



## White Paper

### Pressure Ulcers in Neonates and Children

#### Introduction

Although there is a newly emerging awareness that acutely ill and immobilized neonates and children are at risk for pressure ulcers, there is a paucity of empirical data upon which to guide practice.<sup>1-5</sup> In fact, most prevention and treatment protocols are extrapolated from adult practice guidelines.<sup>2,6-10</sup> Given the anatomical and physiological differences between adults and children and adults serious concerns arise regarding the safety, clinical efficacy and cost-effectiveness of employing adult protocols and products into the management of neonates and children.<sup>11</sup> Evidence-linked clinical practice guidelines for prevention and treatment which specifically address the unique needs of the neonatal and pediatric population are needed.

#### Background

##### Pressure Ulcer Prevalence Rates

Pressure ulcer prevalence rates as high as 27% have been reported among patients in PICU and 20% in NICU with most ulcers occurring within two days of admission.<sup>8,5</sup> Among non-critical hospitalized pediatric patients prevalence rates of 0.47% -13% and incidence rates of 0.29% - 6% have been cited.<sup>13-15</sup>

In a longitudinal four year study, children with spina bifida and spinal cord injuries were tracked at the Children's Hospital Medical Center of Akron. Of the 4,533 hospital days, 22% (n=994 days) were secondary to loss of skin integrity<sup>6</sup>. Admissions related to skin integrity related admissions resulted in additional costs of over \$1.4 million dollars.<sup>6</sup> These data become even more critical in view of pressure ulcer incidence rates as high as 20% - 43% among patients with myelomeningocele<sup>16</sup>. While a higher incidence of pressure ulcers has also been noticed in patients on high frequency oscillatory ventilation (HFOV) compared to conventional ventilation (53% vs. 12.5%), life-table analyses found PICU length of stay to be statistically significant, not ventilation type.<sup>25</sup>

## Pressure Ulcer Risk Factors

Pre-term infants (< 24 weeks gestation) and very low birth weight infants (< 1,500 grams), with edematous, thin dry skin, decreased epidermal-dermal cohesion, minimal subcutaneous tissue and immature organ systems are especially susceptible to the deleterious effects of pressure and shear forces.<sup>12</sup> Younger children and neonates most commonly develop occipital ulcers (incidence 17%-19%), as the head makes up a disproportionately higher percentage of their total body weight.<sup>18,19</sup> When supine, it is the occiput which becomes the primary pressure point with the greatest interface pressure.<sup>20</sup> Older children, similar to adults, are more likely to develop sacral and heel pressure ulcers.<sup>17</sup>

The number of pressure ulcer risk factors cited in the pediatric critical care literature is extensive. In a case controlled study of 118 PICU patients edema, LOS > 96 hours, increased PEEP, weight loss and not turning the patient or use of a specialty bed in the turn mode were identified as risk factors for pressure ulcer development.<sup>21</sup> Neidig and others, found that in pediatric open heart patients routine turning was not initiated until hemodynamic and respiratory stability were demonstrated, as turning was not viewed as a priority.<sup>19</sup> Furthermore, repositioning of the head was often limited by internal and external jugular catheters, edema of the neck and head and air leakage around the endotracheal tube with movement, all of which are issues seen in the management of adult critical care patients at high risk for ulceration.

Use of adult specialty beds in the turn mode is problematic for small children for two reasons, first the occiput was pivoted on the same pressure point, thus not reducing pressure and potentially increasing shear and friction injuries.<sup>21</sup> The second issue, relates to the use of beds designed for adults being used on children. Low air loss beds designed for adults do not possess the numerical options to accommodate the height and weights of small children. Children and infants often sink into and between the cushions, with clinical efficacy of pressure distribution being questionable at best.<sup>22</sup> Neidig and colleagues, through a retrospective chart review reported that age (< 37 months), LOS in PICU > 8days, duration of intubation (> 7 days) and ventral septal defects repairs attributed to a higher pressure ulcer risk status among critically ill children.<sup>19</sup>

Waterlow identified the pressure from medical devices, tubing, casts, splints, as well as staff awareness to be additional factors impacting patient risk.<sup>15</sup> In fact, the belief held by many clinicians that pressure ulcers are not a problem faced in the neonatal and pediatric population is in itself a major risk factor.<sup>15</sup>

Among 227 patients with spina bifida high paraplegia, high sensory impairment, mental retardation, a large head circumference, kyphoscoliosis or kyphosis, an abnormal neurological exam of the upper extremities and chronic fecal or urinary soilage have also been implicated in pressure ulcer development.<sup>16</sup> In a retrospective, exploratory study of

69 pediatric outpatients with myelodysplasia and cerebral palsy,, paralysis, insensate areas, high activity and immobility were identified as risk factors.<sup>26</sup>

## **Risk Assessment Scales**

Building upon the Braden adult pressure ulcer risk assessment tool, the Braden Q was developed for pressure ulcer risk identification in those aged 21 days to 8 years.<sup>8,9,28</sup> Braden Q has undergone validity testing among 322 PICU patients, sensitivity of 83% and specificity of 58% was found.<sup>8,9,28</sup> The Neonatal Skin Risk Assessment Scale (NSARS) also modeled after the adult Braden tool, measures six subscales pertinent to neonates.<sup>18,28</sup> NSARS validity testing among 32 patients showed a sensitivity of 83% and specificity of 81%.<sup>18,28</sup> Additionally, the Neonatal Skin Condition Scale (NSCS) aimed at assessing the general skin condition of 1,006 neonates has an interrater reliability of 69% - 85% and an interrater reliability of 66% - 89%.<sup>29,30</sup> The Starkid Scale evaluated the risk of general skin breakdown in 347 pediatric patients reporting a sensitivity of 18% and specificity of 99%.<sup>27</sup>

## **Summary**

Based on currently available pressure ulcer prevalence and incidence data, neonates and children are at risk for and develop pressure ulcers. Products manufactured to prevent and treat pressure ulcers among adults may not be suitable to use for children and neonates.<sup>31</sup> Alterations in the tissue integrity of neonatal and pediatric patients can result in pain, infection, mortality, higher care costs, increased hospitalization and increased litigation.

## **Questions**

Utilizing the modified list of questions developed by the WOCN Pressure Ulcer Guideline Panel<sup>1</sup> below, an evidenced-linked neonatal and pediatric pressure ulcer prevention and treatment guideline could evolve:

- What are the unique risk factors for development of pressure ulcers?
  - High Risk Groups
- What are unique assessment factors for this population?
  - Nutrition
  - Support Surfaces
  - Continence Management
  - Comorbid Conditions
  - Others
- What are the best and safest therapies to treat pressure ulcers?
  - Topical dressings
  - Topical antimicrobials
  - Debridement methods
  - Adjunctive therapies
  - How is pain associated with pressure ulcers assessed for and managed?
  - What is the role of surgery in treating pressure ulcers?

- What methods or tools are used to assess healing of pressure ulcers?
- What factors are most influential in recidivism of pressure ulcers?
- What pressure ulcer prevention and treatment education is provided and how is it delivered to professional clinicians, ancillary healthcare providers, patients, and family caregivers?
- What is the role of palliative care and does it differ from the adult?

## References

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