

MANAGE NEONATAL STRESSORS



Helping you reduce
the impact of stress
in the NICU.
**Because today
decides tomorrow.**

Medtronic
Further, Together

HOW STRESS AFFECTS PATIENT OUTCOMES IN THE NICU

The average daily exposure to stressors is greatest in the first 14 days of life.²

A preterm baby is extremely fragile.

Every intervention, every procedure, and even every touch may produce harmful stress.^{1,3-8}
And we are only beginning to understand the repercussions.^{1,3-5,8}

Marked growth and development taking place in the perinatal brain make neural damage a significant concern for all neonates — especially premature infants.^{1,3-5}

Recent research shows that NICU stress is correlated with MRI measures of brain structure and function.^{2,5}

Stress may be a byproduct of life in the NICU. But let's work together to reduce its footprint.

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"Evidence suggests that repeated stress has serious and enduring effects on multiple physiological systems for preterm infants."

— Newnham, et al.¹

WHY NEONATAL STRESS MATTERS

Neonates undergo as many as 16 procedures a day.⁹ For tiny babies fighting to survive in the NICU, even nonpainful procedures like a position change or administration of medicine through an existing IV can cause a stress response.^{1,5,8} Stress increases in magnitude with the number of prior procedures.¹⁰

Environmental stimuli that we take for granted — like noise, bright lights, and frequent handling — may impact a neonate's:^{1,11}

- Heart rate
- Respiration rate
- Oxygen saturation

These physiologic signs of stress result in higher oxygen demand and calorie consumption, which may impact growth and healing.⁶ And that may have profound implications for the future.

What you can do to reduce stress in the NICU

- **Ventilation** — delivering synchronized breath, with both invasive and non-invasive ventilation, can have important benefits for neonates.¹²
- **Patient monitoring** - providing continuous SpO2, pulse rate, and respiration rate monitoring, so clinicians may detect respiratory complications earlier and intervene sooner.¹³⁻¹⁵
- **Nutrition** — feeding systems designed specifically for the NICU can ensure uninterrupted nutrition.
- **Procedural stress** — reducing any associated pain, discomfort, or risk of infection may help.

We offer a range of products to reduce unnecessary stress in the NICU. Giving you the tools you need to ensure a brighter future for your patients — because today decides tomorrow.



GENTLE RESPONSIVE VENTILATION

More comfortable ventilation — matched to a neonate's lung volume and breathing rhythm — may reduce stress and improve outcomes.

Reduce the work of breathing

Breathing is hard work for a preterm infant.

Common breathing interventions are prone to air leaks and put unnecessary stress on the neonate.^{12, 16, 17} Noninvasive ventilation is more preferable, but it has been traditionally more susceptible to leaks — and that leads to asynchrony and increased work of breathing.¹⁸⁻²¹

Asynchronous ventilation is associated with elevated markers of stress and blood pressure variability.²¹ Synchronous ventilation leads to quicker weaning,²¹ reducing the prevalence of ventilator-acquired pneumonia in NICU patients.²²

Leak Sync software on the Puritan Bennett™ 980 ventilator helps promote patient-ventilator synchrony by compensating for leaks.²³



FOR DELICATE NEONATAL LUNGS

Puritan Bennett™ 980 ventilator

- Leak Sync software compensates for fluctuating leaks up to 15 L/min in neonatal patients
 - Allows both invasive and noninvasive therapies
 - Helps reduce the work of breathing
 - Improves patient-ventilator synchrony²³
- Highly accurate tidal volume²⁴ protects delicate neonatal lungs
- Recommended for neonates weighing as little as 0.66 lbs (0.3 kg)



SOOTHING THE STRESS OF A TRACHEOSTOMY

Tracheal infections pose a significant challenge to compromised neonates.²⁵ And so does the need to remove wire-reinforced tracheal cannulas before MRI imaging.

That's why Shiley™ neonatal tracheostomy tubes offer clinician-inspired solutions.

Shiley™ neonatal tracheostomy tubes

- Wire-free cannula
- Soft flange material for comfort
- A lower flange angle to improve fit for infant patients



RELIABLE NONINVASIVE MONITORING

Reducing discomfort and unnecessary stress lets neonates rest — and spend more time healing and growing.

CONTINUOUS, ACCURATE MONITORING

Managing oxygenation within extremely tight ranges is critical in the NICU.

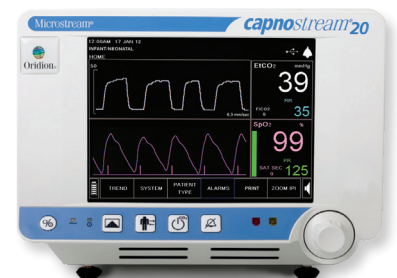
Patient monitoring provides a vital connection to each newborn, alerting you to subtle changes that, left untreated, could quickly become life-threatening.

Our range of noninvasive, continuous monitoring solutions — including SpO_2 , etCO_2 , and rSO_2 indicators — give you a more complete picture of each baby's evolving needs. Which may help you minimize unnecessary stress.²⁶



Capnography monitors with Microstream™ technology

- Alarm management features that distinguish clinically significant events from minor and brief desaturations, which may result in nuisance alarms
- May reduce neonate disturbance compared to mainstream technology
- Designed for intubated and nonintubated neonates
- Provides an early indication of respiratory compromise
- Only 50 mL/min sample volume required, reducing the competition for tidal volume



INVOS™ cerebral/somatic oximeter

- Noninvasive real-time monitoring of cerebral and somatic tissues
- Early indication of changing regional oxygen saturation
- Lets clinicians stay ahead of rapidly changing conditions



REDUCE ENVIRONMENTAL DISTURBANCES

Our alarm management tools are designed to reduce patients' exposure to clinically insignificant alarms. Because fewer alarms means less disturbance to resting neonates.

MONITOR REMOTELY

You need critical monitoring information at your fingertips. Our Vital Sync™ Virtual Patient Monitoring Platform allows timely response to patients in distress.²⁷

Vital Sync™ Virtual Patient Monitoring Platform

- Allows near-continuous remote monitoring
- May shorten response time to changes in patient conditions
- May reduce active alarm time and neonate exposure to noise



"Light, sound, and caregiving interventions are the main environmental stressors that are harmful to preterm infants in NICUs."

— Peng, et al.⁶



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6135 Gunbarrel Avenue
Boulder, CO 80301

800.635.5267 medtronic.com/covidien

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