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Evaluation of the Knowledge of Nursing Students on Medical Device-Related Pressure Injury: A Descriptive Study

Hemşirelik Öğrencilerinin Tıbbi Araçlara Bağlı Basınç Yaralanmasına Yönelik Bilgilerinin Değerlendirilmesi: Tanımlayıcı Araştırma

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ABSTRACT Objective: To evaluate the knowledge of nursing students on medical device-related pressure ulcer injury (MDRPI). **Material and Methods:** The population of the descriptive study consisted of third and fourth year nursing students in Türkiye. The study was finalized with 380 students who met the inclusion criteria. A specifications form, the MDRPI Information Form, was utilized for the collection of necessary data. Data were obtained online between July-October 2022. Number, mean, and percentile distributions were used to evaluate the data. **Results:** It was observed that most of the students (80.8%) responded correctly to the question about the definition of MDRPIs, but most of them (57.1%) responded incorrectly to the question about differentiating MDRPI from classical pressure ulcers. It was detected that the students mostly answered the questions about the risk factors of MDRPI and the prevention of MDRPI wrongly, or had no idea. Most of the students answered the questions about the nursing care of MDRPI correctly (91.6% and 79.5%, respectively). The correct response score of the students to the MDRPI information form was 1571 (minimum: 0, maximum: 3800). **Conclusion:** It was observed that the students had some knowledge about MDRPI, but they had difficulty in differentiating MDRPI from classical pressure ulcers, and they lacked knowledge about the risk factors of MDRPI and nursing interventions for prevention. Educational programs should be organized in such a way so as to improve the knowledge level of students on the subject.

Keywords: Nursing students; pressure ulcer; knowledge

ÖZET Amaç: Bu araştırma, hemşirelik öğrencilerinin tıbbi araç ilişkili basınç yaralanmasına [medical device-related pressure ulcer injury (MDRPI)] yönelik bilgilerinin değerlendirilmesi amacıyla yürütüldü. **Gereç ve Yöntemler:** Tanımlayıcı türde yürütülen araştırmanın evreni Türkiye'de hemşirelik bölümünde eğitim gören 3. ve 4. sınıf öğrencileri oluşturdu. Araştırma, dâhil edilme kriterlerini sağlayan 380 öğrenci ile tamamlandı. Veri toplamada Tanımlayıcı Formu ve Tıbbi Araç İlişkili Basınç Ülseri Bilgi Formu kullanıldı. Araştırmada veriler, Temmuz-Ekim 2022 tarihlerinde çevrim içi toplandı. Veriler sayı, ortalama ve yüzde olarak verildi. **Bulgular:** Öğrencilerin, MDRPI'ların tanımına yönelik soruya çoğunun (%80,8) doğru yanıt verdiği ancak MDRPI ile klasik basınç ülserini ayırmaya yönelik soruya çoğunun (%57,1) yanlış cevap verdiği görüldü. Öğrencilerin MDRPI'nın risk faktörleri ve MDRPI'yı önlemeye yönelik sorulara çoğunlukla yanlış veya fikrim yok şeklinde yanıt verdikleri saptandı. Öğrencilerin MDRPI'nın hemşirelik bakımına ilişkin sorulara çoğunun doğru yanıt verdiği görüldü (sırasıyla %91,6 ve %79,5). Öğrencilerin MDRPI bilgi formuna verdikleri doğru yanıt puanı 1571 idi (minimum: 0, maksimum: 3800). **Sonuç:** Öğrencilerin MDRPI'nın ne olduğunu bildikleri ancak MDRPI ile klasik basınç ülserini ayırt etmekte zorlandıkları, MDRPI'nın risk faktörleri ve önlemeye yönelik hemşirelik girişimlerinde bilgi eksikliklerinin olduğu görüldü. Öğrencilerin klasik basınç ülseri ile MDRPI'ları ayırt edebilmeleri, risk faktörlerini saptayabilmeleri ve önleyebilmeleri için eğitim programlarının öğrencilerin konuya yönelik bilgi düzeylerini artıracak şekilde düzenlenmesi gerekmektedir.

Anahtar Kelimeler: Hemşirelik öğrencisi; basınç yaralanması; bilgi

Pressure injury is defined as "an injury localized to the skin and/or underlying soft tissue, usually over a bony prominence or associated with medical devices".[1] The National Pressure Ulcer Advisory Panel states that pressure injury can occur in any tissue under pressure and can also develop under medical devices. These instruments used for diagnostic and therapeutic purposes pressurize the skin or subcutaneous tissues and thus lead to medical device-related pressure ulcers.[2] Medical device-related pressure

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ulcer injury (MDRPI) differs from conventional pressure ulcers in a number of respects.[3,4] One of these differences is the localization of the injury. Classical pressure ulcers occur in the occipital area, trochanters, costae, fingers, ilium cristae, coccyx, ischium, patellas, medial ankle, medial knee, toes, and elbows, but are more common in the sacrum and heels.[5] MDRPI can occur in any tissue or mucous membrane depending on the medical device.[6] The other difference is related to patient position. While classical pressure ulcers are frequently observed in the supine and sitting position, the location of MDRPI varies and can occur in more than 40 sites depending on the weight, fixation and shape of the medical device.[7]

MDRPI is one of the quality indicators and the prevalence varies in both national and international literature. In international literature, it is reported to occur in between 3% and 50% of patients; in national literature, it is reported to occur in 40% of patients.[8-10] MDRPIs directly affect the quality of life and treatment process of patients and also increase the cost of care. It is reported that treatment for pressure injuries can cost up to 470 euros per patient per day.[4] In Türkiye, this cost is reported to be approximately 1,425,000,000 dollars.[11] The occurrence of pressure injuries, as well as being costly, indicates that nursing care may be inadequate and protective measures are not being carried out sufficiently.[12,13] Therefore, nurses have a significant role in the prevention of pressure injuries.[13] In order to prevent MDRPIs, nurses and therefore, nursing students, should have sufficient knowledge on the subject. When the literature is examined, it is found that the knowledge levels of nursing students about classical pressure ulcers have been assessed, but their knowledge status about MDRPIs has not.[14-17] Therefore, it is believed that determining the knowledge of students on the subject will provide an important contribution to the literature. Therefore, this study was conducted to evaluate the knowledge of nursing students about MDRPIs. The Research question is as follows;

What's is the nursing students' knowledge level regarding the definition, risk factors, prevention and nursing care of MDRPIs?

MATERIAL AND METHODS

STUDY DESIGN

The research is descriptive.

POPULATION AND SAMPLING

The population of the research consisted of students studying in the department of nursing in Türkiye. The sample comprised nursing students who met the inclusion criteria and who completed the data collection forms. The inclusion criteria were volunteering to participate in the study and being in the third and fourth grades. Although students receive theoretical knowledge about wound care in their first year, only 3rd and 4th year nursing students were included in the study because they had little clinical experience According to the data of the Council of Higher Education, there are 35,000 nursing students in the third and fourth grades.[18] In the sample calculation conducted through the OpenEpi program, it was determined that the number of participants should be at least 380 with a 50% incidence rate and a 95% confidence interval, and the study was therefore finalized with 380 nursing students.

INSTRUMENT

The data in the study consisted of a demographic information form and a MDRPI information form.

The demographic information form included a total of six questions about the age, gender, grade, theoretical and practical training experiences of the students regarding medical device-related pressure ulcer injuries.

The Medical Device-Related Pressure Ulcer Injury Information Form was developed by the researcher after reviewing the necessary literature and guidelines.[7-9,19,20] The form included a total of 10 multiple-choice questions including diagnosis (2), prevention (2), risk factors (2), evaluation (2) and care (2) of MDRPIs. Prior to the initiation of the study, the MDRPI Information Form was submitted to 10 educators, who are specialized in the field, to provide expert opinion. A 4-point Likert type scale was sent to experts to evaluate the questions. For content validity, Content Validity Ratio (CVR) and Content Va-

lidity Index (CVI) were calculated. For each question in the information form, the CVR values were found to be between 0.66 and 1.00. The total CVI value of the information form was determined as 0.81. The interview form was organized in line with the recommendations of the experts. Students received one point for each correct answer and zero points for each incorrect or unanswered response to the questions on the form. The score obtained by the students from the form constituted the Medical Device-Related Pressure Ulcer Injury Knowledge score (minimum: 0 maximum: 3800).

DATA COLLECTION

In the study, data were obtained online between July-October 2022 by the snowball sampling method, which is one of the purposive sampling methods. The advantage of this chain-referral method is that it enables reaching a wider participation in a more cost-effective and simpler way. Data collection forms were first forwarded to the nursing students in the faculty who agreed to participate in the study and were asked to forward these data collection forms to other nursing students. Data collection was terminated when the desired sample size was achieved.

DATA ANALYSIS

The IBM SPSS 20.0 (IBM Corporation, Armonk, NY, USA) program was utilized to evaluate the data. The relationship between the demographic data of nursing students and their mean knowledge scores was analyzed with parametric or nonparametric tests in accordance with the distribution of the data.

ETHICAL CONSIDERATIONS

Permission was obtained from Yalova University Human Research Ethics Committee (date: June 29, 2022, no: 2022/92) prior to study. After the participants clicked on the link of the online data collection form, they were directed to a section providing brief information about the research and confirming their voluntary participation, and after confirming this section, they answered the forms in Turkish. The confidentiality of the answers of the nursing students participating in the study was ensured, and they were only viewed through Google Forms (Google, USA) via e-mail defined in the name of the researcher. The research was conducted in accordance with the principles of the Declaration of Helsinki.

RESULTS

Descriptive characteristics of the participants are presented in Table 1. Accordingly, the mean age of the students was 20.72±1.33 years (minimum: 18, maximum: 32) and most of them (73.9%) were female. It was observed that most of the nursing students (70%) provided care to patients with pressure injury during clinical practice.

Table 2 demonstrates the responses of nursing students to the questions in the medical device-related pressure ulcer information form. Accordingly, it was observed that most of the students (80.8%) answered the question about the definition of MDRPI correctly, but most of them (57.1%) considered the coccyx wound arising from the lying position as a medical device-related pressure ulcer. It was detected that most of the students gave (3-4) either no opinion or incorrect answers to the questions about MDRPI risk factors. While most of the students responded correctly to the question about the prevention of MDRPIs (5), most of them had no idea to the question

TABLE 1: Certain descriptive characteristics of nursing students.

Variables	n	%
Gender		
Female	281	73.9
Male	99	26.1
Years of study		
3	239	62.9
4	141	37.1
The status of being informed about pressure injury by the educator or nurse in clinical practice		
Yes	225	59.2
No	155	40.8
The status of providing care to the patient with pressure injury in clinical practice		
Yes	266	70.0
No	114	30.0
The presence of elective courses on wound/wound care at school you attend		
Presence	169	44.5
Absence	211	55.5
Admission to elective courses on wound/wound care		
Yes	123	32.4
No	257	67.6

TABLE 2: The responses of nursing students to the questions in the Medical Device Related Pressure Ulcer Injury Information Form.

Questions	n	%
1. Which of the following is the definition of the medical device-related pressure ulcer injury?		
Localized skin and/or subcutaneous tissue damage caused by pressure from instruments such as nasal cannulas, oxygen masks, tubes or restraints, which takes the shape of the instrument involved[a]	307	80.8
Localized skin and/or subcutaneous tissue damage, usually on bony prominences, caused by either pressure alone or in combination with pressure or laceration.	52	13.7
Skin damage caused by pressure on any part of the body.	13	3.4
No opinion	8	2.1
2. Which of the following statements about medical device related pressure ulcer injury is incorrect?		
The ulcer formed by peripheral oxygen saturation probe on patient finger is associated with medical instrument[a]	23	6.1
The ulcer formed by the patient's lying position in the coccyx region is associated with the medical instrument.	217	57.1
The ulcer formed on the patient's arm by the liquid sets is associated with the medical device.a	63	16.6
No opinion	77	20.2
3…....., …… and ……. are among the risk factors for the development of medical device-related pressure ulcer injury. Which three of the following should fill in the blanks above?		
Age- Skin condition - Sheer force of the medical device[a]	37	9.7
Lack of access to appropriate equipment - Gender - Race	24	6.3
Knowledge level of workers - serum K+ level - Nutrition	21	5.5
No opinion	298	78.4
4. Which of the following statements regarding medical device-related pressure ulcer injury is incorrect?		
The hard structure of medical instruments increases the coefficient of friction, leading to pressure ulcers.	11	2.89
Lack of regular positioning of the medical vehicle increases the risk of pressure ulcers.	35	9.22
Moist/wet skin does not affect the risk of medical device-related pressure ulcer injury[a]	186	48.95
No opinion	148	38.94
5. Which of the following statements regarding the prevention of medical device-related pressure ulcer injury is true?		
Any possible pressure sources related to the device must be eliminated promptly from a medical point of view.	5	1.3
The patient or device must be repositioned to redistribute the pressure and reduce the sheer force.	2	0.5
All above[a]	219	57.7
No idea	154	40.5
6. Which of the following statements is incorrect?		
All patients with medical devices should be recognized as at risk for medical device-related pressure ulcer injury.	26	6.8
The skin around and under any medical device should be assessed at least twice a day[a]	18	4.7
The skin around and under any medical device should be assessed every three days.	9	2.4
No idea	327	86.1
7. Which of the following statements is true?		
Tıbbi araç ilişkili basınç ülserlerinin değerlendirilmesinde klasik basınç ülseri evrelendirme sistemi kullanılmaz.	77	20.2
Tıbbi araç ilişkili mukozal basınç ülserlerinin değerlendirilmesinde evrelendirme yapılmaz[a]	15	4.0
All above	0	0
No idea	288	75.8
8. Nurse A.B. notices a wound on the oral mucosa of a patient, arising from the endotracheal tube. The wound is dark red in color. How can the nurse A.B. evaluate the wound in the patient's mouth?		
The wound on the oral mucosa of the patient is a Stage I pressure ulcer[a]	29	7.6
The wound in the mouth of the patient is staged as suspected deep tissue damage.	49	12.9
Staging is not possible.	76	20
No opinion	226	59.5
9. Which of the following statements about the care of a patient with a medical device-related pressure ulcer injury is correct?		
I. In continuous monitoring, the blood pressure cuff should be removed after measurement.		
II. Products compatible with body PH should be utilized in the care of the patient.		
III. In continuous monitoring, the fingers on which the peripheral oxygen saturation probe is attached should be rotated.		
IV. Medical equipment should not be left in the patient's bed.		
I-II.	5	1.3
III-IV	11	2.9
All above[a]	348	91.6
No opinion	16	4.2
10. Which of the following statement(s) are included in the care of a patient with a medical device-related pressure ulcer injury?		
The skin and mucous membrane under and around the medical device should be evaluated.	0	0
The medical device should be properly positioned to avoid pressure on the patient's skin.	0	0
All above[a]	302	79.5
No opinion	78	20.5

[a]Correct answers of the questions.

TABLE 3: Scores of medical instrument-related pressure ulcer injury information form of the students.

Points	Score	Minimum-Maximum
Total points for correct answers	1571	0-3800
Total points for incorrect answers	609	0-3800
Total points for absence answers	1620	0-3800

about evaluating the patient in terms of MDRPI (6). It was observed that most of the students did not have any opinion on the questions asked about the staging of MDRPIs (7-8), while most of them answered correctly to the two questions asked about the care of the patient with MDRPIs (9-10).

It was observed that the correct response score of the students to the MDRPI information form was 1571 (minimum: 0, maximum: 3800) (Table 3).

DISCUSSION

Medical device-related pressure injuries have negative effects on patients, their relatives and the healthcare system. Therefore, healthcare professionals are expected to have adequate knowledge and skills to prevent and care for MDRPI. It is also necessary to determine and increase the awareness and knowledge of students who will be the nurses of the future. When the literature was examined, it was observed that there were studies in which the knowledge levels of nursing students were determined mostly for pressure injury, while studies on MDRPI were limited.[21-23] In this study, in which the knowledge of nursing students about MDRPIs was evaluated, it was observed that most of them were informed about pressure injury by their educators or clinical nurses in clinical practice and most of them provided care to patients with pressure injury. It is believed that educators or nurses informing students in clinical practice and students having experience in caring for patients with pressure injuries will increase their awareness of MDRPIs. In the studies conducted, it is stated that the experience of caring for patients with pressure ulcers increases the level of knowledge and skills related to the subject.[22-24]

When the answers of the students to the questions in the MDRPI information form were examined, it was realized that while most of them answered the question about the definition of MDRPI correctly, most of them defined the pressure ulcer caused by the lying position as MDRPI. This result indicates that students have knowledge about the subject, but this knowledge may be insufficient and that students have problems in distinguishing MDRPI from classical pressure ulcers. Theoretical and practical knowledge about MDRPI is provided in main courses and elective courses on wound care during undergraduate education. However, in the study, most of the students stated that they did not have elective courses on wound care in their schools and that they did not participate in this elective course. It is believed that this situation may cause students to be unable to distinguish between MDRPI and classical pressure ulcers. When the literature was examined, it was observed that there was only one study on MDRPI with nursing students (that is about attitude, not knowledge), and the sample group of the studies conducted on MDRPI generally consisted of nurses.[23,25-27] In the only study conducted with students, it was reported that 41.7% of nursing students did not take courses on MDRPI during their education and almost all of them needed a training workshop on the subject.[23]

Nurses have a key role in the prevention of MDRPIs because the quality of care increases with the prevention of pressure ulcers.[25,28] Therefore, the knowledge of nursing students about the risk factors of pressure ulcers should be improved. In the study, it was observed that most of the students gave no idea or incorrect answers to the questions about the risk factors of MDRPI. This result may be related to the fact that MDRPI is not sufficiently included in theoretical education. It was observed that there were no studies conducted with nursing students on the subject in the literature, and the studies conducted with nursing students focused on classic pressure ulcers. In these studies, it was reported that the knowledge of students about the risk factors of classical pressure ulcer was insufficient, and in studies conducted with nurses, it was reported that the knowledge of nurses about the prevention of MDRPI was insufficient.[26,29-31] Inadequate knowledge levels of both nursing students and nurses make it essential to review the theoretical education.

The primary goal of care at MDRPI is to prevent ulcers from developing. Therefore, the skin around and under any medical device should be assessed at least twice a day. If a pressure ulcer develops, care for the patient should be sustained.[19,32] In the study, it was observed that most of the students answered one of the questions about the prevention of MDRPI as true and the other as no idea. Looking at the question for which students mostly stated no idea, it was observed that it was about the evaluation of the skin around the medical device. The incorrect answers given by the students to the questions on diagnosing MDRPI and risk factors make it predictable that they responded as no idea to this question. In the study conducted by Gürlek Kısacık and Sönmez it is determined that the nursing students obtained the lowest scores in the themes of "preventive measures to reduce the amount of pressure/shear" (36.8%). This result can be explained by the large number of questions used in the research.[21]

MDRPI is staged like classic pressure ulcers, but staging is not utilized in mucosal pressure injuries since mucosal tissue is histologically distinct from skin tissue.[19] In the study, it was observed that nursing students mostly responded as "no idea" to two questions about staging. In the study conducted by Erbay Dalli and Kelebek Girgin, 99.1% of the nurses responded correctly to the question about the staging of medical device-related pressure ulcers; in the study conducted by Sönmez and Bahar, 41.6% of the nurses responded correctly.[22,29] The variability in the knowledge of nurses regarding staging in the study results demonstrates that the content of training programs and in-house training plans should be reviewed. Since most of the students in the study reported that they were informed about pressure injuries by educators or nurses in clinical practice, it is thought that nurses with adequate knowledge on the subject will provide more comprehensive and accurate guidance to students in clinical practice. As a matter of fact, students reported that they were informed about pressure ulcers by nurses in clinical practice. Students can participate in patient care or observe patient care with educators or nurses in clinical practice. Therefore, in the study, students mostly gave correct answers to the questions about the care of MDRPIs.

In the study, it was observed that the students mostly answered the questions in the MDRPI information form as "no idea" and their correct answer scores were below the average. This result reveals that the knowledge of the students about MDRPI is inadequate. In the study conducted by Gürlek Kısacık and Sönmez, the mean knowledge score of the nursing students was determined as 38.2% (9.95/26).[21] In the study conducted by Behnammoghadam et al. it was stated that although the students indicated that they did not receive adequate training on MDRPI, their attitudes towards the prevention and care of MDRPI were positive.[23] Although the study emphasized that positive attitude towards MDRPI would affect behavior, it was recommended that studies should be conducted to determine the MDRPI knowledge levels of students. Indeed, adequate knowledge and positive attitude will improve care behaviors. Since this is the first study in the literature in which students' knowledge of MDRPI was assessed, it is thought that the findings of the study can be used both in the organization of educational programs and as a guide for new research.

LIMITATIONS

The research has some limitations. One of them is that the knowledge of the students was measured with only 10 questions. Also, online application of data collection forms limits the reliability of the data.

CONCLUSION

In this study, in which the knowledge of students regarding MDRPIs was evaluated, it was found that students lacked knowledge in questions about the risk factors of MDRPI and interventions to prevent MDRPIs. Although the students responded mostly correctly to the questions about nursing care for MDRPIs, it was observed that they could not distinguish between classic pressure ulcers and MDRPIs. Accordingly, it is recommended that care management of MDRPIs should be included more in training programs to increase awareness. In addition, it is recommended that institutional training programs should be established so that nurses, who are role models in practical education, can raise awareness in students. Since there is only one study on the subject in the lit-

erature, more comprehensive studies should be conducted.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

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