Updated Neonatal Skin Risk Assessment Scale (NSRAS)

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Neonatal Skin

Skin is the largest vital organ and protects the body in numerous ways. An intact integumentary system helps with thermoregulation, tactile sensation, insulation and fat storage, while providing a barrier against infection, toxins and fluid and electrolyte losses (Lund, Kuller, Lane, Lott & Raines, 1999; Cislet-Cahill, 2006). Skin integrity is important for all aspects of nursing across the lifespan, but most especially so in neonates. The Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) and National Association of Neonatal Nurses (NANN) support evidence-based clinical practice guidelines for skin care of neonates (Lund, Osborne, et al., 2001). Impairment of skin integrity in neonates can be costly on healthcare systems and can have significant effects on morbidity and mortality. Therefore, preventing skin breakdown is essential in maintaining the health of neonatal skin integrity.

All skin is composed of three layers: the epidermis, dermis and the subcutaneous tissue. The stratum corneum is the outermost layer of the epidermis and is the skin's main barrier to protection against toxins, bacteria, fungi and viruses (Lund et al., 1999; Huffines & Logsdon, 1997). The stratum corneum consists of 10-20 layers in adults and provides control of evaporative heat loss and transepidermal water loss (TEWL). TEWL can cause significant morbidity due to dehydration, thermal instability and electrolyte imbalance (Afsar, 2009). Infant's skin, unlike mature, adult skin, must transition from the aquatic environment to the aerobic environment. This maturation process is attained in 2 - 8 weeks (Kalia, 1998; Lund, 1999). Premature infants have an underdeveloped stratum corneum. Infants less than 30 weeks gestation may only have 2-3 layers, while extremely premature infants less than 24 weeks may have virtually no stratum corneum (Lund et al., 1999). Because of the thin stratum corneum, water loss in premature infants is dramatically increased from adult levels. Afsar (2009) states that an infant born at 25 weeks will have transepidermal water loss 15 times greater than a term neonate. The vulnerable skin of premature infants also has diminished cohesion between the epidermis and dermis, putting them at higher risk for injury from adhesions or friction and their color appears ruddy due to their thin skin, making color a poor assessment of oxygenation (Lund et al., 1999). Adverse outcomes related to the presence of neonatal wounds/skin breakdown can develop while in the NICU, including increased risk of infection, greater transepidermal water and heat loss, increased discomfort, lengthened hospital stay and increased cost (Cisler-Cahill, 2006). Ruth (2011) states that the cost to heal a full thickness pressure ulcer may be as high as $40,000. Recognizing infants that are at risk for breakdown allows staff to take preventive measures and prevent these complications. The typical newborn skin assessment lists skin as "intact" or simply mentions that skin breakdown is present. There are numerous instruments for more specific pediatric and infant skin assessments, but only a few specifically designed for the neonatal period.

The Neonatal Skin Condition Scale (NSCS) was developed by AWHONN in collaboration with NANN to have research-based neonatal skin care guidelines (Lund, Osborne, et al., 2001; Lund, Kuller, et al., 2001). Lund and Osborne (2004) tested the validity and reliability of the NSCS. It was assessed using 2,820 infants from 51 Neonatal Intensive Care Units (NICU) and well baby nurseries in 27 states in the United States with site coordinators educated for 1½ days on the NSCS guidelines. It only tested for dryness, erythema and breakdown/excoriation on a scale from 1 to 9. It found that infants < 1000 grams commonly have erythema 6 times more frequently than larger babies, since their underdeveloped stratum corneum allows for greater visualization of the vasculature (Lund & Osborne, 2004). The scale concluded that the higher the skin scores, the increased potential exists for a systemic infection, increased breakdown and a longer hospital stay (Lund & Osborne, 2004). The NSCS is a very basic skin scale but is more applicable to infants greater than 1000 grams.

The Braden Q Scale is a skin scale that was adapted from the adult Braden pressure ulcer scale. It was initially called the "Modified Braden Q Scale" (Quigley & Curley, 1996). The authors of the instrument prefer the title, Braden Q Scale for Predicting Pressure Ulcer Risk, as discussed in their later work (Curley, Razmus, Robert & Wypij, 2003). It is composed of seven subscales. The subscales are rated 1 (least favorable) to 4 (most favorable). Three subscales measure intensity and duration of pressures (mobility, activity and sensory perception) and four subscales measure tolerance of the skin and supporting structures (moisture, friction/shear, nutrition and tissue perfusion). Patients with scores of less than 16 are at risk for skin breakdown (Noonan, Quigley & Curley, 2011). The Braden Q is a thorough skin scale but is more applicable to the acute pediatric population than neonates.

The Neonatal Skin Risk Assessment Scale (NSRAS) was developed by Huffines and Logsdon (1997) specifically for the neonatal population at risk for skin breakdown and is based on the Braden Scale for Predicting Pressure Sore Risk. The NSRAS has six subscales: general physical condition, mental status, mobility, activity, nutrition and moisture. Each subscale is scored 1 point for a total of 6 thru 24, with a higher score indicative of lower risk. The sensitivity and reliability of the NSRAS was piloted on 32 neonates. It was found to be reliable for general physical condition, activity and nutrition. Evidence for predictive validity was present, with sensitivity at 83% and specificity at 81%. Three subscales were deleted (mental status, mobility and moisture) for psychometric evaluation but are considered essential in determining skin breakdown. Therefore, the use of the total instrument is recommended.

The NSRAS has been widely used internationally. Researchers and clinicians in Hong Kong, 8 neonatal hospitals in Spain, The Elsevier Resource Center, as well as hospitals in New Jersey, Nebraska, California and Virginia have requested permission for its use.

The NSRAS was developed and tested in 1997, over 15 years ago. The field of neonatology has changed, necessitating a revision of the instrument to reflect evidence-based practice. The first author recently updated the instrument for current use. The updated-NSRAS measures the activity of the neonate "completely bed-bound in a humidified giraffe", which is a specialized incubator for micro-preemies. The humidification of the incubator decreases the insensible water losses experienced by micro-preemies. The previous NSRAS measured activity as "completely bed-bound on a radiant warmer covered with saran-wrap". The revision of the scale makes it more applicable to current assessments in the NICU while being simple to use and thorough. A pilot study of the revised NSRAS at University of Louisville Medical Center NICU is planned.

In conclusion, of the three neonatal specific skin assessment instruments, the NSRAS is preferential for ease of use and its specific application to neonates. Accurate prediction of skin breakdown prevents injury to the precious neonates while saving healthcare dollars.

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