

*Review Article***A systematic review of nursing students' knowledge and related factors towards pressure ulcer prevention****Zahra Ghobadi-Larimi**<sup>a</sup>  | **Poorya Takasi**<sup>b, c</sup>  | **Seyed Javad Hosseini**<sup>d\*</sup>  | **Mahbobeh Firooz**<sup>d\*</sup> 

a. Nasibeh School of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran

b. Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran

c. Burn and Regenerative Medicine Research Center, Guilan University of Medical Sciences, Rasht, Iran

d. Department of Nursing, Esfarayen Faculty of Medical Sciences, Esfarayen, Iran

**\*Corresponding author(s):** Seyed Javad Hosseini (MSN) & Mahbobeh Firooz (MSN), Department of Nursing, Esfarayen Faculty of Medical Sciences, Esfarayen, Iran.Email: [s.j.hosseini2016@gmail.com](mailto:s.j.hosseini2016@gmail.com)Email: [mahbobehfirooz@gmail.com](mailto:mahbobehfirooz@gmail.com)<https://doi.org/10.32598/JNRC.P.23.24>This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial 4.0 License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0).

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**Abstract**

The present systematic review was conducted to investigate the nursing students' knowledge and related factors towards pressure ulcer (PU) prevention. A comprehensive, systematic search was performed in different international electronic databases, such as Scopus, PubMed, Web of Science, and Persian electronic databases such as Iranmedex, and Scientific Information Database using keywords extracted from Medical Subject Headings such as "Knowledge", "Pressure ulcer", and "Nursing student" from the earliest to the February 1, 2023. The quality assessment of the present studies in this systematic review was based on the appraisal tool for cross-sectional studies (AXIS tool). In general, a total of 7,375 nursing students participated in 14 studies. The average knowledge score of nursing students about the prevention of PUs was 47.60 out of 100. There was a significant positive relationship between knowledge and the factors such as attitude, age, the number of clinical units, and self-assessment of knowledge. There was also a significant relationship between the knowledge of nursing students and factors such as years of education, the number of clinical units, clinical experience, age, experience in caring for PUs, sex, specialization, level of education, attitude. Overall, the level of knowledge of nursing students about the prevention of PUs was at a moderate level. Therefore, healthcare managers and policymakers might improve nursing students' knowledge by introducing training programs on the prevention of PUs into nursing students' curricula.

**Keywords:** Pressure Ulcer, Pressure Sore, Nursing Students, Knowledge, Systematic Review.**1 | Introduction**

According to the definition of a pressure ulcer (PU), it is when pressure alone or in conjunction with shear causes localized injury to the skin and/or underlying tissue [1-9]. Age, immobility, incontinence, poor nutrition, dehydration, neurosensory impairment, device-related skin pressure, various comorbidities, and circulatory irregularities are some factors that increase the risk of PUs [10-12]. Adult PU incidence ranges from 0 to 12% in acute care settings, 24.3 to 53.4% in critical care settings, and 19 to 59% in geriatric care settings [13]. PUs raises the expense of hospital care, contribute to patient-acquired infections, and raise morbidity and death rates [14]. As a result, effective prevention is crucial

to the treatment of PUs since it may be prevented with adequate prevention [15, 16].

A multidisciplinary team approach is required for the prevention and management of PUs. So far at medical facilities, it is nurses who are most in charge of preventing and treating PUs [17, 18]. It is very crucial to have enough knowledge of PU prevention. Nursing students frequently lack the expertise necessary to use the most recent PU guidelines once they begin their clinical rotations [15, 19, 20]. As a result, the findings of the Moroccan study indicated that nursing students have limited knowledge about PU prevention [21]. But so far, a different study conducted

in Portugal revealed that nursing students have a good level of knowledge on the prevention of PUs [22].

No integrated systematic review has, as far as we are aware, looked into nursing students' knowledge of PU prevention. This systematic review was conducted to determine the level of nursing students' knowledge regarding the prevention of PUs and its associated factors, taking into account the significance of nursing students' participation in clinical work as well as the significance of knowing the methods of care and prevention of PUs.

## 2 | Methods

### 2.1 | Study registration and reporting

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria were used to perform this systematic review [23]. It should be noted that the international prospective register of systematic reviews (PROSPERO) database does not yet list this study.

### 2.2 | Search strategy

A comprehensive, systematic search was performed in different international electronic databases, such as Scopus, PubMed, Web of Science, and Persian electronic databases such as Iranmedex, and Scientific Information Database using keywords extracted from Medical Subject Headings such as "Knowledge", "Pressure ulcer", and "Nursing student" from the earliest to the February 1, 2023. For example, the search strategy was in PubMed/MEDLINE database including (("Knowledge") OR ("Awareness")) AND (("Pressure ulcer") OR ("Pressure injury")) AND (("Pressure ulcer prevention") OR ("Pressure ulcer injury")) AND ("Nursing students"). The terms provided above were searched for in Iranian electronic databases using their Persian equivalents. Separately, two researchers took part in the systematic review's search phase. No articles from the "gray literature," including committee and research reports, expert opinions, conference presentations, and ongoing research, that have not been peer-reviewed by a for-profit publisher were included in this study because the findings could be completely altered given that they are unpublished [24].

### 2.3 | Inclusion and exclusion criteria

All of the scholarly tasks cited in this systematic review were pertinent to nursing students' understanding of PUs prevention and the factors connected to it. Case reports, letters to the editor, conference proceedings, studies with an experimental, qualitative design, and review papers were all disqualified.

### 2.4 | Study selection

In this study, the data management program of choice was End-Note X8. Two researchers independently evaluated the title, abstract, full text, and removal of duplicate articles as part of the evaluation of publications based on inclusion and exclusion criteria. Where the judgments of the researchers conflicted, the third evaluator's review was taken into account. To prevent data loss, a manual review of study references was completed.

### 2.5 | Data extraction and quality assessment

The information extracted from the included studies consists of the first author's name, publication year, implementation location, sample size, age, male/female ratio, level of education, academic year, clinical experience, number of clinical units, units' type, experience in caring for PUs patients, questionnaire, and key results. The quality assessment of the present studies in this systematic review was based on the appraisal tool for cross-sectional studies (AXIS tool). This tool evaluates the quality of studies using 20 items that are scored with a two-point Likert scale including Yes (score of 1) and No (score of 2). The AXIS tool is divided into 3 subscales: quality of reporting (7 items), quality of study design (7 items), and potential biases of introduction (6 items). This tool rates the quality of studies on three levels: high (70-100%), fair (60-69.9%), and low (0-59.9%) [25].

## 3 | Results

### 3.1 | Study selection

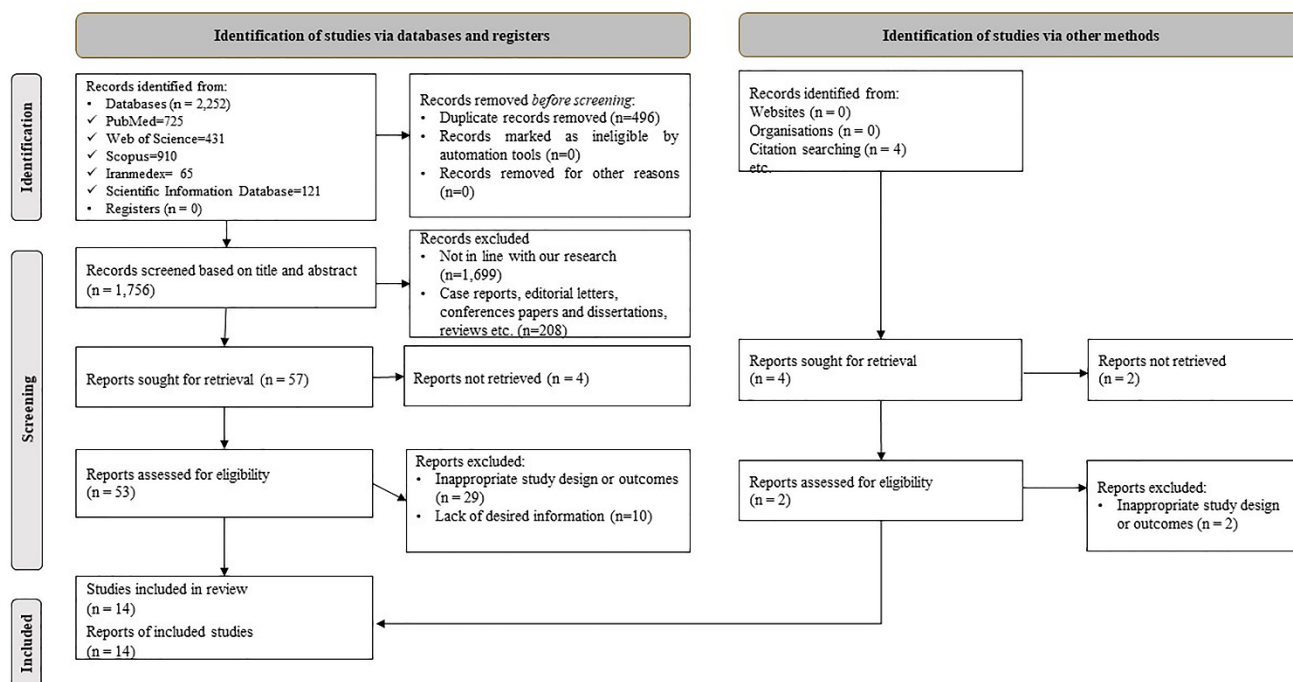
As shown in Figure 1, following a thorough search of electronic databases, a total of 2,252 articles were found. Due to duplicate information, 496 papers were left out of this review. The remaining 1,756 cases were excluded because 208 did not have a cross-sectional design and 1,699 did not follow the objectives of the study. The ensuing analysis of the full texts of the publications resulted in the omission of twenty-nine research due to improper methodology and ten studies due to incomplete data from this systematic review. Ultimately, the current research was performed with the inclusion of fourteen articles [18-22, 26-34].

### 3.2 | Study characteristics

A total of 7,375 nursing students participated in 14 studies [18-22, 26-34]. The average age of the participants was 21.84 (SD=2.35) and 77.90% of them were female. Among them, 97.42% were undergraduate nursing students. The studies included in this systematic review were conducted in Turkey (n=4) [18, 19, 30, 33], Australia (n=2) [20, 31], UAE (n=1) [28], Italy (n=1) [32], Malaysia (n=1) [29], Poland (n=1) [34], Saudi Arabia

(n=1) [26], Portugal (n=1) [22], Croatia (n=1) [27], and Morocco (n=1) [21]. In the studies included in this systematic review, the PU knowledge assessment tool (PUKAT) (n=10) [20, 21, 26-33], a researcher-made questionnaire (n=2) [22, 34], PU

knowledge assessment instrument (PUPKAI) (n=1) [19], and Pieper ulcer knowledge test (PUKT) (n=1) [18] were used to measure the knowledge of nursing students ([Supplementary Table 1](#)).



**Figure 1.** Flow diagram of the study selection process.

### 3.3 | Methodological quality of included papers

Quality of all papers [18-22, 26-34] included in the present research was high. Four studies [18, 26, 29, 34] lacked limitations disclosure. Five research [19, 22, 26, 27, 29] also failed to disclose their funding sources or any conflicts of interest (Figure 2).

### 3.4 | Nursing students' knowledge regarding the prevention of PUs

As shown in [Supplementary Table 1](#), the average knowledge score of nursing students about the prevention of PUs is 47.60 out of 100, which is a moderate level.

### 3.5 | Factors related to the nursing students' knowledge regarding the prevention of PUs

As shown in [Supplementary Table 1](#), there was a significant positive relationship between knowledge and the factors such as attitude (n=6) [20, 26, 29, 30, 32, 33], age (n=1) [34], the number of clinical units (n=1) [21], and self-assessment of knowledge (n=1) [34]. There was also a significant relationship between the knowledge of nursing students and factors such as years of education (n=4) [20, 30, 32, 34], the number of clinical units (n=3) [20, 31, 32], clinical experience (n=2) [20, 32], age (n=2) [18, 31], experience in caring for PUs (n=2) [18, 30], sex (n=1) [18], specialization (n=1) [21], level of education (n=1) [34], attitude (n=1) [22].

		Chil <i>et al.</i> , 2013	Simonelli <i>et al.</i> , 2015	Ushar <i>et al.</i> , 2018	Isa <i>et al.</i> , 2019	Kisauak <i>et al.</i> , 2020	Szymmiski <i>et al.</i> , 2020	Alshahrani <i>et al.</i> , 2021	Fomandes <i>et al.</i> , 2021	Sánchez <i>et al.</i> , 2021	Kara <i>et al.</i> , 2021	Culjak <i>et al.</i> , 2022	Muthur <i>et al.</i> , 2022	Steu & Killie, 2022	Chamni <i>et al.</i> , 2023	
Introduction	Clear aims	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Appropriate design	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Methods	Sample size justified	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Population defined	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Sample representative of population	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Selection process representative	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Measures to address non-responders	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Appropriate outcome variables	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Valid measures	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Defined statistical significance	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Methods described	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Results	Results data described	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Concerns about non-response bias		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-responder information described		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Results internally consistent		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Results presented for analyses		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Discussion	Conclusions justified	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Limitations identified	*	*	*	-	*	-	-	*	-	*	*	*	*	*	*
Others	Funding sources or conflicts of interests	*	*	*	-	*	-	-	*	*	*	*	*	*	*	*
	Ethical approval/consent attained	*	*	*	-	*	-	-	*	*	*	*	*	*	*	*

Figure 2. Assessment of the quality of the included article.

#### 4 | Discussion

In general, a total of 7,375 nursing students participated in 14 studies. The level of knowledge of nursing students about the prevention of PUs was at a moderate level. Factors influencing the knowledge of nursing students included attitude, age, the number of clinical units, self-assessment of knowledge, years of education, clinical experience, experience in caring for PUs, sex, specialization, and level of education.

Poor nursing care can contribute to the problem of PUs, which can be prevented. For the care and prevention of PUs, nurses' knowledge of PU prevention is especially crucial [35]. Knowledge assessment can assist in the development of targeted educational interventions by shedding light on educational needs and priorities [36]. As future employees, nursing students' level of knowledge on PU prevention is particularly crucial. The results of this systematic review showed that the level of knowledge of nursing students about PUs prevention is at a moderate level. The findings of a systematic review and meta-analysis demonstrated that nurses' knowledge of PUs prevention is below the acceptable level [37]. Another study conducted in Ethiopia revealed inadequate levels of knowledge among nurses on PU prevention [38]. The findings of a systematic review of nurses' knowledge of PU prevention connected to medical devices revealed that their knowledge is at a moderate level [2]. The findings of the research suggest that by incorporating educational programs on the prevention of PUs into nursing students' curricula,

healthcare managers and policymakers can contribute to the improvement of nursing students' knowledge and, in turn, nurses' knowledge.

The findings of this systematic review demonstrated a substantial association between nursing students' knowledge and their clinical and PU care experiences. The findings of a systematic review and meta-analysis demonstrated that nurses have a greater knowledge level than nursing students about PUs prevention [37]. The research findings also indicated a strong correlation between nursing students' knowledge of PU prevention and the academic year [20, 30, 32, 34]. These findings demonstrate the beneficial influence of PU clinical experience and treatment on the understanding of PU prevention. Hence, it is recommended that nursing students receive hands-on training in the management of PUs in hospitals.

Another influencing factor on nursing students' knowledge about PU prevention was their attitude towards this issue. The results of this study showed that there is a positive and significant relationship between knowledge and attitude toward the prevention of PU. A systematic review and meta-analysis study's findings revealed that nurses and nursing students have a moderately positive attitude toward the prevention of PU [39].

#### 4.1 | Limitations

It is important to mention a few restrictions on this systematic review. Notwithstanding the effectiveness of the systematic approach in obtaining, classifying, and analyzing results, it is impossible to overlook the rise in heterogeneity of results brought on by the lack of meta-analyses about the many study techniques and instruments. This study's thorough search was restricted to electronic Persian and English databases. As a result, this systematic review did not include any papers that were authored in other languages. Also, the results of the grey literature were not searched due to the likelihood of alterations. This might represent yet another study constraint.

#### 4.2 | Implications for nursing managers and policy-makers

The findings of this systematic review indicate that because nursing students are thought of as the future workforce, their knowledge of PU prevention is particularly significant. The research's findings imply that nursing managers and policymakers might improve nursing students' knowledge by introducing training programs on the prevention of PUs into nursing students' curricula. Also, it is advised that nursing students get practical experience managing PUs in hospitals.

#### 4.3 | Recommendations for future research

It is advised that in the future, experimental studies should be carried out to look into how different PU prevention-related teaching initiatives affect nursing students' knowledge about PU prevention.

#### 5 | Conclusions

In sum, the level of knowledge of nursing students about the prevention of PUs was at a moderate level. Factors influencing the knowledge of nursing students included attitude, age, the number of clinical units, self-assessment of knowledge, years of education, clinical experience, experience in caring for PUs, sex, specialization, and level of education. Therefore, healthcare managers and policymakers might improve nursing students' knowledge by introducing training programs on the prevention of PUs into nursing students' curricula.

#### Supplementary files

[Supplementary Table 1.](#)

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#### Authors' contributions

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: ZG, PT, SJH, MF; Drafting the work or revising it critically for important intellectual content: ZG, PT, SJH, MF; Final approval of the version to be published: ZG, PT, SJH, MF; Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: ZG, PT, SJH, MF.

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#### Ethics approval and consent to participate

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#### Competing interests

We do not have potential conflicts of interest with respect to the research, authorship, and publication of this article.

#### Availability of data and materials

The datasets used during the current study are available from the corresponding author on request.

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