Helping neonates breathe, sleep and grow

Servo-n neonatal ventilator

GETINGE

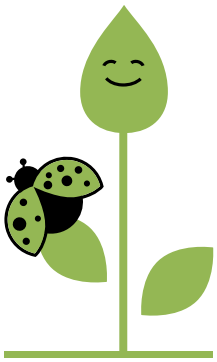
They deserve our best from the very beginning

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 breathe, sleep and grow.

Finding the right level of ventilatory support without over- or under-assisting neonates is a delicate balance.[1,2] Servo-n helps you assess that balance with the patients' own physiology[3] and enables you to act on almost any situation from delivery to discharge.

This gives you the opportunity to personalize the treatment[3,4] to the babies' needs and protect the lungs, brain and other developing organs.

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



Protect the lungs and brain from short- and long-term damage

– At every step of respiratory support

Even though we can now treat and save infants born as early as 22 weeks GA, mechanical ventilation can harm premature lungs. Servo-n, an all-in-one ventilator, can help you mitigate the risks and provide more protective care.

Breathing easily, sleeping and growing are all intertwined and essential in protecting the developing lungs and brain. For delicate neonates, Servo-n, with its variety of modes, monitoring and diagnostic capabilities, can improve short-term physiological effects[5] and lower the work of breathing[6,7] to prevent intubation.[8] If prevention fails, Servo-n can also help decrease the amount of sedation, provide lower pressures and enhance oxygenation.[9-11] These may all contribute to allowing babies to rest more,[5,10,12] and implies that energy can be spent on growing and maturing, rather than just trying to breathe.

Assess

Diaphragm monitoring (Edi) aids you in determining and providing the appropriate support the babies want and need[3] while managing sedation[13] and monitoring apnea of prematurity.[14]

Prevent

When CPAP is not enough, NIV NAVA offers a viable alternative that may increase the chance of NIV success.[8]

Protect

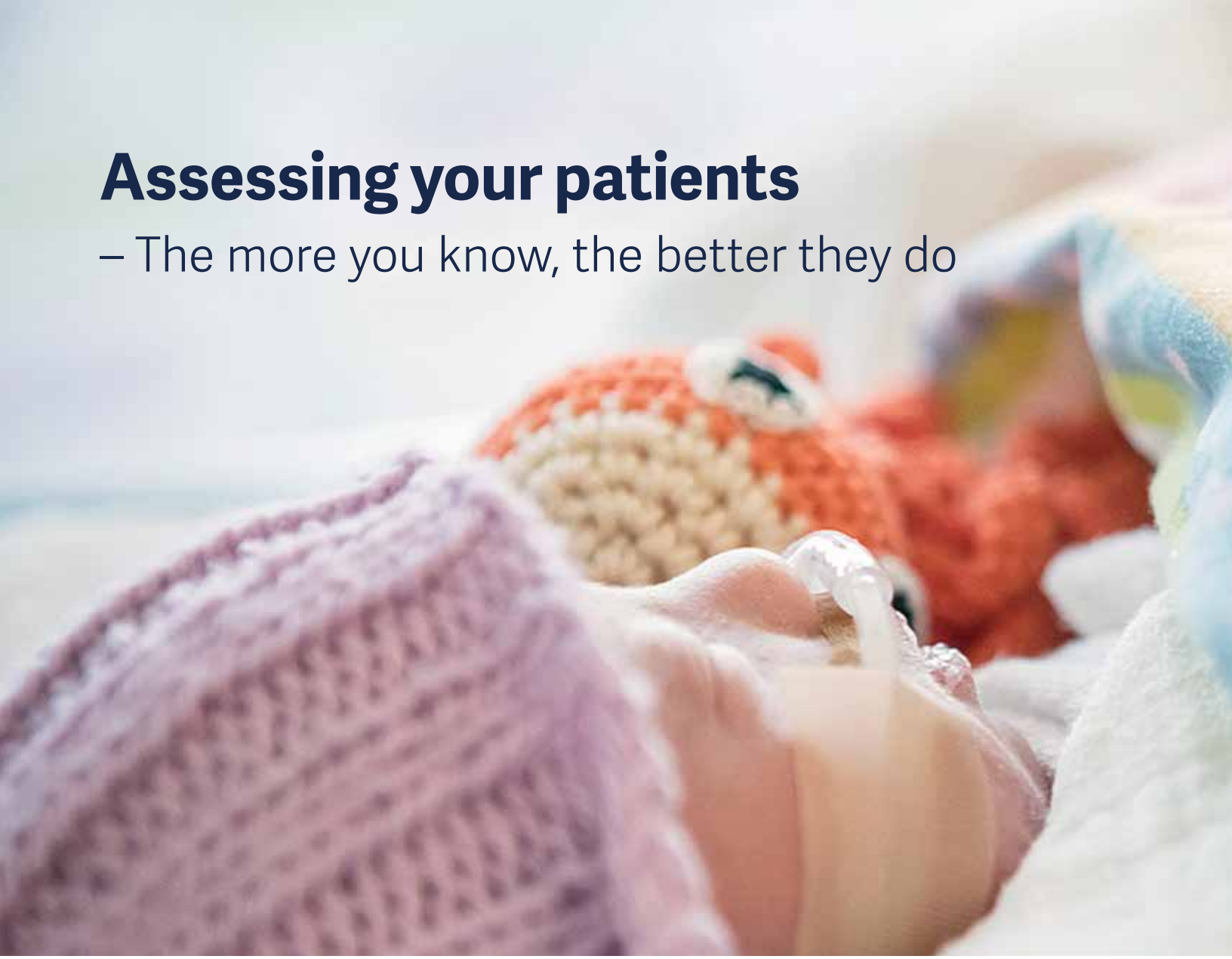
With NAVA, you have the opportunity to personalize the support and protect the neonate from risk factors associated with negative outcomes.[11,12] And if the babies need controlled ventilation, PRVC is there for you.

Wean

There are several modes to help you wean with Servo-n. Most interesting is NAVA, which can help protect against over- and under-assist and limit diaphragm atrophy with the potential for earlier extubation.[1,2,8]

Assessing your patients

– The more you know, the better they do



Ensuring the best level of support in neonates is difficult.[15] Servo-n can measure the electrical activity of the diaphragm (Edi) and display it on-screen. This vital sign of respiration[3] can help you identify the best level of support at all times during any mode of ventilation.[3]

Optimal support at any time

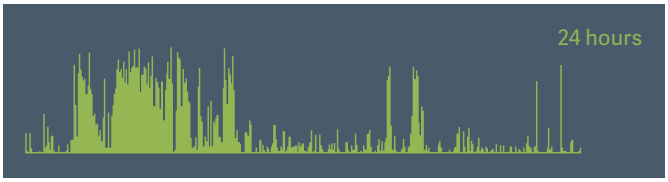
Edi helps you detect and monitor work of breathing and the presence or absence of breathing.[1] This may help you identify what type of support is best for your patients without delay.[1,2,3] It can help you prevent intubation but also determine when it is necessary.[3,8]

Once you decide on the most appropriate support, you can utilize Edi to optimize it.[1,3,15] By comparing Edi with the pressure curve, you can identify patient-ventilator asynchrony, such as wasted efforts and delayed triggering. In addition, the Edi minimum can indicate if the diaphragm relaxes between breaths and helps to prevent derecruitment of alveoli during expiration.[3,16,17]

Monitoring the diaphragm can also help you manage caffeine treatment,[18] sedation,[13] kangaroo care[19] and ideal resting positions. It may even be valuable in discovering disruptions in the respiratory drive[3] and to help monitor extubation readiness and recovery.[3,20,21]

Assess growth and maturity

Edi allows you to trend and monitor the respiratory pattern and apnea.[14] This will help you determine maturity and identify severe apnea that could otherwise lead to bradycardia or desaturation.[22]



This trend shows time on back-up ventilation, which occurs during apnea. The more premature the babies are, the more apnea episodes they experience.

Preventing intubation

– With the gentlest of support

Nasal CPAP

Every clinician's goal is to deliver CPAP as early as possible when needed. In the delivery room, its use can decrease the number of babies that need intubation and the number of overall ventilator days.[23,24] The CPAP on Servo-n provides a constant distending pressure with varying flow to support spontaneous breathing, which may decrease the work of breathing.[25]

NIV NAVA

For some neonates (about 45%), CPAP is not enough.[26] This is when NIV NAVA can help. It uses the neonates' own diaphragm to drive the ventilation. The mode is leakage independent with gentle mask application.[27] It increases patient-ventilator synchrony[7] and normalizes airway pressures and blood gases[5] with improved diaphragm unloading,[7] indicating higher chances of NIV success and less time on ventilatory support.[6-8]

Preventing intubation

– the clinical experience of Turku University Hospital

Fewer intubations with CPAP and NIV NAVA, among others, have proven useful for Prof Liisa Lehtonen, her team and the neonates they treat. They now see improved sleep and average weight gain; decreased exposure to painful procedures and pain medication; decreased risk of hyperventilation; fewer infections; and less inflammation.[28,29]

Protecting and stabilizing

– The right breath, just when they need it

The sooner babies can be stabilized, the faster they can be weaned and recover. Servo-n has several modes that can help you achieve these goals for your patients.

Neurally Adjusted Ventilatory Assist

NAVA is superior in supporting spontaneous breathing in neonates, targeting poor compliance and poor blood gases without a higher pressure setting that is often seen in other modes. When babies are on this mode, they tend to choose lower pressure[10] and tidal volumes with improved compliance[12] and synchrony,[30] improving their blood gases and oxygenation.[9] NAVA allows the neonates to regulate their own ventilation, limiting the risk of over- or under-assist.[1,2] NAVA also lowers the work of breathing, increases comfort[12] and reduces the need for sedation.[9] This may allow for more sleep and greater energy for growth and maturation.

Pressure Regulated Volume Control

PRVC is a volume-targeted mode that automatically adapts the inspiratory pressure to account for changes in lung mechanics. Separated regulation of controlled and assisted breaths reduces tidal volume swings and ensures low driving pressure, even when the patient starts to trigger the ventilator.

Automode

Automode supports smooth and 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.

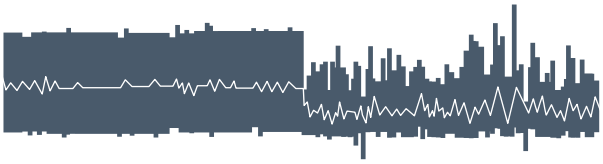
Protecting the brain

- Reduced risk of hyperventilation since neonates self-regulate their blood gases[10,31]
- The potential for improved duration and quality of natural sleep.[9,12,32] Thanks to improved ventilator-patient synchrony[31], comfort[11] and breathing variability, with lower neural drive and physiological distress.[12]
- Less exposure to analgesics and sedatives, minimizing the potential neurologic damage from these medications.[9,12,29,33]
- Indications for decreased time on ventilation[8,9,12]

26 weeks GA | 38 week GA

Lowering pressure

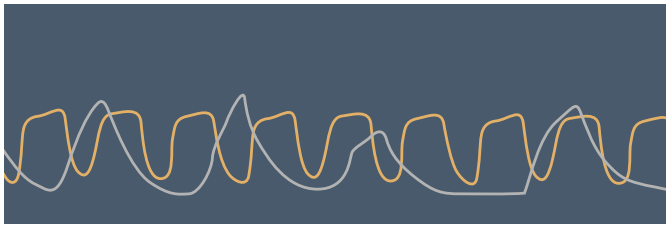
The trend shown to the right illustrates a neonate that was switched from SIMV to NAVA, resulting in an immediate drop in pressure. The baby is actively using his diaphragm, which lowers the pressure and allows him to recruit his own lungs with sighs.



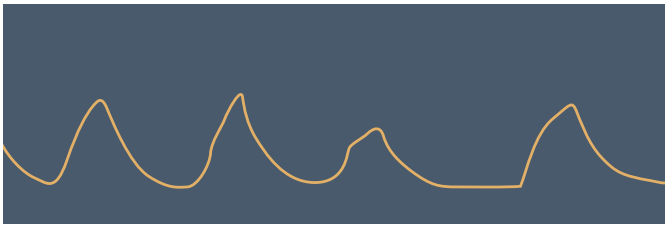
Switch from SIMV to NAVA (pressure curve trend)

Improving comfort

Compare SIMV with NAVA below. NAVA's support is so sensitive the baby can breathe as she wants and needs with proportional assist. This improves synchrony and comfort and may allow the baby to spend energy on growing rather than fighting the ventilator.



SIMV, pressure curve (yellow) with Edi overlay (white)



Pressure curve in NAVA

Neonatal respiratory conditions can change quickly and Servo-n is designed to keep up.

Servo-u/n demonstrates the highest level of use safety and user experience.[37]

Non-invasive modes:
NIV NAVA, NASAL CPAP, NIV PS, NIV PC

Invasive modes:
NAVA, PRVC, Automode (PC-PS and PRVC-VS), BiVent/APRV, SIMV (PC/ PRVC) + PS, PS, PC, VS

Baby care:
Edi monitoring, Leakage compensation, intrahospital transport, integrated nebulizer and Y sensor

1. Start weaning early without compromising on lung protection with PRVC.

2. Allow the diaphragm to work unhindered as soon as possible with NAVA and NIV NAVA.

3. If neccessary, safeguard your neonate through Nasal CPAP or High Flow therapy.

4. Monitor recovery when respiratory therapies have been removed, with the help of the Edi signal.

Weaning from ventilation

Assessing the readiness of weaning with Edi

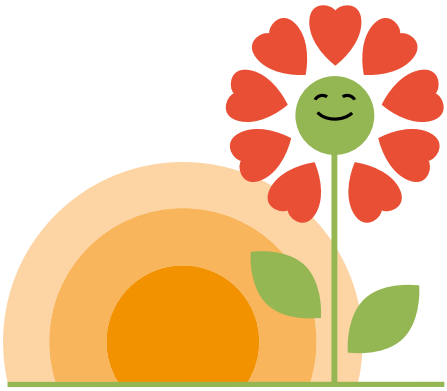
The Edi signal can be an invaluable tool for you to assess and help predict the likelihood of successful weaning.[3,20,21] It is possible to follow the patients' progress and assess when assist is no longer necessary.[1,2,3] When on CPAP or after all support has been removed, the patients' respiratory recovery can still be evaluated with the Edi signal.[3]

Weaning from the start of ventilation

Servo-n helps you wean babies from ventilation as soon as they are ready. PRVC automatically adjusts the peak pressure, achieving the set tidal volume based on compliance.

Spontaneous breathing with NAVA and NIV NAVA allows the diaphragm to work in synchrony with appropriate unloading.[7] The maintenance of diaphragm activity, avoiding over- or under-assist ventilation, may limit atrophy and lead to earlier extubation.[1,2,8,34,35]

You can further reduce the risk of re-intubation thanks to the leakage independence of NIV NAVA.[8] This mode also allows for many types of interfaces that can be applied more comfortably.[27]



Optimizing uptime and efficiency

Easy to learn, safer to use

Servo ventilators build on 50 years of close collaboration with intensive care clinicians around the world. The result is better patient safety thanks to higher levels of use safety and a superior user experience.[36]

The intuitive touchscreen makes Servo-n a breeze to learn and use. Different views, help texts, recommendations and prompts help staff to orientate quickly and support you when choosing modes and when managing settings, alarms and interventions.

Seamless connectivity

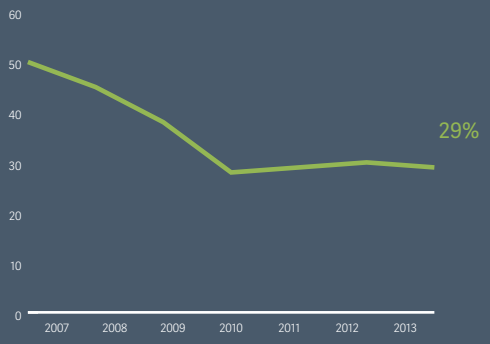
Connectivity is essential to improve efficiency and positive outcomes in healthcare. Servo-n onnects to a range of PDMS systems and patient monitors.

Secure investment

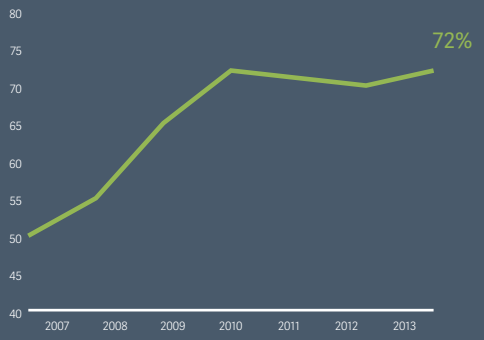
The flexible, modular platform is always ready to adapt to your changing clinical needs and a Getinge Care service agreement maximizes long-term value. Four levels of service packages are designed with your hospital's success in mind to ensure your Getinge equipment delivers peak performance.

The Toledo Hospital journey towards better outcomes

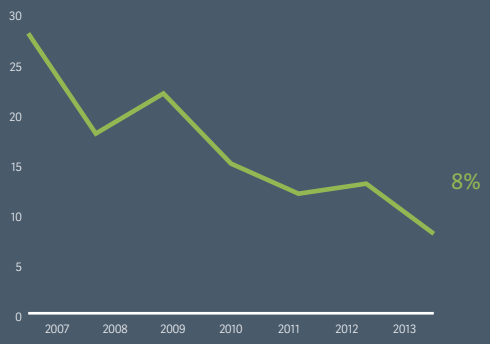
Reduced death and morbidity in neonates by 40%



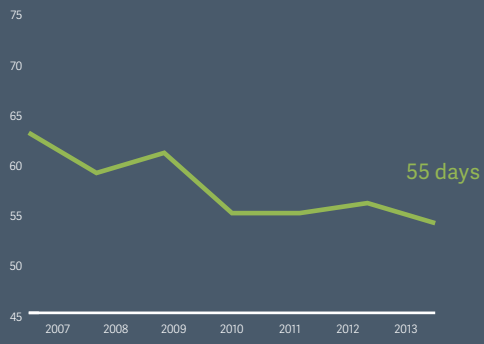
Survival without morbidity increased by 40%



Decrease in Chronic Lung Disease by 70%



Reduction in median length of stay by 9 days



Dr. Howard Stein says there are a number of alterations to thank for his patients' improvements – PICC line reduction and non-invasive ventilation strategies, such as CPAP and NIV NAVA, to name a few. The neonates included in the data are 1500 grams with no cardiac surgery and no ECMO.[37]

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