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INFANT-DRIVEN EDUCATION

Neuroprotective & Nurturing Interventions with a Neuroscientific Foundation: *Touch & Massage*

Neuroprotective Care

Former preterm infants suffer moderate to significant negative neurodevelopmental outcomes like cerebral palsy, lower IQ scores, language delay and impairment, social and behavioral problems, mental health impairments, school-related difficulties, sensory integration deficits, and employment and relationship issues in adulthood (Watson, 2010). Although the exact cause of these adverse outcomes is not clear, the stressful environmental influences on the still developing brain during critically sensitive developmental periods is recognized as a contributing factor (Smith et al., 2011).

Neuroprotective Care in the NICU is designed to mediate the biological, developmental, neurological, and psychological needs of the infant. Research now tells us that the neonatal population not only benefits from a change in our handling and interactions to a more neuroprotective model, but requires it for optimal development. Neuroprotective and nurturing touch and massage is an easy, cost effective strategy to improve the neurodevelopmental outcomes of premature infants.

Neuroscience of Touch

Touch is the first sense to develop in a fetus, becoming functional as early as 7 weeks gestation. While the somatosensory cortex is the main sensory receptive area for touch, the insular cortex is responsible for storing touch as an emotional memory after it travels through the sensory afferent C-fibers with slow-threshold mechanoreceptors. The insular cortex is structurally present at 13 weeks and functional at survivability, where it mediates self-awareness, empathy, interpersonal experience, and homeostasis. This neurobiological link explains why touch has such a critical role in the development of an infant's survival, attachment, emotional satisfaction and psychopathology. The insular cortex has also been suggested to have a role in anxiety disorders and emotional dysregulation,which are common in preterm infants (Schore, 2002).

Unfortunately, most of the touch and handling experienced by the neonatal population is procedural or painful. Research suggests that less than 5% of touch experienced by premature infants in the NICU is meant to be comforting or loving (McGrath et al., 2007). Providing early, frequent, consistent skin-to-skin holding is one evidence-based way to ameliorate this concern. Similarly, providing nurturing touch and massage could provide the positive emotional memories for a better lifelong neurobiological and psychological foundation.

Nurturing Interventions

Neonatal touch & massage are age-appropriate activities within the core measure of "Promoting a Healing Environment" (Altimier & Phillips, 2014). These nurturing interventions can be used as a neuroprotective strategy to counteract negative sensory input, promote a parasympathetic nervous system response, and enhance developmental outcomes, as well as provide parent-infant attachment.

Decreased Length of Stay

A 2013 meta-analysis found that massage decreased length of stay by 4.41 days (Wang & Zang, 2013) . With the average cost of NICU admission for an infant born < 32 week PMA totaling $280,000, shortening the length of admission by 4 days can have significant cost savings for hospitals and families (March of Dimes, 2011). Despite the well- documented neuroprotective and financial benefits, massage is practiced in only 38% of Neonatal Intensive Care Units (Field et al., 2010).

The Role of Parents and Massage

Attachment is the fundamental process of developing a deep and enduring emotional bond, which establishes an infant's relationship with the outside world. Fostering the infant-parent relationship is crucial, as it is the foundation for attachment. Additionally, research has proven parental presence in the NICU makes a direct impact in developmental outcomes (Reynolds et al., 2013). Massage provides a meaningful activity to promote attachment and parental confidence and competence in parenting their infant in the NICU and beyond.

Studies in which parents provide massage have shown both short and long term benefits in infant development as well as parental benefits. These benefits include:

Eases stress about separation
Provides active parenting role
Decreases maternal depression
Increases responsiveness of infant
Optimizes mother-infant interaction
Increases sense of maternal competence
(O'Higgins et al., 2008)

Incorporating neonatal touch and massage is an easy way to support and encourage parents as their infant's primary caregiver, while improving the outcomes for both infants and parents.

Implication for Practice

Equipped with the knowledge of neuroprotective care and the scientific evidence supporting the implementation of nurturing touch & massage in the NICU, healthcare providers should be held accountable to provide such care. Implementation should start at admission with nurturing touch and handling and early parent engagement in facilitative tuck and skin-to-skin holding. Massage must be individualized for the patient and meet their neurodevelopmental needs, which is why traditional infant massage techniques are often not age-appropriate nor neuroprotective with the NICU population. Additional staff, such as massage therapists are not necessary in the NICU since trained neonatal RNs, OTs, SLPs, and PTs can provide this care during their daily caregiving. Trained NICU professionals should not only provide neonatal touch & massage for their patients, but more importantly, teach and encourage parents to provide these neuroprotective, inexpensive, non-pharmacological, scientifically-based nurturing caregiving activities.

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Full references available upon request

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