, 2025. Descriptive statistics were applied, and inferential tests—including the independent t-test, ANOVA, and chi-square test—were used for data analysis via SPSS software (version 29.0), with a significance level set at $p < 0.05$. Nurses had a mean age of 28.9 ± 6.2 years, ranging from 20 to 49 years. Females represented 52.4% of the study sample. The majority held a diploma degree (57.1%) and had 1–4 years of work experience (50.8%). Regarding wards, the highest proportion (31.0%) worked in general wards. The overall satisfactory knowledge of nurses towards pressure ulcer prevention was 19.8%, $n=50$. The overall knowledge of nurses regarding pressure ulcer prevention was found to be unsatisfactory. Most knowledge subthemes fell below the expected competency level. Only the subtheme concerning 'classification and observation' demonstrated an acceptable level of understanding.

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1- INTRODUCTION

A pressure ulcer (PU), also known as pressure injury (PI), bedsore, or decubitus ulcer, is defined as localized damage to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear. Pressure ulcer usually occur over a bony prominence but may also be related to a medical device or other object [1].

According to the latest National Pressure Ulcer Advisory Panel (NPUAP) guidelines, shear and friction, as when lying at an incline, can affect local capillary beds and are believed to contribute to tissue hypoxia, which is a key factor in the development pressure ulcer [1, 2]. However, evidence has shown a strong link between old age, disease-related sedentary lifestyles, and unhealthy eating habits. Also, direct skin contact with a bed or chair without frequent position changes can cause pressure ulcer. Urinary and faecal incontinence, diabetes, and injuries that restrict body position and nutrition are also known risk factors [3, 4].

The classification system of EPUAP proposes six categories in which a present pressure ulcer can be classified, higher categories indicate deeper damage to the skin and/or underlying tissue [1]. The most frequently occurred stages were stage I (33.5%) and stage II (28.0%). The most affected body sites were sacrum, heels and hip [5].

According to recent systematic review and meta-analysis study of the global PU/PI recurrence, PU prevalence in hospitalized patients ranges from 11.8-13.9%, while the incidence rate ranges from 3.4-7.8% [5]. In developed countries, such as US, the overall prevalence of pressure ulcer in hospitalized patients has been estimated to range from 5% to 15% but may be significantly higher in intensive care units and certain long-term care settings [2]. While in Iraq, only limited local data are available on the prevalence of PU in hospitals, according to sporadic local studies, the prevalence of pressure ulcer in Iraq is estimated to vary from one place to another, ranging from 4.7% to 32.1% for hospital populations [6, 7, 8]. While in neighbouring countries, according to a meta-analysis conducted in Iran, pressure ulcer incidence was 57% in ICUs [9]. Similarly, a Saudi study reported that prevalence of PU in critical care units of 44.4% and an incidence of 38.6% [10].

Nurses have an important role and responsibility in the detection and prevention of pressure ulcer [11]. The provision of sufficient education, and fostering positive behaviour, are important aspects of improving the knowledge and use of pressure ulcer preventive measures among nursing staff [12]. Traditionally, the treatment of pressure ulcer has been left to nurses. Thus, Nurses must have up-to-date and evidence-based information regarding the PU risk factors, evaluation, staging, and care [13].

2- METHOD

A cross-sectional study was carried out over a period of five months, beginning on the 10th of December 2024 and concluding on the 1st of May 2025. The study was conducted across multiple governmental hospitals within Diyala Governorate. Targeted clinical units included the Intensive Care Unit (ICU), Respiratory Care Unit (RCU), Neonate Respiratory Care Unit (NRCU), general medical wards, internal medicine wards, surgical units, specialized surgical wards, and oncology departments.

The study sample consisted of nurses of both sexes actively working in the aforementioned clinical units. Eligibility criteria required that participants have at least one year of work experience in their respective wards. Excluded from the study were nurses newly employed for less than one year, healthcare personnel outside the nursing profession (including medical and paramedical staff), nurses employed in non-clinical or administrative roles, and those assigned to departments outside the designated study units.

Data collection was performed using a structured questionnaire. The first section focused on demographic variables including age, gender, marital status, academic qualification, clinical unit assignment, years of professional experience, and prior attendance in any pressure ulcer training programs.

The second part of the questionnaire includes the Pressure Ulcer Knowledge Assessment Tool (PUKAT) 2.0, a revised and updated version developed at Ghent University, Belgium. The PUKAT was developed by [14] and updated by [15] to the PUKAT 2.0 in 2017. The tool underwent some modifications based on the opinion of the supervisors the experts, to increase clarity, and comprehension for the Iraqi nurses, items such 3, 11, 16, and 17 were replaced by items from [16] questionnaire. The original questionnaire had "cases" items, such 5, 10, 13, and 23, these were seen to be extremely difficult for nurses, thus, they have been simplified and modified into direct questions, while keeping the same idea of the original item. The rest of the items were remained the same with some clarifications when needed.

The tool was validated and is reliable in assessing knowledge of pressure ulcer prevention [17]. Researchers were granted the permission by the corresponding author [15] to adopt and utilize the assessment tool in this study. Content validity is good, moderate difficulty level, and tool stability is sufficient, the original instrument demonstrated a Cronbach α 0.77. 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 [15].

The tool is 25 multiple-choice items, reflecting themes (or domains) expressing the most critical aspect of pressure ulcer prevention namely:

- 1- Aetiology
- 2- Classification and observation
- 3- Nutrition
- 4- Risk Assessment
- 5- Prevention of Pressure Ulcer
- 6- Specific Patient Groups.

Statistical analysis

Analysis of data carried out using the available statistical package of SPSS-29 (Statistical Packages for Social Sciences- version 29). Data were presented in simple measures of frequency, percentage, mean, standard deviation, and range. The significance of differences in means (quantitative data) was tested using the Student's t-test for comparisons between two independent means, or the ANOVA test for comparisons among more than two independent means. The significance of difference of different percentages (qualitative data) were tested using Pearson Chi-square test (χ^2 -test) with application of Yate's correction or Fisher Exact test whenever applicable. Statistical significance was considered whenever the P value was equal or less than 0.05.

3- RESULTS AND DISCUSSION

Demographic Characteristics

Table (3-1) displays the details of the 252 nurses in the study, aged between 20 and 49 years, with an average age of 28.9 ± 6.2 years. Among the nurses, those aged 20-29 years had the highest percentage at 71.8%, whereas those aged 40-49 years had the lowest percentage at 10.3%. The sample consisted of 53.6% married nurses, and only 2.0% were divorced/widowed nurses. 52.4% of study sample were female. The majority of the study sample held a diploma degree 57.1%, and had 1-4 years of experience 50.8%.

The majority of the study samples were from Baqubah Teaching Hospital, representing the highest proportion at 54.8%, while the lowest percentage (2.0%) was from Al-Zahraa Obstetrics and Gynaecology Hospital. Regarding ward distribution, nurses from the general ward constituted the largest group (31.0%), followed by those from the internal ward (15.9%) and the RCU (12.7%), ranking second and third, respectively. The remaining participants were distributed across the surgical ward (11.1%), NRCU (10.3%), ICU (9.9%), specialized surgery ward (6.7%), and oncology ward (2.4%).

The study revealed that 80.2% of nurses did not receive any training on pressure ulcer prevention, while only 19.8% were trained.

Table (1): Demographic characteristics of study sample

Demographic Characteristics (n=252)		No.	%
Age (years)	20-29	181	71.8
	30-39	45	17.9
	40-49	26	10.3
	Mean $\pm$ SD (Range)	28.9 ± 6.2 (21-49)	
	Total	252	100%
Sex	Male	120	47.6%
	Female	132	52.4%
	Total	252	100%
Hospital	Ba'qubah Teaching Hospital	138	54.8%
	Al-Batool Obstetrics and Gynaecology Hospital	19	7.5%
	Al-Khalis General Hospital	20	7.9%
	Al-Muqdadiya General Hospital	15	6.0%

	Al-Zahraa Obstetrics and Gynaecology Hospital	5	2.0%
	Jalawlaa General Hospital	18	7.1%
	Khanaqeen General Hospital	21	8.3%
	Baladroz General Hospital	16	6.3%
	Total	252	100%
Marital Status	Married	135	53.6%
	Single	112	44.4%
	divorced/widow	5	2.0%
	Total	252	100%
Education Level	Preparatory	36	14.3%
	Diploma	144	57.1%
	Bachelor	65	25.8%
	Master	7	2.8%
	Total	252	100%
Ward	ICU	25	9.9%
	NRCU	26	10.3%
	RCU	32	12.7%
	Specialized surgery ward	17	6.7%
	General ward	78	31.0%
	Internal ward	40	15.9%
	Surgical ward	28	11.1%
	Oncology ward	6	2.4%
	Total	252	100%
Experience, y	1-4	128	50.8
	5-9	75	29.8
	10-14	23	9.1
	15-19	12	4.8
	=>20years	14	5.6
	Mean $\pm$ SD (Range)	6.3 $\pm$ 5.4 (1-24)	
	Total	252	100%
Training of PU Prevention	No	202	80.2%
	Yes	50	19.8%
	Total	252	100%

Nurses' Level of Knowledge

The maximum achievable knowledge score is 25. The average knowledge score of nurses was 12.08, indicating 48.3% correct answers. The subthemes specific patient groups 26.3%, *risk assessment* 36.3%, and *nutrition* 38.4% had the lowest percentages of correct answers. Conversely, the subthemes with the highest scores were *classification and observation* 71.6%, *aetiology and development* 54.8%, and *prevention* 43.9%. A summary of knowledge scores for both overall and by subthemes is provided in table (3-2) and depicted in figure (3-1).

Table (2) Nurses' Total Knowledge Subthemes Scores

Subtheme	No. Items	Mean $\pm$ SD	Correct answers, %	Knowledge Level
Subtheme 1: Aetiology and development	6	3.29 $\pm$ 1.12	54.8%	Unsatisfactory
Subtheme 2: Classification and observation	4	2.86 $\pm$ 0.98	71.6%	Satisfactory
Subtheme 3: Risk assessment	2	0.72 $\pm$ 0.59	36.3%	Unsatisfactory
Subtheme 4: Nutrition	3	1.15 $\pm$ 0.81	38.4%	Unsatisfactory
Subtheme 5: Prevention	8	3.51 $\pm$ 1.25	43.9%	Unsatisfactory
Subtheme 6: Specific patient groups	2	0.52 $\pm$ 0.73	26.3%	Unsatisfactory
Total	Total: 25	12.08 $\pm$ 2.74	48.3% $\pm$ 10.96%	Unsatisfactory

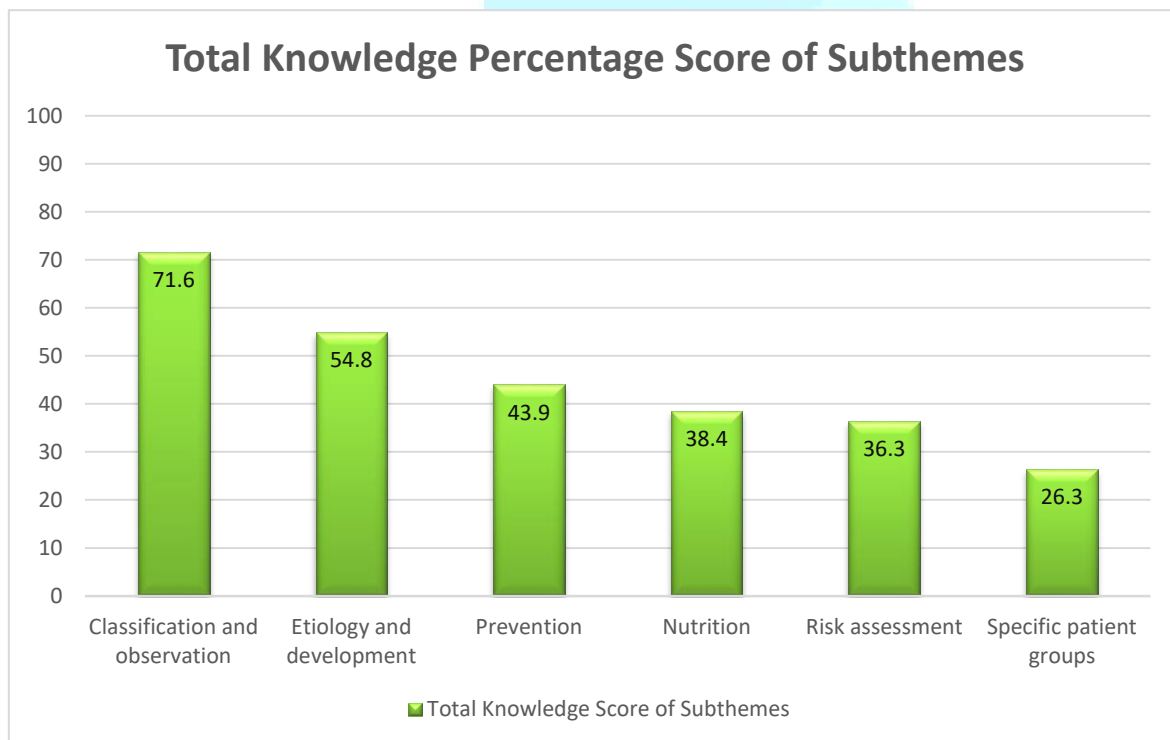


Figure 1: Total knowledge percentage of the subthemes

The overall percentage of nurses' knowledge about PU prevention was 48.3% which is considered unsatisfactory (14 and lower). From the sample of 252 nurses only one-fifth (19.8%, n=50) had satisfactory (15 and higher) knowledge, and the majority of three-fifths (80.2%, n=189) had unsatisfactory knowledge figure (3-4) provides a visual representation of these percentages.

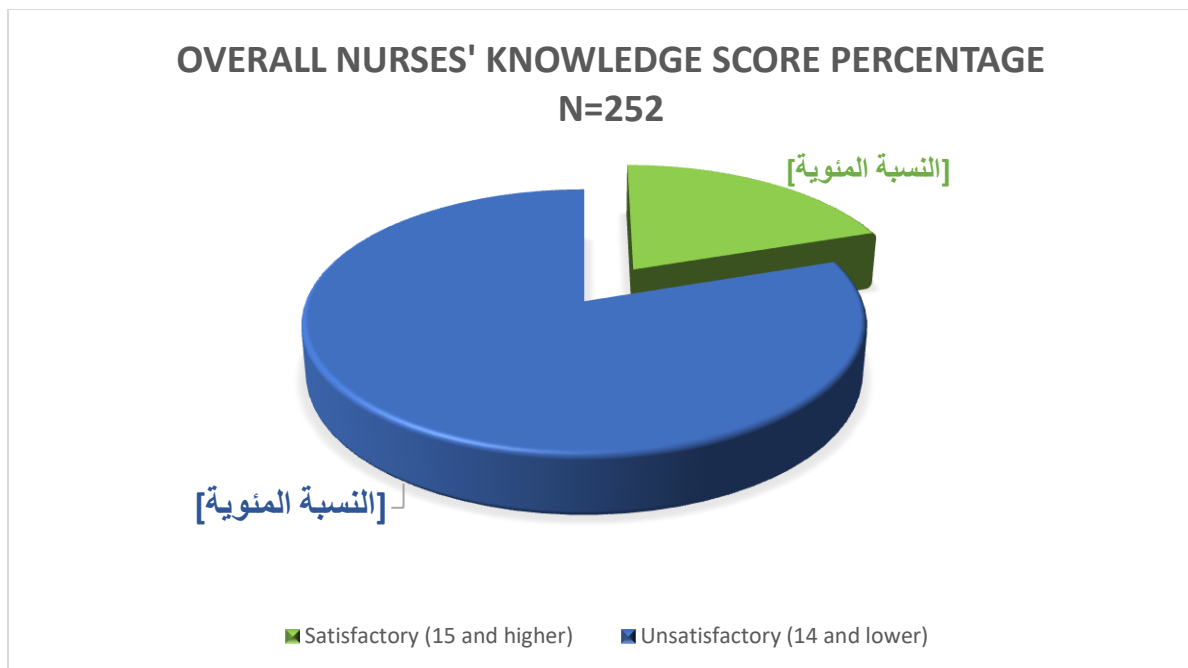


Figure 2: Overall knowledge score percentage of nurses

Relationships between Demographic Characteristics and Nurses' Knowledge

As presented in Table 4-3, knowledge scores did not significantly differ across demographic groups, with the exception of age, which showed borderline significance ($p=0.05$). The post-hoc comparisons using the LSD test making comparisons for the significant associations. Regarding the age group nurses aged 20–29 years and those aged 30–39 years, with the younger group scoring lower in knowledge ($p=0.049$). Additionally, nurses aged 40–49 years scored significantly higher than those aged 30–39 years ($p=0.028$).

Table (3-3): Knowledge Significant Variable

Knowledge	Variable	LSD Comparisons		Mean Difference	P value
	Age Group, years	20-29	30-39	-0.894	0.049#
		30-39	40-49	1.470	0.028#

#Significant at a $p \leq 0.05$ level

4- DISCUSSION

Demographic Characteristics of the Studied Sample

According to the current findings, the majority of the study sample consisted of female nurses (52.4%). This is consistent with previous studies conducted in Iraq, such as one in Al-Basra and Dhi-Qar, which reported 53.7% female nurses [18], and another in Karbala with 53.3% females [19]. Similarly, an international study conducted in Belgium also reported a higher proportion of female nurses [20].

The majority of the study sample (71.8%) was between the ages of 20 to 29 years. This finding aligns with other studies in terms of this being the most represented age group, although the percentages differ. For example, a study conducted in China reported 54.9% in the same age group [13], and a study in the UK reported (36.2%) [21]. This trend could be linked to the previous and current policy of the Iraqi health and higher education authorities of expanding the capacity of the health and medical educational colleges and institutes and granting them full capacity employment, although this approach is changing now.

Staff with 1 to 4 years of experience constituted a major portion of the current study sample (50.8%), These findings are consistent with previous results in Iraq 51.90 [18], as well as in KSA (62%) [22].

Concerning educational level, the largest proportion of the study sample held a diploma degree (57.1%). This finding is not the same as results in other parts of Iraq, such as the studies by [19] and [18], where the highest percentages of the studied samples held a bachelor's degree. This could be attributed to the presence of only a nursing institute—rather than a nursing college—in Diyala, which leads to more graduates with diploma-level qualifications.

This study showed that more than half of the study sample was from Baqubah Teaching Hospital (54.8%); this proportion is attributed to the fact that it is the major hospital in Diyala, with 1,052 nurses and 571 beds (Appendix B), and has wards that are not present in other hospitals, such as the ICU, internal ward, surgery ward, specialized surgeries ward, and oncology ward.

The ward with the highest representation in the study was the general ward (31.0%), likely because it is present in most hospitals and, in some cases, is the only one available (e.g., Jalawla Hospital).

Concerning training in PUs prevention, four-fifths of the nurses didn't undergo any PUs prevention training (80.2%), which aligns with findings from other Iraqi studies, such as in Al-Najaf, where 71.7% had not undergone PUs prevention training [23]. However, the results contrast with international findings—for example, in China, only 33.1% of nurses had not received PU prevention training [13].

Knowledge of the Studied Sample Regarding PUs:

The majority of reviewed literature mostly shows an unsatisfactory level of knowledge in PU prevention among nurses; an Iranian study reported a mean knowledge score of 44% [24], and studies in Belgium and the UK showed similar findings with mean scores of 49.7% and 47.1%, respectively [20] [21]. These results are consistent with the current study's finding of a 48.3% mean knowledge score.

Additionally, studies conducted in Iraq showed a lower level of knowledge toward PUs prevention, such as a study in Al-Basra, and Al-Najaf. [18, 23]. These lower results might be attributed to the use of the PUKAT 1.0 tool, which is an older version for evaluating knowledge. However, the findings are still considered consistent with those of the current study.

In contrast, some other studies conducted in Iraq showed higher levels of knowledge among nurses, such as a study in Mosul [25], and Duhok/Kurdistan [26]. This advantage could be due to the usage of a specially made tool for evaluation by the researchers themselves.

In this study, the low level of knowledge among nurses regarding PU can be attributed to the lack of in-service training programs. This study revealed that the vast majority of the nurses (80.2%, n=202) had not participated in any training program regarding PUs prevention. Additionally, this result may be influenced by the fact that most participants were newly employed staff with 1–5 years of experience (57.1%, n=144).

Nurses' busy schedules may also pose a barrier to their participation in training programs. Moreover, available training workshops often emphasize the management and treatment of existing pressure ulcers rather than focusing on their prevention.

Knowledge of Nurses About Aetiology and Development of PUs:

The current study showed that nurses' knowledge about the 'aetiology and development of PUs' was low (54.8%), which is consistent with a study in China (50.90%) [13], a study in Iran (32.67%), and KSA at Hail hospitals (36.10%) [27], although the current study shows a slightly higher level of knowledge regarding this theme.

On the other hand, these results were different to some other studies, a study in KSA at Jeddah found a raised level of knowledge (62.81%) [22], which is considered a satisfactory level of knowledge regarding aetiology and development. A consistent result in a Malaysian study showed a higher level with mean value of 73.3%. [28], higher level of knowledge of this theme, is probably due to the difference in the tool used for assessing the knowledge of nurses.

Knowledge of Nurses About Classification and Observation of PUs:

This subtheme achieved the highest score within the knowledge section, with a correct response rate of 71.6%, which is considered a satisfactory level of knowledge. However, this finding differs from most of the reviewed

literature, where the "classification and observation" subtheme typically ranked lower. It was the second-highest in an Indonesian study [29], and third-highest in a Slovakian study [30].

In contrast, 'classification and observation' was the lowest among other subthemes in a study conducted in Iran. [24].

The discrepancies in findings among studies may be ascribed to variations in the execution and prioritisation of pressure ulcer prevention. In environments where preventive measures are inadequate, nurses may face a higher incidence of pressure ulcers, enhancing their expertise in classification and monitoring. In contrast, workplaces with robust preventative measures see fewer ulcers, perhaps diminishing nurses' direct exposure to various ulcer phases and, as a result, their capacity to appropriately categorise them.

Knowledge of Nurses about Risk Assessment of PUs:

In this study the level of knowledge regarding 'risk assessment' was 36.3% which is considered unsatisfactory. This is the same for many other studies where risk assessment was shown to be among the lowest subthemes, such as a study conducted among ICU nurses in tertiary hospitals in KSA 31.19% [31], and a study in Basra, Iraq where the percentage was (24.24) which was the lowest among other subthemes.

Low level of knowledge in this subtheme might be due to a lack of PU education about the basic information regarding the scales used for assessment; only 13.5% knew that Braden is a scale used for PU assessment in patients, which indicates little concentration given to PUs assessment among nurses.

Knowledge of Nurses about Nutrition and PUs:

The subtheme 'Nutrition and PUs' in the current study has a low-level knowledge among nurses (38.4%), which consistent to a study in Al-Basra, Iraq (30.30%) [18].

Some, such as a Slovakian study by [30] reported a high level of knowledge regarding the role of nutrition in pressure ulcer prevention (77.0%). In contrast, the lower scores in the current study may be attributed to limited awareness among nurses about the link between nutrition and pressure ulcer development. Many nurses may not fully recognize that inadequate nutrition is a significant risk factor for the occurrence and progression of pressure ulcers.

Knowledge of Nurses about Prevention of PUs:

Regarding nurses' knowledge about PUs prevention, the current study revealed an unsatisfactory level of knowledge, with only 43.9% achieving a satisfactory score. This finding is consistent with a study conducted in Basrah, Iraq, which reported a similar low percentage (30.08%) [18], and also aligns with international findings, such as a study in Slovakia showing 51.2% [30]. These results may be attributed to gaps in continuing education and limited access to updated clinical guidelines on PUs prevention.

In contrast, a Chinese study conducted on ICU nurses reported a satisfactory level of nurses' knowledge regarding PU prevention of 68.8% [13]. This higher score could be due to the more specialized setting of intensive care units, where PUs prevention is a critical part of routine care, possibly supported by ongoing training and institutional emphasis on evidence-based practices.

Knowledge of Nurses about Specific Patient Groups and PUs

In most of the reviewed literature, nurses' knowledge regarding 'specific patient groups' is not commonly addressed as a separate subtheme. However, in the current study, this area demonstrated the lowest level of knowledge, with only 26.3% of correct responses. This finding aligns with an international study conducted in Indonesia, which reported a similarly low percentage of 24.6% [29].

In contrast, a study conducted in tertiary hospitals in China reported a satisfactory level of knowledge on this subtheme, with a score of 64.4% [32]. Even higher results were observed in a Chinese study among ICU nurses, where knowledge reached 95.2% [13]. These differences may reflect the influence of workplace settings and the emphasis on targeted training in specialized units, such as ICUs, where nurses are more frequently exposed to high-risk patients and receive more focused education on their needs.

Relationships between Demographic Characteristics and Nurses' Knowledge Regarding Pressure Ulcer

The current study revealed no statistically significant differences in nurses' knowledge regarding PUS prevention based on demographic characteristics, including age, ward type, and years of experience.

Although numerical variations in mean knowledge scores were observed, such as slightly higher scores among nurses aged 30–39 years and those with 5–9 years of experience, these differences did not achieve statistical significance.

This study's findings differ from several international and national studies. Research by [32], [21], and [20] found significantly higher PU knowledge among mid-career nurses and those in specialized units like ICUs, probably due to increased clinical exposure. Similarly, Iraqi studies by [19] and [23] bonded knowledge to unit type and experience.

However, findings by [18] showing lower knowledge in general wards and among senior nurses align with the non-significant trends seen in this study.

Interestingly, although years of experience had no statistically significant relationship with knowledge ($p=0.287$), those with 5–9 years of experience had a noticeably higher proportion of satisfactory knowledge (31.7%), compared to other groups. This aligns directionally with findings from [18] in Basrah, who suggested that mid-career nurses may be more engaged in continuing education and policy adherence.

Overall, regardless of age, experience, or work environment, the non-significant differences in PU knowledge highlight the need for institutional initiatives to guarantee similar educational standards across all levels of nursing personnel.

5- CONCLUSION

The overall knowledge of nurses regarding PU prevention was found to be unsatisfactory. Most knowledge subthemes fell below the expected competency level, particularly in areas related to 'specific patient groups', 'risk assessment', and 'nutrition'. Only the subtheme concerning 'classification and observation' demonstrated an acceptable level of understanding. These findings highlight a potential lack of structured in-service training and insufficient emphasis on preventive care strategies within Diyala's governmental healthcare facilities.

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معارف الممرضين فيما يتعلق بالوقاية من قرحة الفراش في مستشفيات محافظة ديالى

الخلاصة

قرحة الفراش هي تلف موضعي يصيب الجلد و/أو الأنسجة السفلية نتيجة الضغط أو الضغط المصحوب بقوى القص. الهدف هو تقييم معرفة الممرضين حول الوقاية من قرحة الفراش وإدارتها، وتحديد العوامل المؤثرة في هذه المعرفة.

أُجريت دراسة مقطعية في مستشفيات محافظة ديالى لتقييم معرفة الممرضين حول قرحة الفراش باستخدام أداة **PUKAT 2.0**. تم اختيار 252 ممرضاً عبر أخذ عينات عشوائية متناسبة على مدى خمسة أشهر، من 10 ديسمبر 2024 إلى 1 مايو 2025. استُخدمت الإحصاءات الوصفية والاختبارات الاستدلالية مثل اختبار **t** المستقل، وتحليل التباين **ANOVA**، واختبار مربع كاي (لتحليل البيانات عبر برنامج **SPSS** (الإصدار 29,0)، مع تحديد مستوى الدلالة الإحصائية عند $p < 0.05$.

بلغ متوسط عمر المشاركين $28,9 \pm 6,2$ سنة، وكانت الفئة العمرية بين 20 و49 سنة. شكلت الإناث 52,4% من العينة. أغلب المشاركين حاصلون على دبلوم تمريض (57,1%) ولديهم خبرة عمل تتراوح بين 1-4 سنوات (50,8%). فيما يخص الأقسام، كانت النسبة الأعلى (31,0%) في الردهات العامة. كانت النتيجة ان نسبة المعرفة تعتبر مقبولة لدى الممرضين حول الوقاية من قرحة الفراش 19,8% فقط (ن=50)، بينما لم تكن كذلك بالنسبة لبقية المحاور.

كانت المعرفة العامة للممرضين حول الوقاية من قرحة الفراش غير مرضية. معظم الجوانب المعرفية كانت دون مستوى الكفاءة المطلوب، باستثناء جانب "التصنيف والملاحظة" الذي أظهر مستوى مقبولاً من الفهم.