Transepidermal Water Loss

About this Document
This document is a resource to the course: Core Measure 6 Protecting Skin, Lesson: Transepidermal Water Loss.

Educational Use Only
Philips is providing these materials for educational use only. They may not be sold or copied for distribution by any person, institution or company without the express written consent of Philips. Specifications are subject to change without notice.

Planning images shown in this guide are examples; the actual planning required should be discussed with the radiologist.

Warranty Disclaimer
Philips provides this document without warranty of any kind, implied or expressed, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Limitation of Liability
Philips has taken care to ensure the accuracy of this document. However, Philips assumes no liability for errors or omissions and reserves the right to make changes without further notice to any products herein to improve reliability, function, or design. Philips may make improvements or changes in the product(s) or program(s) described in this document at any time.
Lesson: Transepidermal Water Loss

Transepidermal Water Loss

Skin Function

The most important function of the skin is to protect against water loss, absorption of noxious substances, intrusion of microorganisms, and physical trauma (Blume, 2012). The skin barrier can be measured by the skin's ability to hold on to water (Transepidermal Water Loss - TEWL), stay hydrated (stratum corneum hydration - SCH); and is influenced by pH. Immaturity, alterations in pH, skin injury or disease can all result in impaired barrier function.

Because of poorly keratinized stratum corneum that provides minimal resistance to the diffusion of water, the preterm infant is subjected to TEWL and heat loss via evaporation that results in low body temperatures during the first few days after birth. The premature infant is very vulnerable to evaporation because it has immature skin with a thin epidermal layer that lacks keratinized tissue.

The epidermal layer acts as a barrier to older infants and adults to prevent skin water loss. In fact, in the first 48 hours of life, a 26-week-gestation infant will have an insensible water loss of 180 ml/kg/day and thus lose 100 Kcal/kg/day (Baumgart, 1996). When the environmental temperature is warmer than the body temperature, evaporation is the only way heat is lost; thus, humidity in an incubator is very important in keeping the infant warm.

The subcutaneous fat layer that is almost nonexistent in premature infants also decreases evaporative heat loss. Premature infants also have a greater body surface area-to-body mass ratio, which increases insensible water loss. Evaporative heat loss is greatest in infants less than 31 weeks’ gestation in the first week of life before the skin matures. Because of decreased subcutaneous fat and a greater body surface area-to-body mass ratio, the small-for-gestational-age infant will have greater evaporative losses than does a term, appropriate-for-gestational-age infant. The infant’s first encounter with evaporative heat loss occurs in the delivery suite, where the infant is born covered with amniotic fluid and is exposed to cool dry air during resuscitation (Chandra & Baumgart, 2005).

<table>
<thead>
<tr>
<th>Strategies to decrease Transepidermal Water Loss and Evaporative Heat Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Plastic wrap or bags</td>
</tr>
<tr>
<td>■ Supplemental conductive heat (heated mattress)</td>
</tr>
<tr>
<td>■ Incubator rather than radiant heater</td>
</tr>
<tr>
<td>■ Humidity &gt; 70 %</td>
</tr>
<tr>
<td>■ Transparent adhesive dressings</td>
</tr>
<tr>
<td>■ Emollients</td>
</tr>
</tbody>
</table>
Management of Skin Care Problems

The stratum corneum can be traumatized by a variety of insults, including epidermal stripping from removal of adhesives; burns from transcutaneous oxygen electrodes; pressure sores; infection; nutritional inadequacies; extravasation of intravenous fluids; and diaper dermatitis. The goal of all skin care for neonates should be the maintenance of skin integrity; however, even with meticulous care, skin breakdown can occur (Lund & Kuller, 2014).

Skin Assessment

As with other clinical assessments, the assessment of skin integrity is an essential component of a neonate’s care. A thorough examination of all skin surfaces on a daily basis will reveal the state of skin integrity in critically ill or extremely premature infants in the NICU. Quantifiable clinical skin assessment scores may be obtained through the use of several validated and reliable skin scales. The Braden Q and Starkid Skin scales assess for the risk of pressure sores and skin breakdown in the pediatric population (Kottner et al., 2013). The Neonatal Skin Condition Score (NSCS) is an objective scale that quantifies the overall skin condition by assessing for dryness, erythema and breakdown.

Management of Skin Integrity

Prevention is the first foal of intervention and is paramount in maintaining skin integrity in neonates. The AWHONN and the NANN collaborated in the development of a comprehensive evidence-based neonatal skin care guideline (AWHONN, 2013). By utilizing the most evidence-based skin care guidelines available along with careful monitoring and gentle, consistent care, improved skin outcomes can be realized.