Neurally Adjusted Ventilatory Assist (NAVA) for neonatal respiratory support

TIMEFRAME: Estimated earliest commercial availability in the UK

Currently unclear  Now  6 months  1 year  18 months  2 years  Over 2 years

Neurally Adjusted Ventilatory Assist (NAVA) is a respiratory monitoring and support device for neonatal and paediatric patients, developed by Maquet Getinge Group.

NAVA is a mechanical ventilation method that is characterised by a proportional response to diaphragm electromyography (EMG), originating from centrally controlled phrenic nerve stimulation. The device consists of a single-patient use nasogastric feeding tube (certified for five-day diaphragm monitoring and feeding usage) fitted with an electrode array, which captures the electrical activity of the diaphragm (Edi). This is attached to the Servo-n® ventilator and used to assist the patient's breathing in synchrony with, and in proportion to, their own breathing efforts. The ventilator and diaphragm are effectively controlled by the same signal from the respiratory centre in the brain, and are therefore synchronised simultaneously.

The intended use of NAVA is as a form of respiratory monitoring to guide interventions, and as a mode of ventilation to help reduce asynchrony during invasive and non-invasive ventilation. It can be used to monitor diaphragm voltage as a guide to escalation or weaning of ventilator support, as well as for the discrete mode of ventilation (NAVA) where support is triggered by, and is proportional to, diaphragm voltage with each breath.

NAVA is CE marked and expected to launch with the Servo-n® ventilator in the NHS for clinical use in early 2017. It is already being used at selected UK sites.

The company also produce Niv-NAVA (Non-invasive Neurally Adjusted Ventilatory Assist). This is essentially the same technology except that Niv-NAVA is adapted to work with the varying leakage inherent in 'mask' ventilation. It is also CE marked and is expected to launch within a similar timeframe to NAVA.
POTENTIAL FOR IMPACT

The primary objective of assisted ventilation is to support breathing until the patient's respiratory efforts are sufficient. Ventilation may be required during immediate care or prolonged periods of respiratory failure treatment in neonatal and paediatric patients. Respiratory support that is not delivered in synchrony with a neonate’s breathing effort has been shown to increase the length of stay in intensive care and prolong mechanical ventilation.

The company describe NAVA as unique in delivering pressure support synchronised both in time and in amplitude to the individual patient’s diaphragm voltage. It uses the patient’s own biological signal for the generation of ventilatory assist in proportion to the patient’s own effort. They also claim that when Niv-NAVA is used for non-invasive ventilation, the effect of leakage on delivered ventilation is minimised.

Maquet Getinge Group reports that all existing ventilators are only capable of measuring pneumatic events that are post-hoc in relation to breathing effort, whilst NAVA adjusts support in response to changes in voltage at many times per second. Furthermore, they claim that there is no other means of monitoring diaphragm electromyography as a continuous, real-time waveform. Therefore the potential for impact is a reduction in all forms of patient-ventilator asynchrony, and reduced time in intensive care and sedation use. Furthermore, they report that the evidence for NAVA initially indicates lower peak airway pressures, which may be lung protective. In addition, time on the ventilator may also be reduced leading to earlier discharge and therefore a significant potential for cost-savings.

An expert in the field has commented that although survival of prematurely born infants has increased over the last 30 years, many suffer chronic respiratory morbidity. Therefore, a form of ventilation tailored to the infant’s respiratory efforts may reduce ventilator damage. If effective, this technology is predicted to have an impact on the following domain of the NHS Outcomes Framework (www.england.nhs.uk/resources/resources-for-ccgs/out-frwrk):

Domain 1  Preventing people from dying prematurely.

EVIDENCE

PUBLISHED PAPERS AND ABSTRACTS


RELEVANT PAPERS


The Neurally Adjusted Ventilatory Assist (NAVA) device helps babies and children to breathe if they are having problems with their lungs and need the use of extra oxygen and a ventilator. NAVA uses a nasogastric tube (a tube that is passed through the nose and down to the stomach) to detect electrical signals from the diaphragm (the main muscle used in breathing). This information is then attached to the ventilator to help the patient breathe in a natural way similar to their own breathing. The developer says that the main advantage of the device is a better match between the patient’s own breathing and the ventilator machine, in the hope of reducing the time needed to be ventilated and also the time spent in hospital.