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# **Original papers**

The risks in nursing interventions offered by nurses with the purpose of preventing hospitalacquired pressure ulcers Claudia Elena Dobre<sup>1,3</sup>, Florin Cătălin Cîrstoiu<sup>2</sup>, Mariana Zazu<sup>3</sup>, Doina Carmen Mazilu<sup>1,3</sup>

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### Abstract

The study was performed in seven medical units in Bucharest with the intention to offer a comprehensive analysis of the nurses' current prevention practices for hospital-acquired pressure ulcers and also to determine: (1) the main risks that can negatively affect the prevention activities for this type of injury, and (2) if there is a correlation between the nurses' knowledge and the clinical approach to the current hospital-acquired pressure ulcer prevention practices. The statistical analysis was based on data collected from 713 questionnaires from subjects who met the inclusion criteria of the study. The results showed that nurses considered protocols for hospital-acquired pressure ulcer prevention and its management to be important, but both were not always fully implemented into practice due to the lack of resources, time allocation and staff shortages. The regression analysis method we used was focused to assess the predictive capacity for the combined clinical knowledge and professional approaches to hospital-acquired pressure ulcer prevention and management. The conclusion was that a simultaneous improvement in the clinical approaches and professional knowledge on the topic of pressure-ulcer prevention and management may lead to an improvement of up to 6% of the practices in this field according to the results of the statistical analysis performed.

Keywords: risk, nurses, practice, hospital-acquired pressure ulcers, prevention

## Introduction

Pressure ulcers represent the fourth preventable medical error [1]. This type of injury is one of the most common and serious complications of the bedridden patient. It represents an important indicator for monitoring the quality of the medical assistance offered by nurses and a significant indicator of patient safety [2]. From the perspective of hospitalacquired pressure ulcer prevention, these two previously mentioned concepts drive and impose the development of programs for the implementation of "best practice" clinical approaches based on evidence from research as an intrisic part of the nursing process [3].

Pressure-ulcer prevention must represent a priority for nurses and the key-factor for implementing into practice the most appropriate nursing approach supported by clinical education and access to the best scientific evidence. Although patient nursing it's still a multidisciplinary approach, the nurses have the greatest responsibility and role in the hospital-acquired pressure ulcer prevention and its management, therefore the introduction in the continuous medical education plan of a periodic mandatory course on this topic could be very helpful for nurses [4, 5].

# The importance of the topic

Skin injuries caused by pressure (pressure ulcers) represent a major health problem on a global level because there is a great number of vulnerable people at risk for developing this complication during hospitalization and important financial resources are necessary for the treatment and special care of these patients. This risk can be minimized only by knowing and applying the best practices in the field.

The National Authority Quality Management in Health (ANMCS) imposes quality standards which should have as a result the patient's and the medical staff's safety. The implementation of safety measures makes necessary the correct identification and acknowledgement of the leading risks. According to the quality standards in the medical assistance as defined by ANMCS, hospital-acquired pressure ulcer prevention is a quality indicator of the medical assistance offered by the nurse and a good indicator of patient's safety [2].

The development of hospital-acquired pressure ulcers as a result of the deficiencies in the patient care could mean, beside the patient's suffering, an increase in the hospitalization costs.

In 2013, by analyzing the results of studies made in several countries, the European Wound Management Association drew the attention on the high costs generated by the hospital care of these patients. Therefore, in The United Kingdom, it is estimated that the value of the registered annual costs varies from 1,4 to 2,1 milliard pounds, representing 4% of the total costs for medical assistance in The United Kingdom [6], and in Spain, pressure-ulcer treatment required approximately 5% of the total costs for medical care [7]. Pressure-ulcer prevalence registers high values and varies from a country to country as follows: in Jordan,12%, Norway, 54%, Ireland, 16%, Denmark, 15%, Sweden, 25%, Wales 8,9% [4, 8-12].

In a systematic review that analyzed pressure-ulcer interventions, Reddy et al. showed that in 2006 the pressure-ulcer incidence rates, depending on the type of nursing, varied from 0,4 to 38% in acute care, from

2,2 to 23,9% in long term care and from 0 to 17% in home care [12]. Pressure-ulcers are commonly seen in geriatric patients and the development of this injury is associated with an increased risk of death. Certain risk factors as patients' prolonged bed immobilization and incontinence can favour the development of pressure-ulcer; therefore, the modification of these risk factors could prevent the development of these lesions. In general, hospital-acquired pressure-ulcers develop in patients over 65 years old, bedridden or with limited mobility and also in patients with cognitive deficiencies [13].

The main cause for developing pressure-ulcer during hospitalization is represented by the lack of professional knowledge of nurses in this field. A study made in 2008 in Belgium hospitals showed that pressure-ulcer prevalence was 12,1% and only 10,8% of the patients at risk received proper prevention [14]. At international level, organizations such as the European Pressure Ulcer Advisory Panel (EPUAP), the National Pressure Injury Advisory Panel (NPIAP) and the Pan Pacific Pressure Injury Alliance (PPPIA) have shown a continuous interest in pressure-ulcer prevention and management and developed care and treatment guidelines based on the best research evidence.

The prevention activity must start with the assessment of the risk of pressure-ulcer development: the assessment of the cognitive state, the assessment of the nutritional state, the skin aspect, the assessment of the state of the skin in contact with medical devices and identification of the early signs specific for pressure-ulcer development. The prevention should continue with: choosing a mattress according to the patient's state, repositioning and early mobilization of the patient, the daily care of the skin in accordance with existing protocols [15]. All these activities are a part of the competencies of the nurse who gained appropriate knowledge during professional development.

In clinical practice, at international level, for the assessment of pressure-ulcer risk, nurses commonly use the following specific tools (scales): Waterlow, Braden, or Norton. These tools assess individual factors that might increase the risk for hospitalacquired pressure-ulcer development such as age, constitution, mobility, continence, skin type, etc. Among these three scales, the one with the highest sensitivity is the Waterlow scale because it assesses all the individual factors that can lead to the development of pressure-ulcers: gender, age, mobility type, patient's activity, associated pathology, specific medication, and invasive operative actions [16, 17].

## Method/Design

The study occured from June to August 2019, based on a collaboration protocol between the Romanian professional organization of nurses (OAMGMAMR -Ordinul Asistenților Medicali Generaliști, Moașelor și Asistenților Medicali din România - Bucharest branch) and seven acute care units from Bucharest. It consisted of a 95-item questionnaire pre-tested in a focus group of 30 nurses experienced in the field. The questionnaire was structured into 4 sections: (1) the respondents' socio-demographic data, (2) the clinical knowledge scale, (3) the professional approach scale, and (4) the clinical practice scale. The collected data were grouped as follows: training activities, the assessment of the patient's risk factors, the use of wound care protocols in the field of pressure-ulcer prevention and its management, pressure-ulcer prevention activities, the documenting of the nursing care act, difficulties in the nurses' pressure-ulcer prevention practice and the correlation between the nurses' practice, clinical knowledge and approaches.

To identify the main risks that can negatively affect the prevention activity when a series of steps in the care for the bedridden patient are not followed, the primary objective of our study aimed to provide a comprehensive understanding of the nurses' practice

### **Table 1.** Socio-demographic characteristics

The source of the data in Table 1 is from the statistical analysis of the questionnaires applied to a group of 713 nurses. The differences for up to 713 (n) are represented by non-answers.

Characteristics	n (%)
Gender	
Female	637 (91)
Male	16 (9)
Education level	
Nursing high school	12 (2)
Nursing post-high school	579 (82)
Bachelor's degree	104 (15)
Master's degree	8 (1)
Doctoral Studies	0 (0)
Activity field	
Surgical unit	287 (41)
Intensive care	98 (14)
Medical unit	295 (42)
Other domains (palliative care)	18 (3)

in the field of hospital-acquired pressure-ulcer prevention. A secondary objective of the study was to identify the nurses' educational needs, these being a first step in establishing a curriculum for a course on the theme of pressure ulcer prevention and in developing a protocol for the care of the patient at risk for pressure-ulcer.

The study included general practice adult medicine registered nurses who worked in units where bedridden patients over the age of 65, with a various degree of incontinence and different associated comorbidities, were treated. The study excluded nurses who worked in Pediatric units as well as other medical staff such as volunteer nurses, doctors, kinesiotherapists, college or high school students. The nurses' participation in the study was voluntary and was based on a consent form signed by each participant. The directors and chief nurses from the respective units applied the questionnaires by holding meetings with the nurses who wanted to participate in the study. The filling of the questionnaire form took on average 35 minutes and was done in the presence of the person in charge of the study, without any access to documentation sources. The questionnaire was sent to 845 nurses; only 713 signed the consent form and were nurses. The study participation was restricted by obtaining the consent form through which every participant was informed on the purpose, the objectives and the results of the study, the participants being assured of the data confidentiality and of the fact that they could withdraw from the study at any moment without offering any justification. The questionnaires were collected into an urn to preserve the confidentiality for all participants.

The statistical analysis of the data was performed by using the SPSS 20.0 application. All data were entered in SPSS 20.0 (IBM) for analysis. Each question regarding knowledge, attitudes and practice approaches was coded to correct and incorrect, and, if a participant had two or more missing answers, it was not included in the final analysis. For each participant, three scores were calculated by summing the number of correct answers, for each category. Thus, we obtained 3 numeric variables, that allow us to apply multiple regression analysis, in order to test the capacity for simultaneous prediction of the combination between clinical.

#### The studied parameters

# 1. The socio-demographic characteristics of the participants in the study

The study participants were nurses of an average age of 41,05 with an average professional experience of

14,21 years. Regarding the workplace distribution: 41% of the nurses worked in surgical units, 14% in ICUs, 42% in medical profile units (Neurology, Internal Medicine, Medical Recovery) and 3% in other domains such as palliative care units (Table 1).

#### 2. Training and self-training activities on the topic of pressure ulcer prevention and management performed by nurses during the last two years

An analysis of the clinical training type received by the nurses showed that from the total respondents only by 42% stated updating their knowledge after the initial training, while 58% of them claimed that they hadn't participated in any continuing medical education courses on the topic of pressure ulcer prevention and its management over the last two years. The self-learning activity represented by individual reading of articles, books or journals related to this topic, the nurses reported performing it "frequently" in 16% of the cases, only "sometimes" in 57% of the cases, "very rarely" in 22% of the cases, while 5% of the respondents claimed that they hadn't read any materials on this topic (Figure 1 and 2).

# 3. Assessment of the patient's risk factors for pressure ulcer development performed by the nurse as the first step in the patient's care

The assessment of the patient's risk factors for pressure ulcer development through the use of the Waterlow, Braden, or Norton scales, was answered "every time" only by 21% of the respondents. The rest declared that they used these scales (Figure 3) "sometimes" (19%), "very rarely" (6%), or "never" (54%).



**Figure 1.** The percentage of nurses who benefited from continuing medical education in the last two years



**Figure 3.** The percentage of nurses who reported the use of tools for the assessment of the patient's risk of developing pressure ulcers

The source of the data in figure 3 is from the statistical analysis of the questionnaires applied to a group of 713 nurses.



**Figure 2.** The percentage of nurses who reported self-learning activities on the theme of pressure ulcers by reading books, journals or papers



**Figure 4.** The graphic represents the percentile repartition of those who answered to the question regarding the importance of protocols (registred non-answers: 37 (5%))

The source of the data in figure 4 is from the statistical analysis of the questionnaires applied on a group of 713 nurses.

# 4. Use of pressure ulcer prevention and management protocols (PUPMP) in nurses' practice

The use of PUPMP protocols was considered as being "very important" by 69% of the respondents. Also, their implementation into practice was reported as being "very important" by 55% of the respondents, while 30% didn't answer this question (Figure 4 and 5).

# 5. Activities reported by the respondents as being a part of the therapeutical measures plan

# for pressure ulcer prevention in the unit where they worked

The nurses who participated in the study were asked to describe the main measures set in place in their respective medical units to limit pressure ulcer development in hospitalized patients. We noticed a great variety of answers from the respondents, which reflects the significant variability and heterogenity in the implementation of measures for hospitalacquired pressure ulcer prevention (Table 2). These results show the lack of standardization of the clinical practice and approach to hospital-acquired

Answers given by nurses			
a. Developing the care plan, the mobility program, the dressing, filling in the form for pressure ulcer assessment, participating in courses		22	
<li>b. Supporting the nutritional intake, skin care, the control of humidity excess, changing positions, assessing the risk on admission, proper hygiene</li>			
c. Mobilization/changing the patient's position, the use of anti-pressure ulcer devices (mattresses, pillows, ring cushions, ensuring hygiene measures (personal and/or of the bed) and/or proper nutrition/hydration	80	14	
<ul> <li>Mobilization/changing the patient's position and the use of anti-pressure ulcer devices (mattresses, pillows, ring cushions)</li> </ul>	65	12	
e. Mobilization/repositioning and the ensuring of hygiene	40	7	
f. Only mobilization and repositioning	27	5	
g. Mobilization/repositioning and massage/dabbing (with/without using anti- pressure ulcer devices and without mentioning hygiene)	24	4	
<ul> <li>Hydration, patient mobility, the use of anti-pressure ulcer devices, the ensuring of hygiene, massage/dabbing and/or the use of creams/other treatments</li> </ul>	22	4	
i. Only the use of anti-pressure ulcer devices	18	3	
<ul> <li>Mobilization, repositioning, the use of anti-pressure ulcer mattress, massage, the use of support points for patient positioning</li> </ul>	11	2	
k. Mobilization and proper nutrition/hydration	7	1	
I. Educating the patient about mobility and maintaining hygiene	6	1	
m. Negative answers- they don't know	37	6	

The source of the data in Table 2 is from the statistical analysis of the questionnaires applied to a group of 713 nurses.



**Figure 5.** The graphic presents the percentile repartition of those who answered to the question regarding the importance of protocols (non-answers: 213 (30%)

The source of the data in figure 5 is from the statistical analysis of the questionnaires applied to a group of 713 nurses.



**Figure 6.** Represents the percentile repartition of the documents used by the nurse in the documenting of the care interventions offered to the patient with pressure ulcers.

The source of the data in figure 6 is from the statistical analysis of the questionnaires applied to a group of 713 nurses.

pressure-ulcer prevention and it could be explained by the absence of a set of national guidelines in this field, which further leads to the lack of consistent implementation of a clear clinical protocol for nurses in the hospital setting.

#### 6. Documenting the care services offered by the nurse to the patient may help to prevent hospital-acquired pressure-ulcers

Another aspect assessed by the study was the documentation of nursing care services offered to the patient at risk for developping pressure-ulcers. The analysis of this aspect also showed a great variability in the clinical practice reflected through the recorded answers. The documenting of the nurses activity currently represents an area that needs improvement. As shown in Figure 6, only 35% of the nurses reported the use of the care plan.

# 7. Difficulties reported by nurses in the practice of pressure ulcer prevention

The study also took into consideration an assessment of some possible impediments that intervene in the pressure-ulcer activity, therefore nurses were asked to name three important aspects that they believed to negatively affect the practice of pressure-ulcer prevention. As shown in the presented data, the main barrier was *"the increased volume of tasks per person corroborated with medical staff shortages"*, reported by 82% of the respondents. *"The presence of other*  priorities" and the "lack of pressure relief devices or other medical devices" were mentioned in a relatively equal percentage, 36%, respectively 35%, while the "lack of a training course on this topic" was reported by 31% of the respondents. Also, 21% of the respondents reported that the perceived "lack of a tool for the assessment of the patient at risk for developing pressure ulcer" was another deficiency explained by the reduced access to training materials and the lack of a standardized practice in the field (Figure 7).

#### 8. Correlation between the nurses' practice, knowledge, approaches in the field of pressureulcer prevention and its clinical management

The existence of a linear relationship between the dependent variable and the two independent variables was tested using variance analysis (ANOVA). The value of F (7.43, p <.001) confirmed the existence of such a relationship and the coefficients obtained from the regression analysis (Table 3) show that both predictor variables (knowledge and attitudes in the field of pressure-ulcer prevention and its clinical management) are important for estimating the criterion variable (practices), the significance of the coefficients t for both predictor variables being less than 0.05. Even if the value of  $R^2$  (.063) is modest, we can still say that we can expect a simultaneous improvement in knowledge and attitudes to lead to an improvement of about 6% in clinical practices approaches (Table 3).



**Figure 7.** Represents the percentile distribution of the main barriers identified by nurses in the practice of pressure ulcers prevention

The source of the data in figure 7 is from the statistical analysis of the questionnaires applied to a group of 713 nurses.



Unstandardized Coefficients							
Variables	В	Std. Err.	Beta	t	Sig.		
Practices (Constant)	12.153	2.144		5.668	.000		
Attitudes	.208	.073	.186	2.859	.005		
Knowledge	.239	.104	.149	2.290	.023		

The source of the data in Table 3 is from the statistical analysis of the questionnaires applied to a group of 713 nurses.

### The results analysis

The results analysis of this study indicate the fact that, generally, there is a good understanding of the principles of pressure ulcer prevention and management among nurses. However, certain deficiencies were identified in the current care practices amongst which a non-standardized clinical practice with increasingly variable implementation in the various stages of patient care for the pressure-ulcer prevention and management, was by far the most commonly one being reported. The nurses' continuing medical education represents a professional obligation, while the analysis of the training needs represents an attribute of the hierarchic supervisor. The data collected in this study on this topic showed a lack of formal training on the topic of pressure ulcer, only 42% of the respondents reporting that they had participated in continuing medical education courses in the last two years on the topic of pressure ulcer prevention and management. EPUAP recommends that the evaluation of the medical staff's clinical knowledge should be made periodically by use of valid assessment tools before and after offering an continuous education medical program in the field of pressure-ulcer prevention and management [15].

Also, the guidelines for best practice recommend that the assessment for the pressure-ulcer risk should be made within 8 hours from admission using a valid and reliable tool, and that the reassessment should be made within 72 hours if there are changes in the patient's medical condition [15-17]. The results of this research prove that in the nurse's current practice there is a noticeable deficiency regarding this aspect, only 21% of the nurses reporting that they "always" used a risk assessment tool. Also, the study results underline a great variability of prevention practices, which could be explained not only by the lack of specific prevention resources, but also by the systematic absence of use of the assessment tools for the patient at risk for pressure-ulcer development.

In 2019, in Romania, a study was conducted on the factors that limit the care offered by nurses, a study which assessed the general indicators of workplace satisfaction, the workload, the medical staff's perception of the quality of care and the measures that were considered beneficial to the improvement of the quality of medical procedures. This study emphasized the fact that the understanding of factors that limit medical care represent an essential intervention to ensure the quality control of medical services. The great volume of tasks and the lack of medical staff and

specific resources can generate work-related stress for the entire medical staff, which can further impact the quality of patient care [18].

In conclusion, the main risks associated with the patient-care interventions offered by nurses to prevent hospital-aqcuired pressure ulcers that can generate negative effects for the patient are: the systematic lack of updating the clinical knowledge and the absence of standardized nursing protocols.

### Discussions

The best practice guidelines developed at international level are based on research evidence and recommend that the pressure-ulcer prevention activity set by clinical protocols should encompass interventions such as: (1) assessing the patient's risk degree for developing pressure-ulcer by using valid and reliable tools [19], (2) assessing early the patient's skin status and skin care requirements, (3) ensuring an appropriate nutritional intake after the assessment of the patient's nutritional status with the help of valid and reliable tools, (4) applying patient mobility and repositiong techniques [20], (5) ensuring appropiate support according to the patient's clinical status and degree of risk for developing pressure-ulcers, (6) using prophylactic dressing in the areas prone to develop pressure-ulcers, (7) ensuring educational support for the medical staff and last but not least (8) improving patients' compliance with medical staff's solutions for clinical care and therapeutic recommendations [15].

An efficient solution for checking the implementation in the clinical practice of PPMLP measures is offered by a clinical audit that has to take into consideration the verification of the level of completion of main activities meant to prevent pressure-ulcers. The results of a clinical audit should be used to facilitate a process of change and the alignment of care standards with the best modern international practices. The clinical audit must take place systematically and be accompanied by the implementation of specific measures that should be permanently monitored and maintained to obtain an improvement of the medical procedures [3, 5]. A good example of the implementation of best practices in the medical activity is represented by the Joanna Brings Institute model of evidence-based health care. This model of implementing the best evidence into clinical practice was built to allow reasoning and critical analysis of evidence-based healthcare and health improvement on a global level, in a conceptual and logical frame. The basic principle of evidencebased healthcare is that clinical decisions should be made depending on the best available scientific evidence, but also on acknowledgement of the patient's preferences, the medical assistance context and the clinician's judgement [3, 21].

### Conclusions

We hope that our study is a contribution to the development of evidence-based practice of pressure-ulcer prevention and management through emphasizing the elaboration and implementation of the standardized protocols for pressure-ulcer prevention and management and by assessing healthcare practice through the implementation of clinical audit programs. Also, we would like this study to appeal to general awareness by underlining the importance of continuous medical education programs correlated with the identification of the actual and specific professional training needs.

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