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Understanding Preterm Infant Behavior in the NICU

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All living things are in constant communication with their environment. The trick is learning how to understand their method of communication. Heidi Als, Ph.D. has been a pioneer in helping us understand how to "read" preterm infant's cues, especially while they are still in the NICU. Dr. Als has made her life's work observing preterm infants, and thanks to her we have a greater understanding of what these fragile infants are trying to tell us. Many nurseries have incorporated Dr. Als' ideas into their nursery practice, and much has been written on this topic. This is not meant to be an exhaustive explanation of this body of work, but rather a brief summary of the main points of her theory and a few examples of how it is applied to care in the NICU. The Synactive Theory of Infant Development provides a framework for understanding the behavior of premature infants. The infant's behaviors are grouped according to five "subsystems of functioning." The five subsystems are as follows:

1. MOTOR - We look at the infant's motor tone, movement, activity and posture.
2. AUTONOMIC - This is the basic physiologic functioning of our body necessary for survival. The easily observable indicators of this subsystem are skin color, tremors/startles, heat rate and respiratory rate.
3. STATES - This is a way of categorizing our level of central nervous system arousal - sleepy/drowsy, awake/alert and fussing/crying.
4. ATTENTION/INTERACTION - This is the availability of the infant for interacting, alertness and the robustness of the interaction.

5. SELF-REGULATORY - This is the presence and success of the infant's efforts to achieve and maintain a balance of the other four subsystems.

Each subsystem can be described independently, yet functions in relation to the other subsystems. The autonomic system has to be functioning (the baby breathing and has a heat rate) to be able to assess an infant's ability to look at something. The process of subsystem interaction (how the five subsystems work together or influence each other) is what is meant by the term "synaction." This synaction is combined with the infant's continuous interaction with the environment to formulate the "Synactive Theory of Infant Development." The basic concept underlying this approach is that the infant will defend him/herself against stimulation if it is inappropriately timed or is inappropriate in complexity or intensity. If an inappropriate stimuli persists the infant will no longer be able to maintain a stable balance of subsystems (e.g., decrease or increase in heart or respirations may be observed or skin color may change, or muscle tone decrease). If properly timed and appropriate in complexity and intensity, stimulation will cause the infant to search and move toward the stimuli, while maintaining him/herself in a stable balance (e.g., appropriate color, even heart and respiratory rate and/or good muscle tone). In healthy full term infants these systems generally work smoothly supporting and promoting each other. In the preterm infant these systems are not fully developed and ready to function. Therefore, the preterm infant's behaviors are generally characterized by disorganization and signs of stress. The preterm infant is more dependent, than the full term infant, on its environment to help support and maintain balanced equilibrium. Technology, which focuses care solely on the autonomic system (respiratory, cardiac, digestive and temperature control functions), comes at the expense of the motor, state, organizational and self-regulatory systems, which are intimately dependent on an adaptive environment.

Signs of stress, by subsystem, seen in preterm or full term infants cared for in the NICU include:

- Autonomic Signs of Stress Color changes (pallor, flushing (turning red), and cyanosis (turning blue) Changes in vital signs (heart rate, respiratory rate, blood pressure (BP), pulse ox rate) Visceral responses (vomiting, gagging, hiccups, passing gas) Sneezing Yawning

- Motor Signs of Stress Generalized hypotonia (limp, decreased resistance to moving of the infant's extremities) Frantic flailing movements Finger splaying (holding fingers spread wide apart) Hyperextension of extremities (arms or legs extended straight out almost in a locked position)
- State Signs of Stress Diffuse sleep states (lots of twitching, grimacing, not resting peacefully) Glassy-eyed (appears to be "tuning out") Gaze aversion (cuts eyes to the side trying not to look at what is in front of them) Staring (a locked gaze, usually wide open eyes) Panicked look Irritability (hard to console)
- Attention/Interaction Signs of Stress Infant will demonstrate stress signals of the autonomic, motor and state systems Inability to integrate with other sensory input (can't look and face, listen to talking and suck a bottle at the same time)
- Self-Regulatory Behaviors - these are attempts to deal with stress and regain control Change in position Hand-to-mouth Grasping Sucking Visual locking Hand clasping

Some Intervention Strategies in Response to Signs of Stress

- Strategies for dealing with "State Signs of Stress" Grouping care activities - This should enable infants to have longer periods of quiet. Hopefully increased rest will optimize an infant's growth and development. Appropriate Timing of Care - As much as is possible in an intensive care unit organize the infant's daily routine to his "best times." Individualize care to the capabilities and needs of each infant. Some interventions may be helpful to one infant and stressful to another, and sometimes be helpful or stressful to the same infant at different times. Use swaddling, prone or side lying supported positioning to help an infant with state control. Look at and listen to the infant's immediate environment from his/her point of view. Particularly, look at the appropriateness and quantity of stuffed animals and pictures in the infant's immediate environment and adjust them to aid in state maintenance and smooth transitions. The baby needs to be able to look at things if he/she chooses, but also be able to look away easily if it becomes stressful.
- Strategies for dealing with "Attention/Interaction Signs of Stress." If the

infant has disorganized autonomic, motor and state subsystems the infant will rarely have the energy needed for social interaction. The infant may have difficulty tolerating social interaction and other sensory input at the same time. For example, many preterm babies can not control feeding and being talked to and looked at simultaneously. Coordinating sucking, swallowing and breathing may take all the energy and concentration the infant has. Separating feeding and socializing may be very beneficial. Feeding should be quiet and calm. Getting the baby ready to feed may be the time for a little socializing. Always watch the baby closely for cues as to how much he/she can tolerate.

· Strategies for helping the infant use his/her "Self-Regulatory" responses to "Signs of Stress." Use of rolls and other supports to help keep the infant in a comfortable flexed position. Holding an infant's hand (gently placing a finger in the baby's palm, which stimulates the grasp reflex) or giving them something to suck on can be calming. When possible slow the pace of what you are doing or give the infant a break if signs of stress are noted. As the infant shows signs of stability the action can be resumed gradually. Self-regulatory behaviors will be seen more often as the infant matures, getting closer to 40 weeks gestation. The earlier the gestation the less self-regulatory behaviors the infant has available to him/herself, and the more the infant has to rely on outside help in regulating him/herself