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Determinants of mortality among older adults with pressure ulcers

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ABSTRACT

The presence of pressure ulcers imposes a huge burden on the older person's quality of life and significantly increases their risk of dying. The objective of this study was to determine patient characteristics associated with the presence of pressure ulcers and to evaluate the risk factors associated with mortality among older patients with pressure ulcers. A prospective observational study was performed between Oct 2012 and May 2013. Patients with preexisting pressure ulcers on admission and those with hospital acquired pressure ulcers were recruited into the study. Information on patient demographics, functional status, nutritional level, stages of pressure ulcer and their complications were obtained. Cox proportional hazard analysis was used to assess the risk of death in all patients. 76/684 (11.1%) patients had pre-existing pressure ulcers on admission and 30/684 (4.4%) developed pressure ulcers in hospital. There were 68 (66%) deaths by the end of the median follow-up period of 12 (IQR 2.5–14) weeks. Our Cox regression model revealed that nursing home residence (Hazard Ratio, HR = 2.33, 95% confidence interval, CI = 1.30, 4.17; $p = 0.005$), infected deep pressure ulcers (HR = 2.21, 95% CI = 1.26, 3.87; $p = 0.006$) and neutrophilia (HR = 1.76; 95% CI 1.05, 2.94; $p = 0.031$) were independent predictors of mortality in our elderly patients with pressure ulcers. The prevalence of pressure ulcers in our setting is comparable to previously reported figures in Europe and North America. Mortality in patients with pressure ulcer was high, and was predicted by institutionalization, concurrent infection and high neutrophil counts.

1. Introduction

Pressure ulcers are associated with disability and are increasingly common with age, with 70% occurring in people aged over 70 years (Bansal, Scott, Stewart, & Cockerell, 2005). The development of pressure ulcers results in increased morbidity and has a major impact on the older person's quality of life. Although preventable, pressure ulcers are a common finding in hospitalized elderly patients who are confined to bed by their acute illness (Allman, Goode, Patrick, Burst, & Bartolucci, 1995). The prevalence rate of pressure ulcers in hospitals ranged from 5.8% to 26% according to studies from Europe, Canada and United States (Lyder et al., 2012; Vanderwee, Clark, Dealey, Gunningberg, & Defloor, 2007; Woodbury & Houghton, 2004). There have been few published studies on the prevalence of pressure ulcers in Asia, and these were small studies in single centers. The prevalence of pressure ulcers in a teaching hospital in China was very low at 1.8%, and while the much higher prevalence of 18.1% was reported from a tertiary hospital in Singapore (Chan, Tan, Lee, & Lee, 2005; Cong, Yu, & Liu, 2012). Igarashi and colleague performed a postal survey in Japan and reported the prevalence of 9.6% in long term care hospitals (Igarashi et al., 2013). There has been no previous published report of pressure ulcers or its implications involving older persons in Malaysia. Malaysia is a young country with rapid development following just over 50 years of independence. Like its South East Asian neighbors, the older population in Malaysia is expanding rapidly as it moves from an agriculturally based economy to a manufacturing based economy. The ethnic composition in Malaysia is, however, unique as Malaysia consists of large populations of ethnic Chinese and Indian settlers with highly variable health profiles compared to its ethnic Malay and indigenous population. It is predicted that the percentage of elderly people will comprise of more than 11% of the population by 2020 (Department of Statistics, 2014). With the advancing age of our older population, the healthcare facilities will undoubtedly

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face an increasing number of frail elderly patients who will be at risk of developing pressure ulcers.

Patients with pressure ulcers usually have impaired mobility, malnutrition, incontinence and chronic diseases (Gallagher et al., 2008). As it can be considered a geriatric syndrome, rather than focus on the wound itself, a multidisciplinary approach is required to address the underlying primary illnesses, co-morbidities, functional and nutritional status, social as well as emotional support (Jaul, 2010). In addition to the large physical, emotional and financial burden associated with pressure ulcers, pressure ulcer sufferers are also at increased risk of mortality (Brem et al., 2010; Landi, Onder, Russo, & Bernabei, 2007). The healing of pressure ulcers in an elderly person is difficult to predict and some patients can have chronic deep wounds for prolonged periods. When serious infective complications such as bacteraemia or sepsis occur, the mortality risk has been reported as greater than 50% in this group of patients (Braga, Pirett, Ribas, Gontijo Filho, & Diogo Filho, 2013).

The purpose of this study is to determine the burden and characteristics of pressure ulcers among hospitalized older adults of at least 65 years of age in an acute geriatric unit of a large teaching hospital in Kuala Lumpur, Malaysia. This study will also determine prospectively specific demographic, medical, functional and nutritional factors, and predictors of mortality among patients with pressure ulcers. A better understanding of the factors associated with mortality will be invaluable for healthcare providers in the decision making process of care both acutely and at the end-of-life for this vulnerable group of individuals.

2. Methods

2.1. Setting and patients

This was a prospective observational study performed in a 30-bedded acute geriatric unit at the University of Malaya Medical Centre, Kuala Lumpur from October 2012 to May 2013. This 1000-bed urban teaching hospital is the only hospital that has an acute geriatric unit in Kuala Lumpur, Malaysia. Subjects included in the study were all patients of at least 65 years of age with preexisting pressure ulcers on admission and those who acquired pressure ulcers during their hospitalization. A pressure ulcer was considered to be present if there was evidence of epithelial loss or skin breakdown over a bony prominence in our study. The grading of pressure ulcer stages was documented according to the European Pressure Ulcer Advisory Panel (EPUAP) staging system (Table 1). Individuals with only stage 1 pressure ulcer (erythematous lesions of intact skin) and those with no pressure ulcer throughout the duration of their hospitalization were excluded from the study. Despite the clinical importance of stage 1 pressure ulcer, identification of these lesions are challenging especially in persons with highly pigmented skin in our population. These lesions are frequently confused with other skin lesions and misclassified (Defloor, Schoonhoven, Katrien, Weststrate, & Myny, 2006). Therefore, patients with only stage 1 ulcers were considered ulcer-free for the purposes of this study. This study had obtained ethical approval from the hospital medical ethics committee. Verbal consent was obtained from the patients or their next-of-kin for examination of the pressure ulcer.

Table 1
The EPUAP grading system for pressure ulcers.

Stage	Description
1	Non-blanchable erythema of intact skin
2	Partial thickness skin loss involving the epidermis, dermis or both
3	Full thickness skin loss involving damage to or necrosis of subcutaneous tissue that may extend down to, but no through, underlying fascia
4	Full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone or supporting structures

2.2. Identification and evaluation of pressure ulcers

Pressure ulcers were identified from nursing staff documentation on the skin assessment charts which were performed on all patients admitted to the geriatric unit. Based on the hospital protocol, daily entries were made on the pressure ulcer chart regardless of the presence or absence of a pressure ulcer. The chart also contained information on the stage and location of the pressure ulcers. A trained physician would perform a skin examination on admission and if a new skin break was noted to confirm the diagnosis of a pressure ulcer and its stage, and to distinguish it from other potential skin injury. The skin assessment charts were reviewed weekly by a physician and nurse during the multidisciplinary team meeting to identify any patients with newly acquired pressure ulcers in hospital. Wound infections were diagnosed based on clinical criteria of surrounding skin erythema, purulent discharge with or without increased leukocyte count and spiking pyrexia of above 38 °C.

2.3. Investigative procedure/data collection

Data collection was performed through the review of medical records, hospital charts, laboratory results and interview with patients or their next-of-kin using a standardized data collection document. Sociodemographic details such as age, sex, ethnicity, residence in either own home or nursing home and their length of hospital stay were recorded. Primary diagnosis or diagnoses on admission and the comorbid conditions associated with pressure ulcer development were recorded. These include pneumonia, urinary tract infection, fracture, infected pressure ulcers, peripheral vascular disease, congestive cardiac failure, myocardial infarction, diabetes mellitus, stroke, Parkinson's disease, dementia and chronic obstructive pulmonary disease. The Braden scale was used for documentation of pressure ulcer risk assessment. A Braden scale 12 or less was considered high risk of pressure ulcers. Mobility and continence were assessed as part of the modified Barthel's index of activities of daily living. Mobility status is further dichotomized as bedbound or non-bedbound. Nutritional status was defined using the Mini Nutritional Assessment (MNA) Screening Form. Individuals with an MNA score of seven or less was considered malnourished (Langkamp-Henken, Hudgens, Stechmiller, & Herrlinger-Garcia, 2005). Laboratory data including serum albumin level, leukocyte count, neutrophil count, lymphocyte count and hemoglobin levels were also recorded. Serum albumin levels of 27 g/l or less were considered hypoalbuminaemic. Neutrophil counts of more than 11×10^9/l were considered raised. Cut-off values of hemoglobin less than 12 g/dl and lymphocyte counts of less than 1.5×10^9/l were used to define the presence of anemia or lymphopaenia.

2.4. Mortality

Length of hospital stay and in-patient mortality was obtained from hospital electronic records. For information on post discharge mortality, the hospital database was interrogated to determine patient's vital status. Individuals who were noted to be alive on the database were contacted at least after 3 months post discharge via telephone to verify their status.