

The influence of comorbidity on the prevalence of pressure ulcers in geriatric patients

Neloska Lenche^{1*}, Damevska Katerina², Andjelka Nikolchev¹, Pavleska Lidija¹, Petreska-Zovic Biljana¹ and Kostov Milenko³

¹PHI Gerontology Institute "13 November Skopje", Skopje

²University Clinic of Dermatology, Medical Faculty, Skopje

³University Clinic of Neurosurgery, Medical Faculty, Skopje

Abstract

Background: Pressure ulcers are a common problem among older adults in all health care settings. A number of contributing factors are associated with pressure ulcers.

Aim: The aim of the present study was to determine the prevalence of pressure ulcers in patients hospitalized in long term care facility, and to examine the influence of comorbidity on the prevalence of pressure ulcers.

Methods: Data were retrospectively collected, and included demographic characteristics and comorbidities. For each patient with PU we collected PU characteristics (location, number of PU per patient, and stage).

Results: In the study period, 2099 patients were hospitalized; and 1289 patients (61.4%) were women. Median age was 76.32years. The total pressure ulcer prevalence was 12.19%. The number of comorbidities was higher in the patients with PU, compared with patients without PU ($p < 0.001$). The prevalence of PU was significantly influenced by diabetes ($p = 0.021$) and neurological disorders ($p = 0.051$).

Conclusion: Our data suggest that the comorbidities play an important role in the pathogenesis of the pressure sores.

Background

A pressure ulcer (PU) is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure or pressure in combination with shear. It leads to ischemia, cell death, progressive destruction and necrosis of the underlying soft tissues [1].

It is estimated that the prevalence of PU has doubled in recent years [2], and the incidence has increased by 80% between 1995 and 2008 [3].

Pressure ulcers are among the most common conditions encountered in patients requiring institutional care. The prevalence of PU ranges from 1 to 18% of in-patients, from 3 to 29% of those admitted to long-term settings, and 0% to 17% in home care settings [3-5].

They are a common problem among older adults in all health care settings, including acute hospitals, nursing homes and geriatric and palliative centers (3). In a study performed in Sweden, 97% of patients with PU were 65 years and more, 63% of them were older than 80 years [6].

Prevalence and incidence estimates of PU in the elderly vary by setting, ulcer stage, and length of follow-up [3,7]. For example, many epidemiological studies have elected not to include stage 1 ulcers since they are difficult to reliably detect.

A broad range of factors have an influence on development of PUs in long-term care residents [5]. Mobility limitation, incontinence, nutritional status, pain, infectious complications, prolonged

hospitalizations and altered consciousness are the most consistently reported risk factors for pressure ulcers [8].

Although previous studies have suggested that certain conditions, such as spinal cord injuries, hip fractures, cardiovascular disease, and diabetes, increase the likelihood that a patient will develop a PU, the role of the comorbidity status in the development of PUs in geriatric hospitals is rarely investigated.

The objective of this study was to investigate the prevalence of PUs in a geriatric hospital and explore the possible connections between prevalence rate and comorbidity status.

Material and method

The study was carried out at the Geriatric and Palliative Care Hospital in Skopje, an institution that serves the 1200000 population, offering geriatric and palliative care. It is the largest specialized geriatric and palliative hospital in the country and exclusively attends to patients through the Public Health System. The study design was approved by the Hospital Ethics Committee. Informed consent was waived because of the study's observational nature.

Correspondence to: Neloska Lenche, PHI Gerontology Institute "13 November Skopje", Skopje, **E-mail:** neloskal@gmail.com

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We included all consecutively admitted patients from October 2014 to November 2015.

We collected data using a case report form specifically created for this study, recording information about demographics, main diagnosis, length of stay, presence of PU and PU characteristics.

The Braden scale was used to assess the risk of developing PUs. The total score can range from 6 to 23 with a lower score indicating a higher risk [9]. The risk of PUs increases in patients with a score ≤ 12 points (cut-off point). The grading system of the EPUAP was used [1].

Descriptive statistics were used to describe the study population, with continuous outcomes summarized as a mean and range, and categorical outcomes presented as a percent. We performed Chi-square tests for continuous variables and independent *t*-tests for continuous variables. *P*-values < 0.05 were considered statistically significant.

Results

During the study period, two thousand and ninety-nine patients were consecutively admitted to the Geriatric Hospital. Their baseline characteristics are shown in Table 1. The mean age was 76.32 years, SD 11,202. There was a female predominance (1289 or 61.4%).

A total of 540 PUs were presented in 256 patients. 136 of 256 patients (53.1%) developed one PU, 49 patients (19.2%) developed two, 39 patients (15.3%) developed three and 32 patients (12.4%) developed more than four PUs (Figure 1).

The total pressure ulcer prevalence was 12.19% (256 out of 2099).

Table 2 presents the anatomical distribution of the detected pressure ulcers (N=540) and reveals that the most common body sites

Table 1. Baseline characteristics of patient population, according to the presence/absence of PU.

Gender				Age			
		N	%	(\bar{x})	SD	Min.	Max.
PU absent	Male	724	39.28	74,63	11,697	25	103
	Female	1119	60.71	77,41	10,717	22	101
	Total	1843	87.80	76,32	11,192	22	103
PU present	Male	86	33.59	74,50	12,234	38	97
	Female	170	66.40	77,34	10,702	37	95
	Total	256	12.19	76,38	11,296	37	97
Total	Male	810	38.58	74,61	11,748	25	103
	Female	1289	61.41	77,40	10,710	22	101
	Total	2099	100.00	76,32	11,202	22	103

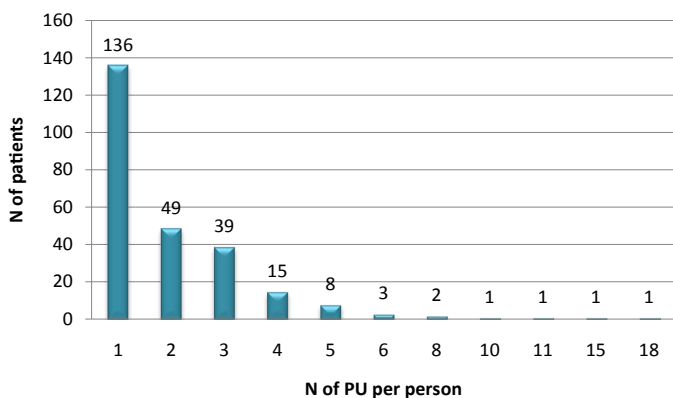


Figure 1. Distribution of PU per person (Total 540).

Table 2. Pressure ulcers stages by site.

	St 1	St 2	St 3	St 4	Echar	STDI	Total
Sacrum	20	76	25	23	9	0	153
Hip	7	34	4	10	3	0	58
Heel	28	75	10	8	18	1	140
Gluteal	5	43	4	3	3	0	58
Back	2	13	4	0	1	0	20
Scapula	2	8	3	2	2	0	17
Elbow	1	7	1	0	1	0	10
Malleolus	9	17	4	0	6	0	36
Other	4	23	7	5	9	0	48
Total	78	296	62	51	52	1	540

STDI=suspected deep-tissue injury

Table 3. Number of comorbidities per person.

	PU present N (%)	PU absent N (%)
0	4 (1.6)	60 (3.3)
1	40 (15.6)	335 (18.2)
2	85 (33.2)	587 (31.9)
3	88 (34.4)	535 (29.0)
4	26 (10.2)	251 (13.6)
5	11 (4.3)	61 (3.3)
6	1 (0.4)	13 (0.7)
7	1 (0.4)	1 (0.1)
Total	256	1843

of PUs were the sacrum and the heel, and the most common stage was Stage 2.

Table 3 shows the number of comorbidities per person. There was a positive association between the number of comorbidities and PU prevalence ($\chi^2=15,578$; $p < 0.01$).

Table 4 presents a significant connection between the presence of PU and a range of individual comorbidities. The two factors with the greatest association with the presence of a pressure ulcer were diabetes mellitus ($p=0,021$; OR=1.082, 95%CI 1.052-1.894) and neurological diseases ($p=0,051$; OR=1,344, 95% CI 0.960-1.882). We also noted that there was a significant connection between the presence of PU and the Braden score ($p < 0,00001$).

Discussion

This study revealed that PUs constitute a significant problem in geriatric and palliative patients. The reported prevalence of PUs in geriatric patients vary widely from 9%-32% [3-5]. This difference most likely reflects the variation in the characteristics of the cases, PU classifications, inclusion criteria, and data collection methods. The prevalence rate detected in this study of 12.19% was generally consistent with international studies employing similar methodology.

The significant variability in PU prevalence and incidence in long-term care settings for older people suggests that opportunities exist to improve outcomes for persons at risk for PU [10].

Pressure ulcers occurrence presents a heavy burden on the medical services. The estimated cost of treating each case of PUs ranges from \$37 800 to \$70 000 [11].

The presence of a pressure ulcer constitutes a geriatric syndrome consisting of multifactorial pathological conditions. The accumulated effects of impairment due to immobility, nutritional deficiency and chronic diseases involving multiple systems predispose the aging skin

Table 4. Differences between patients with and without a pressure ulcer.

	PU absent N=1843	PU present N=256	P-value (chi-square)	OR	95%CI
Diabetes mellitus, n (%)	400 (21.7)	72 (28.1)	0.021 -5.317	1.412	1.052-1.894
HTA, n (%)	1075 (58.3)	162 (63.3)	0.131 -2.278	1.231	0.939-1.614
CMP, n (%)	1279 (69.2)	173 (67.6)	0.555 -0.349	0.919	0.695-1.216
Neurological disease, n (%)	1276 (5.5)	49 (19.4)	0.051 -4.98	1.344	0.960-1.882
Psychiatric, n (%)	240 (12.9)	31 (12.1)	0.683 -0.167	0.92	0.617-1.372
Renal, n (%)	65 (3.3)	5 (2.0)	0.189 -1.727	0.545	0.217-1.366
Hepatic, n (%)	44 (2.5)	9 (3.5)	0.281 -1.162	1.49	0.718-3.089
Malignancy, n (%)	258 (13.7)	30 (11.7)	0.32 -0.987	0.815	0.545-1.220

CMP cardiomyopathy, HTA hypertension

of the elderly person to increasing vulnerability [12].

Geriatric and palliative patients are especially susceptible to the development of PUs but truly independent predictive factors have yet to be conclusively established. Risk factors for PUs include older age, ethnicity, lower body weight, cognitive impairment, physical impairments, and urinary or fecal incontinence [13]. The role of other comorbid conditions that affect soft tissue integrity and healing in the development of pressure ulcers in geriatric hospitals is rarely investigated. In this case-control study, more than 90 % of participants suffered from at least one comorbid condition, with cardiovascular and neurological diseases being the most prevalent.

This study also shows that an increasing number of comorbid conditions was positively associated with PU prevalence in hospitalized geriatric patients.

The presence of diabetes was associated with an increased PU prevalence. Diabetes is prevalent among geriatric patients [7,8] and it is associated with increased physical and psychosocial disability. Over 100 known physiologic factors, including decreased cell and growth factor response, diminished peripheral blood flow and decreased local angiogenesis, contribute to wound healing deficiencies in individuals with diabetes [14].

Prevention of pressure ulcerations in geriatric patients is imperative to reduce patient morbidity, mortality, and overall healthcare costs. Prevention strategies for pressure ulcers begin with the identification of high-risk persons, appropriate allocation of resources, and adequate techniques of pressure relief [15]. The clinician must correct all conditions that retard the healing process, including diabetes mellitus and neurological diseases.

Conclusion

The prevention of pressure ulcers in the geriatric facilities is a constant challenge for clinical staff. Regardless of the care setting a geriatric patient is admitted to, any length of stay must be accompanied by a risk assessment for preventing PU. This evaluation includes an understanding of not only the most critical medical status, but also

of any underlying comorbidities. Our results suggest that diabetes mellitus and neurological diseases may be added to existing methods to determine PU risk in the geriatric population.

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