Abstracts from the 99NICU Meetup April, 7-10, 2019 in Copenhagen

Francesco Cardona, MD, MSc and Stefan Johansson, MD, PhD

The abstracts from the 99NICU Meetup are presented below:

Poster Abstracts Table of Contents:

99NICU2019-1

Neonatal outcome after mid-trimester preterm premature rupture of membranes (PPROM): Can standardized perinatal care improve survival?

A Vinaixa, R Porta, N Miralles, A Farrés, B Serra

Hospital Universitari Dexeus, Spain
avinaixav@gmail.com

Background
Mid trimester premature rupture of membranes (PROM) is commonly associated to a high risk of adverse perinatal outcome in terms of mortality and morbidity. The main factors related to the prognosis are the gestational age at birth, the length of latency period and the development of chorioamnionitis. Studies published in last two decades show survival rates of 52-73% and rates of bronchopulmonary dysplasia (BPD) of 40%, and an increased risk of severe neurological damage and retinopathy of prematurity (ROP).

Methods
A retrospective study was performed in a single centre during the period 2012-2018 inclusive, including all the cases of mid trimester PROM.
Results: 21 cases of PROM who choose to continue the pregnancy after mid trimester PROM were found. Other 13 cases chose elective termination of pregnancy shortly after PROM and were excluded from the analysis.
Of the 21 cases reviewed, 7 cases occurred after an invasive procedure, and there were no deaths in this group. In the 14 cases of spontaneous PROM the mortality rate was 14%. The rate of bron-

chopulmonary dysplasia (BPD) was 25% in the group of PROM occurred after an invasive procedure and 14,2% in the group of spontaneous PROM. There were no cases of severe BPD.

Results

	PPROM not preceded by invasive procedure	PPROM after an invasive procedure
n	14	7
Gestational age at PPROM (w), mean (range)	20,14 (15-23)	17,8 (15-21)
Evolutive Chorioamnionitis (%)	50	0 (0)
GA at birth (w) mean (range)	33,5 (19-40(	37 (30-40)
Minimal amniotic fluid pocket (cm)	0-8	1,5-10
Trend in amount of residual amniotic fluid		
Increase	29%	71%
Stable	64%	29%
Decreasing	7%	0
Days of latency between PPROM and delivery , mean (range)	80 (2-189)	130(63-168)
Neonatal survival	86%	100%
NICU days, mean (range)	7,38 (0-45)	2,28 (0-11)
Days on Invasive mechanical ventilation, mean (range)	0,58 (0-3)	0,14 (0-1)
Days on non-invasive mechanical ventilation, mean (range)	6,25 (0-45)	0,78 (0-3)
BDP in survivors (%)	25	14,2
Early onset sepsis (%)	0	0
Major abnormalities in brain ultrasound (%)	0	0
ROP (%)	0	0

Conclusions
A high-quality collaborative, standardized perinatal care, and a good communication flow between obstetricians and neonatologists improve the survival and quality of life of the babies born after mid trimester PROM and help parents to face one of the most devastating complications of pregnancy.

99NICU2019-2

Impact of the Introduction of Minimally Invasive Surfactant Therapy in Preterm Infants at 25-28 Weeks Gestation

Wong MM, Meyer MP

KidzFirst Middlemore Hospital, Auckland, New Zealand
maisiewong@middlemore.co.nz

Background
There is increasing use of nasal continuous positive airway pressure (CPAP) as the primary mode of respiratory support in extremely preterm infants to avoid the adverse effects of mechanical

ventilation. However, these infants are at risk of CPAP failure requiring intubation and surfactant treatment for respiratory distress syndrome (RDS). A technique of providing surfactant without endotracheal intubation via a thin catheter has been described. This provides minimally invasive surfactant therapy (MIST) in preterm infants with RDS, thus avoiding intubation and ventilation.

Methods
Preterm infants born between 25+0 to 28+6 days gestation admitted to neonatal unit in Middlemore Hospital who were stabilised on CPAP from birth were included, those intubated and ventilated within 1 hour after birth were excluded.
PreMIST period consists of infants born from Jan 2010 to Dec 2013; this was the period before introduction of MIST. The MIST period was from Jan 2014 to June 2017 where infants with RDS could be treated with MIST.

Results
There were 90 infants in PreMIST period and 94 infants in MIST period. Mean birthweight was 1053 gms vs 1105 gms (p= 0.11). Mean gestational age was 27.3 weeks vs 27.6 weeks (p=0.093). There was a significant reduction in number of infants requiring ventilation by age 72 hours 21.1% vs 7.4% (p=0.015). There was a significant increase in number of infants treated with surfactant 20% vs 36.2% (p=0.007). The median age of first surfactant therapy reduced from median of 12 hrs to 3 hrs (p=0.006).
There was a trend to reduction in mortality but this was not significant 10% vs 2.1% (p=0.10). There was a non significant reduction in chronic lung disease (CLD) 34.4% vs 27.7% (p=0.63) and CLD/Death 42.2% vs 29.8% (p=0.29). Other morbidities were unchanged.

Conclusions
Introduction of MIST in preterm infants at 25 to 28 weeks gestation has resulted in lower incidence of CPAP failure and earlier age of treatment with surfactant.

99NICU2019-3

Ethical Considerations in NLS (Neonatal Life Support)

Jellila khatib

Universidad de Navarra , UOC, Spain
jkhatib@alumni.unav.es, jkhatib@uoc.edu

Background
The typical day in a Neonatal Unit is a busy place. Many ethical questions may arise in the background. Starting in the delivery room, when to start and stop resuscitation? Then what was in the best interest of the neonate once in the NICU? Should we consider withdrawing care in some cases? This aim here is to evaluate the limit of neonatal viability by exploring the ethical considerations in neonatal resuscitation and proposing a guideline.

Method
Systematic review of peer-reviewed journals and/ or standard guidelines. Sources were selected using Pubmed, Cochrane , Google Scholar and hospital documentations. Several European/ N. American Countries were reviewed as case studies: England (UK), France, Belgium, Spain, Italy, United States and Canada.

Results
The no clear consensus at the time but more of a grey area where some countries were more conservatives like France and others more proactive such as Denmark. The results are shown in table that gives an overview of practices in countries studied. An updated version using current literature for a more complete view added Sweden and Denmark. Taking into account all ethical considerations, the consensus is that the limit of viability is around 23 weeks in practice.

Conclusions
The important ethical considerations that need to be considerations are informed consent, overtreatment concerns (whether it is adequate to start and stop NLS), quality of life, economic considerations, therapeutic futility, and physical suffering. Even though there is a grey area regarding limits of viability, there is a general consensus that this is at about 23-24 weeks. Recent research have added weight to other factors to consider including: birth weight, gender, maturation or staff prudence that lowers the limits of viability to 22 weeks in some instances.

99NICU2019-4

Successful Non Invasive Oxygenation Treatment of Extremely Low Birth Weight with Early Enteral Feeding In Developing Country

Brigitta Ida Resita Vebrianti Corebima, MD, M.Kes.Paed (C)

Faculty of Medicine University of Brawijaya, Malang, Indonesia
Saiful Anwar General Hospital, Malang, Indonesia
brigitta_vebi@yahoo.com

Case report
Higher levels of care are associated with lower neonatal mortality, particularly among infants with very low birth weight (below 1500 g). In this case, we admitted extremely a LBW infant in the tertiary hospitals in relatively good condition because the critical situation (prematurity-related respiratory distress syndrome) had been treated appropriately in the first and second hospital. A 700-gram female neonate was born at 28 weeks gestation by spontaneous breech delivery presents with grunting and chest retractions.. After 5 days of treatment at the secondary hospital, she has referred to Saiful Anwar Hospital (tertiary public hospital). The patient was diagnosed with respiratory distress syndrome / hyaline membrane disease (improved), apnea of prematurity, and extremely low birth weight. Initial assessment showed that she did not require oxygen support. Medications included: aminophylline injection dosage 6 mg/kg BW) for 2 weeks, tapering off gradually then replaced with caffeine citrate orally; fluconazole injection dosage 6 mg/kg BW) for 1 week. She was feed by using an oral gastric tube because of inappropriate sucking reflex. The Kangaroo method was introduced from the first day of admission. After 3 weeks this patient already had an improved sucking reflex and began to use the bottle and pacifier.

99NICU2019-5

Comparison of breastmilk production from mothers of premature and mature NICU's babies during the first week in our NICU

Naomi Esthernita F. Dewanto, Nancy Napitupulu

Tarumanagara University, Siloam Hospitals Kebon Jeruk, Jakarta, Indonesia.
naomiesthernita@gmail.com

Background
The principal goal for infants, especially preterm, is the provision of the mother's own milk (MOM), but on the other hand it is difficult to get MOM for preterm babies due to delay of lactogenesis and mother's stress. Milk production and adequacy, for mothers of

both healthy breastfeeding term infants and non-nursing preterm infants, have been shown to have a significant relationship with milk production 4-6 days after birth.

Methods
This is a descriptive and comparative study of mother's milk production of preterm (<37 weeks) and term (>37 weeks) babies during the first week of life in our NICU during 2018. We documented the milk production from mothers breastmilk expression every 3-4 hours since 4-6 hours after delivery until day 7.

Results
From 181 babies during 2018, we studied 31 preterm and 77 term babies from birth until day 7. The average breastmilk production of the preterm vs term mothers in each expression from day 1-7 were 0,81 vs 1,61 ml; 3 vs 3,65 ml; 6,66 vs 6,94 ml; 21,5 vs 26,6 ml; 34,1 vs 46,4 ml; 45,92 vs 46 ml; 48,88 vs 50,4 ml/x expression.

Conclusions
Expressing for a preterm or unwell baby requires commitment by the mother and effective support from staff. Commencing breast milk expression as soon as possible after birth and at least within the first six hours, followed by frequent, regular and effective breast milk expression to stimulate adequate breast milk production may provide adequate MOM even for preterm babies in the NICU.

99NICU2019-6

Long-term effects of neonatal complications on brain growth at 10 years of age in children born extremely preterm

Padilla N[1], Jimenez-Espinoza C[1], Kvanta H[1], Ådén U1,[2].

[1]Dept of Women's and Children's Health, Karolinska Institutet, Stockholm, Sweden.
[2]Dept of Neonatology, Karolinska University Hospital, Stockholm, Sweden.
nelly.padilla@ki.se

Introduction
We have demonstrated reduced brain volumes at term-age in extremely preterm (EPT) infants (born <27 weeks of gestation) with the lowest gestational age, intraventricular hemorrhage I-II (IVH I-II), patent ductus arteriosus (PDA) ligation and mechanical ventilation (MV) > 10 days, compared with the other EPT born infants (Padilla et al., 2015). The long-term impact of these neonatal complications on brain growth during childhood is poorly described. We aim to investigate brain volumetric differences in grey matter, white matter, cerebrospinal fluid between EPT children at 10 years of age who were the most immature and/or had neonatal complications (PDA, IVH I-II, MV) with those who had not.

Methods
Forty-seven EPT children (mean gestational age 25.6 weeks (SD 0.91)) underwent structural magnetic resonance imaging at 10 years of age (mean 9.9 (0.83)). Automatic segmentation of T1-weighted images using age-specific templates in SPM8 was done. We segmented grey matter, white matter, and cerebrospinal fluid (CSF). Intracranial volume was calculated (ICV=all brain tissues). Owing to the fact that variations in CSF volumes could affect the ICV in the EPT children, we also calculated the cerebral parenchyma (CPAR=all brain tissues excluding cerebrospinal fluid). Student's t-test and General Lineal Model Analyses were used for comparisons between groups. Analyses were performed with and without covariates (gestational age and/or gender as appropriate).

Results
Of the 47 children scanned at 10 years of age, 31 (66.6%) EPT children had PDA, 15 (53.6%) had surgical ligation; 14 (33.3%) had IVH I-II; 16 (69.6%) had MV > 10 days, and 25 (53.2%) were the most immature (< 25 weeks of gestation). Even though these children tended to have smaller brain volumes than those without those complications; the differences did not achieve statistical significance (Table 1). The results were not altered when analyses were adjusted for covariates.

Conclusion
Contrary to the neonatal findings, immaturity, PDA, IVH I-II and MV > 10 days were not associated with altered global growth at 10 years of age, indicating that there is a catch-up brain growth during childhood in EPT children with a complicated neonatal course. Nevertheless, this does not rule out the presence of differences in brain organization, which require other methods to be demonstrated.

Reference
Padilla et al. Cereb Cortex 2015; 25:1897-905

99NICU2019-7

Neocosur HIC as an early risk prediction model of severe IVH: how effective is it?

Ziad El Ghannudi

University of Southampton, UK. Centralsjukhuset Kristianstad, Sweden
zeg1n17@soton.ac.uk

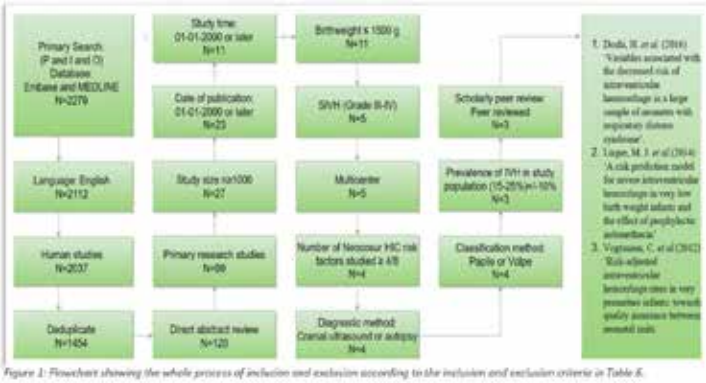
Background
Intraventricular hemorrhage (IVH) is a huge problem in the neonatal care setting accounting for a considerable part of the neonatal morbidity as it occurs in about 25% of very low birth weight infants (VLBWI). Despite a gradual decline in the incidence of most severe grades of IVH, the increased survival of very low birth weight infants has resulted in an increase in the absolute number of infants with IVH. While low gestational age and birth weight were consistent risk factors for IVH in many studies, other risk factors such as amnionitis, being outborn, vaginal delivery, male gender, intubation in the delivery room, surfactant, RDS, pneumothorax, NEC-associated perforation and HFOV were suggested to be associated with an increased incidence of severe IVH.
Neocosur HIC is a web-based SIVH early-risk calculator developed by Luque et al. (2014) and is available at https://www.neocosur.org.

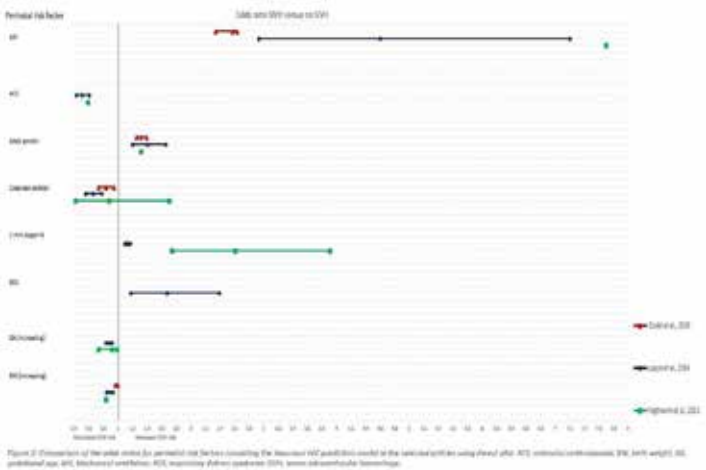
Methods
A systematic review including relevant papers to answer the following question: Is the use of Neocosur HIC model in VLBWI effective in the early identification of patients with SIVH (grade III-IV)?
The process of inclusion and exclusion of relevant papers is summarized in (Figure 1).

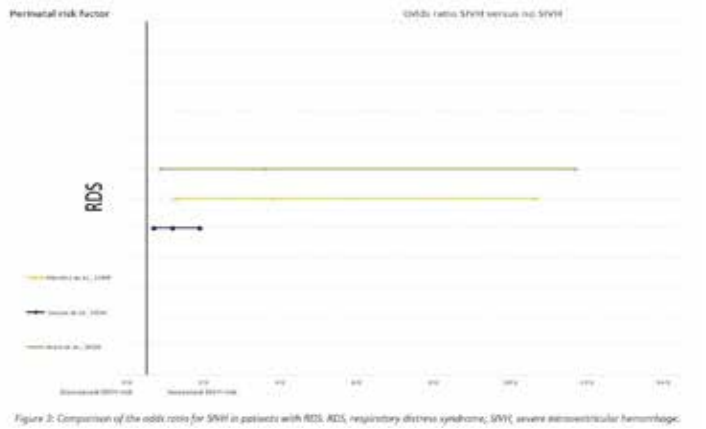
Results
Of the eight factors consisting the Neocosur HIC five factors were shown to be consistently associated with decreased SIVH risk. These are the use of antenatal corticosteroids, caesarean section, female gender, gestational age and birth weight (Figure 2). The other factors were not fully studied in all the three papers included in the review. A comparison of RDS was made with further two other papers (Figure 3).

Conclusions

This review suggests that Neocosur HIC could be useful in the prediction of cases of SIVH as early as 12 hours of age. However, further studies aiming to validate Neocosur HIC as an early SIVH prediction model in VLBWIs are needed.







99NICU2019-8

The Role of continuous Kangaroo Mother Care and intermittent Kangaroo Mother Care for Gain velocity (GWV) and IgA secretory fecal in preterm baby

Kartika Darma Handayani, Devi Emawanti, Risa Etika, Agus Harianto, Martono Tri Utomo, Dina Angelika, Mahendra TA Sampurna

Division of Neonatology, Division of Nutrition and Metabolic, Department of Child Health, Soetomo Hospital, Medical School, Airlangga University, Surabaya, Indonesia
k.d.handayani@umcg.nl

Background
Prolonged stress in the preterm baby during treatment in an incubator and separation from the mother can suppress the formation of sIgA; this can affect the defense of the immune system of the gastrointestinal mucosa and also influence the growth of the preterm baby.

Aim
Analyzed difference gain velocity and sIgA fecal in preterm baby with continuous Kangaroo Mother Care (KMC) and intermittent KMC.

Methods
Quasi experimental pretest-post test control group design study at Soetomo Hospital Surabaya. Inclusion criteria included gestational age ≤ 34 weeks and birth weight 1500-2000 g. Baby with congenital multiple anomalies, asphyxia, septicemia, gemelli, sick mother as exclusion criteria. This study looked at preterm babies who were divided into 2 groups who received continuous KMC, and another with intermittent KMC. Chi-square, Mann-Whitney and t-test independent samples were used to analyze GWV and fecal discrepancies. Wilcoxon Signed Ranks test to analyze differences in faecal sIgA levels in each group before and after treatment.

Result
The continuous KMC group had return to birth weight 9.2±SD1.25days, faster than the intermittent KMC 11.5±SD2.42days ($p = 0.042$). The sIgA level of the continuous KMC group before treatment not significant different ($p = 0.757$). The high levels of the continuous KMC group after treatment were 1432.0±43.52 mg/gram higher than the intermittent KMC 1375.5±46.98 mg/gram group($p = 0.008$). The continuous KMC group had a rise in sIgA level of 7% after treatment. The intermittent PMK group had a 3% increase in sIgA level after treatment.

Conclusions
Continuous KMC higher GWV than intermittent group. High levels of faecal levels in preterm baby with continuous KMC group were higher than in the intermittent KMC group.

99NICU2019-9

Perinatal Characteristics are Associated with Free Thyroxine Levels of Preterm Infants on Day of Life Thirty

Dinushan C. Kaluarachchi[1] MBBS, Micheal Lasarev[2] PhD, Tarah T. Colaizy, MD[3]

[1]Department of Pediatrics, University of Wisconsin-Madison, Madison, WI; [2]Department of Biostatistics and Medical Informatics, University of Wisconsin-Madison, Madison, WI; [3]Department of Pediatrics, University of Iowa, Iowa City, IA.
kaluarachchi@pediatrics.wisc.edu

Background
Hypothyroxinemia is a common form thyroid hormone dysfunction among preterm infants. Data on free thyroxine (FT4) levels beyond first two weeks of life is limited. Objective of the current study is to determine the association between perinatal characteristics and day of life 30 FT4 levels.

Methods
Retrospective analysis of serum thyroid function screening at day of life 30 in preterm infants <30 weeks gestation, admitted to Uni-

versity of Iowa NICU between 07/01/2012 to 06/30/2015. Bivariate analysis and multivariable regression was used to determine whether free thyroxine (FT4, ng/dL) at 30 days of life was associated with demographic/perinatal characteristics of the infant, maternal characteristics, or clinical status/treatment of the infant.

Results
The sample consisted of 280 infants. FT4 concentration ranged from 0.38–1.82 ng/dL (median = 1.12, IQR from 0.97–1.28 ng/dL) with one infant measuring 3.51 ng/dL. Bivariate association of demographic/perinatal infant characteristics with (log-transformed) FT4 found strong associations involving birth weight and gestational age. Five minute Apgar score and sex were also associated to a lesser degree. Once consideration was given to birth weight, gestational age, and infant gender, the association between FT4 and 5-minute Apgar score dropped away. These three variables constituted the baseline multivariable model. After adjusting for the elements in the baseline model, only maternal history of thyroid disease was associated with FT4. Further attempts to supplement the model with clinical characteristics of the infant such as IVH, treatment with hydrocortisone, dopamine failed to yield any significant improvement.

Conclusion
Multivariable regression revealed that gestational age, birth weight, gender and maternal history of thyroid disease are associated with FT4 levels on day of life 30.

99NICU2019-10

Quality Improvement during Invasive Ventilation in newborn infants -experiences from the Karolinska University Hospital

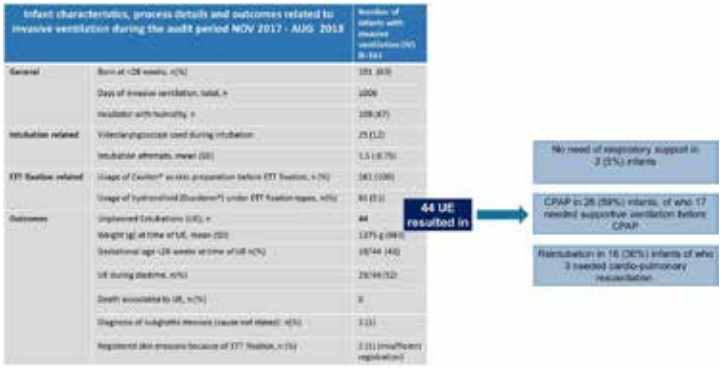
Anna Gudmundsdottir[1]; Kristina Jonsson[1], Christl Drkosch[1]; Johan Bergkvist[1]; Malin Kjellberg[1]; Marie Kristiansen[1]; Nadine Klein-Betzelos[1]; Therese Klaesson[1]; Martino Corrias[1]; Veronica Frimmel[1]; Alexandre Chakhunashvili[2]; Morten Breindahl[1], Lars Navér[1]

[1]Patient Area Sick Newborn Babies,Neonatal Department, Karolinska University Hospital, Stockholm, Sweden. [2]Strategic Health Care Development and Operations, Karolinska University Hospital, Stockholm, Sweden.
anna.gudmundsdottir@sll.se

Background
Invasive ventilation management of infants is complicated and securing patient safety is a challenge. The infant population is vulnerable, they are usually not sedated, kangaroo care is prioritized, smallest infants are cared for in incubators with high humidity and furthermore with decreasing use of invasive ventilation, intubations become more rare in the NICU. The aim was to determine quality indicators during invasive ventilation, such as unplanned extubations (UE), for guiding quality improvements in our NICU.

Methods
A multi-disciplinary Quality Improvement (QI) team worked according to the „Clinical Microsystems Quality by Design“ approach. The audit of the QI study executed from Nov 2017-Aug 2018 including: defining and registration of key indicators, analyses of baseline data, implementation of specific actions points with PDSA cycles and evaluation according to the QI method.

Results
The audit period was November 2017- August 2018. The process from intubation to extubation was defined with focus on: methods aiding intubation success, standardizing endotracheal tube (ETT) fixation and infant nursing during invasive ventilation. The overall UE rate was 4.3 per 100 patient-intubated ventilator days (compared to a baseline of 7.2 before audit) Characteristics and main results are shown in Graph 1. During this period the following PDSA cycles were tested: structured ETT nursing controls, staff



educational inputs, focus on ETT fixation during rounds and testing of new standardized ETT fixation methods. The first ETT fixation method did not increase UE rate, but re-fixation was needed daily so it was abandoned and another more successful method implemented, now with decreasing rates of UE. PDSA cycles with focus on methods aiding intubation success are needed and routines on aiding kangaroo care for infants on invasive ventilation.

Conclusions
The QI methods are effective in modifying patient safety during invasive ventilation. Adequate ETT fixation methods are lacking for newborn infants and urgent need is for innovation.

For more information and registration go to https://99nicu.org/meetup

Our Twitter account is @99nicu (https://twitter.com/99nicu). As in previous years, the hashtag will be #99nicuMeetup (https://twitter.com/hashtag/99nicumeetup)

The authors indicate that they have no disclosures

"Our Twitter account is @99nicu (https://twitter.com/99nicu). As in previous years, the hashtag is #99nicuMeetup (https://twitter.com/hashtag/99nicumeetup)"

Corresponding Author

Francesco Cardona, MD, MSc
Consultant, Medical University of Vienna
Department of Paediatrics and Adolescent Medicine
Vienna, Austria
francesco@99nicu.org

Stefan Johansson, MD, PhD
Consultant Neonatologist, Sachs' Children's Hospital
Associate Professor, Karolinska Institutet
Stockholm, Sweden
stefan.johansson@99nicu.org