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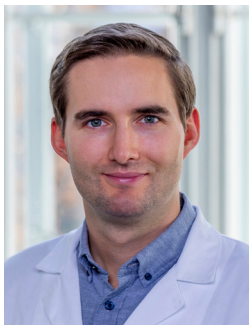
DR MICHAEL WAGNER

Neonatal Consultant and Head of the Pediatric Simulation Training Center at Medical University Hospital Vienna, Austria.

In Austria, more than 82 000 babies are born each year and it is estimated that 7 % of these newborns require some kind of respiratory support at birth.

Medical University of Vienna (MedUni Vienna) is one of the longest-established medical education and research facilities in Europe responsible for a large proportion of the highest risk delivery and premature babies within the region.



MICHAEL WAGNER
Consultant Neonatologist
Medical University Hospital Vienna, Austria.

Founded in 1365 as a Medical Faculty of the University of Vienna, the MedUni Vienna is now one of the world's largest and most renowned medical universities.

The Department of Pediatrics and Adolescent Medicine offers in-patient and out-patient care for all age categories, from tiny newborns to young adults. The department is the largest pediatric institution in Austria and among the best in Europe, not only in terms of patient care but also in the field of research.

Dr Michael Wagner is a neonatal consultant at the Medical University of Vienna and also Head of the Pediatric Simulation Training Center. His research focus is on simulation-based medical education, clinical education, airway management and delivery room management.

Early Adopters with Strong Research Focus

MedUni Vienna was one of the first hospitals to start using the Neo100 in a clinical setting and also participated in an evaluation study to provide input and feedback on the system. Monivent Neo Training has been used for more than 3 years and Monivent Neo100 for 2 years, including use in a clinical trial in the delivery room and for elective neonatal intubation.

With his special focus on new technologies, e.g., feedback devices, telemedicine, virtual and augmented reality, Dr Wagner and his team have conducted numerous different research projects within these areas using Neo Training or Neo100 for data collection and subsequent analysis.

"I did some research on how helpful it is to use a feedback device, no matter if it is chest compression feedback, ventilation feedback or any other technology for individual feedback. We identified that when you use a feedback monitor it is always improving the individual skill and influencing cognitive load of that person. That is very important to know!"

Rethinking Ventilation - A Mind Changer

As a university hospital, high-risk cases are referred to the Medical University of Vienna. In 2022, more than 19 000 babies were born in the province, out of which 3000 (mostly high risk) were delivered by experienced staff at Medical University of Vienna. Located between the delivery room section and the neonatal intensive care unit (NICU), a reanimation room with two resuscitation tables is ready for newborns in need of assistance during the transition from uterine to extrauterine life.

At birth, newborn infants undergo multiple physiological changes, including lung aeration, airway liquid clearance and initiation of pulmonary gas exchange. For those 5-7% who need respiratory support, we provide positive pressure ventilation (PPV) via a face mask connected to a pressure-limited device, e.g., a T-piece resuscitator. Providing effective PPV seems easy. However, performing this procedure correctly is extremely challenging. Airway obstruction and face mask leaks are quite common, Dr Wagner explains.

"*We rethink things that we have been doing for years and see that in some situations we can do better and learn from the information the monitor is showing us.*"

"Now that we are using an Respiratory Function Monitor (RFM), we are actually seeing that ventilation is not an easy skill. It is difficult during the whole time of providing PPV to have a low mask leakage or to have an adequate tidal volume. Now that we see it, we are rethinking the way we perform ventilation", he continues.

There is always a "Wow-effect" when providers first use the RFM. We often hear comments such as: "Oh, I don't need that much pressure to get a good tidal volume for the patient?" or "I really need to reposition the mask". It is really a mind changer when you start using a respiratory function monitor, says Dr Wagner.

"The monitor set-up, the wireless Sensor Module and the light that guides you through the ventilation while you can keep your visual attention on the patient, are all very useful."

Dr Wagner continues: "The advantage of using Neo100 is that you see in a very focused way if you are in the target range of the tidal volume. This is very easy to see with the color indication on the Sensor Module and corresponding color on the cylinder. Green light for within target range, yellow if you are above and red if you are below. That is a huge benefit, and I don't know of any other device with this feature."

Neo100 in Clinical Study

During 2022, a single-center intervention study was conducted at the Division of Neonatology with the aim to compare ventilation quality during manual ventilation of term or preterm infants in either the delivery room or neonatal intensive care unit. A total of 90 preterm and term newborns were included in the study and ventilations were either recorded with the Neo100 monitor hidden or the Neo100 visible to the caregivers and providing real-time feedback on ventilation quality.

”As far as I know, the Monivent Neo100 is the only RFM that is certified for clinical use. That is one of the benefits using Neo100.”

The hypothesis was that using a respiratory function monitor (Neo100) during positive pressure ventilation of infants would lead to more frequent corrections of tidal volumes outside the recommended range and to more frequent adjustments of the face mask to reduce leak. Results from the study *“Optimization of ventilation strategies in preterm and term infants in a single-center intervention study”* suggest that the application of a RFM at the Neonatal Intensive Care Unit and in the delivery room leads to a significantly higher quality of ventilations, Dr Wagner says.

Beneficial to use in Delivery Room and NICU

Dr Wagner sees a benefit in using Neo100 both in the delivery room for breathing support as well as in the NICU for elective or emergency intubation. It can be a very stressful situation in the delivery room leading to high mask leakage because you are stressed with different tasks, and then it is difficult to have focus on ventilation itself. Neo100 is helpful to really show you what you can do better and how to adapt to different circumstances, he comments.

”The monitor set-up, and especially the simplicity, or the easy-to-understand, easy-to-integrate and easy-to-use monitor, is the way to go in this clinical stressful situation. Here, I see a benefit in using the Monivent Neo100.”

Dr Wagner explains that airway resistance, lung compliance and the newborn’s respiratory effort can vary substantially during the first minutes of life due to e.g., low surfactant production and variable chest wall compliance. There are also substantial tidal volume changes occurring before, during and after surfactant administration.

Monitoring respiratory function may help to assess the delivered tidal volumes and airway pressures after surfactant treatment.

“When you start with mask ventilation before intubation, and administer specific medications e.g., fentanyl, the thorax gets more rigid, and it becomes more difficult to ventilate the baby. And then you might give vecuronium and suddenly it is very easy to ventilate. This kind of change in lung compliance could previously go unnoticed and untreated. In addition to guiding you throughout the whole procedure, Neo100 also provides you with feedback and to get an indication on your ET tube placement”, he exemplifies.

Looking into the future

”I definitely think that we will have more feedback in the future. Today, we already have feedback on the baby’s status like ECG and saturation. We will also want to have feedback on ventilation. While we already have feedback on mechanical ventilation by the ventilator, there is no feedback on manual PPV yet. You are not relying on your subjective interpretation of the ventilation but use technology to measure.

”The care provided in the delivery room during the first few minutes of life can impact short- and long-term neonatal outcomes.”

In my opinion it is exactly the same for the initial ventilation, especially in the delivery room. The baby is just starting its life, and you want to do the best in the first few minutes because that could really have influence on what is happening later on”, Dr Wagner concludes.

About Medical University Vienna

Founded in 1365 as a Medical Faculty of the University of Vienna, the MedUni Vienna is now one of the world’s largest and most renowned medical universities.

With more than 6,000 employees, 30 departments and two clinical institutes, 13 medical theory centres and numerous highly specialized laboratories, it is one of Europe’s leading research establishments in the biomedical sector.

There are 2 NICUs, 2 intermediate care wards and rooming-in units. In the labor and delivery department there are 8 rooms for spontaneous births and one room for C-section.

Contact
info@monivent.se
+46 (0)31 395 48 40
monivent.se

Head office
Monivent AB
Regnbågsgatan 8B
SE-417 55 Gothenburg, Sweden

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