PREVENTING PRESSURE ULCERS IN NEONATAL AND PEDIATRIC INTENSIVE CARE UNIT

1Sri Hendrawati, 2Ikeu Nurhidayah, 3Henny Suzana Mediani, 4Nenden Nur Asriyani Maryam
1,2,3,4Department of Pediatric Nursing, Faculty of Nursing, Padjadjaran University, Sumedang, West Java - Indonesia
Email: sri.hendrawati@unpad.ac.id

ABSTRACT
Critically ill neonates and pediatrics are at risk for developing pressure ulcers and associated with pain, infection risk, and prolonged hospitalization. The reported incidence of pressure ulcers in critically ill neonates and pediatrics is 18% to 27%. Anatomic, physiologic, and developmental factors place critically ill neonates and pediatrics at risk for pressure ulcers. Preventing pressure ulcers is critical to optimizing outcomes in hospitalized patients. Nursing interventions to prevent the development of the pressure ulcers have not been established. This literature review aims to identify the prevention of pressure ulcers in neonatal and pediatric intensive care unit. Articles were collected through Medline, CINAHL from EBSCOhost, Google Scholar, PubMed, and Proquest electronic database using the keywords prevention, pressure ulcer, skin injury, skin care, neonatal, pediatric, and intensive care unit using qualitative and quantitative studies. The reviewed articles were only articles with full text, written in English, and published during period 2006 to 2017. The following were excluded: unpublished studies (grey literature) and studies involving patients with pressure ulcers upon admission. The methodological quality of this literature review was assessed according to the guidelines of the Critical Appraisal Skills Programme. A total of 491 articles were found and only nine articles which met the criteria. There are six essential elements of pediatric pressure ulcer prevention: conduct a pressure ulcer admission assessment using neonatal skin risk assessment scale (NSRAS) for neonatal and Braden Q scale for pediatric; reassessment of risk factors; inspect skin daily; manage moisture with keep the patient dry and improve moisturize skin management; optimize nutrition and hydration; and minimize pressure with repositioning and pressure-relieving surfaces or support surface. The development of pressure ulcers is still an important clinical problem in critically ill neonates and pediatrics. Nursing interventions play an important role in the prevention of pressure ulcers.

Keywords: Intensive care unit, neonatal, pediatric, pressure ulcer, prevention, skin care, skin injury

I. Introduction
Pressure ulcers are defined as localized areas of tissue destruction that develop when soft tissue is compressed between a bony prominence and an external surface for a prolonged period of time. Although any hospitalized neonates and pediatrics are at risk for the development of a pressure ulcer, the critically ill neonates and pediatrics are at increased risk (Schindler, 2010). Pressure ulcers can occur due to pressure, shear, friction, moisture or incontinence, device related pressure, immobility, inactivity, and nutritional deficiencies (Rodgers, Nist,
Gardikes-Gingery, Shepherd, Ruth, & Keller, 2014).

The incidence of pressure ulcers in critically ill neonates and pediatrics ranged from 18% to 27% (Schindler et al., 2011). This figure is not different as revealed by Baharestani and Ratliff (2007), that the prevalence of pressure ulcers in pediatric intensive care units (PICUs) as high as 27%, while in neonatal intensive care units (NICUs) as high as 23%. Increased risk factors for developing pressure ulcers in neonates and pediatrics include the following: significant prematurity, critical illness, decreased mobility, neurologic impairments (including myelomeningocele and spinal cord injury), nutritional deficits, poor tissue perfusion or oxygenation, fluid retention, moisture, and exposure to prolonged pressure from hospital apparatus or tubes (Gray, 2004).

Children’s skin undergoes several changes throughout the first 18 years of life. Within the first days of life neonates undergo various adaptation processes needed to accommodate the transition from the wet intrauterine environment to the dry outside environment. During the first months and years the skin continues to develop and evolve its structure and functions. It is known that any skin breakdown, especially in critically ill neonates and infants, increases the risk of septicemia as well as related severe complications and higher mortality. Children and neonates have a greater head to body proportion compared to adults which predisposes them to occipital pressure ulcers (Schindler, 2010). Pressure ulcers also cause an increase in pain, infection, calorie expenditure in pediatric patients, and prolonged hospitalization. Therefore it is of great importance to avoid any damage to the fragile skin of pediatric patients (Schlüer, 2013).

Anatomic, physiologic, and developmental factors place critically ill neonates and pediatrics at risk for pressure ulcers. Preventing pressure ulcers is critical to optimizing outcomes in hospitalized patients (Rodgers et al., 2014). Pressure ulcer prevention requires skills, knowledge, competences, and consistency in nursing practice. Nursing interventions to prevent the development of the pressure ulcers have not been established. Therefore, based on that background, this literature review aims to identify the prevention of pressure ulcers in neonatal and pediatric intensive care unit.

II. Method

The literature search began with the following PICO statement:

- **Population (P):** Neonate and pediatric patients in the neonatal and pediatric intensive care unit (NICU and PICU)
- **Intervention (I):** Skin care pressure ulcer prevention bundle
- **Comparison (C):** Standard nursing care
- **Outcome (O):** Reduction in pressure injuries in the NICU and PICU

Articles were collected through Medline, CINAHL from EBSCOhost, Google Scholar, PubMed, and Proquest electronic database using the keywords prevention, pressure ulcer, skin injury, skin care, neonatal, pediatric, and intensive care unit using qualitative and quantitative studies. The reviewed articles were only articles with full text, written in English, and published during period 2006 to 2017. The following were excluded: unpublished studies (grey literature) and studies
involving patients with pressure ulcers upon admission.

The methodological quality of this literature review was assessed according to the guidelines of the Critical Appraisal Skills Programme. All studies were selected based on inclusion criteria to get a study that has the highest quality and has good validity and precision. The purpose of the critical appraisal is to include only studies that are considered entry into the study with good quality and exclude studies that are considered less good quality.

III. Results

The literature search on five data based found 491 related studies. After screening of titles and abstracts, 461 studies were released. After that the author reviews the full text of the remaining 30 studies to be evaluated in more detail. Of these, there were 9 studies that met the inclusion criteria for inclusion in the literature review.

IV. Discussion

The aim of pressure ulcer prevention is to reduce or inhibit risk factors that may cause injury or tissue loss. Based on this literature review, there are six interventions to prevent pressure ulcers include:

- Skin assessment
  The admission assessment should include a skin assessment to detect existing pressure ulcers. Nurses can conduct a pressure ulcer admission assessment using neonatal skin risk assessment scale (NSRAS) for neonatal and Braden Q Scale for pediatric. The NSRAS is based on the Braden Q Scale. Its subscales reflect the developmental and physical needs of the neonatal and consist of six subscales include general physical condition based on gestational age, mental status, mobility, activity,
nutrition, and moisture. Scores NSRAS range from 6 to 24. Unlike the Braden Q Scale, a low score in NSRAS indicates a low risk for pressure development and a high score indicates a high risk (Gray, 2004).

The Braden Q Scale risk assessment tool is divided into seven subcategories that provide a framework for identifying children at risk for pressure ulcers, include mobility; activity; sensory perception; moisture; friction; nutrition; and tissue oxygenation and perfusion (Razmus & Bergquist-Beringer, 2017; Devi, Kaur, & Kaur, 2013; Schindler, 2011).

Timely skin assessment is recommended but no frequency is described, such assessment includes examining the skin for evidence of new damage (Razmus & Bergquist-Beringer, 2017; Garcia-Molina & Balaguer-Lopez, 2014; Schlüer, 2013; Visscher, 2013).

- Reassessment of risk factors
  The admission assessment should include a risk assessment to evaluate risk of developing a pressure ulcer. The risk assessment must include an assessment of several components, include mobility incontinence, sensory deficiency, and nutritional status including dehydration. Perform initial assessment at admission into the intensive care unit and reassess at least every 48 hours or whenever the patient’s condition changes or deteriorates. For example, changes in mobility, nutrition, or tissue perfusion/oxygenation may change the patient’s risk of developing pressure ulcers (McCord et al., 2004; Ayell & Braden, 2002).

  The following key points outline specific risk groups in the neonatal/infant/pediatric population are neonates and very young children (i.e., younger than 5 years old), marked edema or anasarca, decrease or no spontaneous activity (i.e., sedated, paralyzed, neurologically impaired), limited positioning options (ECMO, high-frequency ventilation, postop gastrochisis), spinal cord injury (SCI), neurologic impairments, nutritional deficits, poor tissue perfusion or oxygenation, and exposure to prolonged pressure from hospital apparatus or tubes (Gray, 2004; McCord et al., 2004).

  The National Pressure Ulcer Advisory Panel (NPUAP) recommends assessing the patient’s skin at least daily and after procedures for changes related to pressure, friction, shear, and moisture. Be sure to examine the skin under and around medical devices at least twice daily for signs of pressure injury (Reyna, 2015).

- Inspect skin daily
  Patients identified as being at risk need a daily inspection of all skin surfaces, from head to toe. Special attention should be given to areas at high risk for pressure ulcer development such as the occiput, sacrum, back, buttocks, heels, and elbows. Children and neonates have a greater head to body proportion...
compared to adults which predisposes them to occipital pressure ulcers (Visscher, 2013; Schindler, 2010).

- Manage moisture with keep the patient dry and improve moisturize skin management

Wet skin plays a significant role in pressure ulcer development. Wet skin is more amenable to the development of several types of skin pathology including rashes, diaper dermatitis, and most importantly the development of pressure ulcers. Both urinary and fecal incontinence play a role in the development of pressure ulcers (Schindler, 2010). Skin should be cleansed at time of soiling and at routine intervals. The process of cleaning the skin should include gentle use of a mild, non-alkaline cleansing agent that minimizes irritation and dryness of the skin (Razmus & Bergquist-Beringer, 2017; Reyna, 2015).

- Optimize nutrition and hydration

Assessment of the patient for possible risk of pressure ulcer development should include a review of nutritional factors and an assessment of hydration. Numerous nutritional factors such as impaired intake, low birth weight, low body weight or unintentional weight loss, and dehydration may contribute to development of pressure ulcers. Fluid, protein, and caloric intake are important aspects of maintaining adequate general nutrition. Nutritional supplements or support may be needed if dietary intake is insufficient. If a patient is identified with significant nutritional needs, a registered clinical dietician should be consulted to assess and suggest feasible nutritional interventions (Razmus & Bergquist-Beringer, 2017; Reyna, 2015; Visscher, 2013; Schindler, 2010; Reddy & Rochon, 2006).

- Minimize pressure with repositioning and pressure-relieving surfaces or support surface

Relieving pressure, especially over bony prominences, is of primary concern. Patients with limited mobility are especially at risk for the development of pressure ulcers. Every effort should be made to redistribute the pressure on the skin, either by repositioning or by utilizing pressure-relieving surfaces (Reddy, Gill, & Rochon, 2006). Repositioning and pressure relief are integral components of effective prevention of pressure ulcers (PUs) in children (Parnham, 2012). The aim of repositioning is to reduce or eliminate pressure, thereby maintaining circulation to areas of the body at risk for pressure ulcers. Repositioning should be performed regularly in immobile patients and should pay special attention to the relevant anatomical localizations in children, which are the occipital, sacral, and calcaneal areas (Parnham, 2012; Butler, 2007). Repositioning is not recommended for hemodynamically unstable patients (Butler, 2007). Next to manual repositioning, therapeutic pressure-relieving surfaces may also be required (Parnham, 2012). Pressure-relieving facilities can use
sheep skin, silk sheets and gel or water pillows for neonates; special pressure-relieving mattresses for older children, and regular turning every 2 hours of the child or neonate (Schlüer, 2013; Devi, Kaur, & Kaur, 2013; Schindler, 2010). Repositioning were effective in prevention of pressure ulcers in bedridden children. Hence use of these measures along with regular change of position of bedridden children is recommended (Devi, Kaur, & Kaur, 2013). Frequent positioning prevents the adverse effects of pressure, friction, and shear in the bedridden individuals. For most clients, maintaining current activity levels, mobility, and range of motion is sufficient to prevent pressure ulcers. For the immobilized clients turning and repositioning every two hourly helps the ischemic areas to recover thus prevent the development of pressure ulcers (Razmus & Bergquist-Beringer, 2017; Reyna, 2015; Devi, Kaur, & Kaur, 2013).

The implementation of the skin care prevention pressure ulcers bundle is associated with a significant drop in pressure ulcer incidence from 18.8% to 6.8% (Schindler, 2010). Quality improvement in skin assessments, patient skin care, patient care indirectly related to skin (pain control, nutrition, hydration), products related to pressure, and patient/family involvement led to a significant decrease in the PU rate in the NICU and PICU (Visscher, 2013).

V. Conclusion

Based on prevalence rates and incidence of incident pressure ulcers, neonates and pediatrics are at high risk of exposure to pressure ulcers. Prevention and management performed in adults is incompatible with neonatal and pediatric conditions. To achieve this goal, it is important for nurses to conduct holistic and systematic assessments of the patient's condition. For prevention of pressure ulcers these nurses can apply the NSRAS and Braden Q Scale risk assessment tool. Damage to skin integrity in neonates and pediatrics can cause pain, infection, dysfigurement, body image disorders, increased morbidity and mortality, increased health care costs, and increased length of stay.

The development of pressure ulcers is still an important clinical problem in critically ill neonates and pediatrics. Nursing interventions play an important role in the prevention of pressure ulcers. Effective nursing care with targeted interventions can reduce the incidence of pressure ulcers in these patients. The nurse should be aware of the importance of preventing the incidence of pressure ulcers in the neonate. There are six essential elements of pediatric pressure ulcer prevention: conduct a pressure ulcer admission assessment using neonatal skin risk assessment scale (NSRAS) for neonatal and braden Q scale for pediatric; reassessment of risk factors; inspect skin daily; manage moisture with keep the patient dry and improve moisturize skin management; optimize nutrition and hydration; and minimize pressure with repositioning and pressure-relieving surfaces or support surface.
Acknowledgment
The authors are grateful for a colleagues at Faculty of Nursing Universitas Padjadjaran in encouraging and supporting authors in the work.

References


