RESEARCH ARTICLE

CYPRUS
JOURNAL OF MEDICAL SCIENCES

DOI: 10.4274/cjms.2025.2025-20
Cyprus J Med Sci 2025;10(4):285-292

Medical Device-Related Pressure Injuries: Knowledge Levels of Nurses and the Affecting Factors

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Abstract

BACKGROUND/AIMS: This study aimed to determine nurses' knowledge of pressure injuries caused by medical devices and the factors that influence this level of knowledge.

MATERIALS AND METHODS: This was a cross-sectional descriptive study. The study sample consisted of 252 nurses. Data were collected using face-to-face and online data collection methods with the medical device-related pressure injuries knowledge questionnaire.

RESULTS: The mean total score obtained by nurses on the medical device-related pressure injuries knowledge was below 70%, indicating a generally insufficient level of knowledge. The sub-domain "prevention and treatment" was rated with the highest percentage of correct answers, 67.87% (10.86±2.43). The "staging" subdomain had the lowest percentage of correct responses with 31.87% (0.956±0.715). It was determined that age (p=0.001), gender (p=0.025), and working shift in the clinic (p=0.006) affected the total score average of the medical device-related pressure injury knowledge level.

CONCLUSION: The issue of pressure injuries related to medical devices should be given more attention in nursing education.

Keywords: Medical device, pressure injuries, nursing, knowledge

INTRODUCTION

Advances in technology and the increased use of medical devices as an integral part of care have resulted in an increase in the number of incidents of medical device-related pressure injury (MDRPI) in recent years.[1] MDRPI is a localized injury to the skin and tissues caused by the continuous pressure exerted by medical devices used for diagnosis or treatment.[2] MDRPI was first defined in the National Pressure Ulcer Advisory Panel guideline in 2016 and has been effective in increasing awareness of MDRPI.[3]

Pressure injuries caused by medical devices account for over 30% of the total number of pressure injuries in hospitals.[4] It has been found that patients with medical devices are more likely to develop a pressure injury than those without.[5] In one study, the reported frequency and the prevalence of pressure injuries caused by medical devices were 12% and 10%, respectively.[6] In a systematic review of thirteen studies, it was found that the incidence of MDRPI in the intensive care unit (ICU) ranged from 0.9% to 41.2%, and the prevalence ranged from 1-1.4% to 121%.[7] In another study, it was observed that MDRPI occurred seven times more frequently than normal pressure injuries.[8]

To cite this article: Yayman K, Sucu Dağ G. Medical device-related pressure injuries: knowledge levels of nurses and the affecting factors.. Cyprus J Med Sci. 2025;10(4):285-292

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Received: 27.02.2025
Accepted: 17.07.2025
Publication Date: 15.08.2025

Pressure injury observed in patients causes deterioration in quality of life, increased care costs, and increased mortality and morbidity. Nurses have an important role to play in detecting patients at high-risk of pressure injuries from medical devices and reducing complications.[9] Zang et al.[10] study of critical care nurses' knowledge, attitudes, and practices of MDRPI found that the nurses' acquired knowledge, attitudes, practical skills are at an acceptable level, and that nurses' practices increased with more hours worked in intensive care. The study by Sönmez and Bahar[11] examined the MDRPI knowledge level of nurses and the factors affecting it. It was found that nurses' level of knowledge was inadequate and was influenced by the gender of the nurse, their experience working in the ICU, the frequency of MDRPIs, prior education about these injuries. In a systematic review conducted by Fang et al.[12], it was found that nurses' attitudes towards MDRPI prevention were positive, and their knowledge and practices were insufficient. It was found that nurses' knowledge, attitudes and practices on MDRPI prevention were affected by education level, work experience, having received previous training on MDRPI, caring for MDRPI patients, being a specialist nurse in the ICU, working in tertiary hospitals, and having a wound care certificate.

The limitations of studies assessing nurses' knowledge, perceptions, and experiences of pressure injuries from medical devices prevent the planning of effective interventions in nurse education and clinical practice.[13] It is important to identify the factors that influence nurses' knowledge levels and clinical practice skills in the care and prevention of pressure injuries from medical devices. In this context, not only are the knowledge level of nurses important, but the factors affecting their knowledge level are also crucial in terms of planned practices to prevent pressure injury. After the pressure injury prevention assessment, the identification of patients at risk and the development of a prevention plan will contribute to a healthy solution of the problem.[14] This study differs from previous studies in that it examines the knowledge and attitudes of nurses working in different clinical settings regarding MDRPI. It was also conducted in a different geographical context. It is believed that the results of this study, by highlighting similarities and differences with the literature, will guide the implementation of clinical studies on nurses' knowledge and attitudes towards MDRPI and aid in educational planning.

Nurses play an active role in patient care in wards and ICUs, providing treatment to patients with pressure injuries from medical devices and those patients at risk. Nurses' knowledge plays a key role in preventing pressure injuries associated with medical devices. As pressure injury resulting from medical devices differs from pressure injury due to other causes, it is believed that the assessment of nurses' knowledge levels and factors influencing pressure injury resulting from medical devices will contribute to the planning of in-service training to meet their needs, the development of preventive protocols, and the literature. This study aimed to assess knowledge of pressure injuries caused by medical devices among nurses working in different clinics, and the factors influencing it.

Research Questions

1. What is the level of knowledge of nurses about pressure injuries related to medical devices?

2. What are the factors affecting nurses' level of knowledge about pressure injuries related to medical devices?

MATERIALS AND METHODS

Desing

This study uses a descriptive cross-sectional research design.

Sample

The population of the study consisted of 375 nurses working in internal medicine (neurology, cardiology, oncology, chest clinics), surgery (neurosurgery, general surgery, orthopedics, cardiovascular surgery, urology, emergency) and intensive care (general intensive care, cardiology intensive care, neurology intensive care, neonatal intensive care) clinics of two state hospitals in North Cyprus. There was no sample selection in the study; it was conducted on the population. The study sample consisted of 252 nurses who met the inclusion criteria and who agreed to participate. Inclusion criteria were working in internal medicine, surgery and intensive care and accepting to participating in the study. The exclusion criterion; is working in clinics providing outpatient clinic services. The rate of reaching the population in the study is 67.2%.

After obtaining the relevant institutional and board permissions, the study was carried out with nurses who work in the Dr. Burhan Nalbantoğlu State Hospital and Famagusta State Hospital State Hospitals between October 2022 and November 2023. There was no protocol in the hospital to identify and prevent risk factors for pressure injury due to medical tools and equipment.

Data Collection

The researcher collected the data using face-to-face and online data collection methods. In face-to-face data collection, nurses working in the relevant clinics were informed about the research. Data collection forms were distributed to those whose informed consents were obtained, and the forms were collected after they were answered. Participants took an average of 20-25 minutes to answer the questionnaires. In online data collection, a Google Forms link was sent via e-mail to nurses who could not be reached in face-to-face data collection. The data collection forms used in the study were transferred to Google Forms. Participants were prevented from switching to the next question without answering the current question to ensure the data was completed in the online data collection form. In the online data collection form, informed consent was first obtained from the nurses participating in the study, after which the research questions were answered.

Nurse Information Form

This form was designed by Bahar and Sönmez.[11] and has contained a total of 22 questions.

The first 10 questions of the nurse information form include the sociodemographic characteristics of the nurses, and questions 11 and 12 include professional qualifications, practices to prevent pressure injury related to medical tools and equipment, and educational status.

Medical Device-Related Pressure Injuries Knowledge Questionnaire

The content validity index of the MDRPI knowledge questionnaire (MDRPI-KQ) was 0.99. The Kuder-Richardson internal consistency coefficient (KR_20) was 0.85611. The questionnaire consists of 36 items and four subdomains. From a total of 36 statements in the questionnaire, 20 were positive and 16 were negative. Each statement

in the knowledge assessment form is answered as "true", "false or no idea". The correct answers are each scored as 1, and the incorrect and "no idea" answers are given a score of 0. The total score that can be calculated from the information form ranges between 0 and 36. The increased mean score derived from the questionnaire indicated that the nurses' knowledge of MDRPI had increased. The percentage of correctly answered questions is calculated by dividing the number of correctly answered questions by the total number of questions, and then multiplying by 100. A 70% correct score (25.2 points) is accepted as the cut-off point. The knowledge questionnaire is interpreted as unsuccessful if the percentage of correctly answered questions is less than 70%, between 70% and 79.9% as "moderate level", between 80% and 89.9% (between 28.8 and 32.4 points) as "good level", and above 90% (above 32.4 points) as "very good level".

Statistical Analysis

The data from the study were analysed using the SPSS 22.0 software package (IBM Corp., Armonk, NY). The normality of data (one-sample Kolmogorov-Smirnov test) was tested to determine whether the study data had normal distribution characteristics. It was seen that the data obtained from the measurement tools used in the study did not exhibit a general distribution. The "Mann Whitney U test" was used for the comparison of paired groups, and the "Kruskal-Wallis H test" was used for the comparison of three or more groups. When the results of the "Kruskal-Wallis H test" were significant, the the "Mann Whitney U test" technique was used to determine between which groups significant differences existed. Bonferroni correction was applied when there was a significant difference between two groups. In addition, Spearman's rho correlation coefficient technique, which is the non-parametric equivalent of Pearson's product correlation coefficient, was used to compare continuous variables.

Ethical

This study was approved by the Ethics Committee of Dr. Burhan Nalbantoğlu State Hospital (approval number: 65/22, date: 23.05.2023), and informed consent was obtained from the nurses participating in the study.

RESULTS

Sociodemographic and Professional Characteristics of Nurses

The average age of the nurses participating in the study was 34.61±7.44 years and the mean number of years of employment as a nurse was 11.72±7.49. It was found that 68.7% of the nurses were undergraduate graduates, 48.4% worked in the ICU, and 91.3% worked in day and night shifts (insert Table 1).

The mean duration of employment (years) of the nurses who participated in the study was 11.72±7.49, and the mean weekly working time (hours) was 40.93±6.82. It was found that 92.1% of the nurses did not receive training on pressure injury related to medical devices, 92.1% did not attend in-service training on MDRPI, and 38.5% frequently encountered a patient with MDRPI. It was found that 28.3% of nurses received information on MDRPI prevention and treatments during their nursing education, 97.6% of them thought that a care protocol was needed to prevent MDRPI, 73.4% of them had quite sufficient knowledge about MDRPI, and 97.2% of them wanted to participate in training on MDRPI.

Medical Device-Related Pressure Injury Knowledge and Influencing Factors

The mean MDRPI-KQ total score for nurses was 22.11±3.83, and when analysing the subdomains, it was found that the highest average score of the preventing and treating subdomain was 10.86±2.43 the lowest average score for the staging subdomain was 0.956±0.715. (insert Table 2). The highest correct response in the MDRPI-KQ was 96% for Q27, while the lowest was 18.7% for Q15 (insert Table 3).

A statistically significant difference was found between the MDRPI-KQ total score of the nurses participating in the study and the mean scores of the diagnostic and risk factors subdomains, as well as regarding gender, working status in the clinic, ($p<0.05$, Table 1). It was found that the difference among nurses' age, educational status, working hours, working clinic, and MDRPI-KQ total score and sub-dimensions was statistically significant ($p<0.05$; Table 1).

There was a significantly weak negative correlation between the age of the nurses and the years of employment, the staging subdomains mean scores (r=-0.139; p=0.028; r=-0.140; p=0.027), between weekly work time (hours) and the total knowledge score of the risk factor subdomain (r=-0.193, p=0.002) (insert Figure 1).

DISCUSSION

Although pressure injuries due to medical devices occur at certain intervals in nursing care services, they are usually preventable with holistic nursing care.[13] In this context, it is important for the quality of care to determine the level of knowledge and influencing factors of nurses for the prevention of pressure injuries due to medical devices

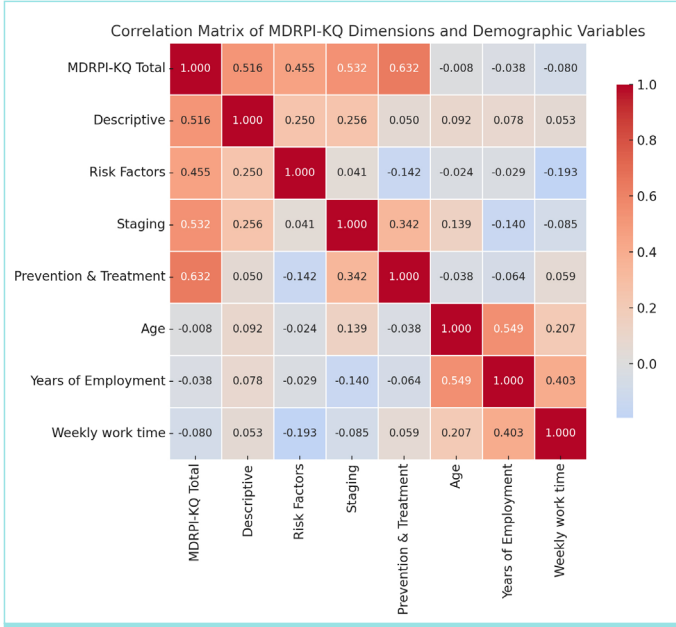

Figure 1. Analysis of the correlation coefficients between the sub-dimensions of the MDRPI-KQ and average total score and age, years of employment in the profession and weekly working hours.

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed). r: Spearman correlation coefficient. MDRPI-KQ: Medical device-related pressure injury- knowledge questionnaire.

and the application of the most ideal care to the patient during the treatment period.

The study found that nurses were insufficiently knowledgeable about MDRPI, and their knowledge level was below the acceptable limit (≥70%). In general, the level of MDRPI prevention knowledge among nurses is inadequate to moderate.[11,15,16] In a systematic review by Fang et al.[12] investigation of nurses' knowledge, attitudes and practices with regard to MDRPIs, it was found that while nurses generally had a positive attitude, their knowledge and practices were inadequate. In this study, it was found that most nurses did not receive any formal training on MDRPIs. Similarly, in the literature, it is seen that nurses working in the clinic do not receive training on MDRPI and that professional and continuous training is insufficient.[10,17,18] In this context, the study results show that there is a need for nurses to be trained in pressure injuries according to the literature. Lack of knowledge and awareness of nurses about MDRPIs may lead to increased incidence of MDRPIs and negative patient outcomes due to failure to adopt prevention strategies.[19] This is supported by the evidence that the majority of nurses felt that their existing knowledge of MDRPIs was not adequate and stated a need for more training in this area.

Another important finding of this study was that the nurses' score in the "stagings" subdomains of the questionnaire was the lowest score compared to the total score of the MDRPI knowledge level questionnaire and other subdomains According to the National Pressure Injury Advisory Panel (NPIAP pressure ınjury stages), it is recommended that MDRPIs should be staged using the pressure injury staging system.[20]

Mucosal pressure injuries (MMPIs) are seen in mucous membranes with a history of using a medical device at the site of injury. Due to the anatomy of the tissue, these ulcers cannot be staged. Therefore, it is recommended to differentiate between general pressure ulcers and

Table 1. Nurses' knowledge scores according to their demographic and professional characteristics (n=252)

Characteristics	Groups	n (%)	MDRPI-KQ**	D	R	S	P/T
			Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Gender	Female	200 (79.4)	19.87±4.04	4.94±1.39	3.28±1.44	0.93±0.75	10.73±2.58
	Male	52 (20.6)	21.08±2.76	5.06±1.38	3.56±1.55	1.08±0.55	11.38±1.69
	p(α)		0.025*	0.453	0.340	0.101	0.137
Working status in the clinic (title)	Department nurse	242 (96.0)	20.13±3.83	4.93±1.39	3.38±1.46	0.96±0.71	10.87±2.39
	Chief nurse	10 (4.0)	19.70±4.22	5.90±0.57	2.30±1.06	0.80±0.79	10.70±3.50
	p(α)		**0.860**	**0.001***	**0.009***	**0.479**	**0.805**
	Groups	**n (%)**	**M (min.-max.)**	**M (min.-max.)**	**M (min.-max.)**	**M (min.-max.)**	**M (min.-max.)**
Age	22-29[1]	77 (30.6)	21.0 (8-32)	5.0 (0-9)	3.0 (0-6)	1.0 (0-3)	11.0 (0-16)
	30-39[2]	112 (44.6)	20.0 (2-36)	5.0 (0-9)	3.0 (0-8)	1.0 (0-3)	11.0 (0-16)
	40-49[3]	45 (17.9)	21.0 (10-27)	5.0 (0-8)	3.0 (1-7)	1.0 (0-3)	11.0 (7-15)
	50-59[4]	18 (7.1)	17.0 (15-22)	5.0 (4-7)	2.0 (2-6)	0.0 (0-1)	9.0 (7-11)
	p(β)		**0.001*** (1-4.2-4.3-4)	**0.042*** (3-1.3-2)	**0.681**	**0.001*** (1-4.2-4.3-4)	**0.000*** (1-4.2-4.3-4)
Education	Associate degree[1]	10 (4.0)	21.0 (10-27)	7.0 (0.0-7)	3.5 (1-5)	1.0 (0.0-2)	10.5 (8-13)
	Bachelor's degree[2]	173 (68.7)	20.0 (2-36)	5.0 (0.0-9)	3.0 (0.0-8)	1.0 (0.0-3)	10.0 (0.0-16)
	Postgraduate degree[3]	69 (27.4)	20.0 (11-25)	5.0 (2-7)	2.0 (1-7)	1.0 (0.0-2)	12.0 (2-16)
	p(β)		**0.573**	**0.003*** (1-2. 1-3)	**0.000*** (2-3)	**0.216**	**0.000*** (2-3)
Clinic currently worked in	Internal services[1]	50 (19.8)	21.0 (2-36)	5.0 (0-9)	3.0 (0-8)	1.0 (0-3)	11.0 (0-16)
	Surgical units[2]	42 (16.7)	20.5 (9-27)	5.0 (1-7)	4.0 (2-7)	1.0 (0-2)	10.0 (0-15)
	Intensive care units[3]	122 (48.4)	20.0 (8-32)	5.0 (1-9)	3.0 (1-7)	1.0 (0-2)	11.0 (0-16)
	Emergency department[4]	38 (15.1)	20.0 (8-25)	5.0 (0-8)	4.0 (0-6)	1.0 (0-3)	10.0 (7-16)
	p(β)		**0.491**	**0.366**	**0.000*** (2-3)	**0.856**	**0.000*** (1-2.3-2.3-4)
Working shift	Days only[1]	21 (8.3)	17.0 (10-24)	5.0 (1-7)	2.0 (2-5)	0.0 (0-2)	9.0 (4-14)
	Nights only[2]	1(0.4)	20.0 (20-20)	5.0 (5-5)	5.0 (5-5)	0.0 (0-0)	10.0 (10-10)
	Days and nights[3]	230 (91.3)	20.0 (2-36)	5.0 (0-9)	3.0 (0-8)	1.0 (0-3)	11.0 (0-16)
	p(β)		**0.006*** (3-1)	**0.937**	**0.001*** (3-1)	**0.000*** (3-1)	**0.026*** (3-1)

*p<0.05 statistically significant difference; p(α): Mann-Whitney U test; p(β): Kruskal-Wallis H test.
**Medical device-related pressure injuries knowledge questionnaire (MDRPI-KQ).
D: Description, R: Risk factors, S: Staging, P/T: Prevention and treatment, SD: Standard deviation, Min.: Minimum, Max.: Maximum.
Analysis of variance; all descriptive statistics are expressed as arithmetic mean ± standard deviation; M: median (min.-max.).

Table 2. MDRPI knowledge questionnaire mean scores of nurses (n=252)

MDRPIs	Mean ± SD	Median (min.- max.)	Percentage of correct answers %
Total score	20.11±3.83	20.00 (2.00-36.0)	55.87
Description score (9 items)	4.96±1.38	5.00 (0.00-9.00)	55.16
Risk factors score (8 items)	3.33±1.46	3.00 (0.00-8.00)	41.66
Staging score (3 items)	0.956±.715	1.00 (0.00-3.00)	31.87
Prevention and treatment (16 items)	10.86±2.43	11.00 (0.00-16.0)	67.87

MDRPI: Medical device-related pressure injuries, SD: Standard deviation, Min.: Minimum, Max.: Maximum.

MMPIs caused by medical devices. It is thought that the nurses' low level of knowledge about the staging of MDRPIs is due to their low level of knowledge about MDRPIs.

In this study, it was determined that the highest rate of correct answers to the questions with correct answers in the MDRPI was in the "prevention and treatment" subdomains, and the lowest rate of correct answers in the "risk factors" subdomains. Similarly, Sönmez and Bahar[11] found in their study that the nurses' highest rate of correct answers to the questions with correct answers in MDRPI was in the "prevention and treatment" subdomains and the lowest rate of correct answers was in the "risk factors" subdomains. Nursing care is important in preventing pressure injury caused by medical devices and nurses take responsibility in this regard. However, the lack of multidisciplinary work is an obstacle in preventing pressure injuries from medical devices, necessitating combined efforts and teamwork to contribute to successful care. Although MDRPI prevention practices are an integral part of nursing, it is recognized that it is not only the responsibility of nurses and that quality care will be provided if other health professionals contribute. The study shows that nurses have knowledge gaps concerning MDRPI, as the item to which nurses gave the most incorrect answers was related to the risk factors that cause the development of MDRPI. At the same time, the findings of the study support the idea that the frequency of nurses' encounters with a patient with MDRPI affects their level of knowledge about identifying risk factors. This finding shows the importance of focusing on risk factors in training programmes.

In the study, it was determined that nurses' "general" and "overall" scores of the pressure sore knowledge scale related to medical tools and equipment affected the variables of age, gender and clinical working shift, the difference between the general scores of the scale and the mean scores of the variables of age, gender and clinical working shift was statistically significant, and the level of knowledge decreased with increasing age. Similarly, Sönmez and Bahar found that the "general" scores of the pressure sore knowledge scale "general" scores of nurses related to medical tools and equipment were affected by the age variable and the difference between the mean scores of the age groups was statistically significant. In the study conducted by Dalli and Girgin[19], it was reported that the difference between the mean general scores of the scale belonging to the variables of age, gender, education status, the clinic where they are currently working, the status in the clinic, and the working shift in the clinic was statistically significant. According to these findings, it is thought that sociodemographic variables and some clinical characteristics should also be taken into consideration in training and other interventions to increase nurses' knowledge of pressure injury due to medical devices and equipment. In the study, the prevention and treatment subdomain scores of nurses working in surgical clinics were lower than those of nurses working in internal services and ICUs, and their risk factors sub-dimension scores were higher than those of nurses working in these clinics. In a systematic review conducted by Parvizi et al.[16], it was found that knowledge of pressure injuries caused by medical devices is limited and is affected by factors such as age, gender, education level, working status in the clinic, and type of service. Another systematic review determined that nurses' knowledge and practices regarding pressure injuries caused by were affected by variables such as age, gender, education level, working status, and the clinic where they worked.[12] While nurses working in surgical clinics have higher levels of knowledge about the risk factors of pressure injuries due to medical devices and equipment, their knowledge about prevention is lower than in other clinics. This suggests that their interventions for clinical practice are insufficient and that there is a need to address their educational needs and awareness. It is recommended to develop strategies to improve nurses' knowledge and practices in the prevention of pressure injuries related to medical tools and equipment.

It was found that as the age and working years of the nurses increased, the average scores of the staging subdomain of the pressure injury knowledge scale, which is related to medical tools and equipment, decreased. Additionally, the risk factors sub-dimension knowledge scores decreased as the weekly working hours increased. In contrast to these findings in the literature, it has been found that knowledge scores are higher for nurses who are older and have a longer continuous work experience. This contradiction could be explained by knowledge attrition over time, especially in the absence of regular refresher training on updated guidelines. Additionally, burnout, which disproportionately affects experienced nurses in high-demand settings such as ICUs, may diminish motivation to engage in continuous learning or pay attention to evolving practices. Another contributing factor may be reliance on outdated protocols or routines that are no longer aligned with current evidence-based practices, particularly if institutional support for ongoing professional development is limited. These results emphasise the necessity for regular, compulsory ongoing training courses for all staff, including those with experience, to keep up to date with their skills, particularly in areas such as MDRPI prevention, where there is ongoing technological development and new risks related to devices.

Table 3. Nurses' knowledge about MDRPIs (n=252)		
Knowledge items	**True**	**False**
	n (%)	**n (%)**
Dimension 1: description		
1- MDRPIs are pressure injuries caused by medical devices and equipment. (T)	231 (91.7)*	21 (8.3)
2- MDRPIs are caused by constant pressure or friction due to medical devices. (T)	230 (91.3)*	22 (8.7)
3- MDRPIs constitute approximately 1/3 of all pressure injuries that may occur in the hospital environment. (T)	178 (70.6)*	74 (29.4)
4- In MDRPIs. the tissue around or under the device and equipment takes the shape of the device. (T)	227 (90.1)*	25 (9.9)
5- The source of pressure in MDRPIs is the medical device itself. (T)	185 (73.4)*	67 (26.6)
6- MDRPIs usually occur in areas with bony prominences. (F)	104 (41.3)	148 (58.7)*
7- MDRPIs are simple wounds and do not cause serious complications. (F)	30 (11.9)	222 (88.1)*
8- MDRPI is most common in the sacrum. (F)	35 (13.9)	217 (86.1)*
9- There are no differences in the appearance between general pressure injuries and MDRPIs. (F	31 (12.3)	221 (87.7)*
Dimension 2: risk factors		
10- Hypertension is not a risk factor for MDRPIs. (T)	81 (32.1)*	171 (67.9)
11- MDRPIs are potentially caused only by breathing apparatus and feeding tubes. (F)	81 (32.1)	171 (67.9)*
12- Hypoalbuminemia and malnutrition are not causes of MDRPIs. (F)	50 (19.8)	202 (80.2)*
13- All patients with a medical device are at risk of MDRPIs. (T)	224 (88.9)*	28 (11.1)
14- Patients with signs of localized and generalized edema have a higher risk of MDRPIs. (T)	239 (94.8)*	13 (5.2)
15- Patients with swallowing problems are at risk of MDRPIs. (T)	47 (18.7)*	205 (81.3)
16- Face masks used for non-invasive positive pressure ventilation (NIPPV) do not cause MDRPIs. (F)	40 (15.9)	212 (84.1)*
17. Commonly used risk assessment scales do not assess the risk associated with MDRPIs. (T)	78 (31.0)*	174 (69.0)
Dimension 3: staging		
18- The most common stage of encountering a MDRPI is stage 2. (T)	142 (56.3)*	110 (43.7)
19- Considering MDRPIs: if the medical device causes a pressure injury on the mucosa staging is achieved using the "International Pressure Ulcer Classification System". (F)	82 (32.5)	170 (67.5)*
20- Considering MDRPIs: if the medical device causes a pressure injury on the skin no staging is required. (F)	17 (6.7)	235 (93.3)*
Dimension 4: prevention and treatment		
21- Placing the medical device or equipment under the immobile patient should be avoided. (T)	209 (82.9)*	43 (17.1)
22- MDRPIs do not require any treatment and heal spontaneously. (F)	32 (12.7)	220 (87.3)*
23- The skin around and under medical devices or equipment should be observed every 48–72 h for signs of injuries. (F)	87 (34.5)	165 (65.5)*
24- If the patient is at risk of edema or exhibits signs of edema. skin assessment should be performed more frequently than usual. (T)	230 (91.3)*	22 (8.7)
25- Medical devices and equipment should be removed from the part of the body they are attached to as soon as medically possible. (T)	210 (83.3)	42 (16.7)*
26- Relocating the medical devices at regular intervals is the most important method to prevent MDRPIs. (T)	235 (93.3)*	17 (6.7)
27- Relocating the medical devices at regular intervals is the most important preventive method to prevent MDRPIs.	242 (96.0)*	10 (4.0)
28- The skin surface in the area where the medical device is located should be massaged to prevent medical device related pressure ınjuries (MDRPIs). (F)	104 (41.3)	148 (58.7)*
29- If the dietary plan of adult patients at risk of MDRPIs does not meet nutritional requirements, it may lead to poor wound healing. A protein-rich nutritional supplement should be recommended to the patients. (T)	201 (79.8)*	51 (20.2)
30. Using medical devices in a way that minimizes skin damage (soft material, etc.,) reduces the risk of injury development. (T)	235 (93.3)*	17 (6.7)
31. Medical devices and equipment should be firmly fixed in place in order to avoid the risk of dislocation. (F)	56 (22.2)	196 (77.8)*
32. The medical device should be placed directly on the skin. (F)	74 (29.4)	178 (70.6)*
33. The skin on which medical devices are worn should be regularly moisturized with products in order to prevent MDRPIs. (F)	124 (49.2)	128 (50.8)*
34. The skin on which medical devices are worn should be kept clean and dry to prevent medical device-related pressure injuries. (T)	235 (93.3)*	17 (6.7)
35. Medical devices and equipment should be the appropriate size for the patient. (T)	241 (95.6)*	11 (4.4)
36- To reduce the pressure associated with the medical device. specific a dressing/pad should be used under the devices. (T)	222 (88.1)*	30 (11.9)
T: True, F: False.		

Study Limitations

The study was conducted in two public hospital in North Cyprus so that the findings cannot be generalizable.

CONCLUSION

The results of this study showed that the nurses' MDRPI knowledge was at moderate level and lower than the limit for four subdomains of the questionnaire. MDRPI is a growing global concern due to the increasing use of invasive medical devices in care settings. In particular, identified knowledge gaps in the prevention of device-related injuries and device-related complications highlight the need for standardised educational interventions in these critical areas.

These results support the integration of MDRPI-focused content into national nursing curricula and continuing education modules, thereby ensuring that evidence-based prevention and staging practices are taught in a consistent manner. Additionally, adapting in-service education programmes to the specific needs of different clinical units (e.g., surgical services or ICUs) and addressing demographic and experiential factors (e.g., duration of practice or unit type) can enhance knowledge acquisition and improve clinical outcomes. These findings can be used to inform national or international nursing education frameworks to create a broader impact. Integrating these interventions with existing global pressure injury prevention frameworks, such as those promoted by the NPIAP or the European Pressure Ulcer Advisory Panel, could facilitate cross-national comparability, benchmarking, and professional standardisation.

MAIN POINTS

- Nurses' level of knowledge about medical device-related pressure injurys (MDRPIs) is insufficient.
- Inadequate knowledge of MDRPIs may negatively affect patient care.
- Training programmes and standards to increase knowledge of MDRPIs developed.

ETHICS

Ethics Committee Approval: This study was approved by the Ethics Committee of Dr. Burhan Nalbantoğlu State Hospital (approval number: 65/22, date: 23.05.2023).

Informed Consent: Informed consent was obtained from the nurses participating in the study.

Acknowledgements

The authors thank the nursing for their participation in this study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: K.Y., G.S.D., Concept: K.Y., G.S.D., Design: K.Y., G.S.D., Data Collection and/or Processing: K.Y., Analysis and/or Interpretation: K.Y., G.S.D., Literature Search: K.Y., G.S.D., Writing K.Y., G.S.D.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study had received no financial support.

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