

# Level of preparation for preventive procedures and pressure ulcer treatment in health care units from the Kujawsko-Pomorski region

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## Abstract

**Purpose:** Prevention of pressure ulcer development is one of the most important tasks of chronic diseases management. These diseases are the risk factors of pressure ulcer development. The effectiveness of prevention depends on medical staff work organization, material resources (e.g. dressings), training system and education.

The aim of the study was to assess the level of preparation for prevention activities, risk assessment, pressure ulcer treatment and documentation in health care units from Kujawsko-Pomorski region.

**Material and methods:** This study was based on the questionnaire and was performed in 21 health care units. We assessed basic equipment of 1 060 beds from internal, neurological and long-term care wards.

**Results:** The highest risk of pressure ulcer development was identified in neurological wards. Hospitalisation longer than 10 days increases the risk. The highest morbidity was presented in long-term care wards. In 50% of hospitals there was a lack of equipment and materials used for pressure ulcer management and prevention, especially pressure-reducing mattresses.

**Conclusions:** Hospitals are not well performed for effective prevention and management of pressure ulcers.

**Key words:** pressure ulcers, prevention, pressure ulcer management.

## Introduction

Pressure ulcers are a kind of chronic wounds which are a problem of many hospital wards. These wounds are treated mainly in long-lasting care wards among patients with chronic diseases. They are defined as a local tissue necrosis caused by mechanical forces and clinically they appear as superficial or deep ulcers [1]. Causative action of mechanical forces leading to ischaemia is composed of local pressure, friction and shear forces. Main role in pressure ulcers development plays long-lasting pressure which exceeds capillary pressure value and shuts vessels. Similar effect is caused by shear forces. Whereas friction leads to damage of the skin which in turn may lead to infection and further damage. Mechanical forces are caused by restricted physical activity [1,2].

Other risk factors of pressure ulcers development are: long-lasting exposure to moisture (urine, sweat, stool, wound exudate), poor pain perception, old age, metabolic disorders (diabetes), circulatory disorders (atherosclerosis), nutritional disorders (anaemia, malnutrition) [3], medicines (sedative drugs, pain killers, steroids) [1].

Long-lasting care wards such as oncology, palliative care, geriatrics, internal medicine and rehabilitation are all units where pressure ulcers risk factors are cumulated [1,4,5]. High mortality is also observed in short-term care units where lack of activity and immobilization are important risk factors. Such units are: surgery, neurology, orthopedics and intensive care where medical and nursing procedures should also include preventive activities [5,6].

These preventive activities include identification and selection of high risk patients and providing appropriate care. Prevention should be focused on etiology which can be modified and limited [5]. Effectiveness of such activities depends on many coexistent factors which form quality of health care: number and disposition of personnel and time of care, unit's equipment (mattresses, topical agents, dressings) depending on material means, education and training which form knowledge and

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Table 1. Characteristics of some long-term care units

Unit	Number of beds	Time of hospitalisation	Number of patients from high risk groups*	Number of patients with pressure ulcers at the moment of admission*	Number of patients who acquired pressure ulcers*
Long-term Care Unit	20	3 month	16 (0.8)	2 (0.1)	0
Nursing Care Unit	22	42 days	43 (1.9)	39 (1.77)	4 (0.18)
Treating-care Unit	12	20 days	2 (0.16)	3 (0.25)	1 (0.08)
Long-term Care Unit	48	45 days	50 (1.04)	22 (0.46)	2 (0.041)
Chronic Diseases Unit	70	19 days	60 (0.86)	85 (1.2)	2 (0.03)
Nursing Care Unit	12	30 days	32 (2.6)	8 (0.66)	1 (0.83)
Palliative Care	7	12 days	26 (3.7)	3 (0.43)	0
Long-term Care Unit	30	28 days	26 (0.9)	3 (0.1)	0
Treating-care Ward	45	6 month	160 (3.5)	7 (0.15)	8 (0.17)
Nursing Care Unit	22	31 days	6 (0.3)	7 (0.32)	3 (0.14)
Chronic Diseases Unit	24	2-3 month	34 (1.4)	12 (0.5)	1 (0.42)
Long-term Care, rehabilitation	30	24 days	2 (0.06)	0	0
Palliative Care	25	10 days	94 (2.25)	56 (2.24)	25 (1)
ALL UNITS	367	$S^*=46$ days $SD^{**}=46.45$	$S^*=42.4 (1.5)$ $SD^{**}=43.65 (1.23)$	$S^*=18.7 (0.05)$ $SD^{**}=25.97 (0.69)$	$S^*=3.62 (0.008)$ $SD^{**}=6.8 (0.33)$

\* number of patients / number of beds ratio (on the brackets)

motivation of medical staff, standards and guidelines, high risk patients identification, multidisciplinary teams [1,3-8].

Level of medical knowledge, acquaintance of pressure ulcers etiology and availability of sources and methods of prevention should restrict mortality and incidence of pressure ulcers. They are still a serious medical problem in many units which are limited in mentioned above aspects. Thus an important part of prevention is analysis and assesment of medical units in aspects of sources and preparation for preventive activity followed by modification and correction of identified factors. These activities are facilitated by multidisciplinary team approach which develop guidelines and algorithms of effective prevention and inspire all members of staff in aspect of implementation of prevention and treatment programs [9,10].

The aim of the study was to estimate the risk of pressure ulcers development and to asses the resources of health care units from the Kujawsko-Pomorski region of Poland.

## Material and methods

This study was conducted in 21 health care units in Kujawsko-Pomorski region. Total amount of analysed beds was 1 060 (from internal medicine, neurology and long-lasting care units).

We used questionnaire developed by Pressure Ulcers Prevention and Treatment Team in cooperation with Regional Nursing Consultant.

Questionnaire was composed of following parts:

- general questions (number of beds, mean time of hospitalisation, number of patients per one month, number of nurses),
- questions concerning a number of patients from high risk group, with already existed pressure ulcers and patients with pressure ulcers developed during hospital stay,

- questions concerning available resources (nursing, preventive),

- questions concerning methods of pressure ulcers prevention, documentation, number and quality of education and training in terms of pressure ulcers.

Data concerning individual patients (high risk groups, patients with already existing ulcers and patients with pressure ulcers developed during hospital stay) were divided by a number of beds because our study included various units. Thus result is presented as a “r” coefficient (Tab. 1,2), r – number of patients/ number of beds.

Statistical analysis was performed to obtain the results (normal distribution, t-student test). Consent of local bioethics commission was obtained.

## Results

Questionnaire was posted to 25 health care units all over the Kujawsko-Pomorski region. Twenty-one questionnaires (84%) returned to authors. They came from 30 different units (internal, neurology, long-term care).

Study concerned various units. In internal units 527 beds were analysed, in neurological units – 166 and in long-term care units – 367. Total number of analysed beds was 1 060.

Duration of patient’s hospital stay was depended on kind of care. In units with emergency rooms high patient’s rotation was observed, patient’s hospital stay was between 3 to 7 days, whereas in long-term care units hospital stay was between 1 to 6 months.

Number of patients from high risk group varied between units. This number was divided by a number of beds obtaining “r” coefficient. The highest risk of pressure ulcers development was found in neurological wards where  $r=0.5.2$ , mean

**Table 2. Short-term care units characteristics**

Unit	Number of beds	Time of hospitalisation	Number of patients from high risk groups*	Number of patients with pressure ulcers at the moment of admission*	Number of patients who acquired pressure ulcers*
Internal medicine units – all	29	2-6 month	20 (0.7)	2 (0.07)	0
	46	4 days	37 (0.8)	2 (0.04)	0
	70	10 days	50 (0.7)	2 (0.03)	0
	36	5-8 days	30 (0.8)	2 (0.06)	0
	81	9 days	60 (0.74)	18 (0.22)	0
	35	4 days	15 (0.4)	2 (0.06)	0
	35	4 days	15 (0.4)	2 (0.06)	0
	36	5 days	80 (2.2)	2 (0.08)	0
	30	5 days	0	0	0
	65	7 days	30 (0.46)	3 (0.04)	0
	35	6 days	5 (0.14)	3 (0.09)	0
	29	7 days	2 (0.07)	1 (0.03)	0
		<b>527</b>	<b><math>S^*=15.63</math> <math>SD^*=32.9</math></b>	<b><math>S^*=28.67 (0.65)</math> <math>SD^*=24.66 (0.57)</math></b>	<b><math>S^*=3.25 (0.0015)</math> <math>SD^*=4.71 (0.05)</math></b>
Neurological units – all	25	8 days	12 (0.48)	1 (0.04)	3 (0.12)
	25	8-10 days	20 (0.8)	1 (0.04)	0
	38	5-7 days	197 (5.2)	1 (0.026)	8 (0.21)
	38	12 days	0	9 (0.24)	0
	40	10 days	120 (3)	5 (0.12)	5 (0.12)
	<b>166</b>	<b><math>S^*=9</math> <math>SD^*=2.23</math></b>	<b><math>S^*=69.8 (0.42)</math> <math>SD^*=2.18</math></b>	<b><math>S^*=3.4 (0.003)</math> <math>SD^*=3.58 (0.09)</math></b>	<b><math>S^*=3.2 (0.003)</math> <math>SD^*=3.42 (0.09)</math></b>
ALL	<b>693</b>	<b><math>S^*=13.68</math> <math>SD^*=27.5</math></b>	<b><math>S^*=40.76 (0.06)</math> <math>SD^*=40.76 (1.33)</math></b>	<b><math>S^*=3.29 (0.002)</math> <math>SD^*=4.3(0.07)</math></b>	<b><math>S^*=0.94 (0.0006)</math> <math>SD^*=2.28 (0.06)</math></b>

\* number of patients / number of beds ratio (on the brackets)

$r=2.1$ . High risk was also observed in long-term care units where mean  $r=1.5$ . The lowest risk was observed in internal units where mean  $r=0.7$ . Comparison of groups found statistically significant differences between patients from neurological units and from internal units ( $t=2.44$ ,  $p<0.01$ ). Differences between neurological and long-term care units were not statistically significant.

All units also varied in aspect of number of patients who developed pressure ulcers during hospital stay. Long-term care units had the highest  $r$  value ( $r=0.008$ ). Slightly less  $r$  value was observed in neurological units ( $r=0.003$ ). In internal units  $r$  value was 0. Statistically significant differences were observed between long-term care units and internal and neurological units ( $t=3.9$ ,  $p<0.001$ ).

Interestingly in long-term care units number of patients with already existed pressure ulcers was high in time of admittance (mean 18-19 patients per three months,  $r=0.05$ ) whereas in short-term care units (neurological and internal) patients with already existed pressure ulcers are admitted very seldom (about 3 patients per three months,  $r=0.002$ ). Differences are statistically significant ( $t=56.9$ ,  $p<0.001$ ).

Our study also compared mortality in big and small units. In small units (7 to 24 beds, mean 17 beds) more patients developed pressure ulcers during hospital stay ( $r=0.014$ ) than in big units (number of beds  $>29$ ) in which  $r=0.003$ . Difference is statistically significant ( $t=3$ ,  $p<0.001$ ).

In every unit staff was complaining on lack of equipment, resources and instruments needed for effective prevention of pressure ulcers. The main problems of all units was lack of special mattresses. Most of all mattresses available in units were static. Only some wards had air-fluidized and low-air-loss devices. Even in these wards available mattresses were enough only for a half of patients from high risk group (e.g. palliative care ward with 25 beds had only 13 special mattresses, whereas nursing ward with 45 beds had only 15 ones). Among other lacking resources were: rolls facilitated patients' position changing, wheel chairs, integrated bath systems, skin care products, napkins, modern dressings.

All questionnaires informed about insufficient number of staff members. Low level of employment, especially on weekends and during the nights doesn't assure patients' needs. In many units special prevention standards and documentation are implemented. Medical staff take part in training days focused on pressure ulcers prevention. Only some wards had sufficient registration of patients with pressure ulcers.

## Discussion

Intensive prevention of pressure ulcers is a fundamental part of nursing care, especially in case of patients from high risk group. The highest risk group are patients with diseases requir-

ing lying in bed whose restricted activity has two aspects. First, low physical activity due to long-lasting immobility. Second, restricted possibility to change position of the body. Effect of these two aspects is long-lasting pressure which plays the main role in pressure ulcer development [6,9,11].

In our study the highest risk of pressure ulcers development had patients from neurological units. In spite of short time of hospital stay the risk in this group is high due to character of pathology and methods of treatment. Among neurological pathologies the most common causes of pressure ulcers are: paralyzes (strokes, injuries) with restricted possibility of movement and perception disorders which interrupt senses of stimuli, especially pain, which suggests local ischaemia caused by pressure.

Patients from long-term care units are also in high risk group. It is caused by long-lasting pressure complicated by complex coexistent diseases. Among these complex disorders the most important are old age, senile dementia, cachexia, multiorgan failure and systemic disorders. In these units a lot of patients have already existed pressure ulcers in time of admission. Other factor which facilitate pressure ulcers development in long-term care units is a long time of hospital stay [3,8,12]. Longer hospital stay facilitate pressure ulcers development in higher number of patients. Doren Norton states that 70% of pressure ulcers develop in two weeks time after admission [13]. Bergstrom and Braden found that 34% of pressure ulcers develop during the first seven days of hospital stay (in older age population), whereas 90% of pressure ulcers develop in third week of hospital stay. In conclusion authors say that the most critical time for pressure ulcers development is 14th day of hospital stay [11]. In our studies a period longer than 10 days increases both risk and mortality.

Prevalence of pressure ulcers is often a result of the lack of special equipment and materials for prevention and treatment of pressure ulcers next to lack of staff.

One of the most important instruments of prevention are special mattresses. They are very important for patients with restricted mobility. These mattresses dispose weight of the body and disperse pressure all over the surface. These mattresses dispose weight of the body and disperse pressure all over the surface. Level of pressure reduction and effectiveness is a result of matres' dynamics which was confirmed in the study of Cochrane Group (1999). Review of mattresses, beds and pillows reported that these equipment is very useful. Similar results were obtained by Russem and Richtenstein [6,14,15].

In all units staff personnel was complaining on lack of equipment and most of all mattresses. In the majority of units available mattresses were enough only for 50% of patients from high risk group. Especially weak resources were observed in small long-term care units and this situation should be changed.

## Conclusions

1. Health care units from Kujawsko-Pomorski region are not well performed to provide effective prevention of pressure ulcers. High risk of pressure ulcers development is observed in short-term and long-term care units.

2. The highest risk was observed in neurological wards. Hospital stay longer than 10 days increases the risk. Half of units had not enough equipment and resources for effective pressure ulcers prevention. The highest prevalence and mortality was observed in long-term care units.

Our results suggest the need for development in aspect of effective prevention and treatment of pressure ulcers. Thus Regional Consultant in cooperation with Pressure Ulcers Prevention and Treatment Team pointed out following tasks:

1. Supervise standards of pressure ulcers prevention.
2. Develop registration of high risk patients.
3. Ensure accurate equipment and resources.
4. Analyse amount of staff members, especially nurses.
5. Implement medical staff education programs.

The aim of mentioned tasks is to improve the quality of health care and increase effectiveness of pressure ulcers prevention in health care units especially in long-term care units.

## References

1. Schue RM, Langemo DK. Prevalence, Incidence, and Prevention of Pressure Ulcers on Rehabilitation Unit. *JWOCN*, 1999; 26, 3: 121-9.
2. Leigh IH, Bennett G. Pressure Ulcers: Prevalence, Etiology, and Treatment Modalities – a Review. *Am J Surg*, 1994; 167, 25–30.
3. Frantz RA, Hsiao-Chen Tang J, Titler MG. Evidence-Based Protocol Prevention of Pressure Ulcers. *J Gerontol Nur*, 2004; 30, 2: 4-11.
4. Galvin J. An audit of pressure ulcer incidence in a palliative care setting. *Int J Palliat Nurs*, 2002; 8, 5: 214-20.
5. Schoonhoven L, Haalboom J, Bousema MT, Algra A, Gryphonck MH, Buskens E. Prospective cohort study of routine use of risk assessment scales for prediction of pressure ulcers. *Br Med J*, 2002; 12, 325 (7368): 797-807.
6. Sanada H, Nagakawa T, Yamamoto M, Higashidani K, Tsuru H, Sugama J. The role of skin blood flow in pressure ulcer development during surgery. *Adv Wound Care*, 1997; 10: 29-34.
7. Dolynchuk K, Keast D, Campbell K, Houghton P, Orsted H, Sibbald G. Best Practice for the Prevention and Treatment of Pressure Ulcers. *Ostomy/Wound Management*, 2000; 46, 11: 38-52.
8. Hunter S, Cathcard-Silberberg T, Langemo DK, Olson B, Hanson D, Burd C. Pressure ulcer prevalence in a rehabilitation hospital. *J Rehabil Nurs*, 1992; 5: 239-42.
9. Richens Y, Stephnes F, Bick D, Loftus-Hills A, Duff L. Pressure ulcer risk assessment and prevention. Oxford: Royal College of Nursing; 2003.
10. MacLeod FE, Harrison MB, Graham ID. The Process of Developing Best Practice Guidelines for Nurses in Ontario: Risk Assessment and Prevention of Pressure Ulcers. *Ostomy/Wound Management*, 2002; 48: 30-38.
11. Bergstrom N, Braden B. A prospective study of pressure sore risk among institutionalized elderly. *J Am Ger Soc*, 1992; 40: 748-58.
12. Armstrong D, Bortz P, Halter MJ. An Integrative review of pressure relief in surgical patients. *AORN Journal* 2001, 73, 3: 645-74.
13. Mei-che Pang S, Kwok-shing Wong T. Predicting Pressure Sore Risk With the Norton, Braden, and Waterlow Scales in a Hong Kong Rehabilitation Hospital. *Nursing Research*, 1998; 47: 147-53.
14. Collins F. ProfiCare: an alternating pressure-relieving mattress. *Br J Nurs*, 2003; 12: 1156-61.
15. Russell JA, Lichtenstien SL. Randomized controlled trial to determine the safety and efficacy of a multicell pulsating dynamic mattress system in the prevention of pressure ulcers undergoing cardiovascular surgery. *Ostomy/Wound Management* 2000; 46: 46-55.