



Pressure injuries to the skin in a neonatal unit: Fact or fiction



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Abstract *Aim:* Pressure related skin injuries (including ulceration, skin/epithelial stripping, and combination injuries) have historically been neglected within neonatal research. Although anecdotal evidence, wound reviews and isolated case studies have been published; there is limited research specific to neonatal pressure injuries despite this population being, arguably, the most vulnerable patient group.

The objective of this study was to investigate specific rates of neonatal skin breakdown from pressure including locations, stages, and etiology associated with tissue damage.

Methods: A descriptive cohort study was conducted in North Queensland's Tertiary perinatal center over a 2-year period. Prevalence audits for pressure injuries to the skin were conducted (including epithelial stripping) and incorporated categorization of with degree of tissue breakdown between Stage 1–4. A modified risk assessment and prevalence tool was utilized in this study.

Results: 247 neonatal patients were reviewed during the study period, of these infants, 77/247 were identified as having a skin injury (a prevalence rate of 31.2%). In total, 107 injuries were identified with the mean number of 1.4 injuries (range 1–4, SD 0.71). The mean gestational age was 28 weeks (range 22–41 weeks, SD 4.1 weeks) and the mean birth weight was 1155 g (range 445–2678 g, SD 620 g). Factors identified as contributing to pressure injuries included indwelling vascular catheters (22.4%), non-invasive continuous positive airway pressure delivery devices (14.0%), oxygen saturation and temperature probes (17.8%). 31.8% of injuries could not be associated with a specific risk factor.

Conclusions: Neonates are undeniably at risk for pressure injuries however; it is still unclear which proportions of injuries are entirely preventable. Further

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development of a risk assessment and prevalence tool will provide practitioners with insight into the specific risk factors applicable for neonatal pressure injuries. Additional studies with larger patient groups will more accurately update practice related to pressure injury prevention and management in neonatal units; as well as critically evaluate the adverse affects of routine care processes that unintentionally harm the skin of these fragile patients.

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Introduction

Pressure related skin injuries (including ulceration, skin/epithelial stripping, and combination injuries) have historically been neglected within neonatal research. Whilst anecdotal evidence from wound reviews and obscure case studies can be found, a limited body of knowledge exists regarding iatrogenic pressure injury (PI) development during the neonatal period (Razmus et al., 2008). Specifically, there is minimal research to identify preventive or causative factors, staging of injuries, and treatment strategies. The majority of existing study samples include neonates within a larger paediatric population when discussing prevalence rates of pressure related skin injuries (Curley et al., 2003; Razmus et al., 2008; Willock et al., 2009).

PIs are caused by a combination of pressure, shear, friction, changes to perfusion, inadequate nutrition, or altered mobility that may affect multiple layers of tissue (Baharestani, 2007; Butler, 2006; McLane et al., 2004). Historically these 'injuries' were known as decubitus bedsores or pressure ulcers (Australian Wound Management Association, 2012; Dunk and Arbon, 2009); describing a crater shaped injury over a bony prominence (Willock et al., 2007) with surrounding maceration to the skin and underlying tissues. Recent literature acknowledges that ulcers are but a single category of skin injury. This has led to a change in terminology and adoption of the term 'pressure injury', to encompass multiple categories of iatrogenic tissue damage to the skin (Australian Wound Management Association, 2012; Dunk and Arbon, 2009; Fox, 2011; Squires and Hyndman, 2009). Furthermore, epithelial stripping is not acknowledged in classic definitions of PI (see Table 3) (Dunk and Arbon, 2009). While neonatal sources suggested that stripping is a problem, few investigations have looked at the association of this type of tissue damage in relation to other skin injuries (Burton et al., 2011; Irving et al., 2006; McLane et al., 2004). The neonate's skin is one of the most underdeveloped organ systems at birth which, when admitted to the neonatal unit, becomes exposed to many

therapeutic interventions and medical devices that it is not yet physiologically prepared for (Baharestani, 2007; Cisler-Cahill, 2006; Irving, 2001; Irving et al., 2006). In contradiction to the scarce population specific literature, wound case reviews state that the occurrence of pressure related injuries are rare in populations nursed in neonatal units (Baharestani, 2007; Forest-Lalande, 2001).

Published reports of PIs in this population; have been focused to single anatomical locations, comprehensive assessment of patients for areas of simultaneous tissue breakdown has yet to occur. Paediatric PI studies and wound reviews, describe the occiput as the anatomical location most at risk for pressure related injury for infants (Baharestani, 2007) (Butler, 2006; Curley et al., 2003; Fox, 2011; Fujii et al., 2010; Irving et al., 2006; Quigley and Curley, 1996; Razmus et al., 2008). More recent studies focus on tissue injuries caused by non-invasive Continuous Positive Airway Pressure (CPAP) delivery devices. The authors identified injuries to the nares (Fischer et al., 2010; Squires and Hyndman, 2009) and forehead (Hodgeling et al., 2012; Razmus et al., 2008), concluding with risk management strategies for prevention. Investigators neglect to mention whether any of the patients studied were observed to have multiple skin injuries, and focused on single risks such as CPAP or bed surfaces, rather than a combination of risk factors.

Conventional risk factors for pressure injuries in the adult population are stratified into two groups; pressure tolerance and tissue tolerance (Australian Wound Management Association, 2012; Razmus et al., 2008). Paediatric studies have expanded upon these typical risk factors, but also acknowledge the patient's increased risk of PI development in the presence of medical devices and anemia (Razmus et al., 2008; Waterlow, 1997; Willock et al., 2005; Willock and Maylor, 2004). These risk factors are clearly applicable to neonatal patients (see Table 1); also illustrated by Razmus et al. (2008). The Razmus et al. (2008) review article emphasized that term and preterm newborns had unique characteristics putting them

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