Original Article

An Analysis of Patients in Palliative Care with Pressure Injuries

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ABSTRACT

Aim: The aim of this study was to evaluate the factors that are effective for the treatment, recovery of pressure injury (PI) and costs in palliative care (PC) patients. **Materials and Methods:** From a retrospective review of patient records, the PI localization, the presence of infection, PI stage on admission, discharge and treatment costs were recorded. Patients were grouped according to diagnoses, and PI localizations (sacrum, trochanter, ischium, and heel). The comparison was made of changes in wound stage in the groups. **Results:** PI was present in all 154 patients during hospitalization and in 94 (61%) on discharge. Full recovery was determined in 52/129 (40.3%) patients with PI in the sacrum, in 23/46 (50%) in the trochanter, in 22/40 (55.0%) in the heel, and in 10/12 (83.3%) in the ischium. Worsening PI stage was observed in 5 (3.9%) in the sacrum, in 1 in the trochanter and in 4 in the heel. Improvement in PI stage was seen in 96 (74.4%) in the sacrum, in 35 (3.9%) in the trochanter, in 27 (50.5%) in the heel, and in 10 (83.3%) in the ischium. Regardless of wound localization, the improvement was observed in 168 (74%) of 227 PI and worsening in 10 (4.4%). The group with no change in the PI stage had prolonged hospital stay and higher costs. The Karnovsky Performance Score and Glasgow Coma Score of fully recovered patients were determined to be higher, and no statistically significant difference was seen in respect of age. **Conclusions:** PC patients are prone to PI due to many chronic diseases. The localization of PI and infection are effective factors in the healing of ulcers. The treatment costs for PC patients is higher if they have a pressure ulcer. More comprehensive studies will be useful to clarify the economic and social dimensions of this issue.

KEYWORDS: *Health care costs, palliative care, pressure injuries*

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INTRODUCTION

Pressure injuries (PIs) are defined by the National Pressure Ulcer Advisory Panel as "a localized damage to the skin and/or underlying soft tissue usually over a bony prominence or related to a medical or other device." The injury presents as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear.[1]

The restricted movement and resting positions of patients in palliative care (PC) are a significant risk factor for PI.[2] Some studies have shown that in patients with PI accepted for PC, there is a risk of new PI forming during hospitalization.[2,3] PC aims to improve the quality of life of patients struggling with life-threatening diseases and that of their families.[4] PC focusses on making the patient comfortable at the end of life rather than treating or curing injuries.[5] Treatment of PI is a substantial burden on the health and social services.[6] 6.5 million people were affected by PI in the United States in 2009, and it costs estimated 25 billion dollars per year.[7]

Determining the effective factors in the treatment and healing of PI in PC patients is crucial in helping them at their end of life period and contributing to reduce the costs. Studies have been conducted in

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Turkey on the determination of PI in Intensive Care Units (ICUs)[8-10] and evaluating the related treatment options.[11,12] However, in general, there are few studies which have analyzed PC patients with PI, and no study on this subject could be found from Turkey.

The aim of this study is to determine the factors effective on wound treatment and healing together with the demographic data of patients with PI in the PC center and the treatment costs of PI in the PC.

Materials and Methods

Approval for the study was granted by the Ethics Committee of Ankara Numune Training and Research Hospital (Approval No. 808, dated February 2, 2016) and the study was conducted according to the principles of the Helsinki Declaration. A retrospective evaluation was made of the records of 173 patients with PI who were admitted to the PC center of Ulus State Hospital between January 2013 and March 2016. A total of 19 cases were excluded from the study, due to incomplete records for 8 patients and repeated admissions of 11 patients. Thus, the records of 154 patients were included in the study.

For each patient, a record was made of age and gender, Glasgow Coma Score (GCS), Karnovsky Performance Score (KPS), diagnosis of any chronic diseases, and duration of stay in the PC center. The KPS allows patients to be classified as to their functional impairment. It is assessed on an 11-step scale, with each 10-point increase. 0 points refer to a patient who is dead, and 100 points refer to a patient with normal activity.[13] Using KPS, functional status of the patients are interpreted in three main groups. 0–40 points: Unable to care for self; 50–70 points: To work; 80–100 points: Able to carry on normal activity and to work.[14]

The location of PI, the PI stage and whether or not it was infected on admission to and discharge from the center for each location and the total treatment costs were recorded. In the grading of PI, the NPIAP grading system was used. The data related to PI were retrieved from the wound care unit records of Ulus State Hospital. The total treatment costs of the patients were determined in detail from the hospital invoices in the patient information management system (HBYS, Alpdata Company, Ankara, Turkey). The costs were updated according to the consumer price index of March 2016.[15]

Statistical analysis

The conformity to the normal distribution of numerical data such as age, GCS, KPS, duration of stay, and total costs of stay, was tested with the Shapiro–Wilk test.

Patients were grouped according to existing diagnoses, the most frequently seen PI localizations (sacrum, trochanter, ischium, and heel) and the presence or absence of a wound. In the comparison of the numerical data of these independent paired groups, the *t*-test was used for data with normal distribution and the Mann–Whitney U-test for data not with a normal distribution.

Regardless of wound localization, fully recovered patients with no wound and those with a wound that was not healed were grouped in the chronology of discharge. The numerical data of these groups were compared.

In addition, to determine the relative healing, patients were grouped as worsened, no change and improved according to the change in grading for each wound localization from admission to discharge. These three independent groups were compared in respect of numerical data. For data with normal distribution, the ANOVA test (*post hoc* Tukey test) was used and for data which was not with a normal distribution, the Kruskal–Wallis test (*post hoc* Mann–Whitney U) was used. Bonferroni correction was applied to these three groups and a value of $P < 0.0166$ was accepted as statistically significant.

To examine the effects on relative healing of the above-mentioned paired groups, cross-reference tables were formed, and evaluation was made with the Chi-square test.

For all the statistical calculations, a value of $P < 0.05$ was accepted as statistically significant.

Results

The study included a total of 154 patients with PI, comprising 85 (55.2%) males and 69 (44.8%) females. Thirty-eight (24.7%) of patients had diabetes mellitus (DM) and 76 (49.4%) had hypertension (HT). The diagnoses on admission and demographic characteristics of the patients are shown in Table 1.

PI was present in all the patients during hospitalization and in 94 (61%) on discharge.

Only one of the patients, who did not have PI in the sacrum, developed PI during hospitalization. All the patients with Stage 1 PI in the sacrum fully recovered, of those with Stage 2 PI, healing was seen in 80.4%, and of those with Stage 3 PI, healing was determined in 28.4%. Of the 33 patients with unstageable PI in the sacrum and the 24 patients with Stage 4 PI, full healing was not seen in any of these cases. When all the stages were evaluated in total, 52 (40.3%) of the 129 patients with PI in the sacrum were observed to have fully recovered. The full healing status on the discharge of the patients was evaluated according to the wound grading during hospitalization and PI localization [Table 2].

Table 1: The demographic characteristics of patients, diagnosis on admission, and clinical characteristics

Parameter	Value
Gender* (%)	
Male	85 (55.2)
Female	69 (44.8)
Age**	76 (27.25)
GCS**	10 (4)
KPS**	40 (10)
DM* (%)	
Absent	116 (75.3)
Present	38 (24.7)
HT* (%)	
Absent	78 (50.6)
Present	76 (49.4)
Pulmonary disease* (%)	
Absent	141 (91.6)
Present	13 (8.4)
Heart disease* (%)	
Absent	144 (93.5)
Present	10 (6.5)
Traumatic brain damage* (%)	
Absent	133 (86.4)
Present	21 (13.6)
CVE* (%)	
Absent	106 (68.8)
Present	48 (31.2)
Hypoxic brain* (%)	
Absent	140 (90.9)
Present	14 (9.1)
Alzheimer-dementia* (%)	
Absent	131 (85.1)
Present	23 (14.9)
Parkinson* (%)	
Absent	145 (94.2)
Present	9 (5.8)
Cancer status* (%)	
Absent	120 (77.9)
Present	34 (22.1)
Cancer type* (%)	
Lungs	6 (17.6)
Head-neck	9 (26.5)
GIS	12 (35.3)
GUS	3 (8.8)
Lymphoma	1 (2.9)
Other	3 (8.8)

*Values are stated as *n* (%), **Values are stated as median (IQR). GCS: Glasgow coma score; KPS: Karnovsky performance score; DM: Diabetes mellitus; HT: Hypertension; CVE: Cerebrovascular event; GIS: Gastrointestinal system; GUS: Genitourinary system; IQR: Interquartile range

Of the 25 patients with no PI in the sacrum, wound grading was seen to worsen in only one during hospitalization. All the patients with Stage 1 PI in the sacrum fully recovered. Of the 51 patients with Stage 2 PI in the sacrum, 43 (84.3%) improved and 2 worsened. Of the patients with Stage 3 PI, 8 (57.1%) improved and no worsening was seen in any case. Of the 33 patients with unstageable PI in the sacrum, 23 (69.7%) improved and worsening was seen in 3 (9.1%). In 15 (62.5%) of the 24 patients with Stage 4 PI, the improvement was seen, and no worsening was seen in any case. When all the stages were evaluated in total, 5 (3.9%) of the 129 patients with PI in the sacrum were observed to have worsened and 96 (74.4%) to have improved. All on

Table 2: Evaluation of the full recovery status according to the PI Stage during hospitalization and the localization

Wound stage on admission*		Wound on discharge*			
		Sacrum, *n* (%)	Trochanter, *n* (%)	Heel, *n* (%)	Ischium, *n* (%)
No wound		25	108	114	142
	Absent	24 (96.0)	108 (100)	114 (100)	142 (100)
	Present	1 (4.0)	0	0	0
Stage 1		7	4	1	0
	Absent	7 (100)	4 (100)	1 (100)	0
	Present	0	0	0	0
Suspected tissue damage		0	0	12	
	Absent	0	0	9 (75.0)	0
	Present	0	0	3 (25.0)	0
Stage 2		51	15	10	9
	Absent	41 (80.4)	14 (93.3)	8 (80)	7 (77.8)
	Present	10 (19.6)	1 (6.7)	2 (20)	2 (22.2)
Stage 3		14	3	1	2
	Absent	4 (28.6)	0	1 (100)	2 (100)
	Present	10 (71.4)	3 (100)	0	0
Unstageable pressure ınjury		33	18	13	0
	Absent	0	4 (22.2)	3 (23.1)	0
	Present	33 (100)	14 (77.8)	10 (76.9)	0
Stage 4		24	6	3	1
	Absent	0	1 (16.7)	0	1 (100)
	Present	24 (100)	5 (83.3)	3 (100)	0
Total		129	46	40	12
	Absent	52 (40.3)	23 (50)	22 (55.0)	10 (83.3)
	Present	77 (59.7)	23 (50)	18 (45)	2 (16.7)

*Values stated as *n* (%)

Table 3: Evaluation of improvements according to the pressure injury stage on admission and localization

Wound stage on admission*	Change in wound Stage during hospitalization			
	Sacrum, *n* (%)	Trochanter, *n* (%)	Heel, *n* (%)	Ischium, *n* (%)
No wound	25	108	114	142
Worsened	1 (4.0)	0	0	0
No change	24 (96.0)	108 (100)	114 (100)	142 (100)
Improved	0	0	0	0
Stage 1	7	4	1	0
Worsened	0	0	0	0
No change	0	0	0	0
Improved	7 (100)	4 (100)	1 (100)	0
Deep tissue pressure ınjury	0	0	12	0
Worsened	0	0	3 (25.0)	0
No change	0	0	0	0
Improved	0	0	9 (75.0)	0
Stage 2	51	15	10	9
Worsened	2 (3.9)	0	0	0
No change	6 (11.8)	1 (6.7)	2 (20)	2 (22.2)
Improved	43 (84.3)	14 (93.3)	8 (80)	7 (77.8)
Stage 3	14	3	1	2
Worsened	0	0	0	0
No change	6 (42.9)	2 (66.7)	0	0
Improved	8 (57.1)	1 (33.3)	1 (100)	2 (100)
Unstageable pressure ınjury	33	18	13	0
Worsened	3 (9.1)	1 (5.6)	1 (7.7)	0
No change	7 (21.2)	4 (22.2)	5 (38.5)	0
Improved	23 (69.7)	13 (72.2)	7 (53.8)	0

Contd...

Table 3: *Contd*...

Wound stage on admission*	Change in wound Stage during hospitalization			
	Sacrum, *n* (%)	Trochanter, *n* (%)	Heel, *n* (%)	Ischium, *n* (%)
Stage 4	24	6	3	1
Worsened	0	0	0	0
No change	9 (37.5)	3 (50)	2 (66.7)	0
Improved	15 (62.5)	3 (50)	1 (33.3)	1 (100)
All stages	119	46	40	12
Worsened	5 (3.9)	1 (2.2)	4 (10)	0
No change	28 (21.7)	10 (21.7)	9 (22.5)	2 (16.7)
Improved	96 (74.4)	35 (76.1)	27 (67.5)	10 (83.3)

*Values stated as *n* (%)

Table 4: Comparison of the clinical characteristics of the patients according to the improvement status of pressure injury in the sacrum

	Worsened	No change	Improved	*P*
Age (years)	70.4±19.2	70.3±17.5	70.3±18.7	0.992
GCS	8.8±1.1	9.8±2.8	10.4±3.2	0.285
KPS	36.0±5.5	32.9±7.6	34.2±9.8	0.646
Total invoices (₺)	28,658.6±29,079.1	15,574.6±16,085.7	32,099.5±31,679.1	0.003*
Duration of stay (days)	34.4±25.9	24.3±23.4	44.8±39.7	0.010*

*Kruskal–Wallis test is used for comparison, $P<0.0166$ is significant Bonferroni correction. ₺=Turkish Lira. 1$=2.95₺ (March 2016 exchange rate). GCS: Glasgow coma score; KPS: Karnovsky performance score

Table 5: Evaluation of the age, Glasgow coma score, and Karnovsky performance score of the fully recovered patients and those not fully recovered

	Not full recovery (*n*=94)	Fully recovered (*n*=60)	*P*
Age (years)	70.2±16.7	70.9±19.8	0.461
GCS	9.7±3.1	10.9±3.2	0.021*
KPS	32.9±10.2	36.0±9.1	0.024*
Total invoices (₺)	29,808.8±31,987.1	2,0414.8±18,448.1	0.291
Duration of stay (days)	41.8±39.7	29.2±24.8	0.140

₺=Turkish Lira; 1$=2.95₺ (March 2016 exchange rate). Values are stated as mean±SD. Mann–Whitney *U*-test is used for comparison *$P<0.05$ is significant. SD: Standard deviation; GCS: Glasgow coma score; KPS: Karnovsky performance score

the PI localization and PI healing in stages of PI status of the patients during hopitalization and on discharge are shown in Table 3. When all the patients were evaluated regardless of wound localization, an improvement in PI stage was observed in 168 (74%) of 227 PI and a worsening of the stage in 10 (4.4%).

When patients with PI in the sacrum were grouped according to improvement in wound stage, no difference was found in respect of clinical characteristics (patient age, GCS, KPS) ($P > 0.0166$, Bonferroni correction). In the group with no change in the PI stage, the duration of hospitalization was longer, and the total costs were higher ($P > 0.0166$, Bonferroni correction) [Table 4].

When the patients who showed full recovery were compared in terms of age, KPS and GCS, the KPS and GCS scores of fully recovered patients were determined to be higher, and no statistically significant difference was seen in respect of age ($P < 0.05$). No statistically significant difference was seen in the comparison of fully recovered patients in respect of total costs [Table 5].

The effects on improvement were evaluated of the clinical characteristics during hospitalization of patients with PI that fully recovered in one or more than one localization. No correlation was found between full recovery of PI and clinical characteristics (diagnoses: DM, HT, cardiac disease, pulmonary disease, Alzheimer's, Parkinson's, certified vocational evaluator [CVE], hypoxic brain, traumatic brain damage, and cancer) and it was understood that cases with no PI infection showed full recovery ($P < 0.001$).

Discussion

Chronic diseases are the most significant cause of disability and death worldwide, constituting 60% of deaths and 43% of the global disease burden of all diseases. It is estimated that by 2020, 73% of chronic disease deaths could be responsible for 60% of the global disease burden.[16] Immobility (inability to move without assistance) or limited movement is a significant risk factor for PI.[17] It does not seem possible to accurately determine the prevalence of PI.[18] Rates of PI have been reported to be between 8.8% and 29.9% of

patients in care homes and for hospitalized patients in Europe and North America as 7.3%–23%.[19]

By prolonging the duration of hospitalization and increasing costs and mortality rates,[20] PI create a social, psychological, and economic burden on the patient, their family and society. The social and psychological burden has a different significance for those with a chronic disease and their caregivers.[21] The economic burden for England was reported as ≤1.4–≤2.1 billion per annum using the costs from the year 2000.[22] As the patient group is not homeogeneous for PI, different results may be seen in respect of costs between countries, communities, and healthcare institutions. The current study is the first such research in Turkey to have evaluated patients being followed up in a PC center, to have defined the patient profile and to have analyzed the costs.

It has been reported that PI is present in 26.1% of patients on admission to a PC unit and in 12% during the stay in the unit.[2] Lyder *et al*. evaluated the development of PI in hospital, there was a higher possibility of PI development in patients aged >65 years and in those with chronic disease (cancer, cardiac failure, pulmonary diseases, cerebrovascular events, and diabetes).[3] Inan *et al*. evaluated PI in ICU patients, 52% were males and the mean age was reported to be 59.6 years.[8] A Japanese study conducted in long-term intensive care hospitals reported that 80.7% of patients were aged ≥75 years and PI was determined at a prevalence of 9.6% and incidence of 1.9%.[23] In a previous study in Turkey which evaluated the development of PI in a hospital, 58% of patients were reported to be male, 36% of patients were aged 61–80 years, general prevalence was reported as 2.5%, incidence as 1.9% and prevalence in ICUs as 5.9%.[9] Grey suggested that PI were more frequent in elderly people.[17] Our results confirmed the literature that PC patients have a high age-average and are in a group of patients with chronic diseases and are at high risk for PI.

In a previous study of patients admitted to ICU with PI, the wounds were determined in the sacrum in 43.9%, in the trochanter in 17.9%, in the heel in 13.7% and were Stage 1 in 30%, Stage 2 in 45.2%, Stage 3 in 17.8%, and Stage 4 in 6.9%.[8] In the Japanese study conducted in long-term infection control hospitals, the wounds were determined in the sacrum in 60.5%, in the calcaneus in 9.7%, in the trochanter in 15.7% and were Stage 1 in 15.4%, Stage 2 in 40%, Stage 3 in 38%, and Stage 4 in 7.3%.[23] Another hospital-based study evaluating the development of PI reported 41% in the sacrum and coccyx, 23% in the hip and 23% in the heel.[3] In a study by Berlowitz *et al*. of patients with PI in a long-term care facility, full recovery was reported in 54%, as 72% of Stage 2 patients, 45.2% of Stage 3, and 30.6% of Stage 4.[24] In this study, the distribution of PI localizations of patients was found to be similar to the literature. Full recovery was found to be the lowest rate in the sacrum and trochanter. The low rate of recovery of PI with a sacral localization was ascribed to high risk of fecal contamination in the sacral region.[24,25] Even if the same conditions are considered for PI in the ischium, the low number of wounds and low stages in the current study were not evaluated as a significant result.

The aim of PC is to improve the quality of life for the patient.[26] The care and treatment of PI is an important element affecting the quality of life. That no worsening of wound stage was seen in 95.6% of patients and no new wounds developed can be associated with the efficacy and experience of the PC center in PI care.

The presence of chronic diseases is a risk factor for the development and progression of PI.[27-29] The effect of the diagnosis at the time of admission and the clinical status on wound healing was evaluated in this study. There was determined to be no effect on full recovery of DM, cardiac failure, CVE, traumatic brain damage, Alzheimer's-dementia, or Parkinson's disease. Neurological diseases are known to be a risk factor for the development of PI.[27-29] However, the results of this study have shown that with the provision of good wound care, other diseases were no different in respect of wound healing.

The KPS and GCS scores of the current study patients without full recovery were determined to be lower. The full recovery rates of patients with PI infection on admission were observed to be low. In the current study, PI infection was determined in 33.8% of patients on admission. There is no definitive data on the prevalence and incidence of PI infection in patients admitted to PC with PI.[30,31]

In the current study, an analysis was also made of the costs for patients with PI. When the costs were evaluated in respect of patients with PI who fully recovered, no significant difference was seen in respect of the total costs and the duration of hospitalization. When classification was made according to improvement in PI stage in those with sacral PI, the duration of hospitalization was longer and the total hospital costs were greater for the patient group with improved and worsening stages of PI compared to the patient group with no change in the PI stage. Previous studies have shown a longer period of hospitalization for patients with PI compared to those without.[3,8] As the current study group was totally comprised patients with PI,

evaluation was made of the effect of PI improvement on costs. The results showed that the highest costs were incurred by patients with worsening PI stage and the lowest by those with no change. The increased costs of the patients with the worsening PI stage is thought to be due to the need for additional treatment and more wound care materials. In the current study, the mean daily cost of a patient with PI receiving PC was determined to be 675 TL (228.8 $ - exchange rate on March 2016). As PC is a new concept in Turkey, the number of patients with PI requiring PC is not known. In the light of the data of the current study and of previous studies in other countries, this number seems to be extremely high. When the estimated number of patients is taken into consideration, it can be concluded that PI constitute a significant financial burden on the national economy.

Study limitations

As the study group of patients with PI being monitored in the PC unit was not a homogenous group, standardization was extremely difficult. Some of the patients with PI had died before treatment was completed. As there were few cases with multiple wounds, the evaluation could not be made of these cases. The evaluation of improvement in PI stage was only made for PI with sacrum localization as this was the localization with the highest number of cases. There are no standard treatments for PI. We noticed that patients were treated with many different protocols when patient records were scanned. Assuming that it would not be statistically significant or reliable, these many different protocols could not be compared with each other using our dataset.

Conclusions

In conclusion, when the clinical and physical status (such as immobility and chronic co-morbidities) of PC patients is taken into consideration, PC patients are the highest risk group for the development of PI. The localization of PI and infection are effective factors in the healing of ulcers. The treatment costs for PC patients is higher if they have a pressure ulcer. PI, constitute a severe psychological, social and economic burden in Turkey and throughout the world. We suggest that the necessary precautions must be taken to prevent the development of PI in these patients and improve the quality of life: And wound care must not be neglected. As there have been no other studies in Turkey on the subject of PI and PC, more comprehensive studies will be useful to clarify the economic and social dimensions of this issue.

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Conflicts of interest

There are no conflicts of interest.

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