NICU Network Neurobehavioral Scale (NNNS) Summary

The NICU Network Neurobehavioral Scale (Lester & Tronick, 2004) is a direct neurobehavioral observation and examination of the newborn infant. The examination assesses the infant's neurological integrity and behavioral and neuromotor organization and functioning.

Equipment Used:

Red ball
Red rattle
Standard flashlight
Bell
Head supports
Plastic foot probe
Watch
NNNS Scoring Form

Administration Time:

25–30 minutes

Administration Method:

Direct examination of the infant, including visual inspection, exposure to visual and auditory stimulation, and physical examination.

Administration Procedures:

Infant State

The infant must begin the examination in a sleep state, preferably halfway between feedings and having been asleep for 45 minutes. The assessment itself is "state dependent," which means that the infant must be at a particular level of sleep or wakeful activity for particular items to be administered.

Packages

Items within the assessment are grouped into modules or "packages" that reflect common areas of functioning and common targets of observation so as to create a smooth administration procedure and minimize handling and repositioning of the infant. Packages are intended to be administered in a standard order, although an individual infant's state might require adjustments to the order.

Each of the packages and the observations of the infant that take place within that package are the following:

A. Preexamination Observation

The infant is observed while asleep and covered, and the state of alertness is recorded without waking the infant.

B. Habituation

The infant is exposed to a series of sensory stimuli. The infant's responses to each source of stimulation, particularly the ability to protect his or her sleeping state by decreasing responses to the stimuli as they are repeated, are observed and recorded. The stimuli include light from a flashlight, the sound of a rattle, and ringing of a small bell.

C. Unwrap and Supine
The infant is unwrapped from the blanket so that limbs are clearly visible and posture, skin color, skin texture, and movement are observed. The infant's head then is supported with head supports, and the foot is stimulated with a plastic probe to observe response decrement to foot stimulation.

D. Lower Extremity Reflexes
The infant's leg and foot reflexes—including plantar grasp, Babinksi reflex, ankle clonus, leg resistance, leg recoil, power of active leg movements, and popliteal angle—are assessed through gentle manipulation of the infant's legs and feet.

E. Upper Extremities and Face
Infant reflexes and muscular tone are assessed through gentle manipulation of the infant's arms and hands and through stroking of the infant's face. The measures taken include scarf sign, forearm resistance, forearm recoil, power of active arm movements, rooting and sucking reflexes, hand grasp, truncal tone, and supported pull to sit.

F. Upright Responses
The infant is held upright under the arms, and foot placing and stepping movements are observed. The infant then is held suspended gently on his stomach. Limb and head tone are observed, and incurvation responses to light stroking of the back are observed.

G. Infant Prone
The infant is placed prone with arms near head and palms down, and crawling leg movement (stimulated if needed by gentle pressing on the feet) and head raising attempts are observed.

H. Pick up Infant
The infant is held and cuddled in the arms of the examiner and on the shoulder of the examiner.

I. Infant Supine on Examiner's Lap
The infant is held supine on the examiner's lap. The infant is exposed to a variety of visual and auditory stimuli, including a red ball, a rattle, and the examiner's voice and face, so that orientation to the sights and sounds can be observed.

J. Infant Spin
The infant is held facing the examiner as the examiner spins around in a full or ¾ circle. The infant's head turn and eye movement responses are observed.

K. Infant Supine in Crib
The infant is placed supine in the crib. A cloth is placed lightly on the infant's face, and defensive responses are observed. The infant's face is turned to one side, and postural adjustments to the arms and legs are observed. Finally, the infant is held supine and the moro reflex is elicited.

Examiner Ratings
After the examination is complete, the examiner completes a series of rating of overall infant behavior and state during the exam, as well as variability in state across the exam. The examiner also records signs of infant stress or withdrawal/abstinence that are noted during the exam.

Risks and Protection Against Risks
The NNNS examination itself is comparable to a normal neurobehavioral status exam that would be performed in a routine newborn examination, and risks are minimal. The examination is suited for infants

for infants as young as 30 weeks gestational age through 46–48 weeks corrected conceptional age (up to a full-term infant who is about 2 months old). The NNNS was designed to permit use on infants at physiological risk due to drug exposure in utero, thus it does not pose special risk for preterm or physiologically at-risk infants. Infants who are too premature for the administration window at the time of discharge can be assessed at a 1 month visit instead.

The infant may become distressed during parts of the examination as positions are changed and gentle handling and stimulation occur. Examiners will be extensively trained in the gentle handling of newborn infants and the smooth administration of the procedures to ensure a smooth and comfortable administration of the protocol. Because the administration of the NNNS is state dependent, the examiner will cuddle and soothe the infant as needed to return the infant to a calm state. Additionally, although there is a recommended order to the administration of the NNNS packages, the order can be adapted to reduce the distress of an infant who becomes upset.