

NICU Environment : Can we be Ignorant?

Col MNG Nair*, Surg Cdr Girish Gupta⁺, Lt Col SK Jatana[#]

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Optimal physical, psychological, social and ethical NICU environment is crucial for the best neonatal outcome. Frequent NICU management procedures like suctioning, heel sticks for blood tests, IV line placements, imaging are stressful for the baby and also disrupt their sleep [1]. For the very small preemies, just being handled for daily care, like diaper changing, feeding, vital parameter's recording etc. can be stressful. Therefore, the physical environment should include attention to sound, light, position, touch and other variables. Slevin et al had shown that significant alteration of the NICU environment for light, noise, infant handling and staff activity for a specified time period, resulted in reduced median diastolic blood pressure, mean arterial pressure, neonatal movements and thus reduction in neonatal stress [2].

Sound Environment

Loud sound besides being stressful, may lead to loss of hearing. The noise of the incubator motor is 55-60 decibels (db) and warmer bed, 62 db. The use of mechanical ventilation or CPAP makes it noisier. Chang et al [3] showed that during the 48 hour observation period, 4994 peak noises were recorded. About 90% of these were due to human-related factors. Loud, sharp sounds can raise noise levels to 100-200 db, which may damage cells in the ear. This is more likely to happen in sick babies on ototoxic drugs like aminoglycosides. Loud or sharp sounds can cause physiological changes like tachycardia, tachypnoea, apnoea, oxygen desaturation and sudden increase in mean arterial blood pressure, disturb sleep, startle the baby and may even produce intracranial haemorrhage in a micropremiee. Sound levels must be reduced by talking quietly, closing doors and portholes gently, not dropping things on top of the incubator, turning down machine alarms and phone ring and by modifying staff behaviour, care procedures, and equipment [4]. Mother's voice and soft music transfer love, emotions and wisdom and thus augur long term developmental benefits, which allows their babies to approach their full potential [5].

Light Environment

Constant light may disturb body rhythm; bright light may not permit baby to open eyes and look around. Premies in nurseries with dimmed nightlight, progress more quickly in their sleep-wake patterns. The amount of light should be reduced by covering the isolettes by laying a blanket over the top with baby hooked to multi-system monitor. While using phototherapy lights, eyes must be covered. "Quiet time" must be maintained during the day, when lights are dimmed for several hours and the baby is not disturbed unless a procedure is really needed. This will help in starting a day/night sleep schedule and support diurnal variations in hormone and temperature levels.

Positioning

The preemies lack the muscle strength to control movements of body. They tend to lie with arms and legs straight, or extended, rather than flexed. The extended position for long periods can lead to abnormal tone with consequent delay in the motor development. Small preemies maintain better oxygenation, temperature, and sleep when they are nursed in prone or lateral positions with mild shoulder elevation. Sometimes, it is difficult to place the preemie in a curled up, flexed position because of attachments of lines and sensors. Nesting is one of the key factors in maintaining beneficial position of a neonate and should be practised routinely.

Handling

Handling of preterms may lead to physiologic and behavioural stress, which is shown as tachycardia, bradycardia, tachypnoea, apnoea, desaturation, colour changes to dusky or flushed, and responses like hiccups or yawning. Therefore, minimal handling is the most important theme in managing a small preterm.

Touch

The sense of touch develops very early in fetal life. In very small preemies, the skin is so fragile that touching has to be done with great care. For preemies <30 weeks gestational age, studies show that touch may

be stressful rather than soothing. For older preemies, gentle touching can be helpful. Preemies react in different ways to different kinds of touch. How and how often the preemie is touched, needs to be based on his responses. A gentle application of bland, sterile oil is recommended for small preterm neonate. Kangaroo Mother care (KMC) which facilitates intimate touch of the baby with mother's chest and provides various benefits to both mother and the baby has become popular.

Analgesia

Neonates feel pain as older children and adults. Experiencing pain is stressful with accompanying harmful effects. Therefore, it is essential to avoid or minimize painful events; if inevitable, then analgesics like oral sucrose, breast milk, mother's nipple, soother, local analgesic, opioid and nonopioid systemic analgesics, should be used judiciously.

Parental Stress

Having a premature baby is one of the most stressful experiences of a parent. Many aspects of neonatal intensive care units are stressful to parents, including prolonged hospitalization, alterations in parenting, exposure to a technical environment, and the appearance of their small, fragile infant [6,7]. Frank, in-depth communication with parents is essential, to make them participate in decision making and baby care. This will remarkably alleviate the parental anxiety and confusion. Therefore, neonatal care providers should be trained in the art of communication, in a structured curriculum. Its importance will progressively increase with the enactment of consumer protection act.

Effects on Healthcare Workers

Effects of light and electromagnetic fields on pineal function could have implications for long-term risk of breast cancer, reproductive irregularities, or depression in healthcare providers [8]. Therefore, there is need to monitor these variables and develop permissible standards.

Family Involvement

The quality and frequency of family participation in their neonate's care in the NICU can play a significant role in their effectiveness after discharge. Their presence and involvement in the NICU offer a unique way to humanize the healthcare experience for infants, their families and their caregivers. The salient guidelines for parental involvement are, to teach parents signs of stress and stability, provide a 'parent friendly' area to be with their infant, provide privacy for breast feeding and kangaroo care, delegate as much responsibility as they are comfortable with, encourage

parents to use their hands to provide support to the infant and provide grasping opportunities, support parents in the transition of caring for their preterm infant.

Nature of the NICU as a Social Environment

The NICU is preemie's home away from home. It is where he begins to learn about people, how they respond to him, and how he feels to be talked to, held, soothed or left alone.

Ethical Environment

NICU is a place where ethical issues are faced very often especially when a neonate suffers from a nearly fatal condition. It is very difficult to decide to withhold life support or withdraw it. One has to be very careful in newborn care because consent is given by a surrogate and not by the patient. It is imperative that NICU should have standard ethical guidelines with full back up of hospital ethical committee to avoid any ethical catastrophe and should practise detailed informed consent.

Developmental Care [10]

The premature and at risk neonates are in a crucial stage of development. The NICU should provide supportive, nurturing environment that will improve developmental outcome of hospitalized neonates. Developmental care is a broad category of interventions designed to minimize the stress of the NICU environment. These interventions may include one or more elements such as control of external stimuli viz. vestibular, auditory, visual, tactile etc, clustering of nursery care activities, and positioning or swaddling of the preterm infant. Individual strategies have been combined to form programs, such as the 'Neonatal Individualized Developmental Care and Assessment Program' (NIDCAP) & WEE care programmes. These programmes have shown improvements in medical outcome including shorter time on respiratory support, healthier lungs, earlier initiation of feeds, improved weight gain, shorter length of stay, and decreased cost of hospitalization.

Outcome Measures of NICU Stress [10]

The following signs will help in ascertaining the baby friendly state of the NICU and evaluation of NICU environment. The signs of stability include stable heart rate and respiratory rate, regular pattern of respirations, stable colour, feeding tolerance, relaxed tone or posture, flexed or tucked position, hand on face, hand to mouth, sucking, clear sleep states and ability to interact.

Research

It is obligatory to have a database and innate research to improve morbidity and mortality statistics. It is

appropriate to nurture an innovative attitude to fulfill the requirement with inexpensive local resources rather than deny them because of cost or non-availability. It is for the entire developing world to encourage, reward and share innovative initiatives to reap optimum benefits. NICU should aim to have references on subjects of neonatal interest and resources like computer, internet within unit. NICU should provide environment for clinical trials, research and practice of evidence based neonatology. Teleneonatology is most ideal as it will minimize the disturbance to the neonates and will permit the practice of the best available medicine. Therefore, future planning should invariably include facilities for transfer of data and practice of telemedicine.

To conclude, it is essential to address the NICU environment to make it neonate friendly and humane right from planning of NICU to daily chores of the unit. Participation in neonatal care by the informed parents should be properly addressed. The communication skills of the NICU staff have to be honed. The attitude of the care provider has to become more humane amidst state of the art technology, to deliver the right mix of art and science of neonatal care to groom more humane, useful citizens of tomorrow.

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MEDICAL PHILATELY

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