Applied Nursing Research xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Applied Nursing Research

journal homepage: www.elsevier.com/locate/apnr

Original Article

The Effectiveness of a Pressure Ulcer Intervention Program on the Prevalence of Hospital Acquired Pressure Ulcers: Controlled Before and After Study

Zeinab Mallah [a], Nada Nassar [a], Lina Kurdahi Badr [b,*]

[a] Nursing Department, American University of Beirut Medical Center, Beirut, Lebanon
[b] Azusa Pacific University, Azusa, California

ARTICLE INFO

Article history:
Received 14 February 2014
Revised 15 July 2014
Accepted 16 July 2014
Available online xxxx

Keywords:
Pressure ulcers
Prevention
Predictors
Lebanon

ABSTRACT

Background: Pressure Ulcers (PUs) are associated with high mortality, morbidity, and health care costs. In addition to being costly, PrUs cause pain, suffering, infection, a lower quality of life, extended hospital stay and even death. Although several nursing interventions have been advocated in the literature, there is a paucity of research on what constitutes the most effective nursing intervention.
Objectives: To determine the efficacy of multidisciplinary intervention and to assess which component of the intervention was most predictive of decreasing the prevalence of Hospital acquired pressure ulcers (HAPU) in a tertiary setting in Lebanon.
Design: An evaluation prospective research design was utilized with data before and after the intervention. The sample consisted of 468 patients admitted to the hospital from January 2012 to April 2013.
Results: The prevalence of HAPU was significantly reduced from 6.63% in 2012 to 2.47. Sensitivity of the Braden scale in predicting a HAPU was 92.30% and specificity was 60.04%. A logistic multiple regression equation found that two factors significantly predicted the development of a HAPU; skin care and Braden scores.
Conclusion: The multidisciplinary approach was effective in decreasing the prevalence of HAPUs. Skin care management which was a significant predictor of PUs should alert nurses to the cost effectiveness of this intervention. Lower Braden scores also were predictive of HAPUs

Published by Elsevier Inc.

1. Introduction

Pressure ulcers (PrUs) are prevalent yet underrated among hospitalized patients and serve as an indicator of the quality of care at an institution (Cox, 2011; Gunningberg, Stotts, & Idvall, 2011). The incidence of PrU varies between 0.4% to 12% in acute care settings and from 2.2% to 23.9% in long term care settings (Bergquist-Beringer, Dong, He, & Dunton, 2013; Lyder et al., 2012; Niederhauser et al., 2012) while prevalence rates range between 12–18% in acute care settings range and between 8.8 to 53.2% in chronic care settings (Gallagher et al., 2008; Moore, Johansen, & van Etten, 2013; Petzold, Eberlein-Gonska, & Schmitt, 2014; Shahin, Dassen, & Halfens, 2009). The rates vary depending on the countries where data were collected, the settings in which they were reported and the methods used in reporting (e.g. whether prevalence was calculated at admission or only during hospitalization). The National Pressure Ulcer Advisory Panel (NAUAP) reports wide ranges of prevalence among patients in the United States (US) estimated to be 1.3 to 3 million with projected costs at $2.2–$3.6 billion a year (Russo, Steiner, & Spector, 2008). In addition to being costly, the workload on nursing is increased, and patients with PrUs experience pain, infection, a lower quality of life, and can even die (Graves, Birrell, & Whitby, 2005; Leshem-Rubinow, Vaknin, Sherman, & Justo, 2013; Saha et al., 2013).

A PrU is defined as a "localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear" (NPUAP (2009) and the European Pressure Ulcer Advisory Panel (EPUAP, 2009)). PrUs are staged form 1 to IV; stage I "is intact skin with non-blanchable redness of a localized area", stage II is "Partial thickness loss of dermis presenting as a shallow open ulcer with a red or pink wound bed, without slough", stage III, is full thickness tissue loss where subcutaneous fat may be visible but bone, tendon or muscles are not exposed and stage IV is full thickness tissue loss with exposed bone, tendon or muscle (NPUAP-EPUAP, 2009). Two additional stages are recognized by the NPUAP and are unstageable which is full thickness tissue loss in which actual depth of the ulcer is completely obscured by slough and suspected deep tissue injury which is of unknown depth with a purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. A hospital-acquired PrU (HAPU) is defined as any ulcer noted 24 or more hours after hospital admission. Because pressure ulcer staging is dependent on visible skin characteristics, a great potential for misclassifying pressure-related injury exists. Deep tissue injury (DTI) can remain undetected for days or weeks before

* Corresponding author at: Azusa Pacific University, School of Nursing, 701 E Foothill Blv., Azusa, CA 91740, United States, Tel.: +1 310 341 3143.
E-mail addresses: linakbadr@hotmail.com, lbadr@apu.edu (L. Kurdahi Badr).

http://dx.doi.org/10.1016/j.apnr.2014.07.001
0897-1897/Published by Elsevier Inc.

a purple discoloration of the skin appears. In patients with very dark skin, a DTI may not be visible at all, especially in the area of the gluteal fold where skin color is darker. Thus, often a patient may be in the hospital for several days and develop an HAPU even though it was most likely present underneath on admission (Gefen, Farid, & Shaywitz, 2013). Studies suggest that deep tissue is more susceptible than superficial tissue to injury caused by externally applied pressure; clinically superficial skin injuries induced by pressure tend to be associated with deep tissue damage; and superficial injuries appear to be caused by factors other than pressure. The cause and development of a DTI is multifactorial with recent evidence that biomechanical forces, morphological changes and inflammation together with ischemia and aging, play a role in pressure ulcer pathogenesis (Berlowitz & Brienza, 2007; Stojadinovic et al., 2013).

Since 2009, the Centers for Medicare & Medicaid Services considered pressure sores reasonably preventable and halted reimbursement for the treatment of hospital-acquired pressure ulcers (HAPUs) stages II to IV, unless they was determined to have been present at admission or within 2 days after admission. However, clinicians argue that some PrUs are unavoidable and will occur even when all the necessary interventions are implemented. Examples of these conditions are hemodynamic instability requiring pharmacologic or mechanical support which diminish perfusion, severe protein-energy malnutrition which alters tissue tolerance, or skin breakdown in terminally ill individuals (Black et al., 2011). In addition, because PrUs are preventable in most situations, they have resulted in litigation, with settlements often favoring patients. Based on these facts, most hospitals in developed countries have established protocols and interventions for preventing or lessening the severity of PrUs (e.g. Asimus, Maclellan, & Li, 2011; Saha et al., 2013; Sullivan & Schoelles, 2013).

Despite a variety of prevention and treatment modalities for PrUs, there is limited consensus on the best interventions, with a paucity of randomized clinical trials (RCTs) to provide conclusive clinical practice guidelines [EPUAP, 2009; Australian Wound Management Association (AWMA, 2012); Ontario Health Technology Assessment Series (OHTAS, 2009; McElhinny and Hooper, (2008)]. Extensive interventions for the prevention of PrUs in the past 5 to 10 years in most developed countries have resulted in significant decreases in HAPUs (e.g. Asimus et al., 2011; He, Staggs, Bergquist-Beringer, & Dunton, 2013; Mathiesen, Nørgaard, Andersen, Møller, & Ehlers, 2013; Stotts, Brown, Donaldson, Aydin, & Fridman, 2013; Sullivan & Schoelles, 2013). However, similar decreases in prevalence rates (including patients with a PrU at the time of hospital admission and in long term facilities have not been achieved (Gunningberg et al., 2011; Kottner, Doris-Dassen, & Lahman, 2009; Leijon, Bergh, & Terstappen, 2013). The following interventions have been used to prevent PrUs to date.

1.1. Patient Repositioning

Repositioning is a basic tenet of nursing care used in most health care facilities to prevent pressure ulcers. Most policies, based on recommendations written in the mid 60s (e.g. Kosiak, 1966), and supported by current best practice guidelines (Australian Wound Management Association, 2012; EPUAP, 2009; Krapfl & Gray, 2008), recommend repositioning the bed ridden patient every 2 hours to help eliminate interface pressure. While a widespread intervention, only five randomized controlled trials have assessed the efficacy or the timing for repositioning (Bergstrom et al., 2014; Defloor, De Bacquer, & Grypdonck, 2005; Moore, Cowman, & Posnett, 2013; Vanderwee, Grypdonck, De Bacquer, & Defloor, 2007; Young, 2004). A recent large multisite study (Bergstrom et al., 2014) found no difference in PrU incidence when patients were repositioned every 2, 3 or 4 hours while a Cochrane review concluded that there is limited empirical evidence of the effect of positioning on the prevention of PrUs (Gillespie et al., 2014)

1.2. Nutrition and Vitamins

The benefits of nutritional supplementation were assessed in few RCTs, with mixed results (Banks, Graves, Bauer, & Ash, 2013; Bourdel-Marchasson et al., 2000; Houwing et al., 2003). A review on the benefits of nutritional support on the development of PrUs in intensive care units (ICUs), by Theilla (2013) concluded that " the paucity of RCTs focusing on intensive care unit (ICU) nutrition in the support of wound healing and the prevention of pathologic healing precludes formulation of evidence-based guidelines for clinicians"(p. 186).

1.3. Support Surfaces

The use of special beds, mattresses, sheets and overlays designed to redistribute pressure, have been widely used to prevent PrUs since the mid-1980s. Several RCTs found that using special mattresses or sheets significantly reduce the incidence of PrUs (e.g. Coladonato et al., 2012; Demarré et al., 2013; Huang, Chen, & Xu, 2013). A Cochrane review concluded that individuals at high risk for developing PrUs could benefit from special alternating pressure mattresses although more RCTs are needed (McInnes, Jammali-Blas, Bell-Syer, Dumville, & Cullum, 2011).

1.4. Skin Care

In the presence of pressure and shear forces both excess moisture and dryness can exacerbate skin breakdown, making a patient more susceptible to a PrU (Sibbald, Goodman, Norton, Krasner, & Ayello, 2012). While some studies report the efficacy of special creams and barriers (e.g. Torra, Bou, Segovia Gomez, Verdu Soriano, et al., 2005; Hunter et al., 2003), the evidence remains weak (Moore & Webster, 2013; Ontario Health Technology Assessment series & Medical Advisory Secretariat, 2009; Saha et al., 2013). A recent systematic review (Clark et al., 2014) found only one high-quality randomized controlled trial (RCT) nevertheless, based on descriptive and cohort studies, they concluded that dressings such as hydrocellular, hydrocolloid or silicone foam dressings as part of pressure ulcer prevention may help reduce pressure ulcer incidence associated with medical devices and in immobile ICU patients.

1.5. Risk Assessment

Many hospitals around the world have adopted risk assessment tools to evaluate patients at risk for developing a PrU. A recent meta-analysis of 57 studies using different risk assessment scales found that the Braden, Norton, EMINA (mEntal state, Mobility, Incontinence, Nutrition, Activity), Waterlow, and Cubbin-Jackson scales showed the highest predictive capacity (Garcia-Fernandez, Pancorbo-Hidalgo & Agreda, 2014), while a Cochrane review found only 2 RCTs and concluded that there is no reliable evidence to suggest that the use of structured, systematic pressure ulcer risk assessment tools reduces the incidence of pressure ulcers (Moore & Cowman, 2014). The three most widely used instruments are the Braden, the Norton and the Waterlow scales with the Braden scale having the highest pooled predictive capacity followed by the Norton scale and the Waterlow scale. The Braden scale has documented sensitivities of 38-100% and specificities of 44-100% in predicting a PrU formation (Kallman & Lindgren, 2014; Kottner & Doris-Dassen, 2010; Suttipong & Sindhu, 2011; Yatabe et al., 2013) with lower predictive values in ICU settings and surgical patients (Chou et al., 2013; Cohen et al., 2012; Cox, 2012; Chan, Pang &, Kwong, 2009; Kottner & Doris-Dassen, 2010; He, Liu, & Chen 2012; Webster et al., 2010).

1.6. Multiple Interventions

There is growing research evidence describing the benefits of multipronged, interventions in reducing PrUs in acute care settings

Please cite this article as: Mallah, Z., et al., The Effectiveness of a Pressure Ulcer Intervention Program on the Prevalence of Hospital Acquired Pressure Ulcers: Controlled Befo..., *Applied Nursing Research* (2014), http://dx.doi.org/10.1016/j.apnr.2014.07.001