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Response to "Nurturing Social Visual Development in the NICU"

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Introduction

We recently published the letter "Nurturing Social Visual Development in the NICU" in the Journal of Perinatology proposing developmental considerations of universal mask policies implemented in response to COVID-19. We are writing this as a response to that article and discussions with multidisciplinary teams as well as growing experience counseling and supporting families during this dynamic time. In this article we will review visual components of social development in light of "whole child". Although we reference NICUs in both our previous letter and this one, these principals are important for all infants and young children facing prolonged hospitalizations.

Unlike the auditory system, which functions relatively well at birth and is already attuned to familiar voices and sounds, newborn vision is very immature and limited compared to adults and develops rapidly over the first year of life[1]. It is assumed that infant visual acuity at birth is specifically developed to facilitate facial focus and recognition. This very limited early visual focus certainly contributes to development of "social networks" in the brain – a complex set of pathways involving many parts of the developing brain[2]. Although visual input is certainly not the only driving factor for these networks, denying infants the visual input reinforcing social interactions cannot be without risk, as these networks are established in early infancy.

Visual facial recognition is a very early developmental milestone, quickly followed by emotional facial expression recognition and differentiation. Newborn infants recognize and prefer faces in the first few hours of life, but with limitations[3,4]. Even preterm newborns orient to face shape, but do not differentiate distortions as well as term newborns[5]. Early visual focus is on the eyes, but between one and two months of age, visual focus of both infants and mothers shifts from eye gaze to include the mouth[7]. Overlapping this change, infants fine tune their preference from facial gestalt to more dynamic facial processing.

Social development progresses in symbiotic and parallel pathways to visual development, but also integrating auditory, emotional, and physical interactions, particularly with primary caregivers. Infants are naturally presented with face at the greatest frequency in the first few months of life[8]. At the same time, infants present their caregivers with facial expressions, the presumed primary goal of which is reciprocal emotional response. Failure to elicit emotional response results in changed infant behavior, namely decreased eye contact and signs of distress[9]. These interactions and changes in behavior occur in the first few days of life. The seemingly innate facial preference changes to intentional social interaction by about 2 months of age. The reciprocal social smile emerges by 6- 8 weeks of age[10]. Early caregiver mirroring (2 months of age) of infant facial expressions is hypothesized to directly impact neurological motor mapping displayed in later infancy[11].

Most specifically related to the present mask situation, by 2 months of age, infants clearly expect reciprocal interactions and are distressed when a caregiver does not respond as expected. Infants also demonstrate a preference for "real" faces as opposed to drawings[12]. By 7 months of age, infants process and respond differently to various facial expressions[13]. Increased focus on infant social attention, including reciprocal facial expressions and mirroring has been proposed as an early intervention technique in children at risk for Autism Spectrum Disorders (ASDs), the most common and well documented social impairment [14].

Additionally, maternal mental health significantly impacts multiple domains of infant health. COVID-19 has increased depression and anxiety worldwide, and preliminary studies have also demonstrated increases in post-partum depression.

Although still early in our knowledge and understanding of COVID-19, infants appear to be at low risk for overall infection and illness, though greater than initially suspected[15]. Infants with prolonged hospitalizations and perinatal complications are known to be at risk for significant neurodevelopmental delays and pathologies, including ASDs[16]. Additionally, extremely preterm infants without ASDs demonstrated different neuroactivation with facial recognition than their peers born at term gestation prior to COVID-19 necessitating universal mask usage[17]. This combination of data supports the need to carefully nurture the social development of infants with prolonged hospitalizations.

As it has become clear that COVID-19 will be challenge for some time to come, we wish to emphasize the need to treat the "whole child" during prolonged hospitalizations. Although a child is a single patient, each child exists in the context of a family and with multiple domains of health and well-being. Family-centered care is documented to decrease stress levels while increasing parenting confidence in multiple settings[18].

NICUs have created comprehensive developmental care programs and these are now standard of care, so much so that there are conferences dedicated to NICU developmental care. However, the most recent consortium statement addressing developmental care in the NICU omits social development, which we consider a significant deficit in a "whole child" approach [19].

Humans are social beings. As such, parents recognize the importance of face visualization by their infants. In fact, multiple parents admitted to "pulling down" their masks when alone in private rooms with their infants to facilitate interactions, which we view as evidence that face to face interaction is "normal" and both infants and parents seek and enjoy it. Encouraging and facilitating enjoyable interactions with their infant should be a NICU developmental care goal. Studies have shown that observed positive parental affect predicts similar positive behaviors in toddlerhood[20]. Parents facing prolonged hospitalizations experience significant and different stressors than other parents of newborns, and this should lead hospitals and NICUs to implement care protocols to ameliorate negative effects of these stressors.

Beyond typical, pre-COVID-19 protocols, we recommend NICUs screen mothers of infants facing prolonged hospitalizations for post-partum depression multiple times during the infant's course, and other caregivers for depression and anxiety. Referral for appropriate services should occur, but this also presents another opportunity to engage parents in their child's development and educate them about the importance of their health in their child's life.

The FDA clearance of clear face masks (currently we are aware of the ClearMask) presents a novel option for facilitating face visualization and can help "normalize" parent-child interactions. Although we do not have data regarding the exact amount of a face needed to optimize the visual component of social development, this product is certainly an option worth consideration and may be easier to present to hospital infection control committees than face shields due to the FDA clearance as a face mask.

Conclusion

In conclusion, as COVID-19 persists, social development of infants and young children with prolonged hospitalizations needs to be considered. Social development is a reciprocal process between caregiver and infant and interference in the normal feedback loops is stressful with detrimental effects in multiple developmental domains. Balancing parental health in all domains, staff well-being, and infant needs requires careful consideration, but also presents opportunity for further engagement of families in care planning and provision.

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