

## Pressure Ulcers in the Elderly, as a Public Health Problem

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### Abstract

Pressure ulcers (PU) are a common medical complication in the frail elderly. Due to the increase of the elderly population and accrued accompanying comorbidities, there is a higher prevalence of pressure ulcers. These induce suffering and worsening in quality of life and prolong hospitalization. Pressure ulcers are a burden on the medical services and increase their cost substantially. Systemic factors such as aging of the skin, functional impairment, chronic diseases, malnutrition and infection contribute to the appearance of the ulcers and activate development. Low BMI, anemia, low protein and albumin are predisposing factors, as well as serious complications of pressure ulcers interfere with the cure. Prevention of pressure ulcers should be started by the primary care givers through education of the patient and family concerning the external factors as pressure relieving devices, especially mattresses and cushions, position changes, lubrication of the skin and adequate calorie intake for the patient. Attention becomes directed to changes of the skin especially at the location of bone prominences exposed to pressure. A zero-tolerance policy is necessary by the primary physician and the nurse, concerning pressure ulcers. The treating physician familiar with the diseases of the immobile patients and the systemic factors leading to pressure ulcers should apply all available preventive measures.

**Keywords:** Pressure ulcers; Frail elderly; Primary physician; Prevention

### Introduction

Pressure ulcers (PU) occurrence presents a heavy burden on the medical services. Better living conditions and improved medical care have increased life expectancy of the elderly population. Many suffer from severe and chronic diseases, nutritional deficiencies and frailty [1]. Comorbidities in addition to the aging process resulting in immobility, which combined are a predisposing factor for PU [2]. Prolonged life expectancy has increased the number of the aged over 80 years, thus being placed at higher risk for immobility and disability. Progress in medicine and research has improved the understanding of systemic disorders (cardiac, pulmonary, diabetes etc), and significantly increased the life expectancy to more advanced stages of the diseases. Similarly, life is prolonged in patients suffering from neurodegenerative conditions such as advanced dementia and a long course of Parkinson's disease. Difficulty in implementing of the preventative measures in traumatic conditions, including hip fracture and deconditioning increase the number of PU. Early hospital discharge of patients suffering from severe diseases predisposes to developing PU. The impact of PU on the health care cost, length of hospitalization and higher mortality were noticed in 1990 by Allman [3]. This study reported the increase in the length of hospitalization from 3.2 days in patient without PU, to 18.8 days with PU. The mortality rate in the first year after discharge was doubled in patients with PU, the total mortality was 41% in the first year. Thomas et al. in a review study found that PU is one of the seven domains associated with high mortality [4]. Bennets et al. reported in 2004 [5], the total cost for PU treatment in the UK was £1.4–£2.1 billion annually (4% of total NHS expenditure). The largest percentage of this cost is for

nursing time. The expenses for PU treatment increase with severity of the wounds from £1,064 (Grade 1) to £10,551 (Grade 4). Brem et al. [6] reported that the average cost per patient in the USA in 2010 involving stage IV hospital-acquired PU complications was \$129,248. The cost for community-acquired PU was \$124,327 diagnosed within an average of recurrent admissions. Expenditures increase with ulcer grade due to the longer time to heal and the higher appearance of complications. Complications such as infections or osteomyelitis increase the financial outlays significantly. In a Netherland study published in 2002, the estimated annual cost of treatment for PU treatment ranged from a low estimate of 362 millions of dollars to a high estimate of 2.8 billion dollars [7]. Without preventive measures and improvement of treatment, financial expenses are likely to increase in the future as the growing population ages. Sen et al. [8] cited that 6.5 million patients in the USA are affected by chronic wounds and the estimated annual cost is in excess of 25 billion dollars.

PU can lead to several complications: the most serious is localized infection and invasion of the contagious soft tissue, expressed as cellulitis, osteomyelitis and sepsis. These complications interfere within the healing process, and increase mortality. Lately there are corresponding in the USA concerning lawsuits due to PU appearance during the hospitalization, and the high financial burden on the hospitals [9].

Pressure ulcers are common with the elderly bedbound patients in the community, nursing homes and hospitals [10]. The prevalence of PU in general hospitals heretofore was 4-30%, in long-term care facilities between 2.4%-23% and 4% in home care patients [11]. The prevalence of PU has doubled in recent years, and is more common in the elderly population [12]. The incidence of PU increased by 80% between 1995 and 2008 [13].

In a study performed in 55 wards in Sweden, the age of patients with PU ranged between 19-95 years: 97.7% were 65 and more, 62.8% of them were older than 80 years [14]. PU is a dominant feature in the old-old population.

### Pathogenesis

Lying in bed or sitting in a chair without movement induces pressure on the skin and sub-cutaneous tissues, and are predisposing factors for PU. Redness and breakdown of the skin occurring at the location of bone prominences and the exposure to fecal and urine secretion increases the appearance of the PU. The tissue ischemia is caused by external factors including pressure; shearing forces, friction and moisture play an important role in the wound emergence. The pressure on the skin and subcutaneous tissue during prolonged lying on a bone prominence, as well as immobility without repositioning compresses the blood perfusion and induces oxygen deprivation. The most exposed skin areas susceptible to the introduction of PU are 65% to 75% in the central region, including the pelvis girdle (sacrum, greater trochanter, and ischium), and 25%-30% appearing in peripheral areas, such as the feet (heel, ankle, and the lateral area of the foot) [15]. 20% of PU notably occurs in atypical locations related to medical devices, severe spasticity and bone deformation [16].

Many factors act synergistically and cause PU. Aging of the skin, comorbidities, nutritional state and the functional impairment were reported to be risk factors in development of PU [17]. The most significant associated factors, however, are the result of the functional outcomes of the diseases such as immobility, incontinence and impaired cognition. These functional impairments, particularly immobility, increase vulnerability as well as damage the integrity of the skin by external factors, including pressure, shearing forces, friction and wetness, resulting in PU [18].

Age-related skin changes induce flattening of the layers at the dermo-epidermal junction, a loss of elasticity and thinning of subcutaneous tissue. Reduced vascular intradermal blood perfusion and oxygenation are important age related factors for the development of PU [19]. Reduced muscle mass (sarcopenia) and decrease in both the hormonal secretion and the immunity lead to susceptibility of skin damage.

The physiologic healing process of these wounds consists of four dynamic, well defined, overlapping stages: homeostasis, inflammation, proliferation and remodeling. In aging, the healing process might be arrested at any of the above stages; especially at the inflammatory or proliferative stage. The mediators of this arrest can include an impairment of the inflammatory cells, growth factors, proteases, cellular and/or extracellular elements [20].

Systemic factors including aging of the skin, functional impairment, chronic diseases, malnutrition and infection contribute to the appearance and development of the ulcers. Anemia, low protein and albumin are predisposing factors, as well as being serious complications affecting PU, interfering with the cure. Low tissue thickness due to decreased BMI is a predisposing factor for PU, especially in surgical and orthopedic patients [21]. These commonly appear in patients with chronic diseases including advanced dementia, Parkinson disease, fracture of the hip, traumatic events and deconditioning occurring with longer hospitalization. Prolonged periods of time lying in bed without movement, as well as moisture due to urinary incontinence, are additional causes increasing the incidence of PU.

Dementia is the fourth leading cause of death and the accompanying prevalence of PU in these patients is rising rapidly. Advanced stages of dementia, accompanied by immobility, spasticity, rigidity, contractures, feeding problems, malnutrition, and recurrent infections, are predisposing factors for PU [22]. Pressure on tissue by medical devices including urinary catheters, gastrostomy, oxygen mask and others are prone to induce skin damage, and are important initial signs of PU [23].

### Prevention

Taking in consideration that PU are avoidable, all preventive measures are to be undertaken. Systemic and local factors are involved in the prevention: including, nutritional measures by increasing the intake of calories: 25-30 cal/kg and proteins 1.2 gr/kg. Blood transfusions are to be considered in the presence of low hemoglobin. Pneumonia, urinary and skin infections require immediate treatment to prevent further deterioration of the patient's condition. Drugs affecting the alertness, movement and appetite are to be avoided. Local factors (pressure, shearing forces, friction, and moisture) play an important role in the appearance of the PU and measures should be taken to prevent these. It is essential to change the position of the patient even when using pressure relieving devices (mattresses and cushions). Patients require repositioned every 2-3 hours. Alternating pressure mattresses are recommended for the prevention of PU, as well as to alleviate the pressure on pre-existing wounds. Nixon et al. reported that the use of these relief mattresses are associated with the delay in wound development and reduce hospital expenses [24].

The immobile and disabled elderly person lying in bed or sitting in a chair for long periods of time is considered to be prone to develop PU. It is encouraged to examine the skin of these patients for redness, especially in the areas of the bony prominences, such as the sacrum, trochanter and heels. The same attention is to be given to young patients who are immobile.

Each elderly patient, either at home, on admission to the hospital or at a long term care facility, requires risk assessment for the potential of PU development. The primary recognized risk assessment scales are the Norton, Braden, Gosnell and Waterlow tools [25,26]. The Braden scale is reported to be superior in sensitivity and specificity compared to other screening tools [25]. The Braden score assesses six risk factors: sensory perception, skin moisture, activity levels, mobility, observed nutritional intake, friction and shearing forces. The Braden score defines the levels of risk, with a maximum normal score of 23; 18 or less identifying being at risk, and a score of 12 and less indicates patients at high risk [26].

There are appropriate strategic interventions for the prevention of PU. In a systematic study with randomized control trials (RCT's), strategy interventions were found to influence the effects of impaired mobility, consisting of redistributing the patient's weight in bed or in a chair, via a special mattress or a special seat cushion, as well as frequent repositioning. Optimizing the nutritional status is promoted as a prevention strategy by supplying adequate amount of calories and protein are recommended [27]. Applying moisturizing creams on the dry sacral skin is beneficial. The preventive measures such as pressure redistribution mattresses, as well as perineal foam cleansers and dry skin emollients, have proven to be a cost-effective treatment for long-term residents [28].

Knowledge and awareness by health-care practice providers, both professional (nurse and physician) and non-professional (family and

aides), decisive factors in the detection of the first signs of redness of the skin. Early detection, identification, and implementing preventative strategies, carried out in various location including the community, hospital and in the LTC are important tasks in the prevention of PU in elderly persons at risk. These strategies are to be broadly implemented by the caregiver.

The preventative measures start at home initiated by family members and care takers by improving the nutritional state of the elderly, preventing external pressure, shearing forces as well as attention to repositioning and avoiding moisture of the skin.

The general practitioner or the nurse is responsible for explaining methods for preventing pressure and moisture of the skin to the patient, family and caretakers. The use of external pressure relieving devices (mattresses and cushions), position changes, lubrication of the skin, and adequate calorie intake are vital. A zero-tolerance policy for the appearance of PU is to be established. It is essential for the physician to acquire sensitivity in detecting subtle clinical changes, affecting skin and subcutaneous tissues, especially edema appears in diseases such as hypothyroidism, congestive heart, renal and liver failure. Sources of infection (urinary or respiratory tract), decrease of alertness and cognitive impairment resulting in pressure on the skin should be taken in consideration. Change in the medical and functional condition requires the treating physician and the nurse to provide immediate preventive measures.

Coordination between the clinical team, the family physician, caregivers and the family is necessary. Assessment for the formation of pressure ulcers should be made periodically.

Lack of knowledge and familiarity with the etiology of the PU formation, significantly at the community level, results in the wound appearance. The primary team and the non-professional caregivers have an important role in the prevention. The GP and nurse are the first to visit the immobile patient at home and to recognize the initial signs of pressure of the skin and plan the interventions for prevention [29]. Periodic training and ongoing continuity of education are fundamental for the primary team, caregiver and the family. Family and private caregivers are typically under-educated in recognizing and addressing the first skin sign of PU. The role of the primary physician in determining the method of feeding for patients afflicted by various degree of dysphagia is particularly challenging in the PU prevention. The issue of the feeding route raises ethical questions centering on whether or not to introduce a nasogastric tube or to perform gastrostomy.

Patients often develop PU within the first two weeks of hospitalization [30]. Elderly bedbound patients upon admission, require a risk assessment, clinical examination, and intervention (e.g., a special mattress or a special seat cushion, and frequent repositioning). At the onset of an acute illness and shortly after hospital admission, when the elderly patients are confined to bed, PU is prone to develop due to lack of a special mattress and repositioning. These PU appearances can be prevented by early intervention. In a related study, 30% of elderly patients with hip fracture developed pressure ulcers shortly after hospital admission due to lack of preventive measures [31]. Acute medical situations including stroke, hip fracture, systemic infections and metabolic disorders, and other severe diseases aggravate the wound state. These factors lower the patient's cognitive/conscious state, impairing the ability to feel pain, to change positions and to ask for help. An incentive system for the staff to promote the prevention of PU should be encouraging [32].

Immediate attention and treatment of PU is advantageous for the patients, and prevents further deterioration [33].

It is relevant to recognize that a prolonged stay in the emergency room induces the first sign of pressure on the skin and can result in the appearance of PU.

The orderlies in LTC facilities are encouraged to report any suspicious skin lesions, as these are the first to be in contact with the patient.

## Conclusion

The increase of the elderly population and the coexisting comorbidities and disability, has brought a higher prevalence of PU occurring in the elderly. These severe medical conditions necessitate hospitalization, with higher morbidity and mortality. The cost of treating PU has substantially increased and is a burden for the medical services. Awareness and familiarity with the medical aspects play an important role in the prevention of PU. Continuing education of the medical staff, caregivers and family members are important tools to prevent and to treat pressure ulcers.

## References

1. Dexter PR, Miller DK, Clark DO, Weiner M, Harris LE, et al. (2010) Preparing for an aging population and improving chronic disease management. *AMIA Annu Symp Proc* 2010: 162-166.
2. Jaul E, Calderon-Margalit R (2013) Systemic factors and mortality in elderly patients with pressure ulcers. *Int Wound J*.
3. Allman RM (1998) The impact of pressure ulcers on health care costs and mortality. *Adv Wound Care* 11: 2.
4. Thomas DR, Goode PS, Tarquine PH, Allman RM (1996) Hospital-acquired pressure ulcers and risk of death. *J Am Geriatr Soc* 44: 1435-1440.
5. Bennett G, Dealey C, Posnett J (2004) The cost of pressure ulcers in the UK. *Age Ageing* 33: 230-235.
6. Brem H, Maggi J, Nierman D, Rolnitzky L, Bell D, et al. (2010) High cost of stage IV pressure ulcers. *Am J Surg* 200: 473-477.
7. Severens JL, Habraken JM, Duivenvoorden S, Frederiks CM (2002) The cost of illness of pressure ulcers in The Netherlands. *Adv Skin Wound Care* 15: 72-77.
8. Sen CK, Gordillo GM, Roy S, Kirsner R, Lambert L, et al. (2009) Human skin wounds: a major and snowballing threat to public health and the economy. *Wound Repair Regen* 17: 763-771.
9. Voss AC, Bender SA, Ferguson ML, Sauer AC, Bennett RG, et al. (2005) Long-term care liability for pressure ulcers. *J Am Geriatr Soc* 53: 1587-1592.
10. Horn SD, Bender SA, Ferguson ML, Smout RJ, Bergstrom N, et al. (2004) The National Pressure Ulcer Long-Term Care Study: pressure ulcer development in long-term care residents. *J Am Geriatr Soc* 52: 359-367.
11. Allman RM (1997) Pressure ulcer prevalence, incidence, risk factors, and impact. *Clin Geriatr Med* 13: 421-436.
12. Whittington K, Patrick M, Roberts JL (2000) A national study of pressure ulcer prevalence and incidence in acute care hospitals. *J Wound Ostomy Continence Nurs* 27: 209-215.
13. Lyder CH, Ayello EA (2009) Annual checklist: the CMS pressure ulcer present-on-admission indicator. *Adv Skin Wound Care* 22: 476-484.
14. Lindgren M, Unosson M, Ek A-C (2000) Pressure sore prevalence within a public health services area. *Int J Nurs Pract* 6: 333-337.
15. Smith DM, Besdine RW, Rubinstein LZ, Sznder (1996) The medical care of the nursing home resident. Philadelphia American college of Physician 61-74.

16. Jaul E (2011) A prospective pilot study of atypical pressure ulcer presentation in a skilled geriatric nursing unit. *Ostomy Wound Manage* 57: 49-54.
17. Thomas DR (2001) Age-related changes in wound healing. *Drugs Aging* 18: 607-620.
18. Allman RM1, Goode PS, Patrick MM, Burst N, Bartolucci AA (1995) Pressure ulcer risk factors among hospitalized patients with activity limitation. *JAMA* 273: 865-870.
19. Farage MA1, Miller KW, Berardesca E, Maibach HI (2009) Clinical implications of aging skin: cutaneous disorders in the elderly. *Am J Clin Dermatol* 10: 73-86.
20. Enoch S1, Grey JE, Harding KG (2006) Recent advances and emerging treatments. *BMJ* 332: 962-965.
21. Ek AC1, Unosson M, Larsson J, Von Schenck H, Bjurulf P (1991) The development and healing of pressure sores related to the nutritional state. *Clin Nutr* 10: 245-250.
22. Mitchell SL1, Teno JM, Kiely DK, Shaffer ML, Jones RN, et al. (2009) The clinical course of advanced dementia. *N Engl J Med* 361: 1529-1538.
23. Black JM1, Cuddigan JE, Walko MA, Didier LA, Lander MJ, et al. (2010) Medical device related pressure ulcers in hospitalized patients. *Int Wound J* 7: 358-365.
24. Nixon J, Cranny G, Iglesias C, Nelson EA (2006) Randomised, controlled trial of alternating pressure mattresses compared with alternating pressure overlays for the prevention of pressure ulcers: PRESSURE (pressure relieving support surfaces) trial *BMJ* 332:1413.
25. Pancorbo-Hidalgo PL, Garcia-Fernandez FP, Lopez-Medina IM, Alvarez-Nieto C (2006) Risk assessment scales for pressure ulcer prevention: a systematic review. *J Adv Nurs* 54: 94-110.
26. Bergstrom N, Braden BJ, Laguzza A, Holman V (1987) The Braden Scale for Predicting Pressure Sore Risk. *Nurs Res* 36: 205-210.
27. Reddy M, Gill SS, Rochon PA (2006) Preventing pressure ulcers: a systematic review. *JAMA* 296: 974-984.
28. Pham B, Stern A, Chen W, Sander B, John-Baptiste A, et al. (2011) Preventing pressure ulcers in long-term care: a cost-effectiveness analysis. *Arch Intern Med* 171: 1839-1847.
29. Kimura S, Pacala JT (1997) Pressure ulcers in adults: family physicians' knowledge, attitudes, practice preferences, and awareness of AHCPR guidelines. *J Fam Pract* 44: 361-368.
30. Lyder CH (2003) Pressure ulcer prevention and management. *JAMA* 289: 223-226.
31. Baumgarten M, Margolis DJ, Orwig DL, Shardell MD, Hawkes WG, et al. (2009) Pressure ulcers in elderly patients with hip fracture across the continuum of care. *J Am Geriatr Soc* 57: 863-870.
32. Rosenthal MB (2007) Nonpayment for performance? Medicare's new reimbursement rule. *N Engl J Med* 357: 1573-1575.
33. Asimus M1, Maclellan L, Li PI (2011) Pressure ulcer prevention in Australia: the role of the nurse practitioner in changing practice and saving lives. *Int Wound J* 8: 508-513.