

**23<sup>rd</sup> - 25<sup>th</sup> JANUARY 2015**



# **TRANSPORT OF HIGH RISK NEONATES**

EXCELLENCE IN PERINATAL MEDICINE:  
WHEN SKILL MAKES THE DIFFERENCE

*Scientific Program and Abstract book*

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ISTITUTO GIANNINA GASLINI



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

Neonatal Transport has largely developed over the past 25 years becoming a cornerstone of the modern perinatal medicine. Centralization of high risk deliveries is highly beneficial to neonatal outcomes although it will be never fully achieved making Neonatal Transport efficiency a invaluable resource. In addition, new diagnostic and therapeutic options (i.e hypothermia) will render neonatal intensive care centers together with neonatal transport medicine a continuously evolving discipline. The meeting focuses on many related topics, with special regard to emerging clinical problems, organizational issues, equipment, safety, cost effectiveness, medico-legal implications in the aim to establish high quality standards. A specific effort of the meeting will be devoted to reach higher levels of knowledge and skills in order to draw a framework for future practice.

Luca A. Ramenghi

Carlo Bellini

Chairmen of TRANSPORT OF HIGH RISK NEONATES

Excellence in Perinatal Medicine: when skills make the difference





# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

JANUARY 23<sup>rd</sup>, 2015

**13.00 - 14.30** **OVERTURE - Drawing ignorance map in neonatal transport: the current evidence**

*Marlys Witte, Carlo Bellini, Morten Breindahl*

### SESSION 1 - PROTECTING THE LUNG

*Chaired by Fabio Mosca (Milan, Italy), Fabio Scopesi (Genoa, Italy), Luc Zimmermann (Maastricht, Netherlands)*

**14.30 - 15.00** Surfactant in the transport bag?

*Jan Mazela (Poznan, Poland)*

**15.00 - 15.30** Ventilatory options: pros and cons

*Virgilio Carnielli (Ancona, Italy)*

**15.30 - 16.00** Most common problems during ventilation

*Olivier Claris (Lyon, France)*

**16.00 - 16.30** *Cumulative Discussion*

**16.30 - 17.00** **Coffee and Tea break**

**17.00 - 17.30** HFVO during transport. US experience

*Donald Null (Salt Lake City, USA)*

**17.30 - 18.00** Transporting a baby with pulmonary hypertension

*Paolo Biban (Verona, Italy)*

**18.00 - 18.30** *Cumulative discussion*

**18.30 - 19.10** **Protecting the Lung Presentations**

DO MECHANICAL AND HUMAN FACTORS COMBINE TO OVER VENTILATE TRANSPORTED INFANTS? (Abstract 1) - *Andrew Leslie et al (Leicester, UK)*

HIGH-FLOW NASAL CANNULA ON NEONATAL TRANSFER, A YEAR'S EXPERIENCE (Abstract 2) - *Michael Boyle et al. (Cambridge, UK)*

TRANSPORT OF NEONATES WITH PNEUMOTHORAX – EXPERIENCE OF CENTRE TRANSPORT SERVICES (Abstract 3) - *Andrew Leslie et al (Leicester, UK)*

CHARACTERISTICS AND RESPIRATORY SUPPORT OF NEONATAL TRANSPORT IN CATALONIA BY YPO2 UNIT (Abstract 4) - *Nuria Torre et al. (Barcelona, Spain)*

**19.10** **Welcome cocktail**



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

JANUARY 24<sup>th</sup>, 2015

### PROTECTING THE BRAIN

Chaired by Luca Ramenghi (Genoa, Italy), Monica Fumagalli (Milano, Italy)

#### THE BABY AT TERM

**08.00 - 08.30** Encephalopathic but not yet asphyxiated one  
*Manon Benders (Utrecht, Netherlands)*

**08.30 - 09.00** Cooling: anticipation or waiting for CFM-EEG?  
*BouBou Hallberg (Stockholm, Sweden)*

**09.00 - 09.30** Treating suspected seizure or not  
*Malcolm Levene (Leeds, UK)*

**09.30 - 10.00** Prevention of the oxidative stress  
*Giuseppe Buonocore (Siena, Italy)*

**10.00 - 10.30** *Cumulative discussion*

**10.30 - 11.00** Coffee and Tea break

#### THE PRETERM BRAIN

**11.00 - 11.30** Brain physiology in the helicopter and high altitude  
*Hubert Messner (Bozen, Italy)*

**11.30 - 12.00** How Future Wearable Health Tech Devices will change neonatal transport and protect the newborn brain  
*Jeroen Dudink (Rotterdam, Netherlands)*

**12.00 - 12.30** *Cumulative discussion*

**12.30 - 13.10** **Protecting the Brain Presentations**

THERAPEUTIC HYPOTHERMIA DURING NEONATAL TRANSPORT (Abstract 5) - P Oana et al. (Dublin, Ireland)

THERAPEUTIC HYPOTHERMIA ON NEONATAL TRANSPORT: IS IT A SUCCESSFUL PROCESS? (Abstract 6) - Ercan Kirimi et al. (Van, Turkey)

EXCESSIVE EXPOSURE OF THE PRETERM HEAD TO SHOCK AND VIBRATION DURING INTER-HOSPITAL TRANSPORT (Abstract 7) - M Yeo et al (Leicester, UK)

STUDY OF EFFECTS OF TRANSPORT MODALITIES ON SHORT-TERM OUTCOME IN PREMATURE INFANTS (Abstract 8) - Mauro Vivalda et al. (Turin, Italy)

**13.10 - 14.30** Lunch



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### TEACHING AND MENTORING

Chaired by Luca Ramenghi (Genoa, Italy), Morten Breindahl (Copenhagen, Denmark)

**14.30 - 15.00** From pure art to a pure professionalism: core curricula of neonatal transport  
*Morten Breindahl (Copenhagen, Denmark)*

**15.00 - 15.30** A dedicated profession: pros and cons from the physician point of view  
*Maurizio Gente, (Rome, Italy)*

**15.30 - 16.00** A dedicated profession: pros and cons from the nurse point of view  
*Johannes van den Berg (Stockholm, Sweden)*

**16.00 - 16.30** *Cumulative Discussion*

**16.30 - 17.00** **Coffee and Tea break**

**17.00 - 17.30** Medico-Legal implication of Transport in Europe  
*Francesco Raimondi (Naples, Italy)*

**17.30 - 18.00** *Cumulative discussion*

**18.00 - 19.30** **The corner of free communications** - Sharing experiences from the world  
Chaired by Sergio De Marini (Trieste, Italy), Hubert Meesner (Bozen, Italy)

A COMPARISON OF RESPONSE AND JOURNEY TIMES BETWEEN AIR VERSUS GROUND TRANSPORT OF THE NATIONAL NEONATAL TRANSPORT PROGRAMME IN IRELAND (Abstract 9) - Nurul Aminudin et al. (Dublin, Ireland)

CURRENT MODELS AND TRAINING FRAMEWORKS WITHIN NEONATAL TRANSPORT SERVICES ACROSS THE UNITED KINGDOM - A NATIONAL SURVEY (Abstract 10) - Neelam Gupta et al. (Southampton, UK)

TWO DECADES' EXPERIENCE OF A DEDICATED NEONATAL INTENSIVE CARE AIR TRANSPORT SERVICE (Abstract 11) - Mattias Kjellberg M et al. (Uppsala, Sweden)

EFFECT OF REGIONALIZATION ON NEONATAL TRANSPORT IN SOUTH TYROL (Abstract 12)  
*Alex Staffler et al. (Bozen, Italy)*

OVERCOMING MEDICAL RECRUITMENT CHALLENGES IN NEONATAL TRANSPORT (Abstract 13)  
*Joanna Behrsin (Leicester, UK)*

THE TRANSPORT OF TWIN NEWBORNS: GENOA EXPERIENCE (Abstract 14) - Andrea Sannia et al (Genoa, Italy)

NEONATAL TRANSPORT IN CENTRAL REGION OF HUNGARY (Abstract 15) - Istvan Kocsis et al. (Budapest, Hungary)

NEONATAL TRANSPORT-BASED TELEOPHTHALMOLOGIC ROP-SCREENING IN HUNGARY (Abstract 16) - Istvan Kocsis et al. (Budapest, Hungary)

T-PIECE RESUSCITATOR'S MODIFICATION FOR NEONATAL TRANSPORT IN INDONESIA (Abstract 17)  
*Rinawati Rohsiswatmo et al. (Jakarta, Indonesia)*



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

JANUARY 25<sup>th</sup>, 2015

**09.10 - 09.30** **Free Presentation**

HIGH RISK NEONATAL TRANSPORT TO ECMO IN SOUTHERN BAVARIA (Abstract 18)

*Mathias Klemme et al. (Munich, Germany)*

### THE BLUE TRANSPORT

*Chaired by Maurizio Marasini (Genoa, Italy), Paolo Biban (Verona, Italy)*

**09.30 - 10.00** The ECMO for newborns

*Kenneth Palmer (Stockholm, Sweden)*

**10.00 - 10.30** ECMO problems during transport

*Andrea Moscatelli (Genoa, Italy)*

**10.30 - 11.00** Coffee and Tea break

**11.00 - 11.30** Neonatal Ultrasound in Transport

*Kathryn Browning Carmo (Melbourne, Australia)*

**11.30 - 12.00** The role for haemodynamic monitoring during transport

*Gunnar Nauelaers (Leuven, Belgium)*

**12.00 - 12.30** Cumulative discussion

**12.30 - 13.15** KEYNOTE LECTURE - Introduced by Irene Cetin (Milan, Italy)

Optimizing in utero transport

*Patrizia Vergani (Monza, Italy)*

**13.15 - 14.15** Lunch

### FROM THE PAST TO THE FUTURE

*Chaired by Paolo Petralia (General Director of "Gaslini" Pediatric Hospital)*

*Claudio Montaldo (Director Health Services County of Liguria)*

**14.15 - 14.45** Outcome and measuring outcome from the fetus to the transported neonate

*Roberto Bellù, Rinaldo Zanini (Lecco - Italy)*

**14.45 - 15.45** Celebration for the 20<sup>th</sup> anniversary of Neonatal transport in Liguria

*Carlo Bellini (Genoa, Italy)*

**15.45 - 16.00** Remarking the future - Our take home messages

*Luca A. Ramenghi (Genoa, Italy), Morten Breindahl (Copenhagen, Denmark)*



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# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### ABSTRACT BOOK

#### Protecting the Lung Presentations

##### Abstract 1

#### DO MECHANICAL AND HUMAN FACTORS COMBINE TO OVERVENTILATE TRANSPORTED INFANTS?

A. Leslie (1,2) J. Behrsin (1,2), A. Kage (1,2) Gareth Penman (2)

(1) CenTre Neonatal Transport Servic; (2) University Hospitals of Leicester NHS Trust, UK

##### Introduction

A recent audit from our service demonstrated hypocarbia ( $pCO_2 < 4 \text{ kPa}$ ) at the end of transport in 12.5% of ventilated transports<sup>1</sup>. The Baby-pac ventilator uses analogue dials to set the ventilator parameters. We wanted to determine how accurately the Baby-pac ventilator delivered the desired ventilation settings and the accuracy of team members setting the ventilator.

##### Methods

We used a gas flow analyser (VT-plus HF) to measure the delivered PIP, PEEP, Ti and ventilator rate. Four Baby-pac ventilators were used in the studies. In the first study one of the authors (AL) carefully set each ventilator to deliver in turn four different typical neonatal settings. The ventilation delivered as measured by the VT-plus was noted.

In the second study members of the transport team were asked to set the Baby-pac ventilator at four different settings. At each setting the VT-plus was used to measure what was delivered.

##### Results

In the first study, all the transport ventilators at all settings over-delivered PIP (median +1 cm/H<sub>2</sub>O (IQR 0.7-1.4) and underdelivered PEEP (median -1 cm/H<sub>2</sub>O (IQR 0.5-1.3).

For the second study data were obtained from five transport nurses, two transport consultants, and nine middle-grade trainees. Similar trends were to study one were seen for PIP and PEEP. Only 11 of 68 ventilator rates was set completely accurately (range between 8 breaths fewer than set to 13 breaths greater).

##### Discussion

We have shown that Baby-pac ventilators consistently over-deliver on PIP settings and underdeliver on PEEP settings. Transport personnel vary in the accuracy with which the ventilator rate is set. These data suggest the move from unit ventilator to transport ventilator will result in alterations to the delivered ventilation with the potential to deliver a higher tidal volume than intended, which may have an impact on hypocarbia.

This study highlights the inaccuracy of relying on the visual analogue scale to set the Baby-pac ventilator. In addition the possibility of delivering inadvertently low PEEP may have adverse consequences, such as atelectasis.

Lilley's work<sup>2</sup> suggests that a respiratory function monitor may be effective in reducing these problems.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 2

#### HIGH-FLOW NASAL CANNULA ON NEONATAL TRANSFER - A YEAR'S EXPERIENCE

M. Boyle, S. Kent, T. Dassios, R. Chaudhary, S. O' Hare, S. Broster

Acute Neonatal Transfer Service (ANTS), Addenbrooke's Hospital, Cambridge, United Kingdom

#### Background

High-flow nasal cannula (HFNC) therapy is a non-invasive form of respiratory support that is widely used in neonatal intensive care units. HFNC has been introduced in neonatal transport, which constitutes a unique and challenging environment where lung mechanics might be distorted and complicated by the impact of acceleration stress, vibration and temperature instability on gas exchange. A pilot study by this group was performed to determine guidelines for safe delivery of this system in the transport environment.

#### Objectives & Methods

To evaluate the use of HFNC in the transport environment using the guidelines developed and record the impact and safety of transfers and evidence of any associated consequential risk.

Demographic, epidemiological and blood-gas data were collected in all infants that were transferred on HFNC by ANTS from May 2013 to May 2014. Changes made following transfer from the referring-unit HFNC-device to transport HFNC-device, as well as incidents during travel were also recorded. All infants were transferred with the Optiflow system.<sup>2</sup> Paired t-test analysis was performed on pre and post transfer HFNC settings and blood gas results.

#### Results

102 infants were transferred over the study period comprising 63 elective and 39 emergency transfers. The median birth weight was 970g (510 – 4320g) and gestational age at birth 28 weeks (23+1 – 41+5). There were 63 males in the group; the median age at transport was 33 days (1 – 130) and weight 1500g (875 – 4700g). The median distance travelled was 44.5 miles (19 – 136 miles). There were 5 aborted transfers, 3 of these were emergency transfers for capacity management; the remaining 2 were planned elective repatriations. There was no significant change in blood gas parameters. Mean pre transfer pH 7.35 and post transfer pH 7.353 ( $p = 0.46$ ) and mean  $pCO_2$  pre and post transfer of 6.6 kPa and 6.66 kPa ( $p = 0.96$ ). There was no significant difference in pre and post transfer HFNC flow rate; mean flow rate pre 4.6L/min and post 4.7L/min ( $p = 0.31$ ). There was a statistically significant increase in the fraction of inspired oxygen from a mean  $FiO_2$  of 0.26 to 0.28 ( $p < 0.05$ ).

#### Conclusions

Transfer of infants on HFNC is well tolerated and is now frequently used in this service. Whilst a statistically significant increase in  $FiO_2$  was noted, this increase is not felt to be clinically significant. HFNC has been shown to be a safe mode of transfer of neonates requiring respiratory support using the guidelines that this unit has developed. This demonstrates that novel therapies can be safely introduced to the transport environment through careful assessment, guideline development and audit of practice.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 3

#### TRANSPORT OF NEONATES WITH PNEUMOTHORAX - EXPERIENCE OF CENTRE TRANSPORT SERVICE

A. Leslie (1,2), W. Shinwari (3), P Chandra (1, 3)

(1) CenTre Neonatal Transport; (2) University Hospitals of Leicester; (3) University Hospital of Coventry and Warwickshire

#### Background

Pneumothorax is one of the air leak syndromes and is more common in the newborn period than in other childhood periods. There is scarcity of data on transported neonates with pneumothorax.

#### Aim

To assess the characteristics, management, safety and short-term outcomes of neonates with pneumothorax transported by the CenTre transport service.

#### Methods

Retrospective case review of all neonates with a pneumothorax who were transported by CenTre Neonatal Transport between April 2010- July 2013.

#### Results

During the audit period CenTre transported 23 neonates with pneumothorax. The median (IQR) gestation was 35 (34:37) weeks at birth and 18/23 (78%) of neonates were born  $\leq 37$  weeks. The median (IQR) birth weight was 2700g (2120:3220). 6/23 neonates had pulmonary hypoplasia due to oligohydramnios and 17/23 neonates received positive pressure ventilation support before pneumothorax. 6/23 neonates had needle thoracocentesis before chest drain insertion. In 5/23 (28%) neonates the chest drain was inserted by the transport team. All neonates had chest x-rays taken post drain insertion to confirm the position of the drain and 7/23 (30%) of the drains had to be re-positioned. 21/23 neonates were ventilated during transfer and all of these received Morphine as analgesia/sedation in-transit. 19/23 neonates were retrieved from level 1 neonatal unit. All transports were uneventful.

	Prior to transfer from the referring unit median (IQR)	On arrival at the receiving unit median (IQR)
FiO <sub>2</sub>	0.33 (0.26:0.4)	0.30 (0.21:0.37)
pH	7.28 (7.28:7.33)	7.31 (7.23:7.37)
pCO <sub>2</sub> (kPa)	5.9 (5.5:6.7)	6.2 (5.1:7.0)

The drain remained in situ for median (range) of 2 days (1-8). The babies were ventilated for median (range) of 1 day (1-4). 21/23 (91%) neonates survived to discharge. The cause of death in 2 neonates was severe pulmonary hypoplasia and hypoplastic left heart syndrome respectively.

#### Conclusions

Over the period in question CenTre performed over 4000 transfers, including 1070 ventilated transfers. Despite this substantial workload, on only 5 occasions was the transport team required to place a chest drain. Their scarcity makes these transfers particularly challenging. Most drains are sited by the referring unit, showing that the transport service is not being called-upon to replace skills that need to be available on site.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 4

#### CHARACTERISTICS AND RESPIRATORY SUPPORT OF NEONATAL TRANSPORT IN CATALONIA BY YP02 UNIT

N. Torre, M. Sardà, C. Alejandro, N. Millan, P. Corniero, C. Launes, D. Vila, A. Martínez-Planas  
Sant Joan de Déu Hospital, Barcelona, Spain

#### Background

The paediatric and neonatal emergency transport service in Catalonia (Spain) has been done since 1995 by three specialised transport teams (two road and one aerial teams). It is a statewide of CatSalut, managed by the Medical Emergency System (SEM). It is the only service of its kind in Spain; providing expert clinical advice, clinical co-ordination, emergency treatment and stabilisation and inter-hospital transport for newborn babies and children up to the age of 18 years. It operates 24 hours a day, 365 days per year. There were 650 transport services per year approximately. A paediatric nurse, an Emergency Medical Technician and a paediatrician form the specialized team. Our team is localised in Sant Joan de Déu Hospital (Barcelona).

#### Aim

The aim of this study is to describe the characteristics of the neonatal transport and the type of respiratory support newborn babies needed during 2013-14.

#### Methods

A retrospective descriptive study included 688 newborn babies. Patients were included from January 2013 to December 2014. Data was compiled from the YP02 team patients' database. Statistical descriptive analysis was made with IBM SPSS statistics v.19 program.

#### Results

688 newborn babies were enrolled, 340 (2013) and 348 (2014), of whom 389 (56.5%) were males. The average days of life was 9 days (IC 95%, 7.68-10.56) and the median was 1 day. The weight average was 2880g (IC 95%, 2675-2806). The gestational age was only compiled in 460 patients: <28w (11%), 28-32w (10.4%), 32-35w (15.4%), 35-37w (14.6%) and >37w (47.8%). The most frequent diagnosis of the transported patients was prematurity (25%), hypoxic-ischemic encephalopathy (11.6%), breathing difficulties (8.7%), congenital heart disease (6.8%), seizures or neurological problems (5.1%) and sepsis (4.2%).

The main transport reason was therapeutics needs 547 (39.5%); the other were divided into diagnostic tests - such MR or CT - 87 (12.6%), return transport services 51 (7.4%) and transports from or to airport services 3 (0.4%).

Respiratory assistance was mechanical ventilation (21.8%), non-invasive ventilation (15.8%; CPAP 76%, BIPAP 24%), nasal cannula or oxygen mask (8%) and incubator oxygen (1.2%). The over half of newborn babies (53%) did not need respiratory support.

#### Conclusions

Neonatal transport represents approximately the half of the whole transports.

The assistance in the first day of live is the most common service in our study, as it is reflected in the bibliography.

Therapeutic need was the most frequent reason of transport. The main diagnosis was prematurity, followed by neurological problems, breathing difficulties and congenital heart diseases. However, almost half of patients were term babies, despite there was a non-insignificant lack of information about the gestational age.

A half of transport newborn babies needed respiratory support and a half of them needed mechanical ventilation. Because of that, in our opinion the paediatric and neonatal specialization of the team determines a better management of critically ill newborn babies.





# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Protecting the Brain Presentations

#### Abstract 5

##### THERAPEUTIC HYPOTHERMIA DURING NEONATAL TRANSPORT

P. Oana, N. Aminudin, B. Bowden, J. Franta

National Neonatal Transport Programme of Ireland, Rotunda hospital Dublin, National Maternity hospital, Dublin, Coombe women's and Infants University Hospital, Dublin, Ireland

##### Background

Hypothermia of 33-34°C initiated within first 6 hours of life in babies with hypoxic ischaemic encephalopathy (HIE) and over 36 weeks gestational age is proven to improve outcomes. Currently there are 4 centres that can provide this treatment in Ireland. Therefore, cooling during transport has become a necessity.

##### Methods

We retrospectively collected the data for a period from December 2014 until present, using the National Neonatal Transport Programme (NNTP) register.

##### Results

There were 26 babies transferred for cooling within that period, 22 of which were transported by NNTP Team. Out of 22 babies: 1 was less than 36 weeks of gestation, 3 ranging 36-38 weeks of gestation and 18 over 38 weeks of gestation. The transport duration was between 90 min and 3 hours for all 22. 6 out of 22 babies arrived to receiving hospital at less than 6 hours of age. Out of 22 patients, only 9 had a temperature between 33-34°C, at the referring hospital when the NNTP. Other 9 patients had a temperature over 34°C. From this last 9 patients- 6 achieved a temp between 33-34°C within first 6 hours of life, 1 reached a temp < 34°C at 7 hours of life and 2 had a temperature of 34-35°C through-out their entire transport. 4 of the 22 patients had a temperature of <33°C at the NNTP arrival and were very easy to cool during their entire transport.

##### Conclusions

The maintenance of temperature within the target range can be challenging during transport. Babies with severe hypoxic ischaemic encephalopathy (HIE) are easier to cool and more likely to drop their temperature sooner.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 6

#### THERAPEUTIC HYPOTHERMIA ON NEONATAL TRANSPORT: IS IT A SUCCESSFUL PROCESS?

E. Kırımı, N. Sari, S. Bektas, N. Demir, N. Acar, M. Mukba

Lokman Hekim Hospitals Group, Neonatal Intensive Care Unit, Van, Turkey. Yüzüncü Yıl University, Division of Neonatology, Van, Turkey

Asphyxia is still an unresolved problem in our area because of social and geographic characteristics. Timing of induction of hypothermia after an asphyxial brain injury is critical for optimum neuroprotection. The hypothermia treatment should be started or maintained during neonatal transport. The aim was to evaluate the effects of our unit's experience with therapeutic hypothermia on neonatal transport. In this study, 288 asphyxiated neonates who referred to our units were evaluated retrospectively, for last 3,5 years. 192 ones of them were decided to cool during transport by air environmental cooling method. However, of 192 neonates, only 62 (32,2%) were cooled appropriately and were maintained hypothermia therapy in unit. In conclusion, therapeutic hypothermia on neonatal transport was poor accomplished in this area. We found that, with experience and education, our referring and transport clinicians can induce and maintain hypothermia for asphyxiated neonates before and during transport.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 7

#### EXCESSIVE EXPOSURE OF THE PRETERM HEAD TO SHOCK AND VIBRATION DURING INTER-HOSPITAL TRANSPORT

M. Yeo (1), C. Henry (1), S. Hill (1), L. Blaxter (2), B. Hayes-Gill (2), D. McNally (2), J. Crowe (2), A. Leslie (3), D. Sharkey (1)

(1) School of Medicine, University of Nottingham; (2) Faculty of Engineering, University of Nottingham; (3) University Hospitals of Leicester NHS Trust, UK

#### Background

Specialist neonatal intensive care has become increasingly centralised in large centres. In the UK, there are now over 16,000 neonatal inter-hospital transfers a year. Neonatal transport exposes the sick newborn to additional stressors including temperature instability, excess noise and mechanical vibration and shock (McNab 1995 and Campbell 1984). Whilst inter-hospital transport of premature babies improves survival, it is associated with an increased risk of intraventricular haemorrhage (IVH), an important risk factor for poor neurodevelopmental outcome (Mohamed 2010). Furthermore, transport results in a number of other adverse effects including cardiovascular and respiratory instability (Williams 2009).

#### Aim

We investigated whole body vibration (WBV,  $m/s^2$ ) during inter-hospital transport of neonatal patients. We hypothesised that the neonatal head would be exposed to significant mechanical forces potentially adding to the risk of IVH.

#### Aims

A retrospective descriptive study included 688 newborn babies. Patients were included from January 2013 to December 2014. Data was compiled from the YPO2 team patients' database. Statistical descriptive analysis was made with IBM SPSS statistics v.19 program.

#### Methods

We measured WBV during inter-hospital ambulance transport using a bespoke accelerometer system. This advanced system included 3 calibrated sensors which were sited on the forehead, body (pelvis) and on the transport incubator frame. Each tri-axial accelerometer logged data at between 100 and 1200Hz. A synchronised GPS data logger was used to track distance and speed. Babies were recruited and followed the normal clinical care pathway with appropriate intensive care and safety equipment (SKIP harness) during ambulance journeys between hospitals in England. A cohort of non-transferred babies recruited allowed a control comparison of WBV.

#### Results

27 babies (17 transfers, 10 controls) were recruited with median gestation 32 weeks (range 24-41) and birth weight 1920g (965-4650g). Median head WBV (IQR) for control babies was 0.08  $m/s^2$  (0.05-0.21) vs 0.56  $m/s^2$  (0.26-0.76) for transported babies. Transport incubator WBV was significantly lower at 0.39  $m/s^2$  (0.20-0.51). When comparing this to the International WBV standard (ISO 2631-1) this resulted in a significant period of time spent in the moderate to severe range of being uncomfortable (a threshold adult employers would need to take immediate action to reduce risk of injury to staff exposed at these levels). WBV increased with increasing speed although shocks  $>2m/s^2$  were not as frequent.

#### Conclusions

Our study demonstrates that with increasing speed there is an increase in neonatal WBV exposure above recommended safe limits for healthy adults. Worryingly, head vibration and shocks are excessive and could be an important factor contributing to the increased risk of IVH observed with transported babies. There appears to be additional head WBV in excess to that of the incubator system supporting the need to re-think the mattress/baby interface.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 8

#### STUDY OF THE EFFECTS OF TRANSPORT MODALITIES ON SHORT-TERM OUTCOMES IN PREMATURE INFANTS

M. Vivalda, L. Garassino

SC Neonatologia Ospedale S. Anna - Città della Salute e della Scienza - Torino

Transporting from their place of birth to a far NICU (Neonatal Intensive Care Unit) appears to be destabilizing for the neonate, particularly in relation to the prematurity degree (8,12), the clinical condition (12), the distance covered (8,12) and the transport condition (12). The direction of the body during transfer could have implications on the neonate health (10), but studies comparing outcomes of different transport modalities are not currently available.

#### Objective

This paper aims to evaluate the occurrence of adverse effects on clinical outcomes and on short-term events, in high premature infants transported in "cross" mode (perpendicular to the travel direction) compared with a population of infants transported in the traditional position (long axis parallel to the travel direction).

#### Materials and method

This is a retrospective study that compares a cohort of infants transported in "cross" mode with a cohort of infants with similar clinical characteristics but different transport modalities: the longitudinal position maintained in the journey (using data extrapolated from the literature). The population "cross" is represented by critical infants with a gestational age less than 32 weeks, object of primary transport, transferred at birth from a spoke center to the hub reference center. The team involved in transport consists of experienced operators (staff NICU) that manage infants resuscitated and stabilized at a peripheral birth point by pediatricians and adult intensivists educated through theoretical and practical courses held by the hub center's operators. The mean of transport is an emergency ambulance set so as to be able to carry incubators fixed perpendicularly to the travel direction: the main incubator near to the bulkhead that separates the guidance compartment from the sanitary compartment; if a contemporary transportation is necessary, a second incubator can be anchored in the rear third of the sanitary compartment.

Incubators, about 120 cm long, are mounted on a trolley with 4 wheels which contains the tools for the newborn's assistance (monitor, ventilator, backpack bag, etc.) and gas cylinders (air and O<sub>2</sub>, 7 liters each). The geographical area source of the cohort "cross" is the southern Piedmont and western Liguria, where 10 I and II level birth-points transfer newborns to the reference NICU center sited in Cuneo.

Data about vital signs (respiratory, cardiovascular, neurological and thermic) were collected and evaluated according to the TRIPS score (3) at the take on responsibility of the infant at the peripheral center and at the arrival at NICU department. Major events (as death or IVH) occurring within 72 hours from transport and total were also considered.

#### Statistics

The study to demonstrate the non-inferiority of the "cross" than the control.

#### Results

In the period from 01/01/2003 to 31/12/2012 66 infants were transported by the team of Cuneo: they included 27 males and 39 females, the mean gestational age at birth was 28 weeks + 5 days, the mean weight was 1270 g and the average distance traveled was 63 km away.





# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

The TRIPS average score is reported in the table below:

	Temperature	Neurological	Respiratory	Pressure	Total
TRIPS I	4.70	1.56	11,15	5.65	23:06
TRIPS II	3.96	1.66	11.07	3.65	20:34

The recurrence of major events is shown in the table below:

	Total	<72 Hours
IHV (< 2°) *	7,5%	3,0%
Deaths	7,5%	4,5%
* IVH any grade 18%		

### Discussion

The examined population, although its high risk characteristics (gestational age, criticality as the transfer at birth with unstable vital signs) and the great mean distance covered, doesn't seem to have suffered significant trauma during transfer.

Clinical conditions were stable: the TRIPS score, that in literature shows a worsening trend during transport (14), in this study improves. Even starting from "critical" scores a minimal improvement is observed between the first and the second detection; this is probably caused by the fact that the first TRIPS detection occurs (moreover as in the cases reported in literature) at arrival of the experts' team, that is before the complete infant stabilization.

Anyway, early events (death or severe IVH within 72 hours of birth) are less frequent than those in subjects with similar risk factors described in the literature. Particularly, comparing our study with a large sample (7), the incidence rate of IVH and severe IVH in outborn neonates stands at lower values (as in the inborn infants population used for comparison). Even regarding mortality, a lower incidence is seen in "cross" transported infants in comparison to the patients described in literature.

Furthermore mortality and IVH incidence of Cuneo inborn patients doesn't deviate from the mean of TIN patients belonging to the Vermont Oxford Network.

So, the theoretical basis of these results can be searched in lesser trauma due to blood volume shift caused by accelerating or braking. Newborns, even more if ill and high risk premature infants, have an almost nil ability to manage the blood movement: during the "cross" transport, the blood volume may reduce its effects moving only between the right and the left side of the body, while in the conventional transport blood flows quickly between head and thorax. This would probably create relevant alterations in cerebral bloodstream or in venous return to the heart.

### Conclusions

The small case series suggests that also the travel direction in neonatal transport may be important, and deserves at least a comparative study and then, if data will be confirmed, a prospective study that could produce powerful results, hopefully so significant as to change the habits of dealing with Neonatal Transport.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Sharing experiences from the world

#### Abstract 9

#### A COMPARISON OF RESPONSE AND JOURNEY TIMES BETWEEN AIR VERSUS GROUND TRANSPORT OF THE NATIONAL NEONATAL TRANSPORT PROGRAMME IN IRELAND

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#### Introduction

Neonatal air transport in Ireland is a service integrated between the National Neonatal Transport Programme (NNTP) and the Eastern Region National Ambulance Service with the Irish Air Corps. The Republic of Ireland has a surface area of 72,273km<sup>2</sup> and population of 4.5 million. There are 19 neonatal units (locations outside Dublin) throughout the country which utilise the NNTP to transfer critically ill neonates for tertiary level care. Due to distance and geographical factors, some of these locations will require neonatal air transport for safe and timely transfers of neonates.

#### Objective

Our objective is to compare the response times and total infant journey times between air versus ground transport over a 5 year period. We also observed the significance of air transport as a time efficient modality in the transfer of critical neonates in Ireland.

#### Methods

A retrospective review of the time log recordings in the NNTP database from the year 2009 to 2013 was performed. The averages of the time parameters between air and ground transport were recorded and the time differences between the two modes of transportation were calculated. We highlighted the locations that required air transport >3 times.

#### Results

8 locations in Ireland used air transport in the five year period. 4 out of these 8 locations used air transport >3 times (Castlebar = 17/ Letterkenny = 14/ Tralee=6/ Sligo=4). The table represents our results.

Locations	Estimated distance from Dublin air base (kilometres)	Estimated flight duration from Dublin air base (hour:minute:second)	Average response time (hour:minute: second)			Average Infant Journey time (hour:minute:second)		
			Air	Ground	Time Difference	Air	Ground	Time Difference
Castlebar	198	01:10:00	02:44:00	03:16:00	00:32:00	01:46:00	02:47:00	01:01:00
Sligo	170	01:07:00	02:44:00	03:04:00	00:20:00	01:28:00	02:23:00	00:55:00
Letterkenny	235	01:18:00	03:08:00	03:27:00	00:19:00	01:44:00	03:17:00	01:33:00
Tralee	246	01:21:00	03:03:00	03:27:00	00:24:00	01:58:00	03:20:00	01:22:00

#### Conclusions

Our study confirms shorter response and infant journey times for air transport compared to ground. Particularly, the infant journey time between Sligo and Dublin was significantly shorter when air transport has been used. This was not previously anticipated and might lead to a change in our future practice. The findings also support the significance of air transport in our national service (NNTP), particularly when geographical factors and 'time-critical' conditions of the neonate are taken into account.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 10

#### CURRENT MODELS AND TRAINING FRAMEWORKS WITHIN NEONATAL TRANSPORT SERVICES ACROSS THE UNITED KINGDOM- A NATIONAL SURVEY

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#### Background

With centralization, transport services have become integral part of neonatal networks in the United Kingdom.

#### Objective

To evaluate current models and training frameworks in neonatal transport services across the UK.

#### Design/Methods

A national survey of neonatal transport services was conducted between July/October 2014.

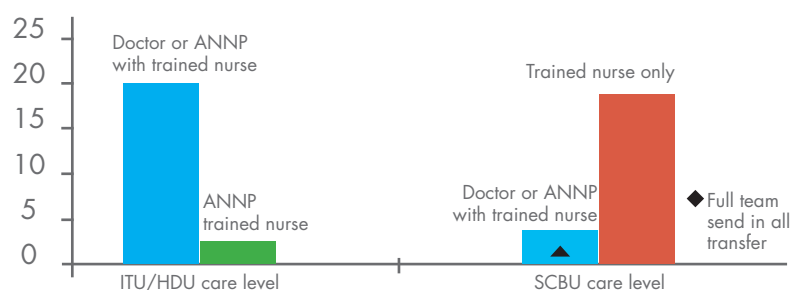
#### Results

Currently UK has 23 regional neonatal transport services supporting 23 neonatal networks. A 24-hour service arrangement exists in 20 neonatal networks. Operational cross cover arrangements are available between 12 regional transport services. 87% of transport services are 'Consultant led'. In 87% of services, the consultant on duty for transport also supervises other clinical areas, although in 17% this is only 'out of hours'. In 90% of consultant led services, team configuration for both intensive care and high dependency level transfers consists of a senior trainee or an advanced neonatal nurse practitioner (ANNP) accompanied by a trained nurse. In 10%, the team consists of an ANNP with a trained nurse.

Vehicular arrangements are variable. 65% have a dedicated vehicle supplied by an ambulance provider. 70% of transport services employ a trained driver whilst others use front line crews.

Selection of transport personnel is chiefly based on experience which is well defined for paediatric trainee and nurses but not for ANNPs. All teams require a new staff to complete an orientation programme which is variable in duration and measures of readiness for independent transfers. 65% of transport teams specify a number of transfer or a defined period of time with preceptor supervision. Ongoing training arrangements include debriefing, case conferences, simulation training and participation in in house or national transport courses. Only 30% of transport teams use competency frameworks for maintaining overall performance standards.

*Figure: Team configuration during neonatal transfers in a consultant-led service*



#### Conclusions

A national survey of neonatal transport services was conducted between July/October 2014. In transport services, similarities in team configuration are evident. The role of ANNPs in neonatal transport service is increasing. A model of collaboration both within and outside neonatal networks is evolving and in future could extend to sharing administrative and educational resources and vehicular arrangements. Transport teams vary in both team composition and training provision. Adopting a unified national approach to transport education would allow teams to evaluate individual personnel, focus on educational needs, and assure acquisition of necessary knowledge and skills.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 11

#### TWO DECADES' EXPERIENCE OF A DEDICATED NEONATAL INTENSIVE CARE AIR TRANSPORT SERVICE

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The Level III NICU of Uppsala University Children's Hospital serves a region of 129.000 square kilometers and 22.000 deliveries annually, distributed on 9 level I, and II hospitals. With centralization of neonatal intensive care, qualified transport of sick newborns became a necessity. In 1993 the first helicopter transport was performed and from 1998 a formalized neonatal transport team with 24/7 coverage was established. Distance to the regional hospitals are between 80 and 280 kilometers. Distance to the two national centers for neonatal cardiac surgery are 450 and 650 kilometers respectively.

#### Aim

To present data on mode and type of transportations performed by a dedicated regional/national neonatal transport service (24 h/7 d; neonatologist and neonatal RN) based at the Uppsala University Children's Hospital, Uppsala, Sweden. All members of the transport team rotate between regular NICU-work and transports.

#### Methods

Data regarding patients (GA, PNA, respiratory support, diagnosis), type and duration of transportation (helicopter/fixed wing) were collected from the years 1993 to 2014.

#### Results

A total number of 1898 transports have been performed. The majority were performed by helicopter - 1712, with increasing use of fixed wing transport. 61% of transports were considered urgent and the rest planned or semi-urgent. 67% of the patients were given respiratory support (751 mechanical ventilation, 367 nasal CPAP and 150 supplemental oxygen via nasal cannula). Reasons for transfer included: 622 congenital heart disease, 725 neonatal medicine (Extreme prematurity; need for invasive ventilation: hypothermia treatment etc.), 263 neonatal surgery/disease.

#### Conclusions

Over a period of 21 years a large number of air transports have been performed by a dedicated neonatal transport team, gaining a vast experience and knowledge of the complicated field of inter-hospital transportations of sick newborn infants.





# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 12

#### EFFECT OF REGIONALIZATION ON NEONATAL TRANSPORT IN SOUTH TYROL

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#### Background

South Tyrol is a region in northern Italy with a population of 515,000 citizens. Over the last decades we registered an almost unchanged birth rate of 5,500 neonates per year in 8 hospitals. In the 1990s a model of regionalization was introduced with one level-III NICU in our perinatal center, where all at risk pregnancies and all preterm infants <34 weeks gestation should be delivered.

Our NICU was also responsible for neonatal transport in the region. Since maternal referral to our center was preferred to neonatal transport we expected a decrease in the rate of neonatal transports.

#### Aim

To evaluate whether implementation of regionalization led to a reduction in the overall transport rate in our region and to analyze the main conditions associated with neonatal transport.

#### Methods

We analyzed data charts of all primary transports in the years 2000-2013 (N=503) with regard to gestational age, pathologies leading to transport and stabilization time.

#### Results

We registered an increase in the number of primary neonatal transports over the years. The “inborn rate” of preterm infants <34 weeks gestation was approximately 93-94% and did not change over the years. Whereas the number of transports of preterm infants remained unchanged over the years, the number of transports of term infants increased. The main clinical conditions leading to transports were asphyxia, respiratory distress and congenital heart defects.

#### Conclusions

Contrary to our expectations regionalization was not associated with a decrease, but resulted in an increase of primary neonatal transports. Preterm infants were primarily cared for in our NICU, proving successful implementation of regionalization. On the other hand we found an increase in primary transports of term infants. Our data could be helpful for those who are interested in implementing regionalization or neonatal transport in other regions.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 13

#### OVERCOMING MEDICAL RECRUITMENT CHALLENGES IN NEONATAL TRANSPORT

J. Behrsin

*CenTre transport and University Hospitals of Leicester NHS Trust*

#### Background

CenTre transport is one of the UK's busiest transport services conducting around 1500 transports per annum by road. The transport service covers the East Midlands with an annual birth rate of 75,000 babies. Transport is provided by two emergency and one repatriation team during the day and one emergency team overnight. Emergency transports are carried out by a consultant, middle-grade doctor or ANNP and a nurse. Repatriations are nurse-only.

Medical staffing is a universal challenge across all specialties due to the working time directive, changes to immigration rulings and a reduction in entry to specialist training programmes. Neonatal transport is not exempt from this. The ultimate staffing goal is to ensure that a competent transport team is available to deliver the specialist skills to retrieve the sickest newborns.

#### *Current solutions to medical recruitment challenges*

CenTre transport uses a number of different medical staff grades and ANNPs to ensure adequate cover for the workload. This is comprised of:

1. ANNPs and middle-grade doctors who work within the co-located neonatal services when not out on transport
2. Resident consultant who rotate between the neonatal services and transport
3. Transport fellows who are attached to CenTre transport for a period of 6-12 months to gain specific training in transport

#### Future directions

Since 2011 we have had 8 fellows in post three of whom have worked less than full time. 6 were in an existing training post in the East Midlands and 2 were from another deanery. All have gained significant clinical experience and had opportunities to gain experience in clinical governance and service development projects. The post has been universally rated as useful in assisting fellows to achieve personal development goals during the post and to assist with career progression.

We hope to broaden the spectrum of recruitment to fellows currently working overseas both by utilising the Royal College of Paediatrics and Child Health medical Training initiative and by forming links with other transport services overseas through the European Society of Neonatology.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 14

#### THE TRANSPORT OF TWIN NEWBORNS: GENOA EXPERIENCE

A. Sannia, F. Risso, C. Traggiai, F. Campone, C. Bellini  
NICU Gaslini Children's Hospital Genoa - Italy

##### Objective

Our purpose is to describe our experience in the transport of twin infants by a single ventilator using a T-piece device splitting the flow, allowing connection to two infants simultaneously and to describe the possibility to use two ventilators and one incubator, using the same tubes providing air and oxygen through a Y-shaped connector to supply effective gas flow to both ventilators.

##### Methods

We retrospectively reviewed 3,400 medical charts from the Neonatal Emergency Transport Service (NETS) of the Gaslini Children's Hospital of Genoa, Italy between January 1996 and December 2011. We then retrieved all the twin infants affected by respiratory distress syndrome (RDS) who had required ventilatory support such as nasal continuous positive airway pressure or mechanical ventilation during transport. Respiratory assistance to twin infants was provided by a single ventilator using a T-piece device splitting the flow, allowing connection to two infants simultaneously. We used a matched population for gestational age (GA) and birth weight (BW) of singleton infants transferred using a single ventilator/nCPAP device to compare results. Then, we describe the simple and inexpensive device we used in two occasions with two ventilators and one incubator that is feasible to treat one twin by selecting the ventilatory parameters that fulfil his/her lung conditions irrespective of the possible differences in clinical conditions of the other twin, who may be ventilated by quite different parameters or by a different mode of ventilation.

##### Results

We transported a total of 46 pairs of twin infants (92 newborns) at the same time using a single transport incubator. The median GA was 31+6 weeks (range 26+1-36+3), and the median BW was 1,770 g (range: 850-2,770). nCPAP was applied to 30/46, while SIPPV was used in 16/46. Median ground transport time (38/46) was 2 hrs. and 20' min, while median air transport time (8/46) was 30' min. We did not observe transport complications. Statistical analysis of data collected did not show significant differences among the twin group and the singleton group of infants collected into this study. The double-ventilator device is now in use.

##### Conclusions

In our experience, the simultaneous transport of twin newborns who need respiratory support is feasible, safe, and effective. The T-shaped connector device we describe is inexpensive and easy to use by a trained and experienced neonatal transport team. The possibility to use two ventilators and one incubator is really promising.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 15

#### NEONATAL TRANSPORT IN CENTRAL REGION OF HUNGARY

I. Kocsis, Z. Somogyvári

Neonatal Emergency and Transport Service of the Peter Cerny Foundation Budapest

The transport of critically ill newborns by dedicated neonatal transport staff has been shown to be associated with a significant better outcome.

Organization and operational plans of the Neonatal Emergency and Transport Service of the Peter Cerny Foundation (NETS-PCA) is described. The NETS covers the central region of Hungary including Budapest and 6 counties with all together 4 million inhabitants in a 120-140km radial surroundings with a driving distance of 60-70 minutes.

The NETS provides neonatal transportation between 11 NICUs of Level-III, 31 referral hospitals with delivery rooms and 10 diagnostic centres. During a 25-year period 61,472 premature and sick newborns has been transported, 12,338 has got ventilatory support, 1,325 resuscitation was made with 90 per cent successfully outcome and 157 active controlled hypothermic treatment has started at the referral hospital and continued during the transport.

Yearly activity of the NETS-PCA – working as a mobil NICU Level III – includes about 3000 neonatal transfer per year, about 1000 emergency cases, many with acute interventions (iv access, intubation, ventilator support, umbilical canulation, chest drains), about 1000 cases back or return transfers to lower level NICU-s, about 1000 cases inter-hospital transport for diagnostic interventions: 320-360 ultrasound, CT, MRI, cardiac echo, 30-40 surgical, cardiac surgical, neurosurgical and 700-900 tele-ophthalmologic screening and 60-70 bed-side Laser-interventions. Mechanical ventilations (700-800 per year) with measuring SAT, RR, HR, and 300-400 mobile blood-gas analysis, 35-50 resuscitations per year in delivery rooms (DR), 40-50 Surfactant treatment at DR, 20-30 newly born baby per year from home deliveries and 30-40 active hypothermia treatment of asphyxiated newborns during transport.

With standardized approaches to neonatal transportation we try ensure that our patients have access to facilities appropriate to their care needs and that movement to different care destinations is provided by highly trained dedicated staff in neonatology.





# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 16

#### NEONATAL TRANSPORT-BASED TELEOPHTHALMOLOGIC ROP-SCREENING IN HUNGARY

I. Kocsis (1,2), E. Maka (3), Z. Somogyvári (1)

(1) Neonatal Emergency & Transport Service named Peter Cerny, Budapest; (2) Second Department of Obstetrics and Gynaecology, Semmelweis University;

3) Department of Ophthalmology, Semmelweis University Budapest

Peter Cerny Ambulance (PCA) dedicated for special neonatal transport has got 150-200 calls per year to transfer premature neonates for ROP examinations and laser-treatment. It is an enormous burden on the emergency and transport service, and poses significant risk to the fragile extremely low birth weight infants (ELBWI). In addition it incurs costs due to the mileage and the transport-time, decreasing significantly the PCA efficiency.

Solving this problem we developed a state-of-the-art modality for bed-side, portable, non-invasive ROP screening, treatment and follow-up telemedicine system, named "Premature Eye Rescue Program" (PERP) for avoiding transport of premature, which fit together the preexisting facilities of the PCA.

The method of the transport-based remote ROP screening in the central region of Hungary based on a collaboration between a nonprofit organization (PCA), and a University Department. PCA offers logistics (24/7 dispatch service), infrastructure (RetCamShuttle Clarity Co/USA), dedicated screening staff (4 transport nurses) and covers the cost of the project. Department of Ophthalmology of the Semmelweis University ensures ROP-expertise, scientific and educational background. ROP specialist on-call has given not only diagnosis via WFDT-telemedicine, but as a "flying ROP specialist" can locally treat the ELBWIs with laser for which PCA provides its own incubators.

Results of the PERP, as a regional "store and forward" telemetric ROP screening has saved 49,204 avoidable transport kms for ambulance (and infants) which has ment 246,000 Euros for 5 years. 3,768 bedside screening and 345 laser-operation (with 690 photo-documentation) was performed, by the PCA-PERP Service. Benefits for newborn: transport related stress and complications are avoidable, the patient safety increases during examination or laser treatment by the well-trained neonatal transport nurse. Benefits for the ophthalmologist: decrease in time consumption, recorded images for follow-up and storage, opportunity to second opinion with international cooperation, and possibility to detect ROP & non-ROP ocular pathologies. Benefits for transport logistics: improve in variability of team composition, and avoidable transports. General benefits for all participants: quality assurance, e-documentation, interdisciplinary cooperation and education. Conclusions of the transport-based remote ROP screening as an "off label transport activity" is an unorthodox system utilizing the preexisting facilities of the neonatal transport service, with a reading center at the university hospital and continuous professional control and education from leading experts in ROP & non-ROP screening and treatment. Besides eliminating the avoidable transport of premature, and recording the objective status of the current ROP stages, telemedicine consultation, second medical opinion and quality control have also become available. The logistic system of Ambulance effectively provides the continuous availability of the remote eye screening system, while allows capacity to be focused on emergency neonatal care.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 17

#### T-PIECE RESUSCITATOR'S MODIFICATION FOR NEONATAL TRANSPORT IN INDONESIA

R. Rohsiswatmo, R. Dewi, C. Haryono, E. Marcia Lavina

Division of Neonatology, Department of Child Health Medical School University of Indonesia, Cipto Mangunkusumo General Hospital, Jakarta

#### Background

Early CPAP in delivery room using T-Piece resuscitator (T-PR) has been proven to reduce the risk of intubation. In order to function, T-PR requires O<sub>2</sub>, blended with medical air to lower the concentration. In Indonesia, like other developing countries, having these gasses ready are difficult. Our T-PR devices equipped with internal compressor to produce medical air. Mixsafe (MS)<sup>®</sup> only need oxygen tank to have different oxygen concentrations. The power source using a battery that can last 3 hours and can be recharged. The mixture of gasses is done manually.

#### Objective

To demonstrate that Mixsafe is as safe as others T-PR, cheaper, easier to use on baby with respiratory distress.

#### Methods

April to October 2014. A total of 80 inborn babies at 26 to 34 weeks gestational age with respiratory distress (RD) were randomized into 2 groups. One group was treated with MS while the other with Neopuff (NP). Parameters used for this studies were gestational age, sex, PEEP, FiO<sub>2</sub> and the incidence of CPAP failure. Data were analyzed using chi square test and Kolmogorov Smirnov.

#### Results

There were no different between MS and NP in term of CPAP failure ( $p = 1.000$ ), and we can save almost USD 3350 for not preparing the medical air.

#### Conclusion

Mixsafe is as safe as others T-PR, less expensive.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### Abstract 18

#### HIGH RISK NEONATAL TRANSPORT TO ECMO IN SOUTHERN BAVARIA

M. Klemme, K. Förster, A. Schulze, S. Herber-Jonat, A.W. Flemmer, Div. Neonatology, V. Hauner  
Children's Hospital and Perinatal Center Munich - Großhadern, Ludwig Maximilian University, Munich, Germany

The transport of newborn infants with acute respiratory failure to an ECMO center is characterized by a substantial risk and in-transport mortality. Consequently, a specialized transport team with specialized equipment is needed.

In cooperation with Stephan Medizintechnik a sophisticated transport system was developed and approved by the German technical control board (TÜV). The system is equipped with a passively heated incubator, a full scale patient monitor and an all-purpose neonatal ventilator with inspiratory gas conditioning, different modes for patient triggered ventilation as well as high frequency oscillation and the potential to apply inhaled nitric oxide during transport conditions (iNO).

The transport system was used for 28 neonates in pre-ECMO conditions due to severe respiratory failure (with 18 air-bound transports by helicopter, EC-145). All infants were transferred from a peripheral hospital to our ECMO center and accompanied by a certified neonatologist and specialized NICU nurse. The mean distance was 72 km ( $\pm 49.5$  km, SD; 8.4-175 km; min-max). The mean oxygenation index (OI) was 37.3 (SD: 19.3; 5-100; min-max). High frequency oscillation was used in 9/28 (32%) and nitric oxide in 19/28 (68%) infants (Mean iNO: 22.5 ppm, SD: 9.2 ppm; 5-40 ppm; min-max). None of the infants died during transport and no adverse events have been observed during transport. A total of 15/28 (53%) patients received ECMO. Overall, 21 (75%) patients survived to hospital discharge, three died despite receiving ECMO therapy.

Our high performance transport unit together with a well-trained transport team, unique in Bavaria, provides a safe and reliable approach to transfer neonates with severe respiratory failure or other life-threatening diseases to a level-III center.



# TRANSPORT OF HIGH RISK NEONATES

## EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE

### GENERAL INFORMATION

#### CONGRESS VENUE



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#### OFFICIAL LANGUAGE

English

#### REGISTRATION DESK & HELP DESK OPENING TIME

January 23<sup>rd</sup> 12.00 pm to 07.30 pm

January 24<sup>th</sup> 07.30 am to 08.00 pm

January 25<sup>th</sup> 08.30 am to 04.30 pm

#### ON SITE REGISTRATION FEES (VAT INCLUDED)

**Physicians: € 400,00**

**Non-Doctors Professionals: € 180,00**

All above mentioned fees are intended VAT excluded. Italian 22% VAT will be applied, if applicable.

The fee includes:

- Access to scientific sessions
- Access to exhibition area
- Final Program
- E-Certificate of attendance
- Congress kit and badge
- Coffee breaks
- Lunches
- Welcome reception

#### ITALIAN CME ACCREDITATION

TRANSPORT OF HIGH RISK NEONATES has been accredited by the Italian Ministry of Health. The accreditation number is 112274. The Italian Ministry of health assigned n. 4,6 CME Credits.

The congress has been accredited for the following categories:

- Physician (Neonatology, Paediatrics, Paediatric Surgery, Gynecology & Obstetrics, General Medicine, Respiratory Medicine, Anaesthesiology)
- Nurse, Paediatric Nurse
- Careworker (OSS)
- Chemist

#### CERTIFICATE OF ATTENDANCE

The E-certificate of attendance will be uploaded on a dedicated area of the congress website. Each delegate will receive an email in order to download his/her own certificate.

#### VIDEO-RECORDING

The Conference will be fully recorded.

Recordings will be available on the congress website at the cost of € 50,00.

**Wi-Fi** Free access to all participants

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#### ORGANIZING SECRETARIAT



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# TRANSPORT OF HIGH RISK NEONATES

EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE



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# TRANSPORT OF HIGH RISK NEONATES

EXCELLENCE IN PERINATAL MEDICINE: WHEN SKILL MAKES THE DIFFERENCE





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EDITION

# TRANSPORT OF HIGH RISK NEONATES

WHEN SKILL, EQUIPMENT AND  
PROFESSIONALISM MAKE THE DIFFERENCE



## COPENHAGEN

President of the meeting:  
Morten Breindahl, *Copenhagen*  
*President of the European Society  
for Neonatology*

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