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Prevalence of deep tissue injuries in hospitals and nursing homes: Two cross-sectional studies

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ABSTRACT

Background: Deep tissue injuries are severe damages underneath the intact skin caused by long-endured, unrelieved pressure or shear forces. Empirical evidence regarding the magnitude of this health problem is limited.
Objective: Investigation of the prevalence, characteristics of persons affected and identification of the most affected body locations.
Design: Two cross-sectional studies in 2008 and 2009.
Settings: Nursing homes and hospitals throughout Germany.
Participants: 6919 (year 2008) and 8451 (year 2009) hospital patients and nursing home residents.
Methods: Trained nurses conducted full skin assessments and collected demographic data based on written data collection forms. The Braden scale was used to measure pressure ulcer risk.
Results: Pressure ulcer prevalence including grades 1–4 and deep tissue injuries ranged from 4.3% (95% CI 3.8–4.9) in nursing homes to 7.1% (95% CI 6.2–8.0) in hospitals. Point prevalence rates of deep tissue injuries were 0.4% (95% CI 0.2–0.5) in hospitals and less than 0.1% in nursing homes. In total, 30 persons were affected by 38 deep tissue injuries. The mean age was 73.4 and the mean Braden scale sum score was 12.8. The most frequently affected anatomic sites were heels ($n = 24$) and ischial tuberosities ($n = 6$).
Conclusions: Nurses must be aware that deep tissue injuries exist in clinical practice. Deep tissue injuries seem to be more common in hospitals than in nursing homes and heels are more prone to this kind of injuries than other body sites. Whenever such a lesion is suspected, optimal pressure relief is required to enable the affected tissue to heal.

What is already known about the topic?

- Deep tissue injuries are severe pressure and shear related damages under intact skin.
- There is limited evidence regarding the extent of this health problem.

What this paper adds

- In Germany 0.4% of all hospital patients are affected by at least one deep tissue injury.
- Deep tissue injuries seem to play a minor role in German nursing homes.
- Heels, ischial tuberorities and sacrum are the most affected anatomic locations.

1. Introduction

Pressure ulcers are serious health problems. Today, there are vast amounts of literature and guidance as to the prevention, classification and treatment of these injuries (Anthony et al., 2008; Kottner et al., 2009a; Reddy et al., 2008). However, the process of tissue breakdown has not been fully understood yet. Recent research results suggest that pressure-induced tissue injuries always start in the

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muscle and/or subcutaneous fat, because the skin survives longer periods of ischemia without irreversible damage (Berlowitz and Brienza, 2007; Salcido et al., 2007). As early as 1975 Shea described "Closed Pressure Sores" (p. 98) to characterise damages in the subcutaneous fat without involvement of the overlying skin but this phenomenon was less often recognised in nursing practice and research. A review including literature up to 2002 revealed 23 articles somehow related to pressure related injuries under intact skin (Ankrom et al., 2005). Since these injuries had been overlooked in current pressure ulcer classification systems, the new category of "Deep Tissue Injury (DTI)" was incorporated into the updated classification by the National Pressure Ulcer Advisory Panel in the USA in 2007. A DTI is defined as a "purple or maroon localized area of discoloured intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue" (Black et al., 2007). Today, DTIs are widely described and discussed in the nursing and wound care literature (e.g. Beeckman et al., 2007; Donelly, 2005; Edsberg, 2007), but knowledge about frequency, clinical course, costs, prevention and treatment strategies of DTIs is still limited (Fleck, 2007; Black, 2009; Linder-Ganz et al., 2009). One important clinical problem that causes difficulties in the correct identification of DTIs is that hours or even days after the injury no or only minor skin alterations are visible (Edsberg, 2007; Salcido et al., 2007). Clinical experience and results of animal and in vitro studies suggest that not every DTI develops to full thickness skin loss (Ankrom et al., 2005; Fleck, 2007; Stekelenburg et al., 2008) but heals without ulceration. Therefore, effective pressure relief is required to support the healing process.

VanGilder et al. (2007, 2009) were the first to report figures of DTI prevalence. In 2006 and 2007, 1340 different US care facilities participated in two prevalence surveys funded by Hill-Rom, Inc. Based on self-reported data DTI prevalence was approximately 3% (VanGilder et al., 2007, 2009). To our knowledge there are no other published figures about the prevalence or incidence of DTIs. In order to evaluate the extent of this health problem in German hospitals and nursing homes the following questions were determined:

(1) What is the prevalence of DTIs among nursing home residents and hospital patients?
(2) What are the defining characteristics of persons affected by DTIs?
(3) Which anatomic sites are most often affected?

2. Methods

2.1. Design

Data about DTIs were obtained during two cross-sectional studies in 2008 and 2009. Methods and procedures followed a standardized study protocol for conducting prevalence studies of care problems in Germany which has been used for several years now (Kottner et al., 2009b). Hospitals and nursing homes throughout Germany were invited to take part in the studies. Participating institutions appointed qualified coordinators who had the primary responsibility for the data collections in their institutions. The study coordinators and ward nurse data collectors were trained based on written instruction material and PowerPoint presentations. According to the study protocol teams of two nurses conducted the data collection including a head-to-toe skin inspection of a standard set of anatomic sites. Data collection occurred within each facility on one single day during a specified week in spring 2008 and 2009. Assessment results were documented on written data collection forms. Upon their completion the data collection forms were sent to our department, where data were input, verified and analysed. The participation of institutions and subjects was voluntary. Any inpatients and residents from all wards of the participating hospitals and nursing homes being 17 years or older were considered eligible. There were no other restrictions or exclusion criteria.

2.2. Measures

Data collection forms for hospital patients and nursing home residents included demographic characteristics and numerous standardized assessment instruments. Among others, the Braden scale (Bergstrom et al., 1987) was used to assess the pressure ulcer risk. It consists of six items contributing to pressure ulcer development. After summing up individual item scores, the Braden scale sum scores can range from 6 (maximum pressure ulcer risk) to 23 (no pressure ulcer risk). A meta-analysis demonstrated that the Braden scale shows the best balance between sensitivity and specificity (Pancorbo-Hidalgo et al., 2006). Interrater reliability of the German version expressed by intraclass correlation coefficients varied between 0.73 (95% CI 0.26–0.91) and 0.95 (95% CI 0.87–0.98) (Kottner and Dassen, 2008a).

The nurses collecting data classified pressure ulcers in four grades in accordance with the European Pressure Ulcer Advisory Panel (1998). Grade 1 is non-blanchable erythema of intact skin. Discolouration of the skin, warmth, oedema, indurations or hardness may also be used as indicators, particularly on individuals with darker skin. Grade 2 is partial thickness skin loss involving epidermis, dermis or both. The ulcer is superficial and is clinically presented as an abrasion or blister. Grade 3 is full thickness skin loss involving damage to or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia. Grade 4 is extensive destruction, tissue necrosis. Additionally, nurses had to rate the existence of a DTI (yes/no) based on the definition and descriptions provided by the NPUAP (Black et al., 2007). In order to ensure conceptual and semantic equivalence the definition and descriptions were independently translated into German by two researchers. The results were then compared and any disagreements resolved. Subsequently, the translation was discussed by all research team members, a wound care specialist and an acknowledged translator until agreement was achieved. Additionally, two photographs showing typical examples of DTIs were