SERVO-n® neonatal ventilation

Breathe, sleep, grow

MAQUET
GETINGE GROUP

They deserve our best **from the beginning**

Newborns should not have to start their lives battling for it. But some will, and the best we can do is help create an ideal environment for them to relax, sleep and grow—while helping to minimize as many risks as possible to their physical and mental development.

SERVO-n® has been designed to help you provide vulnerable neonates with the support they need while protecting the lungs, brain and other developing organs.

SERVO-n offers Neurally Adjusted Ventilatory Assist (NAVA®), a ventilation mode with the capability to truly match assistance to the irregular breathing pattern of neonates. Every breath delivered is what the baby the needs, as determined by their own physiology[1-8].

Starting life in the NICU means the baby will have some catching up to do. Help them breathe, sleep and grow with SERVO-n.

Breathe—Synchrony with the baby's irregular breathing pattern reduces work of breathing, lowers peak pressures and FiO_2[9-11], and potentially reduces the need for sedatives[12]

Sleep—More comfortable breathing[1,13] means better opportunities for sleep

Grow—improved comfort and reduced work of breathing may allow the baby to focus energy on growth and maturation of lungs and brain[8,14]

A better picture **of breathing effort**

Rapid respiratory rates, small tidal volumes, irregular breathing pattern, short inspiratory times with substantial leakage—ventilating neonates comes with its own set of challenges, especially when missed efforts are difficult to detect from pressure and flow waveforms[15]. The baby's struggle is important to understand and act on, as it deflects precious energy away from growth and maturation.

Studies show neonates spend almost one third of their time in asynchronous ventilation[16]. The standard response is to administer sedatives or muscle relaxants in an effort to have the baby conform to the machine's settings—a strategy that can suppress respiratory drive and unnecessarily prolong invasive (and asynchronous) ventilation.

With SERVO-n®, NAVA® caregivers have the ability to monitor the baby's Edi signal. The Edi signal is a valuable vital sign that is obtained by using a specifically-designed nasogastric feeding tube to read the EMG of the baby's diaphragm. This provides continuous information of the baby's respiratory drive.

The baby can now communicate to the clinician about what they need breath-by-breath[17].

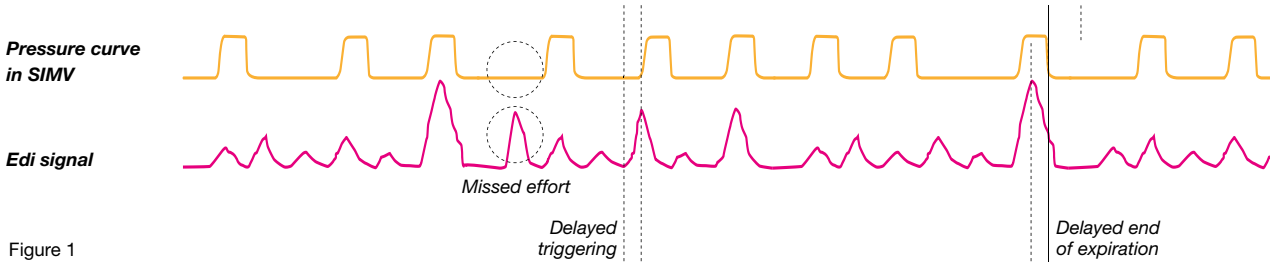


Figure 1

The more you know **the better they do**

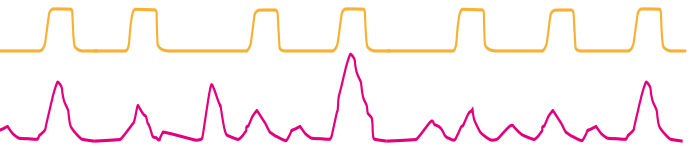
In conventional ventilation, measuring blood gases is standard practice for ensuring adequate oxygenation.

The Edi signal is a valuable diagnostic tool for understanding the neonate's breathing efforts, and ensuring the level of assist that's best for them at any given time, in any mode of ventilation.

Using Edi monitoring with any mode can help identify the wasted efforts that characterize asynchrony. Wasted efforts and other types of asynchrony are immediately detected and displayed, enabling earlier and more relevant intervention.

The Edi signal provides ongoing information about the respiratory drive that can also give clinicians a better understanding of when to let the neonate start breathing spontaneously. The same information may also help prevent or delay the need for intubation, and the resulting stress and sleep loss that can compromise the neonate's progress. It can also help the clinician determine the point of extubation readiness.

Edi monitoring may even be valuable in sedation management[12], and used to accurately monitor and trend central apneas[1,18].



The breathing pattern of neonates is variable. Previously undetected asynchrony, such as wasted efforts and delayed triggering, are now clearly visible with the Edi signal in all modes of ventilation.

The electrical activity of the diaphragm (the Edi signal) is shown on screen, providing insight on the baby's respiratory drive. Recorded in Finland.

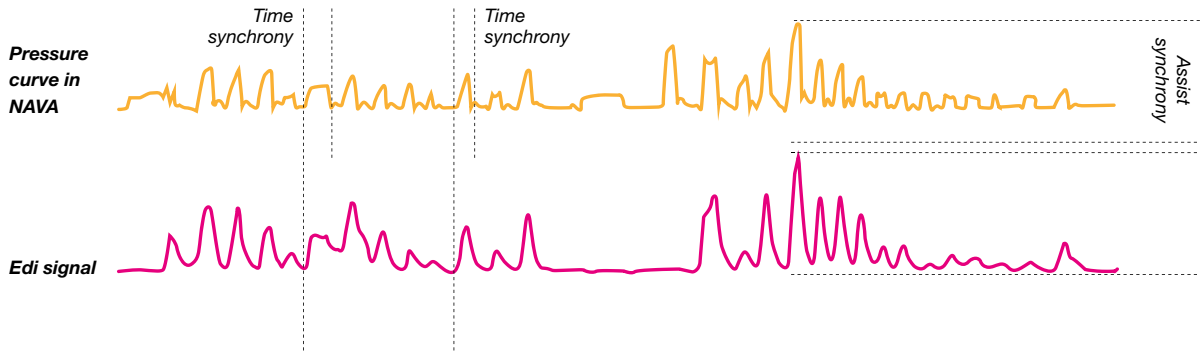
The right breath
right when they need it

SERVO-n® with NAVA® (Neurally Adjusted Ventilatory Assist) gives the clinician a whole new possibility: a neurally-controlled ventilation mode that supports premature babies in breathing spontaneously. The Edi signal is the trigger when in NAVA mode, matching the level of assist to the baby's physiological needs.

NAVA synchronizes support with the neonate's own respiratory drive—what the baby asks for, the baby gets[1-8]. He or she determines pressure, volume and timing for each breath. SERVO-n switches from NAVA to backup ventilation if the neonate experiences apnea, providing support until it detects a respiratory effort again. This means the baby struggles less for air, and has fewer disturbances from stressful alarms[1,13].

Studies show that patients supported in NAVA spend 91% of their time in synchrony, compared to 67% with pressure-triggered and 69% with flow-triggered ventilation[16,17]. The differences this improvement can make have been documented in more than 30 studies in neonatal and pediatric patients[19].

With NIV NAVA, leakage is automatically compensated for ensuring assistance is always matched to the baby's physiological demands[1,3]. This lowers the risk for over- or under-assist that can compromise the baby's rest or possibly affect their maturation. It can also help the clinician delay or avoid the need for intubation or reintubation.



NAVA ventilation matches assist to the irregular breathing of neonates and senses and controls apneas and sighs with normal breathing, providing added comfort for babies.


4
50
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SERVO n
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Ready for the reality of **NICU**

Neonate friendly **in any mode**

SERVO-n® provides many advantages in conventional ventilation

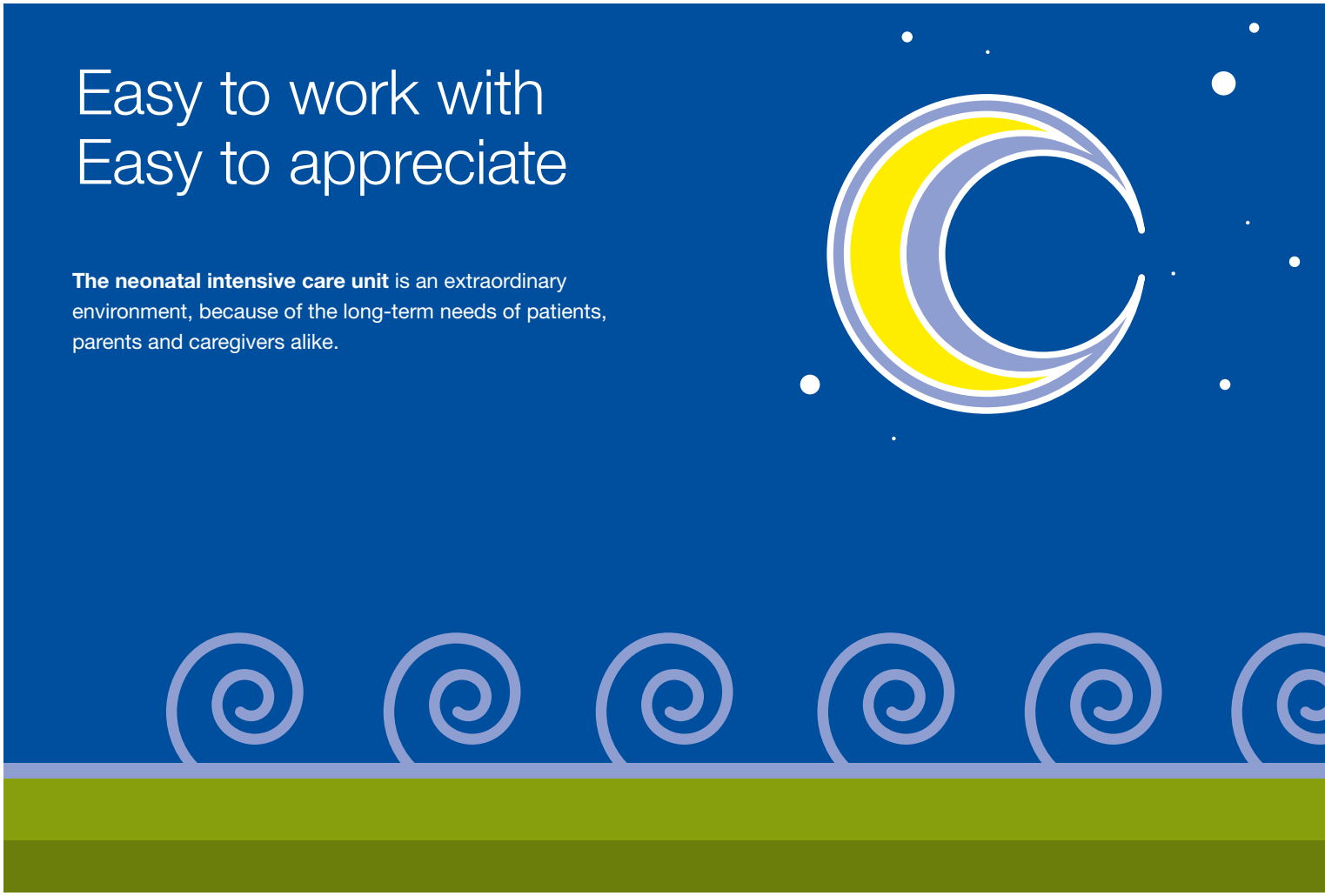
Accurate ventilation is always assured with automatic leakage compensation and the Y sensor—even with the unpredictable leakage due to uncuffed endotracheal tubes. The Y sensor and internal sensors cooperate to trigger, measure and deliver the pressures and tidal volumes you have set, down to 2 ml. If Y sensor measurements become unreliable, SERVO-n notifies you immediately.

Self-adjusting ventilation is another important feature of SERVO-n. PRVC with leakage compensation assures tidal volume delivery even with changing lung mechanics and uncuffed endotracheal tubes. AUTOMODE® supports smooth, safe patient transitions between controlled and supported ventilation, and seamless shifts between triggered and controlled breaths during irregular breathing—all without alarms and with an adjustable apnea time.

Protective ventilation is facilitated in many ways. Tidal Volume per body weight (VTi/kg) is calculated automatically, simplifying the setting and monitoring of tidal volumes to safe levels and according to treatment protocols. Tidal volume limitation, with corresponding alarm, restricts volume delivery to the set level and alerts you if necessary. This may be valuable when there is a significant risk of volutrauma after surfactant administration to neonates ventilated in pressure modes. O_2 boost lets you safely support patient oxygenation during events, while avoiding over-oxygenation. Boost levels can be set to the value you prefer.

Easy to work with
Easy to appreciate

The neonatal intensive care unit is an extraordinary environment, because of the long-term needs of patients, parents and caregivers alike.



More ways **to care**

SERVO-n® makes setting up, monitoring and operating surprisingly simple and intuitive.

With SERVO-n, you are never more than a touch away from onscreen help and suggestions. When changes are needed, illustrations and workflows guide you through the task. The SAFETY SCALE™ tool enables you to set ventilation parameters in a quick, intuitive and safe way.

The media library allows you to record actual events in real time so you can review them bedside or elsewhere. This provides the clinical team with unique opportunities for learning, training and research.

To support different clinical situations, the information in SERVO-n can be presented in a variety of views. In addition to the bedside views you are used to, we have created a distance view to help you monitor the most important information from across the room. During certain times, the *FAMILY View* displays values in a friendlier and more calming way.

To create a more quiet and less stressful environment, the alarm system has been refined to only provide the alerts that are necessary. The alarm management in SERVO-n® gives you more options for their control and provides recommendations to correctly address each one.

SERVO-n is lightweight, flexible and easy to move to either at the side of an incubator or warming bed, or for better positioning during kangaroo care.

Accessorized **just for them**

Disposables and accessories, such as patient interfaces, are optimized for the needs of sensitive neonates and designed to keep your SERVO-n performing at its best.

The Miniflow® system is a complete system for providing NIV NAVA® and Nasal CPAP.

Miniflow is designed with minimal dead space, and comes with a unique and flexible connection that makes it easy to switch between prongs and masks. Interfaces are made of soft material, and their angle is adjustable between 45° and 60° for an optimum fit.

For the sake of the baby's comfort, the noise level is low and the Miniflow adapter weighs only 0.35 oz (10 g).

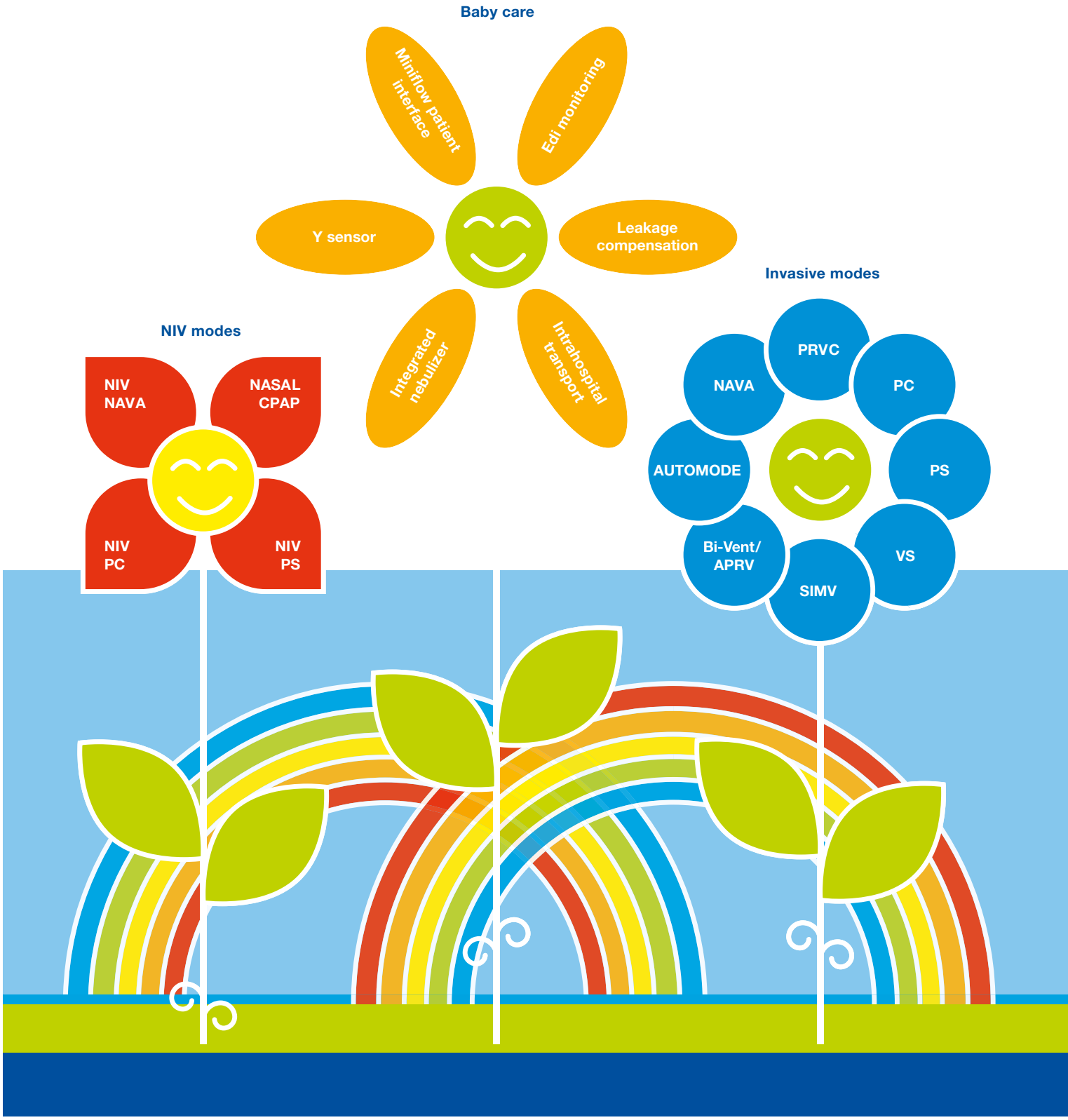
Designed to grow **with you**

SERVO-n® is a modular system, which means that as future functionality becomes available, you can upgrade easily and cost-effectively. Most hardware modules and associated components are interchangeable between SERVO-i® and SERVO-n, which means that the same feature can be used on mixed SERVO fleets, lowering overall costs.

SERVO-n is easy-to-use and easy to facilitate full utilization of the ventilator's capabilities. Intuitive screens and help menus, plus recommendations and prompts, promote quick learning and adoption for all clinical team members. SERVO-n is equipped to allow connection of an external screen to replicate the information on the ventilator's user interface, both in a classroom setting as well as at the bedside. This provides the user with yet another educational tool to support implementation of new therapies as well as basic learning.

MCare scalable services provide options to address the various needs of different organizations. Whichever you choose, it will add value from day one and ensure that your system operates at peak performance throughout its lifecycle.

SERVO-n® for neonatal & pediatric patients



Maquet | The Gold Standard

Leading the way: Maquet is a premier international provider of medical technology solutions. Focused on the OR, ICU and NICU, we are committed to developing solutions that improve patient care.

Maquet draws on many years' experience in supplying state-of-the-art ventilator systems. Since the introduction of the first SERVO ventilator in 1971, we have delivered more than 100,000 units and SERVO has become a world-renowned ventilation brand.

SERVO-n® offers all of the assistance options neonates need, while helping you protect the lungs, brain and other developing organs. SERVO-n is dedicated exclusively to neonate comfort and support.

SERVO-n offers an unprecedented standard of care centered completely around the needs of the most vulnerable patients—neonates.

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