

Reference Case: Caring safely for the smallest patients

The children's hospital Amsterdamer Straße in Cologne is one of the leading paediatric clinics in Germany. The team includes anaesthetists, who safely guide the smallest patients through dangerous operations. Dräger supports their work with modern ventilation technology that allows small breathing volumes and carbon dioxide levels to be monitored reliably.



- Intensive care tailored to the particular needs of premature babies
- No anaesthesia limitations due to low body weight
- Anaesthesia of premature babies requires a sure instinct
- Finely tuned ventilation avoids cerebral haemorrhages

The scene in the patient room is both amazing and awe-inspiring. The intensive care unit of the children's hospital Amsterdamer Straße in Cologne is dedicated to babies who barely larger than the palm of an adult hand. Ventilated by machines, connected to perfusion pumps and infusions. The little patients are difficult to see between the cables of the monitoring devices and the warm bedding they are wrapped in. Looking at the incubators, one thing is immediately clear: this is high-performance medicine, finely tuned to the special requirements of infants. And even though the young patients are so small, they fight with all their might to get well soon and to leave the hospital ward.

OPERATION WITH A BODY WEIGHT OF 800 GRAMS

One of the patients in the intensive care unit of the Cologne paediatric clinic is a little girl called Lucie, who was born prematurely and currently has a body weight of 2000 grams. She was born approximately eight weeks before the estimated due date. And the parents received a shocking diagnosis right away: intussusception. Even though Lucie was very weak with a body weight of just 800 grams at birth and lungs that were not fully developed, she had to undergo abdominal surgery to have this dangerous disorder treated.

Two days ago, the little girl underwent another operation. The artificial anus which had been created to protect the intestinal anastomosis was reversed and the abdominal wall was re-closed.

Medical devices from Dräger are Lucie's constant and reliable bedside companions. A monitoring device in the patient room displays and records all vital parameters, an incubator keeps her body temperature at a suitable level, a ventilator helps her to breathe, and an integrated monitoring system immediately sounds an alarm should something not be quite right on the way to the operating theatre and back.

THE CHALLENGE OF VENTILATING PREMATURE BABIES

The Zeus® Infinity® Empowered anaesthesia device, known for short as the Zeus IE, enables safe ventilation of premature babies in the operating theatre. Anaesthetists consider Zeus to be unique because it allows the precise handling of extremely low ventilation pressures. This means that all ventilation values can be adjusted very finely, avoiding possible complications. 'If a hypocapnia of 20 mmHg or one of 90 mmHg CO₂ is reached just once, the risk of a cerebral haemorrhage can increase tenfold,' explains Dr Jost Kaufmann, consultant paediatric

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Patient safety has the highest priority: There are no limitations regarding age and weight for the anaesthesia of premature babies.

anaesthetist in the children's hospital Amsterdamer Straße. The lungs are very vulnerable, too. Breathing volumes that are too large can cause volutrauma due to the over-extension of the alveoli and bronchioli. A breathing volume of 5 ml/kg body weight is suitable for a newborn baby. This corresponds to a respiratory minute volume of 240 to 300 ml/kg body weight/minute. If ventilation volumes or peak pressures are too high, this can lead to inflammations of the lungs in newborn babies, which can spread to the whole body and become life threatening. There is a risk of pneumothorax or intrapulmonary air accumulations.

With the help of the Zeus IE from Dräger, it was possible to ventilate a child with a body weight of only 385 grams on his ward in the last year, says Professor Frank Wappler, director of anaesthesiology at the Amsterdamer Strasse paediatric clinic: 'Now we face no limitations regarding the age or weight of patients here.'

ANAESTHESIA OF PREMATURE BABIES REQUIRES A STRONG INSTINCT

Dr Kaufmann emphasises that the anaesthesia of premature and newborn babies, not unlike the anaesthesia of children, requires a strong instinct. 'The anaesthesia of a child is also based on experience. One milligram of propofol per kilogram body weight can cause a circulatory collapse in a newborn baby, while larger children need much more of the same medication – sometimes four to five times the amount.' One has to increase the titration to reach the required value, which might be half a milligram per kilogram body weight, diluted accordingly in a syringe.

Equally specialist knowledge is required of the doctors on the intensive care unit of the Amsterdamer Strasse children's hospital, for example during weaning – the process when the ventilation of a prematurely born baby is reduced and the independent breaths should begin slowly. Lucie has to master this in the coming days so that she can go home soon. But this will be a success for both her and the Amsterdamer Strasse children's hospital, which is famous for treating such difficult cases. The focus here is on small, sick, premature babies. Nurses and doctors administer care, and Dräger supports their work with a range of devices and its comprehensive service programme. By providing device training, maintenance and consultation sessions for doctors and nurses in special cases, Dräger is always ready to help.



Intensive care tailored to the particular needs of premature babies.



Professor Frank Wappler, director of anaesthesiology

Professor Frank Wappler, director of anaesthesiology at the Amsterdamer Strasse paediatric clinic in Cologne has developed safe strategies for the ventilation and anaesthesia of premature babies with his team. The Zeus IE represents yet another option for him. Professor Wappler and his colleagues work closely with the device and in cooperation with service engineers from Dräger. Dräger is ready to provide advice or assist with device operation, while doctors share their experiences using the Zeus IE to the service engineers: 'We didn't want to bring intensive ventilation devices into operating theatres because we aim to provide maximum care to the children. Then Dräger launched the ideal solution on the market with Zeus.'



Dr Jost Kaufmann, consultant paediatric anaesthetist

'The lungs of premature babies are very vulnerable,' warns **Dr Jost Kaufmann, consultant paediatric anaesthetist in the Cologne children's hospital.** 'There is a risk of pneumothorax or intrapulmonary air accumulations for unadjusted ventilation.' Another risk is a cerebral haemorrhage, which can result from a single hypo- or hypercapnia. The Zeus IE anaesthesia device from Dräger can help to protect against these risks by allowing the extremely precise measuring and adjustment of breathing volumes and carbon dioxide exhalation. Kaufmann cautions that the anaesthesia of children requires a strong instinct, especially the anaesthesia of premature babies.



About the paediatric clinic

The Amsterdamer Strasse children's hospital belongs to the clinics of Stadt Köln gGmbH and is one of the largest paediatric clinics in Germany.

The following specialist departments are contained in the clinic: paediatrics and adolescent medicine with a social paediatric centre and perinatal centre, paediatric surgery, anaesthesia, radiology, and child and adolescent psychiatry.

A teaching hospital of Cologne University, the facility treats approximately 10,000 inpatients and houses 4,600 surgical operations every year.

CORPORATE HEADQUARTERS

Drägerwerk AG & Co. KGaA
 Moislinger Allee 53–55
 23558 Lübeck, Germany

www.draeger.com

Manufacturer:

Drägerwerk AG & Co. KGaA
 Moislinger Allee 53–55
 23558 Lübeck, Germany

**REGION EUROPE CENTRAL
 AND EUROPE NORTH**

Drägerwerk AG & Co. KGaA
 Moislinger Allee 53–55
 23558 Lübeck, Germany
 Tel +49 451 882 0
 Fax +49 451 882 2080
info@draeger.com

REGION EUROPE SOUTH

Dräger Médical S.A.S.
 Parc de Haute Technologie
 d'Antony 2
 25, rue Georges Besse
 92182 Antony Cedex, France
 Tel +33 1 46 11 56 00
 Fax +33 1 40 96 97 20
dlmfr-contact@draeger.com

REGION MIDDLE EAST, AFRICA

Drägerwerk AG & Co. KGaA
 Branch Office
 P.O. Box 505108
 Dubai, United Arab Emirates
 Tel +971 4 4294 600
 Fax +971 4 4294 699
contactuae@draeger.com

REGION ASIA / PACIFIC

Draeger Medical
 South East Asia Pte Ltd.
 25 International Business Park
 #04-27/29 German Centre
 Singapore 609916, Singapore
 Tel +65 6572 4388
 Fax +65 6572 4399
asia.pacific@draeger.com

REGION NORTH AMERICA

Draeger Medical, Inc.
 3135 Quarry Road
 Telford, PA 18969-1042, USA
 Tel +1 215 721 5400
 Toll-free +1 800 437 2437
 Fax +1 215 723 5935
info.usa@draeger.com

**REGION CENTRAL
 AND SOUTH AMERICA**

Dräger Panama Comercial
 S. de R.L.
 Complejo Business Park,
 V tower, 10th floor
 Panama City
 Tel +507 377 9100
 Fax +507 377 9130
contactcsa@draeger.com

Locate your Regional Sales
 Representative at:
www.draeger.com/contact

