

# Nursing Students' Attitudes Toward the Medical Device-Related Pressure Ulcer in Iran

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**Objective:** Attitudes toward medical device-related pressure ulcers can affect the performance of nursing students in this regard. To date, no studies have examined nursing students' attitudes toward medical device-related pressure ulcers. Therefore, this study aimed to examine nursing students' attitudes toward medical device-related pressure ulcers.

**Methods:** The present study was conducted in 2020 in Iran. The sample size was 187 nursing students who were in one of 5, 6, 7, or 8 semesters. To examine the nursing students' attitudes, a specific questionnaire was used. The questionnaire consists of 11 questions that assess the attitudes of nursing students toward medical device-related pressure in two dimensions of "prevention" and "care". The final score of this questionnaire ranged from 11 to 55. A higher score indicates a more positive attitude toward medical device-related pressure.

**Results:** A total of 187 nursing students participated in the study. Eighty-eight participants (41.7%) reported that they received training on medical device-related pressure ulcers. A total of 163 participants (88%) reported that their training was not sufficient for medical device-related pressure ulcers. Out of the total, 155 students stated that they need to hold a training workshop on medical device-related pressure ulcers. The mean overall score of nursing students' attitudes toward medical device-related pressure ulcers was 42.1±5.2. The mean scores of prevention and care dimensions were 21.8 and 20.2, respectively. No significant relationship was found between the mean score of the overall attitude and the student's demographic variables ( $p < 0.05$ ).

**Conclusion:** The results of the present study showed that nursing students, despite insufficient education, exhibited a positive attitude toward the prevention and care of medical device-related pressure ulcers. However, further studies are needed in this regard with different settings.

**Keywords:** pressure ulcer, medical device-related pressure ulcer, nursing students, attitude, nursing education

## Introduction

In the last definition of pressure ulcer by the National Pressure Ulcer Advisory Panel, a medical device-related pressure ulcer was also added to it.<sup>1</sup> These ulcers are different from the conventional pressure ulcers that occur most often due to immobility and the bony prominence of the body. Medical device-related pressure ulcers are caused by the pressure exerted by the medical devices attached to the patients' skin.<sup>2</sup> Because the use of medical devices is often inevitable, it is more difficult and complicated to prevent medical device-related pressure ulcers than conventional pressure ulcers.<sup>3,4</sup> Medical device-related pressure ulcers can cause many problems such as pain, infection, tissue necrosis, and increased costs for the

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patient, the patient's family, and health care systems.<sup>3,5</sup> Although some reports regarding medical device-related pressure ulcers have been seen in the scientific literature for about 50 years,<sup>6</sup> a focus on such ulcers has increased significantly over the past 10 years.<sup>2,7</sup> In a meta-analysis study by Jackson et al, in 2019, the incidence of medical device-related pressure ulcers was reported as about 12%.<sup>8</sup> Study in Iran about medical device-related pressure ulcers is limited to a few case reports<sup>9-13</sup> and one cross-sectional study. In the only cross-sectional study, Rashvand et al surveyed the incidence of medical device-related pressure ulcer in three hospitals. The incidence of medical device-related pressure ulcers in Rashvand et al's study was reported as 20.5%.<sup>2</sup> Currently, the occurrence of medical device-related pressure ulcers can be considered as one of the indicators of the quality of nursing and medical care.<sup>14</sup>

Final-year nursing students spend adequate time in clinical settings. In addition, they are giving many nursing cares independently, including caring for patients with pressure ulcers or at risk of pressure ulcers. Given the importance of the issue of pressure ulcers, many previous studies have investigated the knowledge, attitude, and performance of nursing students about conventional pressure ulcers.<sup>15-19</sup> Several studies have examined the nursing students' attitudes toward conventional pressure ulcers; however, to our knowledge, no study has examined nursing students' attitudes toward medical device-related pressure ulcers. Medical device-related pressure ulcers are different from conventional pressure ulcers. Medical device-related pressure ulcers are caused by the use of a medical device that has put too much pressure on the patient's skin. The risk factors for conventional pressure ulcers, including immobility, are usually not related to medical device-related pressure ulcers. Also, the intervention for the prevention of conventional pressure ulcers and medical device-related pressure ulcers are different.<sup>1,2</sup> Frequent change of position is the main intervention in preventing conventional pressure ulcers, while other interventions should be used for the prevention of medical device-related pressure ulcers.

Due to the differences between the conventional pressure ulcers and medical device-related pressure ulcers, it is therefore necessary to evaluate the nursing students' attitudes toward the medical device-related pressure ulcers. Till today, no studies have been conducted on the same topic. Therefore, the present study was conducted to fill this gap and improve knowledge and skill on prevention of medical device-related pressure ulcers.

## Materials and Methods

The present study was conducted from May to June 2020. This study was carried out in the two faculties of Nursing and Midwifery in Qazvin and Yasuj. Nursing education in Iran consists of a 4-year course (8 semesters). Students are posted at hospital in the 7th and 8th semesters of nursing. Nursing students in their 5th and 6th semesters also have about 70% of their training practices in a hospital setting.

The study population consisted of all nursing students who were in the 5th, 6th, 7th, and 8th semesters at Qazvin University of Medical Sciences and Yasuj University of Medical Sciences. At the time of the study, about 270 students were studying in the 5th, 6th, 7th, and 8th semesters at the two universities. The convenience sampling method was adopted for the present study. The inclusion criteria for the participants were as follows: 1) those who were studying in 5th or higher semesters; 2) knowledge to access and use of the Internet; and 3) giving informed consent and willing to participate in the study.

First, the study protocol was approved by the Research Deputy of Yasuj University of Medical Sciences. After obtaining the approval code, the researchers went to the education department of Qazvin School of Nursing and Midwifery and Yasuj School of Nursing and Midwifery and received the names and telephone numbers of the students studying in the 5th or higher semesters of nursing. The study was conducted simultaneously with the prevalence of the coronavirus in Iran. Therefore, the questionnaires were distributed through the Web. For smoothing of the study, the electronic version of the questionnaires was designed by the researchers. Students were contacted by telephone and asked to participate in the study. After obtaining verbal informed consent, the questionnaires were sent to the students via email or WhatsApp, and they were asked to fill out the questionnaires as per guidelines. The average time taken to complete the questionnaire was about 5 minutes. Students completed the questionnaires in 5 minutes (approx.).

## Tool Consisted of Two Sections for Data Collection

### Section I: Checklist of Demographic Variables

This checklist includes items such as age, gender, semester, education about medical device-related pressure ulcers, receiving sufficient training on medical device-related pressure ulcers, and there was a need to hold training courses on medical device-related pressure ulcers.

## Section 2: Attitude Questionnaire Regarding Medical Device-Related Pressure Ulcers

There is no standard tool available which can examine the attitudes toward medical device-related pressure ulcers. Therefore, a tool was designed and tested by the researchers in the present study. For this purpose, first, the texts were reviewed and the psychometric steps of the tool including formal validity, content validity, and structural validity were performed. The content validity ratio (CVR) for each item was above 0.8 and the whole questionnaire was 0.89. Also, the Cronbach's alpha value ( $\alpha=0.77$ ) showed an acceptable level of internal consistency of the questionnaire. The attitude questionnaire of medical device-related pressure ulcer consists of 11 questions, which are divided into two dimensions: medical device-related pressure ulcer prevention (6 questions) and medical device-related pressure ulcer care (5 questions). Question responses ranged from 1 (strongly agree) to 5 (strongly disagree). The final score ranged from 11 to 55.

The questionnaire is scored based on the 5-point Likert scale, ranging from 1 to 5. The minimum possible score is 11 and the maximum score is 55. A higher score indicates a more positive attitude toward the pressure ulcer caused by medical equipment. Scores of 11–25 indicate a negative attitude, 26–40 neutral attitude, and scores of 41–55 a positive attitude to medical device-related pressure ulcers. It should be noted that the article related to the questionnaire design is under review in the *Wound Prevention and Management Journal*.

## Ethical Considerations

The present study was approved by the ethical committee of Yasouj University of Medical Sciences (ethical code: IR.YUMS.REC.1398.156). Verbal informed consent was obtained from the subjects to participate in the study. Verbal informed consent was acceptable and approved by the Ethic Committee of Yasouj University of Medical Sciences. Participation in the study was voluntary. Any information obtained in this study that could be identified with participants remained confidential.

## Data Analysis

The obtained data were entered into SPSS version 16 software. Tests such as mean, standard deviation, and frequency were used to describe students' responses to attitude questionnaire items. Pearson's correlation test was used to investigate the relationship between mean attitude scores and the students' mean age. An independent

*t*-test was used to evaluate the difference between the mean scores of attitude score between participants' sex. A *P*-value of less than 0.05 was considered statistically significant.

## Results

A total 187 nursing students participated in the present study. The mean age of the participants was  $23.7\pm 3.9$ . Of 187 nursing students, 101 (54%) were females and 86 were males. With regards to educational semester, 23, 50, 43, and 71 students were in semester 5, 6, 7, and 8. Eighty-eight participants (41.7%) reported that they received training on medical device-related pressure ulcers. A total of 163 participants (88%) stated that their training was not sufficient for medical device-related pressure ulcers. A total of 155 students stated that they need to hold a training workshop on medical device-related pressure ulcers.

The mean score of attitude toward medical device-related pressure ulcers was  $42.1\pm 5.2$ . The mean score of the prevention dimension was 21.8. In this dimension, the highest and lowest scores were related to the items "preventing medical device-related pressure ulcers is not a nurse's priority" and

"It is more difficult to prevent medical device-related pressure ulcers than conventional pressure ulcers, such as those that occur in the patient's sacrum due to lying on the bed for long periods"

respectively (Table 1). The mean score of care dimension was 20.2. In this dimension, the highest and lowest scores were related to the items "nurses don't play an important role in the care of medical device-related pressure ulcers" and "medical device-related pressure ulcers occur only in patients admitted to special wards, such as intensive care unit" respectively (Table 1). No significant relationship was found between the mean score of the attitude and its dimensions with the student's demographic variables such as age, sex, semester, training on medical device-related pressure ulcers, and participating in workshops related to medical device-related pressure ulcer ( $p < 0.05$ ). Table 2 shows this in detail.

## Discussion

It is important for health care workers to pay attention to medical device-related pressure ulcers. In this study, the attitude of final-year nursing students is assessed toward medical device-related pressure ulcers. The results of the

**Table 1** Students' Responses to Attitude Questionnaire Items

Items	Strongly Agree	Agree	No Agree/ Disagree	Disagree	Strongly Disagree
<b>Medical device-related pressure ulcer prevention</b>					
6 - There is no need to use prevention protocols for MDRPU prevention.	6 (3.2%)	20 (10.7%)	22 (11.8%)	98 (52.4%)	41 (21.9%)
1 - In many cases, it is not possible to prevent MDRPUs.	8 (4.3%)	38 (20.3%)	23 (12.3%)	94 (50.3%)	24 (12.8%)
2 - It is more difficult to prevent MDRPUs than conventional PUs, such as those that occur in the patient's sacrum due to lying on the bed for long periods of time.	10 (5.3%)	61 (32.6%)	18 (9.6%)	82 (43.9%)	16 (8.6%)
3 - The MDRPUs are less important than the conventional PUs, such as those in the patient's sacrum due to lying on the bed for long periods of time.	2 (1.1%)	39 (20.9%)	23 (12.3%)	94 (50.3%)	19 (15.5%)
5 - Preventing MDRPUs is not a nurse's priority.	1 (0.5%)	13 (7%)	7 (3.7%)	83 (44.4%)	83 (44.4%)
7 - It is a physician's duty to prevent MDRPUs.	9 (4.8%)	17 (9.1%)	48 (25.7%)	81 (43.3%)	32 (17.1%)
<b>Medical device-related pressure ulcer care</b>					
11 - There is no need for recording and reporting the MDRPUs in the patient's medical record.	0	7 (3.7%)	15 (8%)	103 (55.1%)	62 (33.2%)
10 - MDRPUs do not need any treatment and heal on their own.	0	6 (3.2%)	25 (13.4%)	123 (65.8%)	33 (17.6%)
4 - Nurses do not play an important role in the care of MDRPUs.	3 (1.6%)	5 (2.7%)	8 (4.3%)	88 (47.1%)	83 (44.4%)
8 - MDRPUs never deepen.	3 (1.6%)	6 (3.2%)	31 (16.6%)	103 (55.1%)	44 (23.5%)
9 - MDRPUs occur only in patients admitted to special wards, such as intensive care unit (ICU).	3 (1.6%)	19 (10.2%)	21 (11.2%)	111 (59.4%)	33 (17.6%)

**Table 2** Relationship Between Mean Score of Students' Attitude Toward Medical Device-Related Pressure Ulcer and Their Demographic Variables

Demographic Variables		MDRPU Prevention	P value	MDRPU Care	P value	Total Attitude	P value
Age		rr = -.045, P = 0.542		rr = -.040, P = 0.582		rr = -.050, P = 0.497	
Sex	Male	21.81	0.806	20.12	0.612	41.94	0.706
	Female	21.94		20.30		42.24	
Semester	Five	21.26	0.056	20.09	0.067	43.72	0.09
	Six	23.04		19.28		40.54	
	Seven	21.32		21.20		44.25	
	Eight	21.86		20.15		41.47	
Trained on MDRPU	Yes	22.12	0.296	20.52	0.102	42.64	0.131
	No	21.56		19.88		41.45	

present study showed that nursing students, despite not receiving sufficient education, have a positive attitude toward the prevention and care of medical device-related pressure ulcers.

To our knowledge, no study has examined nursing students' attitudes toward a medical device-related pressure ulcer. This is the first study that examined the nursing students' attitudes toward medical device-related pressure ulcers. In the present study, the positive attitude of nursing students toward medical device-related pressure ulcers is very valuable. This can positively affect their practice. According to Ajzen's theory of planned behavior, a person's performance in a subject is influenced by three

factors, one of which is attitude. This theory states that one of the prerequisites for correct behavior and performance is to have a positive attitude in that field.<sup>20</sup> By applying the concepts of this theory to the performance of nursing students about medical device-related pressure ulcers, it can be concluded that the nursing students' attitudes toward medical device-related pressure ulcers can affect their behavior in this regard. Given the positive attitude of nursing students towards medical device-related pressure ulcers, it seems that their proper training during their studies can lead to a very good performance in this field.

The study participants obtained a high score on both dimensions of medical device-related pressure ulcers.

However, some issues need to be addressed and students' attitudes need to be corrected in those areas. Students believed that medical device-related pressure ulcers were more likely to occur in intensive care units. However, previous studies showed that patients in other wards of the hospital are also at risk for such ulcers.<sup>2</sup> Students also believed that a medical device-related pressure ulcer is not preventable in many cases. Although the use of medical devices is necessary in many cases, it cannot be said that the prevention of such wounds is not preventable in many cases. In this regard, we can apply the recommendations of the National Pressure Injury Advisory Panel to prevent medical device-related pressure ulcer such as not using devices on edematous and damaged skin, choosing the right size of the device, using prophylactic dressing under the devices, assessing the skin under the used device, moving the device over specific periods if possible, such as moving the pulse oximeter probe, and training health care team members about medical device-related pressure ulcers.<sup>1</sup>

Another finding of the present study was that more than half of the study participants said that they received no training on medical device-related pressure ulcers. At the same time, more than 80% of the students who received the training stated that the training they received was not enough. In a study conducted in 2018, we examined nursing students' knowledge and attitude toward conventional pressure ulcers in Qazvin, Iran<sup>21</sup> and 32% of participants said that they did not receive the necessary training on conventional pressure ulcers, which is less than the amount obtained in the present study. The findings of the present study and the previous study showed that in Iran, less attention has been paid to the training on medical device-related pressure ulcers for nursing students. To our knowledge, the first research study conducted on the medical device-related pressure ulcer in Iran was published in 2019.<sup>2</sup> It seems that training on medical device-related pressure ulcers, in particular, should be considered by nursing educators and planners in Iran.

## Conclusion

Nursing students exhibited a positive attitude toward the prevention and care of medical device-related pressure ulcers; it seems that if they receive enough training in this regard, an important step can be taken to reduce medical device-related pressure ulcers. Given the lack of studies, it is therefore recommended that similar studies can be performed on nursing students. Also, it is necessary

to study the knowledge and performance of nursing students about medical device-related pressure ulcers.

## Limitation

In the present study, the data were collected at the time of the outbreak of coronavirus in Iran. The questionnaires were distributed online and it was not possible to obtain written informed consent from the study participants. We selected nursing students from semester 5 and higher, so generalization of results to students in lower semesters is not possible.

## Data Sharing Statement

Data are available if requested to 1 year after article is published.

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## Disclosure

The authors report no conflicts of interest for this work.

## References

1. National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide*. Emily Haesler (Ed). Osborne Park, Western Australia: Cambridge Media; 2014.
2. Rashvand F, Shamekhi L, Rafiei H, Nosratabghaei M. Incidence and risk factors for medical device-related pressure ulcers: the first report in this regard in Iran. *Int Wound J*. 2020;17(2):436–442. doi:10.1111/iwj.13290
3. Erbay Ö, Ceylan I, Girgin NK. A neglected area: medical device related pressure injuries. *Turk Klinikleri J Anest Reanim*. 2019;17(3):96–102. doi:10.5336/anesthe.2019-71429
4. Black J, Kalowes P. Medical device-related pressure ulcers. *Chronic Wound Care Manage Res*. 2016;3:91–99. doi:10.2147/CWCMR.S82370
5. Rafiei H. Stage II pressure ulcer caused by the connection of an electrocardiogram's nonstandard probe on the patient's chest: a case report study. *Int J Epidemiol Health Sci*. 2020.
6. Gilston A. Bedsore of the ear. *Lancet*. 1972;16(2):1313. doi:10.1016/S0140-6736(72)92688-8
7. Hsu MY, Lin JP, Lyu JY. Medical device related pressure injury prevention strategies. *Hu Li Za Zhi*. 2019;66(3):106–111. doi:10.6224/JN.201906\_66(3).13
8. Jackson D, Sarki AM, Betteridge R, Brooke J. Medical device-related pressure ulcers: a systematic review and meta-analysis. *Int J Nurs Stud*. 2019;92:109–120. doi:10.1016/j.ijnurstu.2019.02.006
9. Tafti AA, Sajadi S, Rafiei H. Pressure ulcer stage IV caused by cervical collar in patients with multiple trauma in intensive care unit. *Int Wound J*. 2015;12(5):606–607. doi:10.1111/iwj.12158
10. Tafti AA, Sajadi S, Rafiei H. Scrotum wound caused by orthopaedic traction table in the surgery of femoral neck fracture. *Int Wound J*. 2014;11(5):571. doi:10.1111/iwj.12076

11. Tafti AA, Rafiei H. Pressure ulcer on toe because of attaching patient's toe to bolt of ICU bed. *Int Wound J.* 2014;11(3):339–340. doi:10.1111/iwj.12037
12. Iranmanesh S, Rafiei H, Esmaili Abdar M. A case of pressure ulcer development on a patient's ear as a result of pulse oximetry probe. *Int Wound J.* 2012;9(6):701–702. doi:10.1111/j.1742-481X.2011.00906.x
13. Tafti AA, Sajadi SS, Rafiei H. A deep wound in left leg as a result of skin traction in 81-old-year woman with hip fracture in orthopaedic ward. *Int Wound J.* 2013;10(4):484. doi:10.1111/j.1742-481X.2012.00952.x
14. Kim JY, Lee YJ; Korean Association of Wound Ostomy Continence Nurses. Medical device-related pressure ulcer (MDRPU) in acute care hospitals and its perceived importance and prevention performance by clinical nurses. *Int Wound J.* 2019;16(Suppl 1):51–61.
15. Usher K, Woods C, Brown J, et al. Australian nursing students' knowledge and attitudes towards pressure injury prevention: a cross-sectional study. *Inter J Nurs Stud.* 2018;81:14–20. doi:10.1016/j.ijnurstu.2018.01.015
16. Ünvera S, Arsalan U, Demirci S, Cebeci H. Status of nursing students about identifying pressure injury risk factors. *Turk Klinikleri J Nurs Sci.* 2020;12(1):10–18. doi:10.5336/nurses.2019-70214
17. Xiong S, Sang M, Huang YQ, Wang HP, Jin CD. The competence of nursing students to prevent pressure injury - a scoping review. *TMR Integr Nurs.* 2020;4(2):38–44.
18. Rafiei H, Mehralian H, Abdar ME, et al. Pressure ulcers: how much do nursing students really know? *Br J Nurs.* 2015;24(Suppl 6):S12–S17. doi:10.12968/bjon.2015.24.Sup6.S12
19. Simonetti V, Comparcini D, Flacco ME, Di Giovanni P, Cicolini G. Nursing students' knowledge and attitude on pressure ulcer prevention evidence-based guidelines: a multicenter cross-sectional study. *Nurse Educ Today.* 2015;35(4):573–579. doi:10.1016/j.nedt.2014.12.020
20. Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process.* 1991;50(2):179–211. doi:10.1016/0749-5978(91)90020-T
21. Rafiei H, Mostafaie MR, Senmar M, et al. Assessment of student nurses' knowledge of pressure ulcers and their associated factors. *Wounds Middle East.* 2019;6(1):24–27.

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