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Abstracts

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ABS 1

AN EVALUATION OF DOCTORS AND MEDICAL STUDENT'S KNOWLEDGE OF PAEDIATRIC VACCINATIONS IN PAKISTAN

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INTRODUCTION
Doctors and medical students now have decreased exposure to Vaccine Preventable Diseases (VPDs) as successful vaccination programs have decreased their prevalence. This combined with the media's negative portrayal of vaccines may cause misconceptions and misinformation. The aim of this study was to explore doctors and student's knowledge of paediatric vaccinations, highlight knowledge gaps, identify training needs and make recommendations for future training.
METHODS
Vaccination knowledge of doctors from four Pakistani hospitals and medical students from one medical school was assessed by an anonymous, self-administered, cross-sectional, internet-based survey from 14 April 2015 to 14 July 2015. Questions addressed vaccine guidelines, schedules, administration, handling, contraindications and adverse events. Analysis included comparison of proportions with the use of descriptive statistics. Ethical approval was obtained from King's College, London.
RESULTS
In total, 103 doctors participated from four institutions in Karachi, Pakistan. 86/103 (83.4%) of doctors reported feeling either "very" or "somewhat" confident in their knowledge and understanding of children's vaccinations. The most correctly answered question was related to the ideal age of administration of the BCG vaccine. This was the question best answer in all 4 institutions and was answered correctly by 98/103 (95.1%) of doctors. The most poorly answered question was also the same in all 4 institutions. The question asking whether a 5 week old baby is too young to receive primary vaccinations was answered incorrect or "don't know" by 90/103 (87.4%). 29 medical students from one institution in Pakistan participated, all of whom were in their final year and all were aged less than 30 years of age. 20/29 (68.9%) reported their confidence in children's vaccines as being either "very" or "somewhat". The mean knowledge score was 3.2/10 (32%). As with Pakistan's doctors, the most correctly answered question was related to the ideal age of administration of the BCG vaccine. This was correctly answered by 29/29 (100%) students. The most poorly answered question by the students was related to whether children's vaccines can be frozen to maintain their potency and all 29 students either answered incorrectly or answered with a "don't know" response.
CONCLUSIONS
This study identifies gaps in knowledge amongst doctors and medical students in Pakistan and the findings form a platform upon which to develop educational interventions, that can be integrated into formal educational curriculum. Recommendations include developing up-to-date core competencies and Continuing Medical Education (CME) should be tailor-made to suit individual departments. Teaching methods used in various institutions should be analysed and compared to determine the most effective teaching strategies. Specific communication skills training in the role-play setting should also be promoted. Teaching methods used in various institutions should be analysed and comparisons made to determine the most effective teaching strategies.

ABS 2

AN EVALUATION OF DOCTORS AND MEDICAL STUDENT'S ATTITUDES AND BELIEFS OF PAEDIATRIC VACCINATIONS IN PAKISTAN

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INTRODUCTION
Doctors and medical students now have decreased exposure to Vaccine Preventable Diseases (VPDs) as successful vaccination programs have decreased their prevalence. This combined with the media's negative portrayal of vaccines may cause misconceptions and misinformation. The aim of this study was to explore attitudes and beliefs of

paediatric vaccinations, identify training needs and make recommendations for future training.

METHODS

Vaccination attitudes and beliefs of medical students from four Pakistani hospitals and one medical school was assessed by an anonymous, self-administered, cross-sectional, internet-based survey from 14 April 2015 to 14 July 2015. Questions related to the importance of vaccination, effects of multiple vaccines, reasons for parental refusal and perceived barriers to vaccination in both developed and developing countries. Data were analysed qualitatively for themes and sub-themes. Ethical approval was obtained from King's College, University of London.

RESULTS

In total, 103 doctors from four institutions and 29 medical students from one institution in Karachi, Pakistan participated. Overall, the majority of doctors (83/102 [81.4%]) and students (25/29 [86.2%]) agree/strongly agree that parental refusal to vaccinate their child is a form of neglect. 63/102 (61.8%) of doctors and 11/29 (37.9%) students disagree/strongly disagree that unvaccinated children should be excluded from school. 89/102 (87.3%) of doctors and 14/29 (48.3%) of students disagree/strongly disagree that multiple vaccines weaken a child's immune system. 51/52 (98%). 90/102 (88.2%) of doctors and 13/29 (44.8%) of students disagree/strongly disagree that natural immunity is better than vaccines. A proportion of Pakistan's doctors and students perceived that developed countries have no barriers to vaccination, whereas another proportion of Pakistan's participants perceived parental knowledge to be a barrier to vaccination in developed countries. In developing countries healthcare access, parental knowledge and cost were perceived to be the main barriers. The main reasons for parental refusal were expressed as being parental knowledge, fear of adverse effects and myths.

CONCLUSIONS

This study identifies attitudes of doctors and medical students in UK towards children's vaccines and the findings form a platform upon which to develop educational interventions to integrate in formal educational curriculum. Recommendations include developing up-to-date core competencies and increasing student's practical exposure in vaccination clinics. Specific communication skills training in the role-play setting should be promoted and Continuing Medical Education (CME) should be tailor-made to suit each individual department. Teaching methods used in various institutions should be analysed and comparisons made to determine the most effective teaching strategies. Differences in perceived barriers to vaccination in developed and developing countries are also highlighted and the beliefs of other healthcare professionals including nurses, midwifes and health visitors should also be assessed.

ABS 3

APPLYING DATA MINING TECHNIQUES TO PREDICT BRONCHOPULMONARY DYSPLASIA IN VERY-LOW-BIRTH-WEIGHT (VLBW) INFANTS. A POPULATION-BASED STUDY

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INTRODUCTION

Prediction of bronchopulmonary dysplasia (BPD) provides aid in resource planning, family counseling, and stimulates quality-improvement initiatives but also remains a challenge for neonatologist. The present study aims to find models with better performance in predicting BPD.

METHODS

VLBW preterm cohort data from 2001 to 2013 were used. BPD was defined by O_2 requirement at 36 weeks PMA. Exclusion criteria included 1) Transferred to/from other hospital; 2) GA < 23 weeks or > 32 weeks. Ten out of 36 perinatal and hospitalization risk factors were selected for analysis by CfsSubsetEval in Weka 3.8 (University of Waikato, NZ). The database was randomly divided into training (n = 5,240) and test sets (n = 2,620). In the training cohort, performance of these techniques was evaluated by 10-fold cross validation. The model with the best prediction was used to predict BPD on the test set.

RESULTS

A total of 7,860 infants were included in this study. The performance of each data mining method is shown in **Tab. 1**.

CONCLUSIONS

Naïve Bayes, neural network and logistic regression provide good performance in predicting BPD.

They have accuracy around 80% and ROC area: 0.85 to 0.86.

Table 1 (ABS 3). Performance of different data mining methods in predicting bronchopulmonary dysplasia (BPD) in test dataset and training dataset (in parentheses).

Methods	Accuracy (TP rate)	FP rate	Precision (PPV)	Recall (sensitivity)	F-Measure	ROC area
Logistic regression	0.785 (0.794)	0.258 (0.246)	0.785 (0.795)	0.785 (0.794)	0.782 (0.789)	0.851 (0.859)
Neural network	0.787 (0.783)	0.242 (0.255)	0.785 (0.784)	0.787 (0.783)	0.786 (0.779)	0.847 (0.85)
Decision tree	0.782 (0.781)	0.262 (0.257)	0.781 (0.781)	0.782 (0.781)	0.778 (0.777)	0.793 (0.804)
K-NN	0.687 (0.691)	0.328 (0.321)	0.691 (0.693)	0.687 (0.691)	0.688 (0.692)	0.688 (0.697)
Naïve Bayes	0.785 (0.785)	0.251 (0.248)	0.783 (0.784)	0.785 (0.785)	0.782 (0.782)	0.848 (0.85)
SVM	0.749 (0.75)	0.274 (0.268)	0.748 (0.749)	0.749 (0.75)	0.749 (0.749)	0.737 (0.741)

ABS 4

IN UTERO EXPOSURE TO PERFLUOROALKYL AND POLYFLUOROALKYL SUBSTANCES AND ATTENTION AND EXECUTIVE FUNCTION IN THE OFFSPRING

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INTRODUCTION

Perfluoroalkyl and polyfluoroalkyl substances (PFASs) are ubiquitous in the environment and accumulate in humans. PFASs are suspected to affect the neuropsychological function of children, but only few studies have investigated the association between intrauterine PFAS exposure and childhood executive function or attention difficulties.

METHODS

We included 1,593 children from the Danish National Birth Cohort, born 1996-2003. The levels of 16 PFASs were measured in maternal plasma obtained during pregnancy. At 5 years of age, the attention of the children was assessed by the Test of Everyday Attention for Children at Five (TEACh-5). Also, the executive function of the children was assessed by the Behavior Rating Inventory of Executive Function (BRIEF). After multiple imputation we examined the associations between the levels of seven PFASs and standardized BRIEF and TEACh-5 scores by multivariable linear regression adjusted for a number of potential confounders, including the maternal intelligence quotient.

RESULTS

Perfluorooctane sulfonamide (PFOSA) was associated with lower selective attention [compared to the lowest quartile standardized mean differences (95% confidence intervals) were -0.2 (-0.5, 0.0) for the second quartile, -0.4 (-0.6, -0.2) for the third quartile, and -0.5 (-0.7, -0.3) for the fourth quartile]. Other PFASs were not associated with selective attention, and no clear associations were apparent between PFAS exposure and sustained attention.

Considering the BRIEF parent ratings, perfluorooctanoate (PFOA) and four sulfonated PFASs, including perfluorooctane sulfonate (PFOS) and PFOSA, were associated with an increase in executive function difficulties; the most extreme estimate was 3.8 (95% confidence interval 1.6, 6.0) for PFOA, highest versus lowest quartile. We found no clear associations between PFAS exposures and BRIEF scores rated by day-care employees.

CONCLUSIONS

Intrauterine exposure to some PFASs was associated with executive function difficulties in a large sample of Danish children. Only PFOSA was associated with an increase in selective attention difficulties. Given the widespread nature of PFAS exposure, these findings may have public health implications and warrant further investigation.

ABS 5

MORTALITY, MORBIDITY AND SHORT-TERM RETINOPATHY OF PREMATURITY OUTCOMES IN EXTREME PRETERM NEONATES: A 5 YEAR STUDY

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INTRODUCTION

Increased survival of extreme preterm infants is leading to increased incidence of retinopathy of prematurity (ROP). Children's blindness, including ROP, is a major health morbidity for international and UK health systems. There is lack of robust data on ophthalmological outcome and its possible risk factors in neonates, born between 23 and 25 weeks gestation. The aim of the study was to gather statistical information and improve understanding of risk factors in extreme preterm babies and ophthalmological outcome. Secondary aim was to quantify incidence of mortality and prematurity related morbidities.

METHODS

23^{+0} to 25^{+6} weeks gestation neonates born from 01.01.2011 to 31.12.2015 (5 years) were identified from BADGER and hospital ophthalmology databases. The paper and electronic medical records were retrospectively reviewed to collect data on ROP incidence, gestation, birth weight (BW), sex, ethnicity, grade 3/4 IVH and PVL, PDA requiring surgery, necrotising enterocolitis (NEC), blood culture positive sepsis, postnatal steroids, chronic lung disease (CLD – oxygen at 36 weeks corrected gestation) and home oxygen. ROP outcome was divided into 3 groups: no ROP, Grade 1 or 2 and any grade needing laser prior to discharge. Chi-square using Fisher's exact test was used to analyse statistical significance of correlations between risk factors and ROP. University BSREC and NHS Trust GafREC approvals were obtained.

RESULTS

Of total 120 babies, 46 died, 34 were excluded (21 transferred, 13 incomplete records) and 40 were included. 5, 17 and 18 babies were born with mean BW 542, 651 and 785 g at 23, 24 and 25 weeks respectively. 48% were white-British, 23% Indian or Asian and 15% black-African. 80%, 47% and 33% of 23, 24 and 25 week babies had laser treatment. 28%, 18% and 0% of 23, 24 and 25 week babies had no ROP at discharge. Of 40 babies, 36 had CLD (90%), 23 home oxygen (57.5%), 7 postnatal steroids (17.5%), 4 surgical NEC (10%), 22 PDA treatment (55%), 5 PDA ligation (12.5%), 16 sepsis (40%) and 5 had IVH or PVL (12.5%). Male babies were twice more likely to have laser. No 25 week white-British babies required laser ($p = 0.004$). None of the babies with postnatal steroid use needed laser. Statistically significant correlation was seen overall ($p = 0.015$) and in 24 week group ($p = 0.03$). No other significant correlations were seen. Results are presented in **Tab. 1**.

CONCLUSIONS

ROP is associated with significant co-morbidities in extreme preterms. Male babies develop severe ROP needing laser. Postnatal steroids reduce the need for laser. Oral and inhaled steroids were used in only ventilator dependent babies to aid weaning. These babies do not seem to get more severe ROP despite longer exposure to oxygen. A larger cohort is needed to study long term visual outcomes and effects of risk factors on those outcomes.

ABS 6

ASSOCIATION BETWEEN MATERNAL BODY MASS INDEX IN EARLY PREGNANCY AND INCIDENCE OF CEREBRAL PALSY

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Table 1 (ABS 5). Retinopathy of prematurity outcomes in extreme preterm neonates.

	No ROP	ROP	Stage not recorded	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Bilateral	Laser Tx
	8	32	1	9	12	9	0	1	30	18
Percentage (n = 32)			3%	28%	37.5%	28%	0%	3%	94%	56%
Percentage (n = 40)	20%	80%	2.5%	22.5%	30%	22.5%	0%	2.5%	75%	45%

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INTRODUCTION

We have previously shown that maternal overweight and obesity are associated with increased risks of preterm delivery, asphyxia-related neonatal complications, and congenital malformations. Those perinatal complications are in turn associated with increased risks of cerebral palsy. However, it is uncertain whether the risk of cerebral palsy in offspring increases with maternal overweight and obesity severity and what could be possible mechanisms. In this project, we investigated associations between early pregnancy body mass index (BMI) and rates of cerebral palsy by gestational age, and identified potential mediators of these associations.

METHODS

This was a population-based retrospective cohort study based on national health care registers in Sweden, including 1,423,929 women with singleton children born in Sweden from 1997 through 2011. Among offspring children, 3,029 were diagnosed with cerebral palsy through 2012 (per ICD-codes), over a median of 7.8 years of follow-up (2.13 per 1,000 live births; 2.63/10,000 child-years).

Main exposure was early pregnancy BMI, recorded at the first antenatal visit. The risks of cerebral palsy were estimated as incidence rates and hazard ratios (HRs) with 95% CIs. Hazard ratios were adjusted for maternal age, country of origin, education level, cohabitation with a partner, height, smoking during pregnancy, and year of delivery.

RESULTS

The percentages of mothers in BMI categories were 2% at BMI < 18.5 (underweight), 62% at BMI 18.5-24.9 (normal weight), 25% at BMI 25-29.9 (overweight), 8% at BMI of 30-34.9 (obesity grade 1), 2% at BMI 35-39.9 (obesity grade 2), and 1% at BMI ≥ 40 (obesity grade 3). The rates of cerebral palsy in each BMI category per 10 000 child years were 2.58, 2.35, 2.92, 3.15, 4.00, and 5.19, respectively. Compared with children of normal-weight mothers, adjusted HR of cerebral palsy were 1.22 (1.11-1.33) for overweight, 1.28 (1.11-1.47) for obesity grade 1, 1.54 (1.24, 1.93) for obesity grade 2, and 2.02 (1.46-2.79) for obesity grade 3. Associations were only statistically significant for children born at full term, who comprised 71% of all children with cerebral. An estimated 45% of the association between maternal BMI and cerebral palsy in term-born children was mediated through birth asphyxia.

CONCLUSIONS

Among Swedish women with singleton children, maternal overweight and obesity were significantly associated with the rate of cerebral palsy. The association was limited to children born at full term and was partly mediated through asphyxia-related neonatal complications.

ABS 7

IMPACT OF MAJOR NEONATAL MORBIDITIES ON THE OUTCOME AT 6.5 YEARS OF CHILDREN BORN EXTREMELY PRETERM: A SWEDISH NATIONAL PROSPECTIVE STUDY (EXPRESS)

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INTRODUCTION

Concern remains on the high rates of major neonatal morbidities in extremely preterm infants (EPT) and uncertainty prevails over the extent to which these morbidities predict poor long-term outcomes in EPT infants. We evaluated the individual and combined prognostic effects of bronchopulmonary dysplasia (BPD), intraventricular hemorrhage grade 3-4 (IVH) or periventricular leukomalacia (PVL), and severe retinopathy of prematurity (ROP) in 6.5-year old EPT children born in Sweden after active perinatal care within the EXPRESS study (EXtremely PREterm infants in Sweden Study).

METHODS

In all of Sweden 707 EPT children (22 to 26 weeks' gestation) were born alive from 2004 through 2007 and 510 (72%) survived to a postmenstrual age (PMA) of 36 weeks. Of the 510 EPT children, 462 were assessed at 6.5 years; 441 survivors and all who died (n = 21) after 36 weeks PMA. The main outcome measure was poor outcome defined as death or survival to 6.5 years with one or more of severe disabilities, namely, non-ambulant cerebral palsy, severe hearing loss/deafness, blindness and severe cognitive delay with Full Scale Intelligence Quotient (Wechsler Intelligence Scale for Children, WISC-IV) of ≤ mean-3SD compared to the term born controls. Analyses performed included multivariable logistic regression.

RESULTS

Of 462 EPT children, 80 (17.3%) had poor outcome; 21 died before 6.5 years of age (13 in the first year of life and 8 between 1 and 6.5 years); 59 had one or more severe disabilities at 6.5 years. Multivariable logistic regression revealed that BPD, IVH/PVL, and severe ROP independently predicted death after 36 weeks PMA or severe disability at 6.5 years ($p < 0.005$ in all analyses). Gestational age, neonatal sepsis and necrotizing enterocolitis were not associated with poor outcome. Boys compared to girls had increased risk for poor outcome (22% vs 12%, $p = 0.007$). In children who were free of BPD, IVH/PVL, and severe ROP, the rate of poor long-term outcome was 7% (95% CI, 2%-9%). Corresponding rates with any 1, any 2, and all 3 neonatal morbidities were 10% (95% CI, 6%-16%), 32% (95% CI, 22%-39%), and 47% (95% CI, 36%-76%), respectively.

CONCLUSIONS

Extremely preterm children born at < 27 weeks of gestation who survive to a PMA of 36 weeks, BPD, severe ROP and serious brain injury independently predict death or severe disability at 6.5 years, however, clinical usefulness of these risk estimates is limited because of their relatively modest predictive accuracy. Research to prevent these commonly occurring major neonatal complications of prematurity is critical and may improve overall long-term outcomes.

ABS 8

PREVALENCE OF LONG-TERM NEURODEVELOPMENTAL IMPAIRMENT FOLLOWING EXTREMELY PRETERM BIRTH IN EUROPE: A SYSTEMATIC LITERATURE REVIEW

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INTRODUCTION

Neurodevelopmental impairment (NDI) is a major complication of extremely preterm birth (defined as birth < 28 weeks' gestational age [GA]). The long-term consequences of NDI can include cerebral palsy (CP), visual or hearing impairments, and cognitive, emotional and behavioural difficulties, which can have lifelong consequences for children, their caregivers and society. We conducted a systematic literature review to evaluate the reported long-term prevalence of NDI associated with extreme prematurity in Europe.

METHODS

Searches were conducted systematically in EMBASE and MEDLINE for English-language articles, published between January 2011 and June 2016, using search terms relevant to long-term outcomes of extreme prematurity. For the present analysis, articles were selected from the broader search results that reported the long-term prevalence of NDI among humans born at ≤ 28 weeks' GA, from European observational/real-world studies, based on pre-specified inclusion criteria. Infants born at GA 28 weeks were included in the extremely preterm population to take into account variations in reporting of GA at birth. We defined "long-term" as assessment occurring from 1 year after birth.

RESULTS

Twenty-five studies met inclusion criteria; 20 were prospective (4 retrospective, 1 did not specify), 15 were database/registry studies (6 multi-centre, 4 single-centre), sample size ranged from 17-1,673. NDI was generally assessed as CP, ≥ 1 type of sensory disability (visual or hearing impairment), or other neurological disability; Bayley Scales of Infant Development scores were the most commonly utilised to assess neurological disability. The majority of studies (17/25) reported follow-up at 2 to 2 to < 5 y and 8-11% at ≥ 5 y. Among 4 studies reporting NDI stratified by GA, there was a trend towards higher prevalence of NDI among infants with lower GA at birth.

CONCLUSIONS

The results of this study highlight that children born extremely preterm in Europe frequently experience adverse long-term neurodevelopmental outcomes. Differences in methodology and study populations may account for the wide variations in prevalence estimates. Further studies are needed to assess the contributing factors and clinical burden of NDI, and the prevalence of NDI among older children and adults born extremely preterm.

DECLARATION OF INTEREST

This study was funded by Shire Human Genetic Therapies Inc. S. Sarda and C. Siffel are employees of and hold stock/stock options in Shire PLC. G. Sarri and S. Abogunrin are employees of Evidera, who were paid consultants to Shire Human Genetic Therapies Inc. in relation to this study. The authors thank R. Bonomally, of Excel Scientific Solutions, who provided medical writing assistance funded by Shire Human Genetic Therapies Inc.

ABS 9

NEONATAL MORTALITY AND MORBIDITY IN FIVE PROVINCIAL HOSPITALS IN THE

PEOPLE'S DEMOCRATIC REPUBLIC OF LAOS AFTER IMPLEMENTATION OF A TEACHING PROGRAM FOR NEONATAL CARE

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INTRODUCTION

Aim of this study was to identify reasons and incidences of neonatal morbidity and mortality in five provincial hospitals in Laos from October 2013 to June 2016.

METHODS

This study is a follow-up study of a retrospective data analysis of the years 2010-2012, which was performed to evaluate medical care situation of neonatal patients before a three-year training program for medical staff involved in neonatal care. The survey included all neonatal patients, which have been treated between October 2013 and June 2016 in five provincial hospitals with the highest neonatal mortality rate within Laos.

RESULTS

In total 2,216 neonatal patients have been treated in the five provincial hospitals between October 2013 and June 2016. Main reasons for treatment were infections at 40%, complications of prematurity at 24%, intrapartum related complications at 18% and asphyxia at 11%. Neonatal mortality rate overall was 8.4%, main causes of death were prematurity and infections. Most of the neonatal deaths occurred during the first day of life.

CONCLUSIONS

Since 2010-2012 the relative number of infections as a main reason for treatment has decreased and incidences of prematurity and asphyxia have increased. The results may be used for an individual adaptation of the training program for each hospital.

ABS 10

INCIDENCE OF BRONCHOPULMONARY DYSPLASIA AND INTRAVENTRICULAR HAEMORRHAGE AMONG EXTREMELY PRETERM INFANTS IN EUROPE: A SYSTEMATIC LITERATURE REVIEW

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INTRODUCTION

Complications of extremely preterm birth (defined by the World Health Organisation as birth at < 28 weeks of gestational age [wGA]) are associated with significant clinical burden in the neonatal period, and adverse long-term neurodevelopmental and physical outcomes. We searched the published literature to review the evidence on the incidence of two major complications of prematurity among extremely preterm infants born in Europe, namely bronchopulmonary dysplasia (BPD) and intraventricular haemorrhage (IVH).

METHODS

We conducted a systematic literature review of English-language articles in EMBASE and MEDLINE published between May 2006 and May 2016, and reporting on the incidence of BPD or IVH grade III and IV among infants born ≤ 28 wGA, from European observational studies. When describing outcomes, not all studies adhered to the < 28 wGA cut-off, so data reported for infants born at ≤ 28 wGA were included in the 'extremely preterm' group. Articles reporting data from the same overall study population (data source) were grouped when reporting the same complication, so as not to double count data from the same population.

RESULTS

When defined as requirement of supplemental oxygen at 36 weeks' postmenstrual age (PMA), BPD incidence ranged from 11% to 73% overall (21 data sources). Informal crude mean and median incidence estimates for the 21 data sources were 34% and 28%, respectively. In population-based studies (8 data sources), BPD incidence ranged from 17% (22-28 wGA) to 73% (22-26 wGA). Incidence of IVH grades III/IV ranged from 6% to 52% overall (21 data sources), and 6-17% in population-based studies (8 data sources). Informal crude mean and median incidence estimates for the overall 21 data sources were 15% and 11%, respectively. Reported incidence of BPD and severe IVH varied widely among extremely preterm infants in Europe. Differences in GA, birth weights, diagnostics, case definitions, care procedures, and survival rates over time and across institutions likely impacted incidence estimates.

CONCLUSIONS

Despite the wide incidence ranges observed, our findings highlight that BPD and severe IVH occur frequently among extremely preterm infants in

Europe, in particular among infants with the lowest GA. These complications may be associated with sequelae beyond the neonatal period. Preventive BPD and IVH therapies may have a significant impact on the neonatal and longer-term health and quality of life of extremely preterm infants.

DECLARATION OF INTEREST

This study was funded by Shire Human Genetic Therapies Inc. C. Siffel and S. Sarda are employees of and hold stock/stock options in Shire PLC. K. Kistler and J. Lewis are employees of Evidera, who were paid consultants to Shire Human Genetic Therapies Inc. in relation to this study. The authors thank V. Boissel, PhD, of Excel Scientific Solutions, who provided medical writing assistance funded by Shire Human Genetic Therapies Inc.

ABS 11

PERINATAL INFECTIONS AND CEREBRAL PALSY: ARE PROLONGED RUPTURES OF MEMBRANES A RISK FACTOR IN CHILDREN BORN AT TERM?

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INTRODUCTION

Prolonged rupture of membranes (PROM), defined as breaking of water more than 24 hours before birth, increases the risk for perinatal infections, including severe infection with *Group B Streptococci* (GBS). Severe perinatal infections are associated with excess risk for cerebral palsy (CP). Nonetheless previous studies have not been able to document an association between PROM and CP.

METHODS

Eligible to participate in this cross-sectional cohort study were singletons without congenital malformations born at term in Norway during 1999-2009. Out of 559,634 eligible children, 589 were diagnosed with CP at age 5. In this study we have compared children born after PROM with those born less than 12 hours after rupture of membranes (reference group). Data on maternal diseases, obstetric history, birth and treatment of the newborn (such as treatment in a neonatal intensive care unit, treatment with antibiotics or ventilation) were retrieved from the Medical Birth Registry of Norway. Logistic regression was used to calculate odds ratio (OR) with 95% confidence intervals (CI) as estimates of the relative risk for CP in children born after PROM compared with the reference group.

RESULTS

In all, 30 313 children were born after PROM and of these 47 had CP (prevalence: 1.6 per 1,000 births), compared with 499 of the 494,578 children in the reference group (prevalence: 1.0 per 1,000; OR: 1.5; CI: 1.1-2.1). Adjusting for a number of potential confounders, such as maternal disease before or during pregnancy, parity, low weight for gestational age or fetal lie did not affect this association. However, children born after PROM with CP were more likely to have been treated with antibiotics in the newborn period than the reference group (OR: 7.6; CI: 4.0-14.8). When adjusting for antibiotic treatment, the association between PROM and CP disappeared (OR: 1.1; CI: 0.8-1.5). There were no differences in CP subtypes, motor function or associated problems between children with CP born after PROM and the reference group.

CONCLUSIONS

In this study PROM was an independent risk factor for CP. However, the results suggested that antibiotic treatment probably a proxy for perinatal infection was a significant mediator of this association. Although the absolute risk for CP associated with PROM was low, further studies should address if earlier intervention following rupture of membranes may prevent some cases of CP.

ABS 12

CHILDREN WITH CEREBRAL PALSY (NON-POST-NEONATAL) BORN AT TERM, NON-ADMITTED TO NEONATAL INTENSIVE CARE, FROM THE PORTUGUESE NATIONAL REGISTER

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INTRODUCTION

Even in developed countries, most children with cerebral palsy (CP) are born at term; in many of them, no perinatal major event is identified nor requires special neonatal care, and about 90% of children with CP has no post-neonatal causal event identified. The Portuguese Surveillance of Cerebral Palsy at 5 years of age is a national registry (cross-sectional study) that actively registers children at the target age 5-years-old with CP, using multiple sources. Children with CP born at term in Portugal, non-admitted to neonatal intensive care (NICU), are analysed in order to explore they risk factors and evolution.

METHODS

From 1,270 children of the 2001-2007 birth-cohort, born and living in Portugal, 427 children born at term, with data on admission to NICU and explicit non-post-neonatal CP were included. SCPE definitions and functional classifications (GMFCS, BFMF, MACS, VSC, IQ, vision and hearing) were used, as well as Portuguese scales for assessment of feeding ability, drooling control and school inclusion. CP type was determined by the predominant clinical features. MRI is classified by its predominant pattern (SCPE). Children admitted and non-admitted to NICU were compared. Non-parametric analysis was used. Rates and Odds Ratio were estimated with 95% confidence intervals.

RESULTS

Non-admission to NICU was reported in 195 of 398 children with CP born at term (49%; 95% CI 44.1-53.9). These children significantly less often were born by emergent caesarean section, had low Apgar score or early neonatal seizures; they had more often brain malformations and perinatal infections (congenital CMV); an identified peri or neonatal causal event was less frequent (91.4% vs. 23.8%). Predominant unilateral spastic CP types and MRI findings without predominant grey matter lesions were more frequent. Their functional evaluations were significantly better (grades I-II) in every score. Epilepsy was less frequent (38.1% vs. 59%; OR 0.43; 95% CI 0.284-0.643). Children non-admitted to NICU were more likely to have no indicator of severe CP (50% vs. 26.7%; OR 2.7; 95% CI 1.70-4.45). Full or partial inclusion was more frequent (78.6% vs. 59.2%; OR 2.5; 95% CI 1.42-4.55).

CONCLUSIONS

In Portugal, half of 5-years-old children with CP born at term had no significant neonatal events; a predominant grey matter injury was much less frequent and they are more likely to have no indicator of severe CP than those admitted to neonatal intensive care.

ABS 13

CHRONIC CONDITIONS AND HEALTH CARE NEEDS OF ADOLESCENTS BORN MODERATELY PRETERM AT 32-26 WEEKS' GESTATION: A SWEDISH REGIONAL POPULATION BASED CASE CONTROL STUDY

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INTRODUCTION

Children born moderately preterm constitute an epidemiologically large group of preterm children and NICU graduates, yet the extent of adverse outcomes in their school years remains underresearched. We examined chronic conditions, functional limitations, and special health care needs in 12-14 year old adolescents born moderately preterm children (MPT; 32-36 weeks' gestation) at three different hospitals in the northern region of Sweden that represent three different level-of care units and thus are representative of the centers that provide care to these infants in whole of Sweden.

METHODS

258 consecutive MPT children born between 2000 and 2003 at 3 hospitals in the northern Swedish region were compared with equal number of term-born controls matched for gender, birth hospital and birth date (± 4 weeks). Identification of children with functional limitations and special health care needs was based on a validated questionnaire/interview administered to parents. Categorization of medical diagnoses and developmental disabilities was based on child examinations including cognitive assessment (Wechsler Intelligence Scale for Children, WISC-IV), medical record reviews, and parent questionnaires. Analyses performed included multivariable logistic regression.

RESULTS

In logistic regression analyses adjusting for social risk factors and sex, the MPT children had significantly more chronic conditions than the term-born controls, including functional limitations (16.4% vs 5%; odds ratio [OR], 3.5; 95% confidence interval [CI], 1.7-7.1; p = 0.001), compensatory dependency needs (30% vs 17%; OR, 2.1; 95% CI, 1.1-2.4; p = 0.04), and services above those routinely required by children (36% vs 20%; OR, 1.8; 95% CI, 1.1-2.9; p < 0.001). Significantly more MPT adolescents than controls were receiving full time special education (5.5% vs 0.9%, OR 5.8; 95% CI, 1.3-26.4) and had school difficulties in mainstream schools (22% vs 13%, p = 0.01), respectively. Specific diagnoses and disabilities for the MPT group versus controls included, respectively, asthma (19% vs 5.8%; p = 0.004), IQ < -2 SD (9% vs 3.3%; p < 0.001) and borderline intelligence (FSIQ scores < -1 SD to > -2 SD, 22.4% vs 12%, p < 0.001).

CONCLUSIONS

MPT children have considerable long-term health and educational needs. Very few had severe impairments that curtailed major activities of life. There is a need for standard follow up of MPT infants through childhood and school years in order to identify children with special needs, thus allowing the appropriate interventions to be promptly implemented.

ABS 14

TRENDS IN MORTALITY AND MAJOR MORBIDITY OF VERY PRETERM NEONATES IN 10 NATIONAL NEONATAL DATABASES: THE INTERNATIONAL NETWORK FOR EVALUATION OF OUTCOMES (INEO) EXPERIENCE

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INTRODUCTION

Variability between countries in the case-mix adjusted health outcomes of very preterm neonates has been demonstrated. Evaluation of trends in mortality and major morbidities over time may help to identify areas for further detailed exploration of possible causes for variation within each population and foster collaboration. The aim of this study was to compare trends in adverse outcomes in very preterm neonates between two epochs from the 10 iNEO neonatal databases of Australia-New Zealand, Canada, Finland, Israel, Japan, Spain, Sweden, Switzerland, Tuscany (Italy), and UK.

METHODS

Data on neonates born at 24-31 week GA, BW < 1,500 g, without major congenital anomalies, admitted to a neonatal unit and registered in national databases were retrieved for the two epochs 2007-2010 and 2011-2014 from the iNeo database. A composite outcome comprising mortality (during neonatal unit stay) or any major morbidity (grade 3 or 4 intraventricular haemorrhage/periventricular leukomalacia, severe neurological injuries [SNI], treated retinopathy of prematurity [ROP], chronic lung disease at 36 weeks postmenstrual age [CLD]) was compared in each network between the two epochs using standardized ratios adjusted for gestation, linear and quadratic birth weight z-score, multiple birth, sex, antenatal steroids, and the interaction between birth weight z-score and multiple birth.

RESULTS

A total of 134,035 neonates (64,948 in epoch 1 and 69,087 in epoch 2) were included in the analyses. The composite outcome rate between national networks varied from 27.1-43.4% during Epoch 1 and 26.9-48.1% in Epoch 2. Event rates and standardized ratios (SR) for the composite outcome and individual components of composite outcomes in the two epochs for each network are presented (**Tab. 1**). From different baseline rates, Canada, Israel and Finland had significant improvement in the composite outcome in epoch 2 compared to epoch 1; whereas Australia-New Zealand and Japan had a significant increase in composite outcomes during epoch 2. Variations in individual outcome rates among networks and significant trend changes between epochs are also identified in **Tab. 1**.

Table 1 (ABS 14). Comparing standardized ratios (SR) between Epoch 1 and Epoch 2 for the 10 Neonatal Networks: Australia/New Zealand (ANZNN), Canada (CNN), Finland (FINMBR), Israel (INN), Japan (NRNJ), Spain (SEN1500), Sweden (SNQ), Switzerland (SwissNeoNet), Tuscany, Italy (TuscanNN) and United Kingdom Neonatal Collaborative (UKNC).

	Composite outcome		Mortality		SNI		Treated ROP		CLD	
	2007-2010	2011-2014	2007-2010	2011-2014	2007-2010	2011-2014	2007-2010	2011-2014	2007-2010	2011-2014
ANZNN										
Rate (%)	35.3	38.9	9.1	8.1	7.2	6.3	3.1	2.8	24.3	30.1
SR (99% CI)	0.94 (0.9, 0.98)	*1.01 (0.96, 1.06)*	0.92 (0.84, 1.00)	0.92 (0.83, 1.02)	0.72 (0.65, 0.79)	0.66 (0.58, 0.74)	0.5 (0.43, 0.58)	0.51 (0.42, 0.61)	1.09 (1.03, 1.15)	*1.18 (1.11, 1.24)*
CNN										
Rate (%)	41.5	33.5	10.0	8.8	11.9	10.6	4.4	3.4	25.7	19.9
SR (99% CI)	1.08 (1.04, 1.13)	**0.80 (0.77, 0.84)**	0.98 (0.9, 1.07)	0.96 (0.88, 1.04)	1.28 (1.17, 1.38)	**1.12 (1.03, 1.22)**	0.71 (0.62, 0.8)	**0.57 (0.49, 0.65)**	1.11 (1.05, 1.18)	**0.69 (0.65, 0.74)**
INN										
Rate (%)	34.1	33.0	14.7	15.1	15.1	14.1	3.5	3.0	14.3	13.7
SR (99% CI)	0.99 (0.93, 1.06)	**0.90 (0.83, 0.97)**	1.63 (1.47, 1.79)	1.77 (1.58, 1.98)	1.76 (1.59, 1.94)	1.65 (1.45, 1.86)	0.56 (0.46, 0.69)	0.52 (0.39, 0.67)	0.76 (0.68, 0.85)	**0.61 (0.53, 0.69)**
NRNJ										
Rate (%)	37.5	38.4	6.4	4.6	7.6	6.6	16.0	13.3	19.4	24.9
SR (99% CI)	0.89 (0.86, 0.93)	*0.93 (0.9, 0.97)*	0.41 (0.38, 0.45)	0.37 (0.33, 0.42)	0.55 (0.51, 0.6)	0.57 (0.51, 0.62)	3.89 (3.68, 4.11)	**3.31 (3.1, 3.53)**	0.71 (0.68, 0.75)	*0.85 (0.81, 0.89)*
SNQ										
Rate (%)	31.4	36.6	8.1	8.9	7.1	7.6	4.9	3.9	20.7	24.0
SR (99% CI)	0.81 (0.74, 0.9)	0.87 (0.79, 0.95)	0.77 (0.63, 0.93)	*0.96 (0.8, 1.13)*	0.72 (0.59, 0.88)	0.76 (0.62, 0.93)	0.75 (0.58, 0.95)	0.67 (0.51, 0.86)	0.85 (0.75, 0.96)	0.85 (0.76, 0.94)
SwissNeoNet										
Rate (%)	27.1	26.9	10.6	9.6	9.3	7.6	1.7	1.1	13.0	14.9
SR (99% CI)	0.79 (0.71, 0.88)	0.72 (0.64, 0.79)	1.22 (1.02, 1.45)	1.17 (0.98, 1.4)	1.14 (0.94, 1.37)	0.9 (0.73, 1.09)	0.29 (0.18, 0.44)	0.2 (0.11, 0.33)	0.63 (0.53, 0.74)	0.58 (0.5, 0.67)
SEN1500										
Rate (%)	38.5	40.4	17.3	14.6	15.0	16.5	4.3	5.9	15.3	17.0
SR (99% CI)	1.11 (1.06, 1.16)	1.07 (1.03, 1.12)	2.07 (1.94, 2.21)	**1.88 (1.75, 2.03)**	1.91 (1.77, 2.05)	*2.19 (2.04, 2.36)*	0.77 (0.67, 0.88)	*1.24 (1.1, 1.39)*	0.78 (0.72, 0.84)	**0.69 (0.64, 0.75)**
UKNC										
Rate (%)	43.4	48.1	10.9	10.1	7.1	8.4	3.2	4.5	34.2	39.6
SR (99% CI)	1.43 (1.38, 1.48)	1.45 (1.41, 1.49)	1.22 (1.14, 1.31)	1.16 (1.1, 1.23)	0.85 (0.77, 0.92)	*0.95 (0.89, 1.01)*	0.61 (0.53, 0.69)	*0.87 (0.8, 0.94)*	1.95 (1.87, 2.03)	1.91 (1.86, 1.97)
FinMBR										
Rate (%)	37.8	33.4	11.6	6.1	10.0	8.6	3.7	3.5	22.3	21.2
SR (99% CI)	1.02 (0.9, 1.14)	**0.86 (0.75, 0.98)**	1.2 (0.96, 1.47)	**0.71 (0.52, 0.96)**	1.16 (0.91, 1.44)	0.99 (0.76, 1.27)	0.64 (0.43, 0.92)	0.65 (0.42, 0.96)	0.98 (0.82, 1.15)	**0.76 (0.63, 0.9)**
TuscanNN										
Rate (%)	30.0	30.0	12.1	11.8	17.0	10.5	3.4	3.8	10.0	13.5
SR (99% CI)	0.96 (0.77, 1.18)	0.86 (0.7, 1.04)	1.5 (1.05, 2.07)	1.41 (1.02, 1.9)	2.13 (1.57, 2.81)	**1.21 (0.85, 1.66)**	0.71 (0.34, 1.28)	0.74 (0.4, 1.24)	0.55 (0.36, 0.8)	0.61 (0.44, 0.81)

SNI: severe neurological injuries; ROP: retinopathy of prematurity; CLD: chronic lung disease.
Bold for significantly improvement and italics for an increase in outcomes in Epoch 2 compared to Epoch 1 ($p < 0.05$).

CONCLUSIONS
Variation in outcome trends were identified between countries. These may be related to real change in outcomes or changes in clinical practices, unmeasured changes in population characteristics, differences in data definitions, completeness of recording, or changes in healthcare services and resources. These results provide a unique opportunity for exploration of areas for health systems and practice improvement.

ABS 15

DOWN'S SYNDROME: PREVALENCE AND PRENATAL DIAGNOSIS IN LATVIA

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INTRODUCTION
There is a national policy for routine prenatal ultrasound scanning and the gestational weeks at which the scans are performed and gestational age limit for termination of pregnancy. Since 2011 several changes and improvements have been made in mother and child health care field in Latvia, including prenatal diagnostics and additional medical examinations for pregnant women – 1st trimester genetic screening and necessary tests to facilitate timely diagnosing of congenital anomalies. Objective. To describe live births prevalence and prenatal diagnosis of Down's syndrome (DS) in Latvia over the last 4 years.
METHODs
Data source was Register of Patients with Particular Diseases, Patients with Congenital Anomalies and Medical Birth Register (MBR). All live newborns, who were born (2013-2016) and were diagnosed DS [ICD-10: Q90] (n = 61) and termination of pregnancy for DS following prenatal diagnosis (TOPFA) (n = 106) were included in data analysis. Live birth (LB) and TOPFA period prevalence of DS was calculated. Antenatal factors characteristics provided for those LB cases in which was available to link with MBR data.
RESULTS
Of all 167 DS cases 63.5% (n = 106) were medical abortions. 4 year LB period prevalence of DS was 7.2/10,000 (95% CI 5.5-9.2) and TOPFA 12.4/10,000 (95% CI 10.1-15.0) (per live and still births). There are no statistically significant increase or decrease prevalence trends observed over the study period. However, during the 4 year period TOPFA prevalence has increased twice. 80.3% (n = 49) data of LB with DS was linked with MBR to get more information about perinatal data. Median of mother age was 35 years (IQR 12). LB was from 2nd delivery (IQR 2) and 2nd pregnancy (IQR 3). Median gestational age was 38 GW (IQR 2) and birth weight 3,240 g (IQR 733). Of the all LB cases 55.1% (n = 27) had US screening in 1st trimester, 85.7% (n = 42) in 2nd and 55.1% (n = 27) in 3rd. 69.4% (n = 34) had 1st trimester genetic screening, 22.4% (n = 11) 2nd and 14.3% (n = 7) invasive prenatal diagnostic methods.
CONCLUSIONS
Prenatal testing has increased the TOPFA prevalence of Down syndrome. These changes are likely attributable to improvements in antenatal care and early screening policy. A small number of families choose to continue the pregnancy if antenatal pathology is detected.

ABS 16

EDUCATIONAL TRAJECTORIES OF SCHOOL OUTCOME AFTER PRETERM BIRTH

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INTRODUCTION
Although there is good research evidence of the long term cognitive outcome of preterm infants, the educational trajectories and final educational achievement of preterm infants is less researched. It is not clear if preterm infants follow similar educational trajectories to term infants. The aims of this work are to identify if early educational measures are more, or less, predictive of final attainment in preterm infants than term infants, and to explore which specific measures have more validity in this prediction.
METHODS
The analyses were undertaken using the Avon Longitudinal Study of Parents and Children (ALSPAC), which includes measures of educational achievement at Key Stages 1-4 (KS1-4). For all summary Key Stage Scores, the children were categorised into 4 quartiles. Exposure was a poor (lowest quartile) measure at KS1/2/3, with the

Table 1 (ABS 16). Different models: unadjusted, and adjusted for gestational age, measures of social economic status (SES), and gender added sequentially.

Model	Unadjusted, AUC (95% CI)	Adjusted for gestational age, AUC (95% CI)	Adjusted for gestational age and measures of SES, AUC (95% CI)	Adjusted for gestational age, measures of SES and gender, AUC (95% CI)
KS1	0.78 (0.79-0.81)	0.80 (0.80-0.81)	0.84 (0.83-0.85)	0.84 (0.83-0.86)
KS1 + KS2	0.86 (0.85-0.86)	0.86 (0.85-0.86)	0.87 (0.86-0.88)	0.88 (0.87-0.89)
KS1 + KS2 + KS3	0.87 (0.86-0.87)	0.87 (0.86-0.88)	0.88 (0.87-0.89)	0.89 (0.88-0.90)

SES: social economic status; KS: Key Stage.

primary outcome being a poor (lowest quartile) measure at KS4. The initial analysis investigated the prediction of a low KS4 score from the KS1 using ROC curves. The model then had gestational age, measures of social economic status (SES), and gender added sequentially. At each stage, the model was tested to see if gestational age modified the relationship between the KS1 measure and a low KS4 score. Analyses were repeated using KS2 and KS3 scores.

RESULTS

A total of 12,586 infants had measures of gestational age and educational outcome at 16 years (KS4). Preterm infants (gestational age less than 37 weeks) were more likely to have a lower KS1 (OR 1.70 [1.44-2.01]), KS2 (OR 1.34 [1.14-1.59]), KS3 (OR 1.28 (1.06-1.55) and KS4 (OR 1.34 [1.14-1.59]) score than term infants. There was little evidence that adding gestation age to the model improved the area under the curve (AUC) using KS1 ($p = 0.382$), KS2 ($p = 0.719$) or KS3 ($p = 0.847$) time periods, nor that it modified the predictive association with final outcome at KS4 ($p = 0.405$, $p = 0.516$, $p = 0.864$ respectively). While adding SES and gender data to the model did improve prediction (p 0.5). Results are presented in **Tab. 1**.

CONCLUSIONS

Early educational measures are correlated and help predict later measures. Preterm infants continue to have lower scores in standardised tests than term infants. However, preterm infants show similar educational trajectories to term infants, and premature status at birth does not change the predictive values of early educational measures for final measures.

ABS 17

THE CHANGING OF LATE FETAL DEATH IN LATVIA BETWEEN 2000 AND 2014

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INTRODUCTION

Stillbirth is one of the most common adverse pregnancy outcomes worldwide. European Perinatal Health Monitoring data (PERISTAT) analysis shows that the average reduction of stillbirths in 2010 compared to 2004 was about 19% (variations among countries to 38%). Late fetal death rates mostly are used for international comparisons because of large stillbirth rate variations between countries. Objective. To examine trends in late fetal death (LFD) by multiple births and maternal age in 15-year period.

METHODS

Data from Medical Birth Register (MBR) were used. Design: retrospective cohort study. LFD were defined as stillbirths occurring after 28 completed weeks of gestation and weighting at least 500 g. In total, the data on 1,459 stillbirths were analysed from 2000 to 2014. Averages (maternal age, fetal birth weight and gestational week [GW]) as shown in the median, indicating the 25th and 75th percentile. Late fetal death rates were calculated per 1,000 total births (live and stillbirths), indicating 95% confidence interval (CI).

RESULTS

There were 74% LFD from all stillbirth. The median of maternal age was 28 years (23-33), birth weight – 1,880 g (930-2,890) and GW – 33 (27-38). The overall LFD rate 4.7/1,000 (4.4-4.9) showed slight reduction ($p < 0.01$) from 5.9/1,000 (4.9-7.0) in 2000 to 3.7/1,000 (3.0-4.7) in 2014. Describing antenatal care factors which may be associated with adverse pregnancy outcomes, 30.1% ($n = 439$) where registered late for antenatal care (after 12 GW). There were no big differences in LFD rate by maternal age in the age group ≤ 19 years (4.8/1,000; 4.0-5.7) and 20-34 years (4.2/1,000; 4.0-4.5) but in the second group we observed a significant reduction ($p < 0.01$). More substantial decrease (p

< 0.001) was found in the age group ≥ 35 years, LFD rate reduction from 11.3/1,000 (7.3-16.8) to 5.4/1,000 (3.3-8.2). LFD from multiple pregnancies had no significant changes in 15 years – 11.0/1,000 (9.0-13.6).

CONCLUSIONS

The overall LFD rate showed slight statistically significant reduction (p < 0.001). There was no change in LFD by multiple pregnancies during the 15 years. Older maternal age influence pregnancy outcome, higher LFD rate was observed in age group ≥ 35 years, however, during the study period LFD has decreased twice. Further research is needed to better understand late fetal death causes.

ABS 18

CAREGIVER BURDEN ASSOCIATED WITH EXTREMELY PRETERM BIRTH

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INTRODUCTION

Extreme prematurity (birth at < 28 weeks gestational age [GA]) is associated with various short- and long-term complications, which pose a significant burden to both the child and their caregivers. The objective of this study was to gain a comprehensive understanding of the caregiver burden of extremely preterm birth in terms of the financial, emotional, and physical impacts, and effects on quality of life (QoL).

METHODS

Fifty primary caregivers of extremely preterm born children participated in the study, of whom 92% were the child's mother/step-mother and 8% were the father/step-father (all were living in the United States; mean [SD] age 32.4 [4.97] years). Caregivers were grouped according to the following cohorts based on the age of the child: < 3 months (n = 3), 3-12 months (n = 19), 13-24 months (n = 11), 2-5 years (n = 13), and 6-10 years (n = 4). Data on the burden of extreme prematurity were collected by semi-structured, concept elicitation telephone interviews. After completion of the interviews, caregivers completed a socio-demographic and clinical form and 5 questionnaires to assess health and impact on the family.

RESULTS

Caregivers reported impacts on financial burden (34%), emotional distress (28%), concerns about their future/career (28%), and their relationships/social life (18%) as a result of an extremely preterm birth. Financial impacts reported included having to quit their job (62%), increased medical costs (52%),

Table 1 (ABS 18). Summary of total scores on questionnaires by child age cohorts.

	Total sample (n = 50)	Cohort 1 (< 3 months) (n = 3)	Cohort 2 (3-12 months) (n = 19)	Cohort 3 (13-24 months) (n = 11)	Cohort 4 (2-5 years) (n = 13)	Cohort 5 (6-10 years) (n = 4)
Impact on Family Scale [a]						
Mean (SD)	50.3 (11.8)	46.3 (5.1)	55.2 (11.2)	50.4 (12.4)	46.3 (12.7)	42.3 (6.7)
Range	19.0-68.0	42.0-52.0	23.0-68.0	19.0-63.0	23.0-65.0	38.0-52.0
Level of Depression Severity, PHQ-9 Score [b]						
Mean (SD)	6.7 (5.6)	9.0 (7.5)	6.5 (5.3)	7.2 (6.3)	7.0 (6.2)	3.8 (2.2)
Range	0.0-20.0	2.0-17.0	0.0-17.0	0.0-20.0	1.0-19.0	2.0-7.0
PROMIS Scale v. 1.2 – Global Physical Health 2a[c]						
Mean (SD)	50.0 (10.0)	50.7 (3.9)	47.0 (11.1)	48.7 (10.0)	52.9 (9.0)	57.9 (6.4)
Range	26.3-66.3	46.3-52.9	26.3-66.3	32.9-66.3	39.6-66.3	52.9-66.3
PROMIS Scale v. 1.2 – Global Mental Health 2a[c]						
Mean (SD)	50.0 (10.0)	56.4 (7.9)	46.5 (9.7)	52.8 (7.8)	50.3 (12.7)	53.4 (5.0)
Range	28.8-70.2	49.5-65.0	33.9-70.2	39.1-70.2	28.8-70.2	49.5-59.8
PROMIS Scale v. 2.0 – Ability to Participate in Social Roles and Activities Short Form 8a[c]						
Mean (SD)	50.0 (10.0)	51.5 (13.1)	47.2 (11.1)	49.9 (7.8)	51.2 (10.2)	58.2 (4.4)
Range	29.9-68.5	38.6-64.8	29.9-68.5	41.1-68.5	34.8-67.2	53.5-63.5

[a] Score range: 19 to 76; higher scores indicate higher impact on the family; [b] score range: 0-4 none, 5-9 mild, 10-14 moderate, 15-19 moderately severe, 20-27 severe; [c] scores for the PROMIS Scales are presented as T-scores where 50 represents the US general population mean with standard deviation of 10; higher scores indicate better health.

and drained savings/retirement (36%). Emotional impacts included anxiety/worry (50%), fear (38%), depression (34%), guilt (30%), stress (28%), feeling overwhelmed (24%), and feeling upset/angry (22%). Physical impacts included pain/discomfort from caesarean section delivery (80%), chronic stress/fatigue (28%), and lack of sleep (10%). QoL tended to be reported more positively in the older age cohorts. Questionnaire results also tended to indicate the greatest burden among caregivers in the 3-12 month age cohort with lesser impact in higher age cohorts (**Tab. 1**).

CONCLUSIONS

Caregivers of extremely preterm infants reported numerous impacts on themselves and their families beyond the time their infant was in the hospital, including financial, emotional, physical, and psychosocial effects. Our research underscores that extremely preterm birth is a stressful and life altering event for the families. Assessment of caregiver burden should be included routinely in evaluations of the burden of extreme prematurity.

DECLARATION OF INTEREST

This study was funded by Shire Human Genetic Therapies Inc. S. Sarda and A. Mangili are employees of, and hold stock/stock options in Shire PLC. W.R. Lenderking, R. Pokrzywinski, and S. Stringer are employees of Evidera, who were paid consultants to Shire Human Genetic Therapies Inc. in relation to this study. The authors thank E. Harvey, PhD, of Excel Scientific Solutions, who provided medical writing assistance funded by Shire Human Genetic Therapies Inc.

ABS 19

HOW "BABY FRIENDLY" CAN A "BABY-FRIENDLY HOSPITAL" BE? – EXPERIENCE IN A ROMANIAN NEONATAL CLINIQUE

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INTRODUCTION

Baby-friendly Hospital Initiatives were started by WHO and UNICEF in 1991 in order to promote and sustain breastfeeding. In these hospitals newborns receive formula only on medical recommendation in very well established circumstances. Our hospital adhered to the initiative in 2007. Babies still get formula in the first days of life, mostly because mothers ask for it. The aim of the study was to assess the level of knowledge about importance of breastfeeding of mothers-to-be at admittance to the hospital and changes in attitude at discharge.

METHODS

105 randomly selected mothers with uncomplicated pregnancies and births were questioned about breastfeeding at admittance and discharge. The questionnaire included demographic data, knowledge about mother's milk and formula, nursing techniques, attitude towards breastfeeding. Data were statistically processed with Microsoft® Excel® 2010 and GraphPad Prism 7.

RESULTS

65% of the questioned mothers were 24-35 years old, 20% 35 years old, 61.3% being from urban provenance, 81.3% married, only 5% single, 51% highly educated, 15% with elementary education. 12.5% had participated to prenatal lecture, 35% had their information from the Internet and 32.5% never had been informed about breastfeeding. At admittance more than 65% agreed that supplements are needed only if there are medical reasons, after birth 67.61% asked for supplements in the first days when the baby cried more than expected. At discharge, due to the hospital policy, more than 90% of the infants were exclusively breastfed.

CONCLUSIONS

Most of the mothers intend to breastfeed, but can be easily influenced by the baby's cry or lack of encouragement from the entourage, therefore families and especially mothers should be well informed about the advantages of breastfeeding before birth. Baby friendly Initiative is a good start but not enough to support and sustain breastfeeding for a longer period of time.

ABS 20

DIFFERENTIAL SUSCEPTIBILITY EFFECTS OF MATERNAL SENSITIVITY AT AGE 6 ON SMALL FOR GESTATIONAL AGE ADULTS' ATTENTION REGULATION AND WEALTH AT AGE 26

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INTRODUCTION

Intra-uterine growth restriction (IUGR), assessed by small for gestational age (SGA) birth, is

an adaptation to adverse prenatal conditions (e.g., nutritional and maternal psycho-social stress). SGA birth has been shown to have adverse consequences on later outcomes and is considered a developmental vulnerability. However, *in-utero* protection of the brain by down regulating weight gain may not increase SGA infants' vulnerability *per se*, but potentially also result in higher individual adaptability and susceptibility to environmental experiences. The evolutionary rooted differential susceptibility theory (DST) proposes that those individuals that have been traditionally viewed as vulnerable to environmental influences in the diathesis-stress framework are in fact more susceptible to the environment, for-better-or-for-worse. The aim was to test if individuals born SGA are more susceptible to both negative and positive environmental experiences assessed by sensitive parenting in childhood compared to individuals born appropriate for gestational age (AGA). The target outcomes were attention regulation and economic success in young adulthood.

METHODS

438 participants (SGA n = 109, AGA n = 329) were studied as part of the Bavarian Longitudinal Study (BLS), a prospective, geographically defined investigation of neonatal at-risk children in South Germany. At age 6 years, maternal sensitivity was observed and rated by psychologists during a standardized mother-child interaction task. At age 26, participants' attention regulation was observed and rated by psychologists with the Tester's Rating of Adult Behavior (TRAB); wealth was assessed as a comprehensive composite score. Exploratory regression models were used to identify the main effects of SGA birth and maternal sensitivity on adult outcomes, then an interaction effect was added. Confirmatory model testing was performed by fitting data to four different re-parameterized regression models. This method systematically varies parameters in order to test how well differential susceptibility versus diathesis stress theory explain the data. All models were controlled for gestational age, duration in hospital, and socioeconomic status at birth.

RESULTS

On average, SGA adults had lower wealth scores ($t = 2.57$, $p = 0.010$) and similar attention regulation as AGA adults at 26 years. High maternal sensitivity at age 6 years predicted higher attention regulation ($\beta = 0.22$, $p = 0.019$) and higher wealth ($\beta = 0.25$, $p = 0.001$) at age 26. Confirmatory-comparative re-parameterized regression models confirmed that individuals born SGA were more susceptible to the effects of sensitive parenting. This means, if maternal sensitivity was lower than average, SGA adults did worse than AGA adults, but if sensitivity was high in childhood SGA adults were significantly better regulated ($B = 0.50$, $R^2 = 0.11$) and more successful ($B = 0.54$, $R^2 = 0.15$; see **Fig. 1**) than their AGA peers at age 26 years.

CONCLUSIONS

Individuals born SGA are more susceptible to sensitive parenting in childhood than their AGA peers. If maternal sensitivity was lower than average, SGA adults had more problems regulation their attention span and fared worse economically, but when sensitive parenting

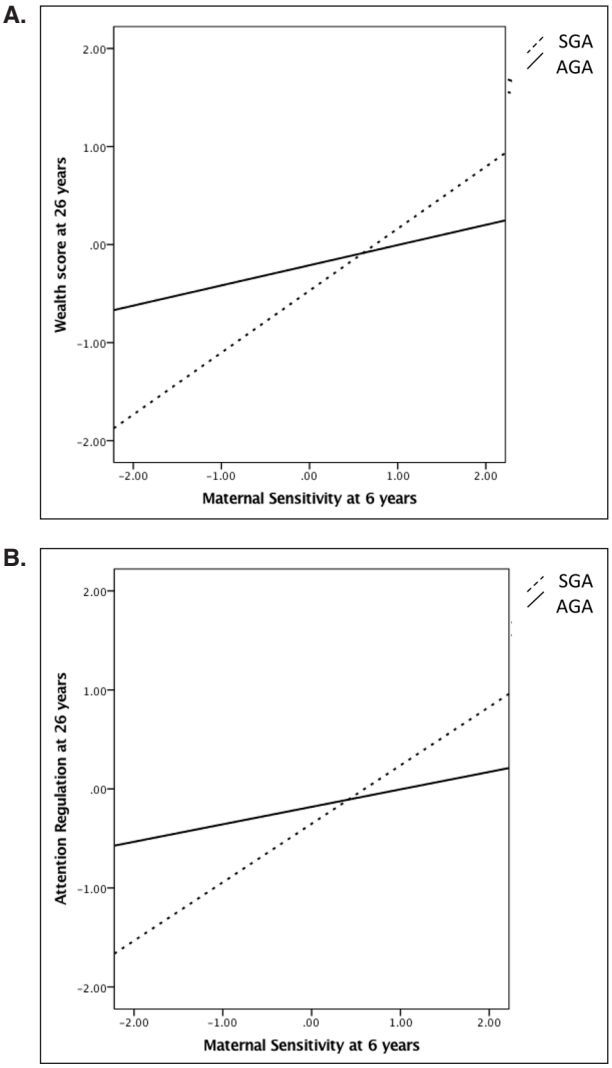

Figure 1 (ABS 20). Differential susceptibility of SGA versus AGA individuals to sensitive parenting in childhood on adult wealth (**A**) and attention regulation (**B**) (n = 438).

was above average, they did significantly better than their AGA peers in young adulthood. This confirms that intrauterine malnourishment may alter individual susceptibility to environmental experiences in a for-better-or-for-worse way. Increasing parental sensitivity is a promising avenue to improve life-course outcomes in these highly susceptible SGA individuals.

ABS 21

PRETERM CHILDREN'S SOCIAL INHIBITION BEFORE SCHOOL ENTRY PREDICTS THEIR FRIENDSHIPS IN 2ND GRADE

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INTRODUCTION

Research suggests that preterm children are at increased risk of social relationship difficulties and poor friendships. Very preterm (< 32 weeks gestation) and/or very low birth weight (< 1,500 g) adults are less involved in social activities and have more withdrawn personalities. Little is known about childhood precursors and underlying mechanisms that explain these social problems. A recent study has suggested that initial social inhibition, a trait in reacting to new people, is associated with preterm birth. The aim was to test whether social inhibition before entry into formal schooling predicts preterm children's friendships and peer relationships in 2nd grade.

METHODS

1,180 children born at 26-41 weeks gestational age were studied as part of the prospective geographically defined Bavarian Longitudinal Study (BLS). Social inhibition was assessed at age 6 years (before children entered school in Germany) using a standardized protocol, in which children's behavioral responses to initiation of social interaction by a stranger were observed. Both nonverbal and verbal response times were assessed and coded into one of three social inhibition categories (1 = disinhibited, 2 = normally responsive, 3 = inhibited). Children's friendships and peer relationships were assessed in 2nd grade (8 years) using the Friendship and Family Interview (child report) and the Mannheimer Parent Interview (parent report).

RESULTS

Children born with lower gestational age were at higher risk to show socially inhibited or disinhibited verbal ($x^2 = 20.52$, $p < 0.009$) and nonverbal ($x^2 = 34.49$, $p < 0.001$) response behavior at age 6 years. At age 8 years, children with lower gestational age had fewer friends (self-report: $\beta = 0.07$, $p = 0.026$, parent report: $\beta = 0.11$, $p < 0.001$, respectively) and spent less time with their friends (self-report: $\beta = 0.11$, $p < 0.001$, parent report: $\beta = 0.07$, $p = 0.014$, respectively) than their full term peers. Social inhibition difficulties (dummy-coded) predicted poorer friendships in both preterm and full term children, e.g., children who had shown highly inhibited verbal response behavior at age 6 reported to have fewer friends at age 8 ($\beta = -0.10$, $p = 0.001$), after controlling for child sex and family socioeconomic status at birth.

CONCLUSIONS

Children born preterm are at greater risk to be socially inhibited; this is considered a temperamental trait and may explain poor social relationship and friendship quality later in life. These findings provide new information about the childhood precursors potentially explaining life-long social relationship difficulties among preterm survivors and suggest potential new avenues to intervention.

ABS 22

THE EFFECTIVENESS OF PRENATAL ULTRASOUND DIAGNOSIS IN RECOGNITION OF MUSCULOSKELETAL MALFORMATIONS

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INTRODUCTION

The bone and limb developmental abnormalities are among the most common fetal malformations with a prevalence of about 0.1-0.3%. Our objective is to examine the effectiveness of prenatal ultrasound diagnostics in detection of musculoskeletal malformations.

METHODS

In our study, we have processed the prenatal sonographic and postnatal clinical and feto-

pathological data of 158 musculoskeletal malformations of 142 fetuses with bone and limb abnormalities over a 7-year period. The patients were divided into three groups. Group I: prenatal ultrasound examination and postnatal/fetopathological test results showed full matches. Group II: postnatally or post abortion detected musculoskeletal anomalies were only partially detected in prenatal examinations. Group III: prenatal diagnosis failed to detect the musculoskeletal malformations found in postnatal or fetopathological examinations. Musculoskeletal anomalies representing part of certain multiple disorders associated with chromosomal aberrations (multiple malformations) were studied separately.

RESULTS

Prenatal sonographic diagnosis of fetuses aborted or born with bone and limb malformations completely coincided in 69/142 patients (48.6%) of cases in postnatal/fetopathological findings. In 16/142 cases (11.3%) the detection was only partial, while in 57/142 cases no musculoskeletal malformations were diagnosed prenatally (40.1%). Exclusively musculoskeletal malformations occurred in 66 cases, in 4 of which (66.7%) the results of prenatal ultrasonography and postnatal or post abortion examinations showed complete coincidence. In 8 cases (12.1%) the prenatal detection was partial, and in 14 cases (21.2%) there was no prenatal recognition of the malformation. Musculoskeletal abnormalities were found as a part of multiplex malformations in 61 cases: in 23 cases (37.7%) there was complete coincidence between prenatal and postnatal/post abortion results, in 6 cases (9.8%) partial match, while in 32 cases (52.5%) there were no detected differences in prenatal ultrasound. In 15 fetuses the musculoskeletal malformation was associated with chromosomal abnormalities. In 4 cases there was trisomy 21 (Down syndrome), in 5 cases trisomy 18 (Edwards syndrome), and in 3 cases trisomy 13 (Patau syndrome). In 3 cases other chromosomal abnormalities were reported.

CONCLUSIONS

In more than half of the cases, postnatally/post abortion discovered musculoskeletal abnormalities coincided with the prenatally diagnosed fetal malformations. These results indicate that ultrasonography plays an important role in diagnosing musculoskeletal malformations, however, it fails to detect all of the bone and limb developmental abnormalities.

ABS 23

A SYSTEMATIC REVIEW OF INCIDENCE OF NEONATAL NECROTISING ENTEROCOLITIS IN HIGH INCOME COUNTRIES

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INTRODUCTION

Necrotising enterocolitis (NEC) is a serious gastrointestinal inflammatory disease, increasing in high income countries as the early survival of very preterm babies improves. Little is known of international variation in disease burden. We aimed to conduct a systematic review of reported national rates of NEC in high-income countries published in peer-reviewed journals.

METHODS

We used a pre-registered protocol to search MEDLINE, EMBASE and PUBMED for articles published between 1946 and 2016 3rd May. Search terms used were "Necrotising Enterocolitis" (MESH) and "Country", which included all 34 countries in the Organisation for Economic Co-operation and Development (OECD). We excluded studies which were single-centre or did not report NEC rates. Where more than one study was conducted in a country, we selected the one covering the most recent period. Two reviewers independently performed the search, selected studies, extracted data and appraised studies using a risk of bias tool.

RESULTS

Of the 1,888 references identified, 120 full manuscripts were reviewed; 33 studies met inclusion criteria; 14 studies with the most recent data from 12 countries were included in the final analysis (**Fig. 1**). The median (range) rate of NEC in babies born < 32 weeks gestation was 3% (2-7%), in studies representing 5-95% of the relevant population. There is variation in the definition used for NEC case ascertainment, with Bell's stage 2-3 the most common.

CONCLUSIONS

The reasons for international variation in NEC incidence are an important area for future research but reliable inferences require clarity in

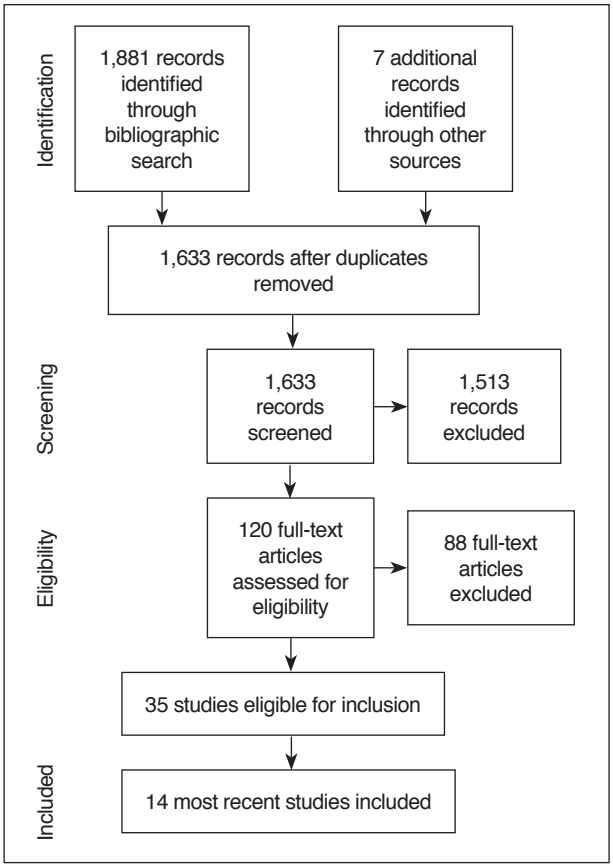

Figure 1 (ABS 23). From the identified references to the final selected studies.

defining the study population and consistency in case definition.

ABS 24

PREVALENCE OF LATE PRETERM INFANTS IN THE UNIVERSITY HOSPITAL OF THE SOUTH REGION OF BRAZIL: INCREASED NEONATAL MORBIDITY RISK COMPARED WITH TERM INFANTS

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INTRODUCTION

The incidence of premature births has been increasing in recent decades. However, the largest increase occurred in the group of late premature infants (LPI) who were born between the 34th week and the 36th week and 6th day of gestation. Studies show that this group of preterm infants presents significant morbidity rates. This study aims to estimate the number of births, prevalence of LPI, maternal-fetal characteristics and their intercurrences during hospitalization.

METHODS

This is a case-control study at the University Hospital of ULBRA/GAMP, in Canoas, Rio Grande do Sul, Brazil, from January to September 2015. Data were collected from all LPI born in the study period. Term infants born immediately after these were used as controls.

RESULTS

There were 3,443 births, 205 were LPI (6%), 54.6% remained in the rooming inn and 45.4% required hospitalization at the Neonatal Intensive Care Unit (NICU). Reasons for needing NICU: 58.1% hyperbilirubinemia, 47.3% respiratory distress syndrome (RDS), 36.6% underweight and 31.2% hypoglycemia. In NICU, 48.4% required respiratory therapy (33.3% CPAP, 7.5% mechanical ventilation and 7.5% oxygen). Feeding at the time of discharge, 60.2% in exclusive breastfeeding, 31.2% with mixed breastfeeding and 8.6% infant formula. The most prevalent comorbidity among the LPI mothers was hypertension. The LPI group had a mean gestational age of 36 weeks and a mean birth weight of 2,667 g.

CONCLUSIONS

The incidence of LPI is 6% in the studied group. When compared to the control group, LPI had a higher rate of hypoglycemia, breastfeeding problems and increased use of infant formula. The most frequent cause of hospitalization in a NICU is jaundice followed by RDS.

ABS 25

VARIATIONS IN INITIAL OXYGEN CONCENTRATION AT RESUSCITATION OF PRETERM NEONATES < 29 WEEKS GESTATION: AN INTERNATIONAL SURVEY

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INTRODUCTION

Room air has been generally well accepted to be the initial oxygen concentration in resuscitation of full term infants at birth. The optimal initial inspired oxygen for very premature infants has not well studied though pulse oximetry has been increasingly used during resuscitation to monitor oxygenation during resuscitation. This study aims to survey the variations in current practice in preterm neonates of < 29 weeks, and whether initial oxygen concentration were revised during the last 15 years and among 10 population-based national or regional neonatal networks participating in the International Network for Evaluating Outcomes in Neonates (iNeo).

METHODS

Online pre-piloted questionnaires were sent to the directors or representatives of 393 NICU's participating in Australia/New-Zealand (ANZNN n = 28), Canada (CNN n = 30), Finland (FinMBR n = 5), Illinois in the USA (ILNN n = 18), Israel (INN n = 26), Japan (NRNJ n = 204), Spain (SEN1500 n = 57), Sweden (SNQ n = 6), Switzerland (SwissNeoNet n = 15), and Tuscany, Italy (TuscanNN n = 4). Each NICU was surveyed on if there was a guideline change in the initial oxygen concentration used at resuscitation, the current and previous practice and the timing of practice change and its adherence among clinicians. The responses were compared between the networks.

RESULTS

Overall, 304 units (77%) responded. The survey response varied from 67% to 100% among participating networks. A majority of respondent NICUs changed their clinical practice guidelines at different time period up to 2015 and most did so between 2005 and 2011. There was a wider variation in the previous approach (**Fig. 1**) that 100% oxygen was used in about half of the NICUs. The variation in current approach is substantially less with few using higher than 50% oxygen as the initial concentration. Vast majority of respondent NICUs are using less than 40% oxygen. Many NICUs reported varying degree of physician dependent clinical practice in choosing starting oxygen concentration, ranging from none in Sweden and Finland to close to half in some NICUs in Israel and Japan networks.

CONCLUSIONS

Many NICUs have adopted guidelines of initial oxygen concentration between room air and 50% oxygen concentration in resuscitating very preterm infants. However, there remain considerable variations in the initial oxygen concentration among clinicians within NICUs, within networks and between countries. More research into finding the optimal initial oxygen concentration is needed for this vulnerable population of very preterm infants.

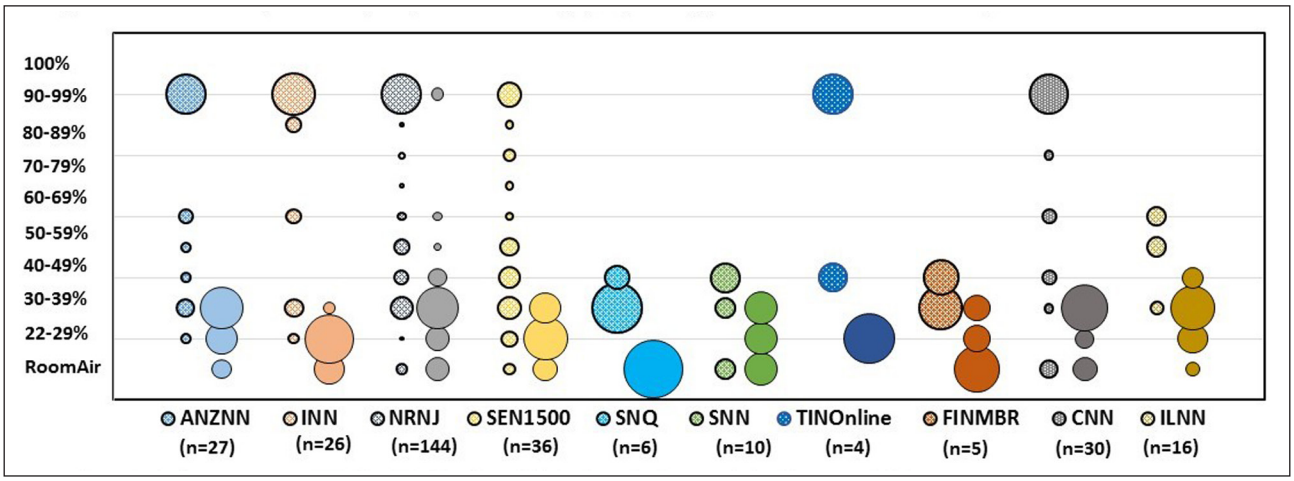

Figure 1 (ABS 25). Initial % oxygen concentration at resuscitation of very premature infants: comparison between previous (left) and current (right) % oxygen concentration used by NICUs in each network.
Size of circles corresponds to the % of units within Network: larger circle denotes a higher percentage.

ABS 26

THE INFLUENCE OF TWO DIFFERENT FAT EMULSIONS USED FOR PARENTERAL NUTRITION ON THE INCIDENCE OF SELECTED COMPLICATIONS OF PREMATURITY

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INTRODUCTION

The composition of the fat emulsion used for parenteral nutrition (PN) can affect the function of liver and other organs. Selection of the appropriate preparation can be an important factor for the treatment optimization of premature infants. The aim of the study was to determine the influence of two different fat emulsions used for PN on the incidence of selected complications of prematurity.

METHODS

395 very low birth weight (< 1,500 g) infants born < 32 weeks of gestation (GW) hospitalized in the Department of Neonatology of Poznan University of Medical Sciences were included in this retrospective study. First group (n = 195) received a fat emulsion, which consists of 30% soya oil, 30% medium chain triglyceride (MCT), 25% olive oil and 15% fish oil (SMOFlipid®). The second group (n = 200) received emulsion containing 100% soya oil (Intralipid®). The data was acquired from medical records and statistically analyzed; $p < 0.05$ was considered significant.

RESULTS

The average gestational age in both groups was 28 weeks. The average birth weight 1,077 g and 1,047 g in the first and second group respectively (ns). The percentage of deaths in the first group was 13.3%, and in the second 14.5% (ns). The sex distribution in both research groups was comparable (female and male infants: SMOFlipid® group 46.2% and 53.8%, Intralipid® group: 47% and 53% respectively, ns). The proportion of patients with conjugated hyperbilirubinemia was significantly lower in the SMOFlipid® group than in the Intralipid® group (4.1% vs. 11.5%, $p = 0.0063$). Less common incidence of sepsis (21.6% vs. 27.5%) and intraventricular hemorrhage (78.2% vs. 54%) were also noticed among the patients who received SMOFlipid®, however this was not statistically significant. No significant differences between groups were found in the rates of bronchopulmonary dysplasia (28.2% vs. 25%), retinopathy (ROP) (34.9% vs. 34.5%), ROP demanding laser treatment (48.5% vs. 47.8% patients with ROP), necrotizing enterocolitis (11.3% vs. 11%) and patent ductus arteriosus (20.5% vs. 19%).

CONCLUSION

The use of SMOFlipid® preparation was associated with significant reduction of conjugated hyperbilirubinemia. This finding is accordance with previous studies suggesting that the fish oil plays an important role in prevention and treatment of conjugated hyperbilirubinemia. The results of the study warrant further exploration of this issue.

ABS 27

RIGHT PLACE – RIGHT TIME? PLACE OF BIRTH AND TRANSFERS OF EXTREME PRETERM NEONATES WITHIN TWO ADJACENT NEONATAL OPERATIONAL DELIVERY NETWORKS

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INTRODUCTION

The EPICure 2 study publication (2014): Perinatal outcomes for extremely preterm babies in relation to place of birth in England provides compelling evidence that increased centralisation of care for babies at less than 27 weeks improves survival. The Department of Health (DoH) Toolkit for High Quality Neonatal Services (2009) includes the recommendation that babies of less than 27 weeks gestation should be delivered in a neonatal intensive care unit (NICU). The recent Bliss publication: Transfers of preterm and sick babies, stresses the impact on families of moving fragile infants in the first day of life. A dedicated neonatal transport service is integral to the delivery of high quality neonatal services to allow babies to be cared for in the right place at the right time. The West Midlands Neonatal Transfer Service (WMNTS) was established in 2006 and since 2016 has become part of KIDS&NTS serving two adjacent operational delivery networks (ODN) as a designated neonatal transfer and cot-locating service. NTS provides

24 hour cover for 4 NICUs, 5 local neonatal units (LNU) and 2 special care units (SCU). Aim: To analyse the demographics of transfers of extremely preterm infants (< 27 weeks gestation) in the first 48 hours of life in two adjacent ODNs served by a single designated transport service.

METHODS

Retrospective data analysis of WMNTS Excel® database 2011-2016, KIDS&NTS transport database and BadgerNet data.

RESULTS

In the 6-year period admissions for babies less than 27 weeks gestation has increased from 193 to 250 babies per year. The trend of babies being delivered outside of a NICU ranged between 25% to 44% over the 6 year period. 29-49 babies born less than 27 weeks are moved annually in the first 48 hours of life. The most common reason for transfer was an uplift in the level of care from LNU to NICU while there has been a decrease in the number of babies referred from SCUs. A small number of babies each year are transferred between NICUs for capacity and a similar number are moved out of network or out of region (4-10 per annum).

CONCLUSIONS

A significant proportion of extreme preterm deliveries continue to occur outside of designated NICUs in the two ODNs covered by NTS over the 6 year period. The number of *ex-utero* transfers of extremely preterm infants in the first 24 hours of life remains unchanged. There has been a reduction in transfers out of SCU over the study period. Improved knowledge of the demographics of *in-utero* transfers in the region is required in order to better understand the on-going need for the transfer of these fragile babies so early in their lives.

ABS 28

MORBIDITY, MORTALITY AND 2-YEAR OUTCOME OF BABIES BORN WITH WEIGHT ≤ 500 G OVER 11 YEARS IN A TERTIARY NEONATAL UNIT

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INTRODUCTION

Advances in obstetric and neonatal practice has increased survival at the limits of viability and in severely growth restricted infants. Clinicians have real dilemmas counselling parents and making decisions about the appropriateness of medical care in such cases. Most of the available data on babies born with birth weight (BWt) ≤ 500 g are extrapolated from studies carried out on Very or Extremely Low BWt infants which do not distinguish the outcome of this highly vulnerable cohort. So, our aim was to evaluate the morbidity, mortality and 2-year neuro-developmental outcome of babies born with BWt ≤ 500 g admitted to our tertiary neonatal unit (NICU).

METHODS

A retrospective review was carried out to identify all infants admitted to our NICU with BWt ≤ 500 g between Jan 2006-Dec 2016. Data on hospital stay for both in- and out-born babies was collected from local and national electronic and other relevant databases. 2 year Neuro-developmental outcome data were collected from the same sources for in-born cases and medical report for out-born babies from their local hospitals.

RESULTS

Results are presented in **Fig. 1**. 15 Out of 6,379 NICU admissions had Bwt ≤ 500 g; constitute 0.23% of all admissions, M/F ratio 2/3, BWt range: 410-500 g (mean 469 g). Gestational age (GA) range: 23^{+1}-29 weeks (median 25^{+4}) Mean 25^{+5}. 8/15 (53%) survived till discharge; M:F ratio of 2:6 (25 and 75% respectively). Survivors: Mean BWt and GA were 475 g and 26^{+2} weeks respectively. Non-survivors: Mean BWt and GA, 462 g and 24^{+6} weeks respectively. Cause of death or Re-direction of care: 4 had grade 3-4 IVH; 1 NEC; 1 *S. aureus* sepsis and 1 intractable hypotension. Morbidity in survivors: 2/8 (25%) had grade 1-2 IVH; 2/8 (25%) had pulmonary hypertension; 5/8 (63%) required home oxygen; 6/8 (75%) had ROP, only 1 required laser treatment. 4 had significant PDA of them 2 required medical treatment and 1 surgical ligation. Duration of stay: 90-238 days (Mean 165; 23.5 weeks; 0.45 year). 6/8 (75%) patients were eligible for review at 2 years; 3/8 (38%) demonstrated age-appropriate neuro-development (Bayleys-II) and 3 had global developmental delay.

CONCLUSIONS

- Cohort constitute far < 1% of total NICU admissions.
- Duration of stay was almost half a year.
- In our institution, just over half survived till discharge.
- Half of survivors demonstrating age-appropriate neuro-development at 2-year follow-up.
- A rarely reported cohort, but need for collating such data to help monitor outcome trends and in counselling of parents.

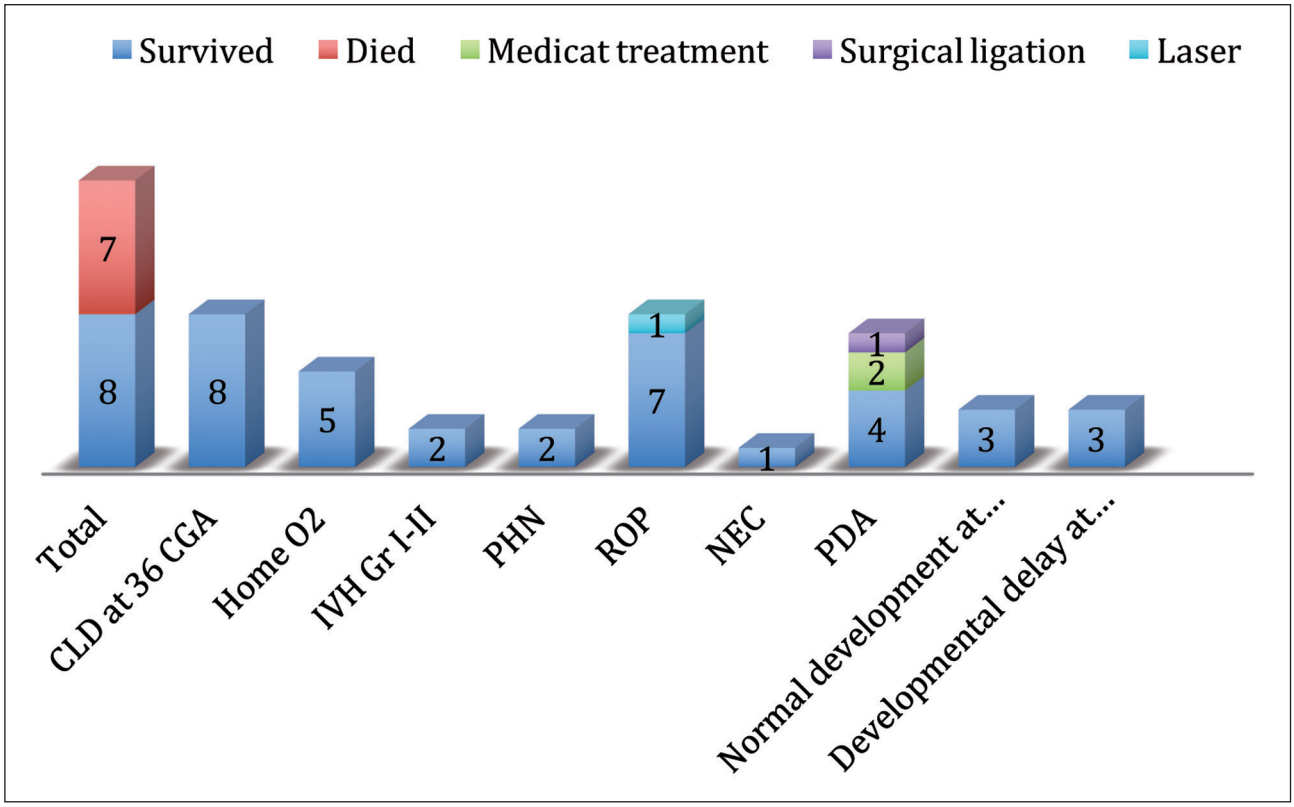

Figure 1 (ABS 28). Morbidities and mortality at discharge and outcome at 2 years.

ABS 29

PHENOTYPIC SPECTRUM OF GOLDENHAR SYNDROME: A DESCRIPTIVE STUDY

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INTRODUCTION

Goldenhar syndrome (GS) or oculo-auriculo-vertebral dysplasia is a sporadic rare condition due to a defect in the development of first and second branchial arches. It is characterized by a combination of various anomalies involving face, eyes, ears, vertebrae, heart, and lungs. Antenatal diagnosis is possible by ultrasonography. Its etiology is not fully understood. Objective: To illustrate the variety of clinical features of GS.

METHODS

A retrospective descriptive study of the patients diagnosed with GS followed in our Neonatal Resuscitation and Intensive Care Unit over the last 15 years.

RESULTS

We have identified four patients with GS during the study period; three males and one female. Antenatal diagnosis was achieved in only one case with indication of medical termination of pregnancy at 26 weeks of gestation. Three patients had various degree of hemifacial microsomia, and one patient presented a left facial paralysis. Two patients had mandibular hypoplasia. Microtia with abnormal implantation of the ears was seen in two cases and the presence of preauricular tags occurred in three cases. One patient had cleft palate. As ocular defects, epibulbar dermoid or dermoid cyst and right anophthalmia in another case were seen. Two patients had vertebral abnormalities: spina bifida aberta with myelomeningocele in the medullar MRI in one case and dystrophy of dorsal rachis without kyphosis and/or scoliosis in another case. Karyotype, cardiac and renal sonography and brain MRI of the three patients were normal. The morphology ultrasound of the one patient detected a complex cardiopathy motivating medical termination of pregnancy.

CONCLUSIONS

We illustrated the variability of phenotypic spectrum of Goldenhar syndrome that may make diagnosis difficult.

ABS 30

EPIDEMIOLOGY OF ESBL-PRODUCING MULTIDRUG-RESISTANT GRAM-NEGATIVE BACILLI IN THREE NICUS IN ITALY

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INTRODUCTION

Healthcare-related infections caused by extended-spectrum beta-lactamase (ESBL)-producing Multidrug-resistant (MDR) gram-negative bacilli (GNB) are of major concern. Neonatal intensive care units (NICUs), in particular, could be involved in severe outbreaks in terms of both morbidity and mortality and, endemic circulation of MDR GNB in NICU can be difficult to control as well. We carried out a prospective cohort multicentric surveillance study involving three different NICUs (NICU 1 in Pavia, NICU 2 in Rome and NICU 3 in Palermo) to represent the different setting and epidemiology of MDR in the north, middle and south of Italy.

METHODS

Rectal swabs from NICU patients, collected weekly between October 01, 2015 and September 30, 2016, were screened for MDR GNB using standard procedure. ESBL-producing MDR GNB were confirmed by disk diffusion and double disk synergy tests at the surveillance laboratory of the University of Palermo. ESBL MDR GNB were identified by API20E strips (Biomérieux, Marne-La Coquette, France). Infants were categorized as colonized by ESBL-producing MDR GNB when at least one swab tested positive. Statistical analysis

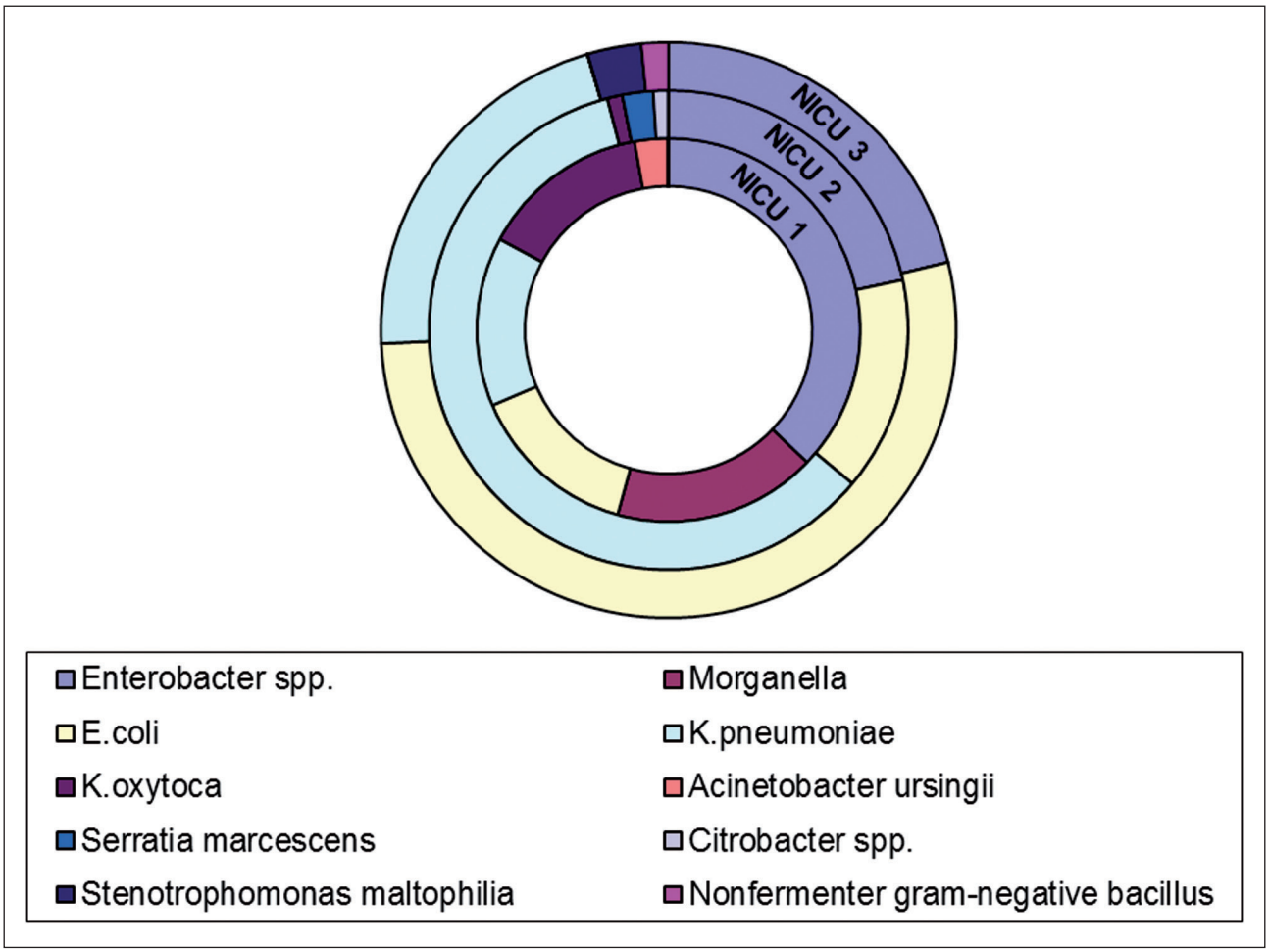

Figure 1 (ABS 30). Extended-spectrum beta-lactamase (ESBL)-producing Multidrug-resistant (MDR) gram-negative bacilli (GNB) colonizing patients in the three NICUs under study.

was performed using the Fisher's exact test. We assumed as statistically significant a p-value < 0.05.

RESULTS

In the NICU 1, 34/378 (8.99%) patients resulted colonized by ESBL-producing MDR GNB. From colonized patients, the most common bacteria isolated from colonized patients were *Enterobacter spp.* (13/34), *Morganella spp.* (6/34), *E. coli*, *K. pneumoniae* and *K. oxytoca* (5/34 each one). In the NICU 2, 70/160 (43.75%) patients resulted colonized by ESBL-producing MDR GNB. The most commonly isolated bacteria were *K. pneumoniae* (58/70), *Enterobacter spp.* (21/70) and *E. coli* (14/70). In the NICU 3, 62/212 (29.25%) patients resulted colonized by ESBL producing MDR GNB. The most commonly isolated bacteria were *E. coli* (35/62), *K. pneumoniae* (14/62) and *Enterobacter spp.* (14/62). 1/34 (2.94%), 25/70 (35.71%) and 14/62 (22.58%) of patients, respectively of each NICU, were colonized by two different ESBL-producing MDR GNB. **Fig. 1** summarizes the rates of isolation of different ESBL producing MDR GNB colonizing patients in the three NICUs under study.

CONCLUSIONS

The colonization rate by ESBL-producing MDR GNB varied between the 3 NICUs studied and their epidemiological traits were retrieved to be statistically significant ($p \leq 0.004$) due to local ecology, structural features and/or own management protocols. Merging data in network, which avoid bias, and allow delineating best healthcare practice, could contribute to assess all the MDR GNB colonization risk factors involved.

ABS 31

RETURN TO WORK TRAINING REQUIREMENTS FOR NEONATAL NURSES: A NETWORK SURVEY

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INTRODUCTION

There is lack of robust evidence for current practices and processes being used within the NHS to facilitate return to work (RTW) for all registered nurses following a prolonged absence from clinical work. Currently we did not find specific published guidance from Royal College of Nursing, UK, on RTW policy. Nursing professionals on medium or long term absence may require additional educational update and training to ensure they are fit for practice. The specific educational training needs of such neonatal nurses have not been formally identified. Our aim was to identify specific professional, clinical, technical and management training needs of neonatal nurses prior to return to work.

METHODS

A ten point questionnaire was designed to assess staff's current place of work, role, experience, duration and reasons of absence, preference for return from work including phased return, attendance at Keep in Touch (KIT) days, topics for catch up training and requirements for management and occupational health support during and after return from work. An online SurveyMonkey link was sent via email to all the neonatal nurses in the Central Newborn Network. The responses were collected over a 5 week period from 31/03/2017 to 05/05/2017.

RESULTS

There were 56 responses, 96% from level 3 neonatal unit. 27 (48%) were band 5 QIS or band 6 nurses and 11 (20%) were band 7 and above. 39% had 2-5 years and 38% had > 11 years work experience. There was near equal split of those who had sick leave (26) and maternity leave (25). 14 had sick leave for less than 3 months and 13 had maternity leave for 6 to 12 months. Only 23% wanted phased return, 29% would change contracted hours and 45% wanted to work as supernumerary in 1st two weeks. Although the uptake for the currently offered KIT days was poor (16% attendance), 68% wanted to attend dedicated Return to Practice (RTP) CPD day. Leading RTP day topics were policy changes (75%), equipment training (73%), recent advances (64%), resuscitation (64%) and simulation based training (48%). 54% wanted management support and allocated mentor but only 34% wanted occupational health support.

CONCLUSIONS

Sickness and maternity leave are main reasons for nurses' absence from work. Around 1 in 2 want management support and first 2 weeks of supernumerary work. The uptake of Keep in Touch days is very poor. The structured Return to Practice training day should include clinical and technical aspects tailored to nurses needs on current advances, resuscitation, equipment and policy changes. The RTP day with simulation based education is the preferred mode.

ABS 32

USE OF SPECIALIST SERVICES UNTIL TWO YEARS OF AGE IN THE EPICE COHORT OF VERY PRETERM BIRTHS IN EUROPE

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INTRODUCTION

Although the survival of infants born very preterm, i.e. before 32 weeks of gestation, has increased over past years, these children have a higher risk of motor and sensory impairments, behavioural difficulties and developmental delay compared to children born at term. Consequently, their use of healthcare services is also higher, as is the need for specialist services such as physiotherapy and psychologist consultations. There is currently little information about the use of specialist services by very preterm children, and the clinical and social factors associated with the use of these services.

METHODS

The data come from the Effective Perinatal Intensive Care in Europe (EPICE) cohort of very preterm births, born in 19 regions in 11 European countries in 2011/2012 (n = 6,792 discharged from neonatal care). 4,321 children who participated in the follow-up at 2 years corrected age were included in the analysis. Perinatal data were abstracted from

Table 1 (ABS 32). Use of specialist services by country, sorted by total use of services.

	N	Paediatrician	Any of the specialised services	Specialised services											
				Eye specialist or ophthalmologist	Physiotherapist or motor development therapist	Respiratory or asthma specialist	Neurologist	Hearing specialist/ ENT/ audiology/ hearing test	Developmental psychologist or psychiatrist	Dietician or nutritionist	Osteopath	Speech therapist
		%	%	%	%	%	%	%	%	%	%	%
Belgium	308	90.0	92.8	33.1	**41.0**	13.7	(0.3)	(2.3)	8.5	1.7	(2.3)	(1.6)
Denmark	180	34.3	63.7	24.0	**45.8**	7.5	3.5	(0.6)	7.5	10.3	(2.2)	(0.0)
Estonia	138	38.4a	100.0	**99.3**	96.4	16.1	70.3	83.3	42.0	3.6	(2.2)	29.7
France	986	96.1	94.6	61.9	46.3	**63.5**	2.2	(32.0)	17.6	0.2	26.9	(6.3)
Germany	435	87.4	88.9	**78.5**	63.8	2.9	8.5	(3.9)	6.0	7.9	(4.6)	(1.6)
Italy	731	86.4a	58.6	**36.8**	30.2	7.8	26.1	(5.9)	10.0	3.1	(2.2)	(1.5)
Netherlands	229	88.9	85.1	37.2	**79.0**	6.7	(0.9)	(3.1)	6.6	10.6	(1.3)	(10.0)
Poland	199	90.9	95.4	**90.8**	82.2	28.4	69.0	(6.5)	42.1	3.6	(0.0)	(10.6)
Portugal	407	84.2	80.7	**67.6**	44.5	17.7	14.6	(12.5)	18.9	9.6	(0.0)	(1.2)
Sweden	165	74.5	95.2	47.8	**54.0**	39.7	20.0b	(7.3)	4.5	27.9	(0.0)	(1.8)
UK	543	56.2	61.3	**33.6**	29.5	11.4	5.6	(4.1)	3.3	25.8	(0.0)	(6.5)
Total	4,321	81.0	80.2	53.3	48.0	23.6	15.2	14.0	13.3	7.9	7.4	4.9
N missing values-	160	-	99	166	244	259	-	174	314	-	-	

Most commonly used service in each country in bold. Free-text responses in parenthesis; no missing values.
[a] Paediatrician outside follow-up clinic; [b] question only asked in 35 cases (18,4%) in Sweden.

obstetric and neonatal records. Health service use, socioeconomic and demographic data were collected using a parent report questionnaire. Specialist definitions were standardised and pretested in all countries before data collection. Reported use of medical specialist services (any use and number of specialists) were compared across the countries by neonatal risk profile and maternal educational level and migration status.

RESULTS

There was a wide variability in the use of specialised services for very preterm infants in their first 2 years of life across the countries, with the use of any specialist varying from 58.6% in Italy to 100% in Estonia. Countries with less specialist service use did not have higher rates of paediatric consultations. The services with highest coverage included eye specialist (53.3%, range between countries: 24.0 to 99.3%) and physiotherapist/ motor development therapist (51.6%, range between countries: 29.5 to 96.4%). The proportion of children having seen any specialist and the mean number of specialists increased with level of neonatal risk, but with larger gaps between the risk groups in some countries compared to others. Differences were not found between mothers of different educational level or between migrant and non-migrant women, after adjusting for risk. Results are presented in **Tab. 1**.

CONCLUSIONS

The large differences seen in specialist service use in the 11 European countries were not explained by the risk level of the very preterm infants. Reassuringly, social factors were not associated with use of these services. The observed differences reveal the challenges of benchmarking care across countries, and provide an opportunity for future research to examine the strengths and limits of these different models of organising health care.

ABS 33

CONGENITAL HEART DEFECTS AND THE RISK OF SPONTANEOUS PRETERM BIRTH: A NATIONWIDE STUDY OF 924,422 LIVEBORN INFANTS

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INTRODUCTION

Congenital heart defects (CHDs) are the most common major birth defects, present in up to 1% of all live births. CHDs remain a leading cause of mortality and severe childhood morbidity. Within this large group of children, preterm birth is a strong predictor of both mortality and morbidity. Major CHDs are considered to be a known cause of preterm birth. However, the relationship between specific subtypes of CHD and preterm birth remains widely unexplored and poorly understood. We aimed to assess the association between all major subtypes of CHD and the risk of preterm birth in a large nationwide study.

METHODS

The study included all live born singletons in Denmark, 1997-2011. CHDs, preterm birth, and potential confounders were identified in nationwide registries. The association between subtypes of CHDs and the risk of preterm birth compared to the general population was estimated by Cox proportional hazards regression. We present hazard ratios (HRs) adjusted for potential confounders, censoring individuals born after labor induction or elective cesarean section. Potential confounders included parental origin, maternal factors including age, pre-pregnancy body mass index, smoking, parity, diabetes, and hypertension, as well as newborn factors including gender, year of birth, as well as information on extracardiac malformations, teratogenic, chromosomal, and genetic syndromes.

RESULTS

The study included 924,422 infants. CHDs were present in 5,519. Overall, CHD was associated with an increased risk of preterm birth, HR 2.0 (95% CI 1.7 to 2.4). Several subtypes of CHD were associated with a markedly higher risk of preterm birth, including pulmonary atresia, HR 6.1 (95% CI 2.6-14.8), interrupted aortic arch, HR 4.4 (95% CI 1.8-10.5), pulmonary stenosis combined with a septal defect, HR 3.6 (95% CI 2.8-4.7), isolated pulmonary stenosis, HR 3.3 (95% CI 2.4-4.3), and total anomalous venous return, HR 3.0 (95% CI 1.4-6.4). Other subtypes associated with a less pronounced increased risk of preterm birth were hypoplastic left heart syndrome, HR 2.2 (95% CI 1.0-4.6), tetralogy of Fallot, HR 2.2 (95% CI 1.4-

3.4), atrioventricular septal defect, HR 2.2 (95% CI 1.4-3.4), and coarctation of the aorta, HR 2.0 (95% CI 1.3-3.0).

CONCLUSIONS

Overall, CHDs were associated with a two fold increased risk of preterm birth compared to the general population. The right-sided obstructions were associated with a three to six fold increased risk, and the left-sided obstructions with a two to fourfold increased risk. This study may help identify fetuses with CHDs at increased risk of preterm birth, mortality, and morbidity. Further, the study may provide new insights to the mechanisms underlying preterm birth.

ABS 34

THE DOSE-EFFECT RELATIONSHIP BETWEEN GESTATIONAL AGE AND SEVERE SCHOOL DIFFICULTIES – A DANISH POPULATION-BASED REGISTER STUDY

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INTRODUCTION

Children born preterm (gestational age [GA] < 37 weeks) are at increased risk of school difficulties. Accumulating evidence also suggests that early term born children (GA 37-38 weeks) also have developmental adversities. Thus, a dose-effect relationship has been described across the full range of gestation i.e. increasing risk of school difficulties with decreasing GA. Our study aimed to investigate the association between severe school difficulties and the full range of GA. Two different measures of severe school difficulties were investigated: 1) Not passing the exam after the 10 years of compulsory school and 2) More than nine hours per week special educational support.

METHODS

A national population-based register study including all live-born infants born in Denmark in the period 1992-1997 and all children attending the Danish compulsory school in 2015. Data were collected from registers hold by Statistic Denmark. Multiple logistic regression analyses with children with GA = 40 weeks as reference were used to estimate the association between gestational age and severe school difficulties, adjusted for the effect of gender, plurality, being small for gestational age and the parents' educational level.

RESULTS

For 1) Not passing the exam the cohort consisted of 409,902 live born children and 374,924 (91.47%) children entered the analyses after excluding those who died and those with missing neonatal-data at follow-up. The risk of not passing the exam increased gradually across the entire range of gestation from 40 to 24 GA: The adjusted odds ratio (OR) was 1.07 (95% confidence interval [CI] 1.04-1.11) at 39 GA and 3.13 (95% CI 2.53-3.88) at GA < 28 weeks. For 2) special educational support, 695,439 children were registered in the special education register and 615,789 (88.55%) children entered the analyses after excluding children with missing neonatal-data. The risk of special educational support also increased across the entire range of GA: The adjusted OR was 1.07 (95% CI 1.03-1.12) at 39 GA and 6.18 (95% CI 5.17-7.39) at GA < 28 weeks. See **Fig. 1**.

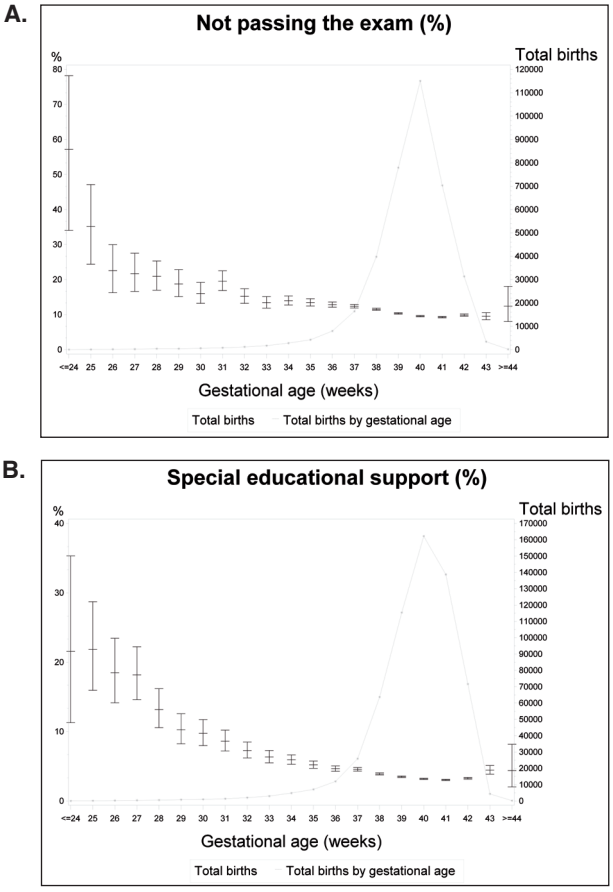

Figure 1 (ABS 34). The percentage distribution with 95% confidence interval of children who **A**) did not pass the exam after 10 years of compulsory school and **B**) received more than nine hours per week special educational support in compulsory school, by gestational age at birth.

CONCLUSIONS
We confirmed a clear dose-effect association concerning severe school difficulties across the entire range of gestational ages. At the community level, the late preterm and early term infants with severe school difficulties far outnumber the very preterm born infants.

ABS 35

RISK FACTORS ASSOCIATED WITH MORTALITY AT THE LIMIT OF VIABILITY

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INTRODUCTION
Perinatal management and outcome of preterm infants at the limit of viability is one of the most important clinical challenges of perinatal medicine. The aim of this study was to analyse potential perinatal risk factors associated with mortality in infants born at the limit of viability and admitted to NICU.
METHODS
This is a single centre (level IIIC) cohort study, over a period of 9 years (2008-2016). We included all preterm infants between $23^{0/7}$ and $25^{6/7}$ weeks gestational age (wga) born at our hospital and admitted to NICU (active management). Patients with major congenital anomalies were excluded. We collected maternal and pregnancy characteristics, perinatal interventions and some neonatal data. The association between perinatal factors and neonatal survival was studied by Cox regression analysis.
RESULTS
194 patients were born at our hospital. An active management in the neonatal unit was performed in 178/194 patients. 90/178 died before hospital discharge. In patients who did not survive, we found a higher incidence of: multiple pregnancy (45.5% vs 29.5%, p = 0.029), advanced resuscitation in the delivery room (10% vs 2.2%, p = 0.002) and Crib Index ≥ 4 (96.6% vs 81.8%, p 0.008). We also found lower prenatal steroids administration (77.7% vs 89.7%, p = 0.01), lower mean gestational age (24^{+3} vs 25^{+1}, p < 0.001), lower mean birth weight (650 g vs 750 g, p < 0.001), and lower 5 minute Apgar scores (7 vs 8, p 0.001). Independent risk factors associated with mortality were multiple pregnancy (p 0.021. HR: 1.61; 95% CI 1.08-2.43), lower gestational age (compared with 25 wga: 23 wga HR 1.78; 95% CI 1.13-2.82; 24 wga HR 1.52; 95% CI 1.08-2.24) and advanced resuscitation in the delivery room (HR 3.82; 95% IC 1.43-10.2).
CONCLUSIONS
The threshold of viability was associated with a high mortality. In this study, lower gestational age, multiple pregnancy and advanced reanimation in the delivery room were risk factors associated with mortality before hospital discharge. In our opinion, risk factors associated with mortality at the limit of viability need continuous analysis to improve perinatal management and survival.

ABS 36

TRENDS IN MORTALITY RATES AT THE LIMIT OF VIABILITY IN THE LAST DECADE

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INTRODUCTION
Available data on mortality rates of extremely low gestational age infants display a wide variation. The objective of this study was to assess changes in mortality rates at the limit of viability during the last decade.
METHODS
This is a single centre (level IIIc) cohort study, over a period of 9 years (2008-2016). We included all stillbirths and live births (including delivery room deaths) between $23^{0/7}$ and $25^{6/7}$ weeks gestational age (wga) born at our hospital. Patient with major congenital anomalies were excluded.
RESULTS
Of all preterm deliveries less than 32 wga, the percentage of infants ≤ 25 wga increased from 12.9% (17/132) in 2008 to 25.8% (24/93) in 2016. 233 patients (between $23^{0/7}$ and $25^{6/7}$ wga) were included in this study: 194 live births (83.3%), 16 intrapartum stillbirths (6.9%) and 23 antepartum stillbirths (9.9%). 106/194 patients died before hospital discharge (54.6% of live births). The percentage of antepartum and intrapartum stillbirths decreased from 29.4% and 11.8% in 2008 to 4.2% and 4.2% in 2016, respectively. The mortality in the

delivery room in live-born patients decreased from 20% (2/10) to 13.6% (3/22). Mortality rates before hospital discharge in patients admitted to NICU varied widely during this period, from 55.6% in 2008 to 61.9% in 2016. The highest percentage was observed in 2012 (72.2%) and the lowest percentage was observed in 2013 (25%).

CONCLUSIONS

Mortality rates at the limit of viability should be analyzed periodically and, in our opinion, stillbirths should be included in these reviews. We observed a decrease in ante-intrapartum stillbirths and delivery room mortality, probably due to an improvement in perinatal management and more active attitude in the delivery room. A wide variation in mortality rates before hospital discharge was observed.

ABS 37

TEMPORAL TRENDS IN PRETERM INFANT MORTALITY OVER THE LAST 15 YEARS (2001-2015), WITH PARTICULAR REFERENCE TO 23 WEEK GESTATION INFANTS. RESULTS FROM A UK SINGLE CENTRE CASE SERIES WITH COMPARISON TO THE VERMONT OXFORD NETWORK

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INTRODUCTION

Improvements in mortality occur in nearly all medical specialties without profound changes in medicines or techniques. Whilst the threshold of viability has dramatically reduced in the last 30 years it is currently unclear if such improvements are continuing to occur. The ability to detect changes in improvement of survival of severely premature infants is complex, partly due to policy decisions not to resuscitate below a specified threshold of gestation, and the rarity of live births in infants of these gestations. The aim of this work was to investigate the temporal trends in mortality over the last 15 years, with particular reference to 23 week infants.

METHODS

Using data from a regional tertiary neonatal unit in the south west of England between 2001 and 2015

Table 1 (ABS 37). Characteristics of 23 weeks infants split by survival (n = 52).

Measure	Alive (n = 36)	Dead (n = 33)	p
Demographics			
Birth weight	573 (67)	546 (74)	0.115
Multiple birth	8 (22.2%)	10 (30.3%)	0.445
Male	17 (47.2%)	18 (54.6%)	0.543
Perinatal			
Antenatal steroids	31 (86.1%)	16 (48.5%)	0.001
Antenatal magnesium sulphate	9 (81.8%)	3 (37.5%)	0.048
Chorioamnionitis	16 (57.1%)	8 (47.1%)	0.511
Maternal hypertension	1 (3.6%)	1 (5.9%)	0.715
Vaginal delivery	34 (94.4%)	29 (87.9%)	0.334
Neonatal			
Early onset neonatal sepsis	3 (8.3%)	1 (4.4%)	0.553
Apgar 1	4.1 (3.4-4.9)	2.8 (2.2-3.6)	0.051
Apgar 5	6.5 (5.8-7.2)	4.4 (3.4-5.6)	0.051
Delivery room			
Intubation	36 (100%)	25 (75.8%)	0.002
Surfactant	35 (97.2%)	22 (66.7%)	0.001
Outborn	6 (16.7%)	4 (12.2%)	0.592
Neonatal pathology			
Severe IVH	12 (33.3%)	9 (42.9%)	0.472
NEC	6 (16.7%)	4 (17.4%)	0.942
PVL	2 (5.6%)	0 (0.0%)	0.272
Length of stay			
Length of stay (days)	165 (144-190)	60 (26-139)	0.017

Numbers are n (%), arithmetic mean (SD) or geometric mean (95% CI) as appropriate.

we characterised changes in neonatal mortality in live births of infants less than 28 weeks completed gestation and compared outcomes to those recorded in the Vermont Oxford Network (VON). Primary outcomes were death prior to discharge or a composite outcome of death, severe intraventricular haemorrhage or periventricular leukomalacia. Clinical covariates of outcome were then assessed. Analyses were repeated for just those infants born at 23 weeks.

RESULTS

Between 2001 and 2015, 673 infants less than 28 weeks of gestation were cared for within 72 hours of birth at North Bristol NHS Trust. Infants at increasing gestational ages had higher Apgar scores and a higher chance of having received antenatal steroids. Babies at higher gestations had lower incidences of chorioamnionitis and lower risk of early onset sepsis. In our 23 week gestation population specifically, antenatal steroids and magnesium sulphate appear to be associated with better outcome, however there was little evidence that other factors played a significant part in mortality (**Tab. 1**). There was a 41% reduction in death prior to discharge between 23 and 28 weeks respectively. Crude mortality has fallen 30% across period of interest in our unit opposed to a more modest reduction of 12% in institutes in the VON network.

CONCLUSIONS

Despite observed temporal improvements in neonatal mortality at a large regional neonatal centre it is unclear if such improvements can be expected in neonatal units across the country. Current obstetric practice shows differing opinions in offering steroids to those mothers in threatened preterm labour at less than 23 weeks gestation, therefore some of these babies who are subsequently born at 23^{+0} or shortly after may be missing out.

ABS 38

TRENDS IN MAJOR MORBIDITY RATES AT THE LIMIT OF VIABILITY IN THE LAST DECADE

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INTRODUCTION

Infants born at the threshold of viability are at the greatest risk for a poor outcome. The objective of this study was to review trends in outcomes of some of the most common conditions affecting infants at the threshold of viability.

METHODS

This is a single centre (level IIIc) cohort study, over a period of 9 years (2008-2016). We included all preterm infants between $23^{0/7}$ and $25^{6/7}$ weeks gestational age born at our hospital and who survived to hospital discharge. Patients with major congenital anomalies were excluded. Major morbidity in survivors were defined as major cerebral injury on ultrasonography (intraventricular haemorrhage grade III-IV, periventricular leukomalacia and cerebellar injuries), chronic lung disease (CLD) stage II-III, retinopathy of prematurity (ROP) ≥ stage III or surgically treated necrotizing enterocolitis (NEC).

RESULTS

178 patients were admitted to NICU during this period. 88 patients (49.4%) survived to hospital discharge. Survival rates varied from 44.4% (4/9) in 2008 to 38.1% (8/21) in 2016. The percentage of cerebral injury decreased from 25% (1/4) in 2008 to 12.5% (1/8) in 2016. CLD decreased from 75% (3/4) to 37.5% (3/8). ROP ≥ stage III decreased from 50% (2/4) to 37.5% (3/8), and surgically treated NEC decreased from 25% (1/4) to 12.5% (1/8).

CONCLUSIONS

Outcome of preterm infants at the limit of viability should be analyzed periodically. Although outcome of extremely low gestational age infants displays a wide variation, we observed during this period, a decrease in major morbidity at hospital discharge.

ABS 39

IMPACT OF ELECTIVE CAESARIAN SECTION ON NEONATAL RETRIEVAL IN WESTERN AUSTRALIA DURING A 12 YEAR PERIOD

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INTRODUCTION

Elective caesarian section (ECS) is one which is undertaken prior to the onset of labour. ECS < 39 weeks is associated with increased incidence

of respiratory morbidity. In 2006, the Royal Australian and New Zealand College of Obstetrics and Gynaecology (RANZCOG) recommended that routine ECS should be carried out at 39 weeks gestation and above. Western Australia (WA) has the largest retrieval area in the world (2.6 million squared kilometers) with highly centralised neonatal services. Neonatal retrieval is costly and often requires the separation of the infant and mother. Our aim is to describe the impact of ECS on neonatal retrieval in WA between 2003 and 2014.

METHODS

Obstetric and neonatal clinical data, of infants delivered by ECS (without significant maternal or fetal medical indication) in WA during a period of 12 years (2003-2014), were studied retrospectively. Data were obtained from the WA Midwife notification system, the state's primary neonatal and obstetric referral centre (King Edward Memorial Hospital, Perth) and the neonatal retrieval service (NETS WA). Two time epochs; 2003-2006 (prior to RANZCOG guideline) and 2008-2014 were compared by rates of ECS, markers of neonatal respiratory morbidity and their associated interventions. Infants from 2007 were excluded, to allow full guideline implementation. Data were described by proportion, median (interquartile range) and analysed using Chi squared and Mann-Whitney test using SPSS® 24.

RESULTS

In the two epochs (2003-2006 and 2008-2014) a total of 366,638 infants were born by ESC. The total rate of ECS < 39 weeks, reduced between epochs; 13,751/41,049 vs. 25,838/90,344 (33.5% vs. 28.6%; $p < 0.01$). In total 381 infants in both epochs were retrieved for specialist care. The proportion of all retrieved infants born by ECS < 39 weeks, was reduced, 90/108 vs. 201/273 (83% vs. 74%; $p < 0.05$). The most common reason for retrieval in both time periods was surfactant deficient lung disease. This decreased between epochs 87/108 vs. 167/273 (80.6% vs. 61.1%; $p < 0.01$). The median duration (hours) and peak oxygen requirement (FiO_2) reduced in the later epoch (64.5 [30.3-100.8] vs. 33.0 [5-70.3], $p < 0.001$, and 0.47 [30-67.3] vs. 0.40 [30-56.6], $p < 0.05$). Median duration of stay in a referral centre reduced from 5 (3-7) to 4 (2-6) days between groups ($p < 0.01$).

CONCLUSIONS

In a 12 year period, a reduction in deliveries by ECS < 39 weeks, was associated with fewer infants requiring retrieval. Infants born by ECS from 2003-2007 had greater respiratory morbidity and duration of stay in a referral centre. Reduced incidence of neonatal retrieval may have a positive impact on infant-maternal separation and overall transport costs. Further ECS reduction may have positive benefits on the neonatal population in Western Australia.

ABS 40

FEMORAL PULSE EXAMINATION'S ABILITY TO PREDICT COARCTATION OF THE AORTA

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INTRODUCTION

The primary objective of the newborn examination is to identify congenital disease where timely treatment will save lives or greatly reduce long-term disability. The aim of this study was to calculate the diagnostic values of the femoral pulse as a screening test for coarctation of the Aorta in the newborn examination.

METHODS

Diagnostic population based study. The dataset included 119 011 singleton newborn babies, with a gestational age of 35 completed weeks or more, born in Stockholm County or Gotland, Sweden, between July 1, 2008 and December 31, 2012. Trisomy, stillbirths, twins and multiplets were excluded.

RESULTS

Of 119,011 infants 80 (0.067%) were found to have coarctation of the aorta. 15 (19%) of those had a positive test and 65 (81%) had a negative test in the screening test. Sensitivity and specificity were 18.8% (CI: 10.2-27.3) and 99.6% (CI: 99.6-99.7) respectively. Positive predictive value (PPV) was 3.5% and negative predictive value (NPV) was 99.9%. Crude OR was 65.6 (CI: 37.1-115.9). Adjusted crude odds OR (adjusted for gestational age, sex, birth weight, and results on respiration test and heart auscultation) was 22.3 (CI: 11.8-42.2).

CONCLUSIONS

The femoral pulse examination on the newborn babies detects only 19% of the coarctation of the aorta. Since a missed diagnosis could lead to major disability or death we need to improve the newborn examination as a screening test.

DECLARATION OF INTEREST

The author has received research scholarship from the Samaritan; the Freemasons Foundations House of Children and the Foundation of Sven Jerring in order to finance the study.

ABS 41

PREDICTING DEVELOPMENTAL OUTCOMES IN EXTREMELY LOW BIRTH WEIGHT INFANTS: A STATISTICAL LEARNING APPROACH

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INTRODUCTION

Extremely low birth weight (ELBW) infants are at increased risk of developmental delay compared to those born at the average birth weight. The ability to predict an individual infant's risk of developmental delay is potentially valuable in identifying those requiring closer monitoring and in counselling parents. Rapid changes in the practice of neonatology and intensive care, however, may render simple averages of past cohorts unreliable for generating accurate predictions of outcomes for new infants.

METHODS

We extracted data on rates of developmental delay from all studies reporting developmental outcomes at two or five years in a population of ELBW infants in the PubMed database. The extracted data was used to calculate a population average of rates of delay in ELBW infants. To account for changes in outcomes over time, a linear regression model was derived using data on rates of delay and birth year, and a neural network was trained on the data to infer more complex determinants of developmental outcome through minimisation of a mean squared error cost function. The relative ability of these models to predict outcomes for a new set of ELBW infants was evaluated using a leave-one-out cross-validation approach, and the levels of accuracy compared.

RESULTS

We identified 12 suitable papers, with a total of 1,875 subjects (1,522 at two years; 353 at five years), demonstrating a historical average of 31% and 50% developmental delay at 2 and 5 years respectively, with a trend towards decreasing rates of delay at two years as birth year increases ($r = -0.58$). The historic average approach to predict outcomes for a new dataset demonstrated high levels of error (mean error: $10.35\% \pm 6.13\%$), with non-significant improvements on application of a linear regression model (mean error: $9.45\% \pm 6.39\%$; $p = 0.626$). The use of a more sophisticated machine learning approach demonstrates significantly greater predictive ability (mean error: $3.53\% \pm 4.44\%$) than both historical average ($p = 0.025$) and linear regression ($p = 0.027$) approaches.

CONCLUSIONS

Historic population averages have limited clinical relevance in predicting developmental outcomes for new infants, largely due to changes in outcomes over time. Statistical learning approaches allow more accurate evidence-based predictions to be made, demonstrating the potential utility of more data-driven methods. Such approaches, however, are limited by the quality of available data and may need to be refined with specific clinical parameters.

ABS 42

A REGISTRY-BASED DESCRIPTIVE ANALYSIS OF END STAGE RENAL DISEASE AND RENAL REPLACEMENT THERAPY IN SWEDISH NEONATES

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INTRODUCTION

Neonatal end stage renal disease (ESRD) is a rare condition that requires renal replacement therapy (RRT) for survival. An incidence of 0.32 cases per 100,000 live births has been reported. However, these numbers are based on chronic RRT registries, and are believed to be underestimated. Neonates with ESRD often have comorbidities and therefore, most neonates do not survive long enough to initiate chronic RRT. Outcome in terms of survival in this patient group is uncertain due to varying study results. The aim of this study is to describe the incidence, outcome and geographical distribution of ESRD and RRT in neonates in Sweden during the period 2006-2016.

METHODS

Data was collected through the Swedish Neonatal Quality Register (SNQ) and the Swedish Renal Registry (SNR). Data about patients born 2006-2016 with renal failure, congenital renal malformation and/or dialysis treatment was requested from SNQ.

Additional data regarding patients who initiated RRT was requested from SNR. Patients who initiated RRT or died during the first 30 days of life and suffered from renal failure in combination with bilateral renal hypoplasia or agenesis, polycystic renal disease or pulmonary hypoplasia, were identified and assumed to have ESRD. In addition, patients, with a diagnosis of renal failure who subsequently received a renal transplant (RTx), were also assumed to have ESRD.

RESULTS

During 2006-2016, 63 neonates with ESRD were identified, corresponding to an incidence of 5.10 cases per 100,000 live births. RRT was initiated in 19/63 (30.2%), which corresponds to an incidence of 1.54 cases per 100,000 live births. Overall survival rate for neonates initiated with RRT was 11/19 (57.9%). Nine (47.4%) of the patients were subsequently transplanted. Median age at transplantation was 21.2 months (ranges 14.7-56.3 months). Results are presented in **Fig. 1**. Survival rate after transplantation was 8/9 (88.9%). Median follow-up time after transplantation was 29.7 months (ranges 3.9-69.9 months). Comparing the two largest counties in Sweden, patients from the county of X were more likely to be initiated with RRT than patients from the county of Y ($p = 0.049$).

CONCLUSIONS

A majority of patients developing ESRD within the first month of life were not treated with RRT. However, neonatal RRT was followed by a 47.4% chance of subsequently receiving a RTx. The incidence of ESRD in neonates was 16 times higher in our study than previously reported. Based on our results, RRT treatment in neonates with ESRD in Sweden is nationally unequally distributed, which may reflect differences in physician attitudes towards RRT in neonatal ESRD.

ABS 43

PAEDIATRIC HEAD TRAUMA IN THE EMERGENCY DEPARTMENT

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INTRODUCTION

One in five children will sustain a mild Traumatic Brain injury (TBI) with causes including falls (51%) and sports-related activities (25%). One in seven of these children may develop post-concussion syndrome. We aimed to describe symptomatic traumatic brain injury attending Paediatric Emergency Departments (PEDs) in a large urban centre.

METHODS

Using the departmental information and radiology systems was interrogated for the diagnoses of head

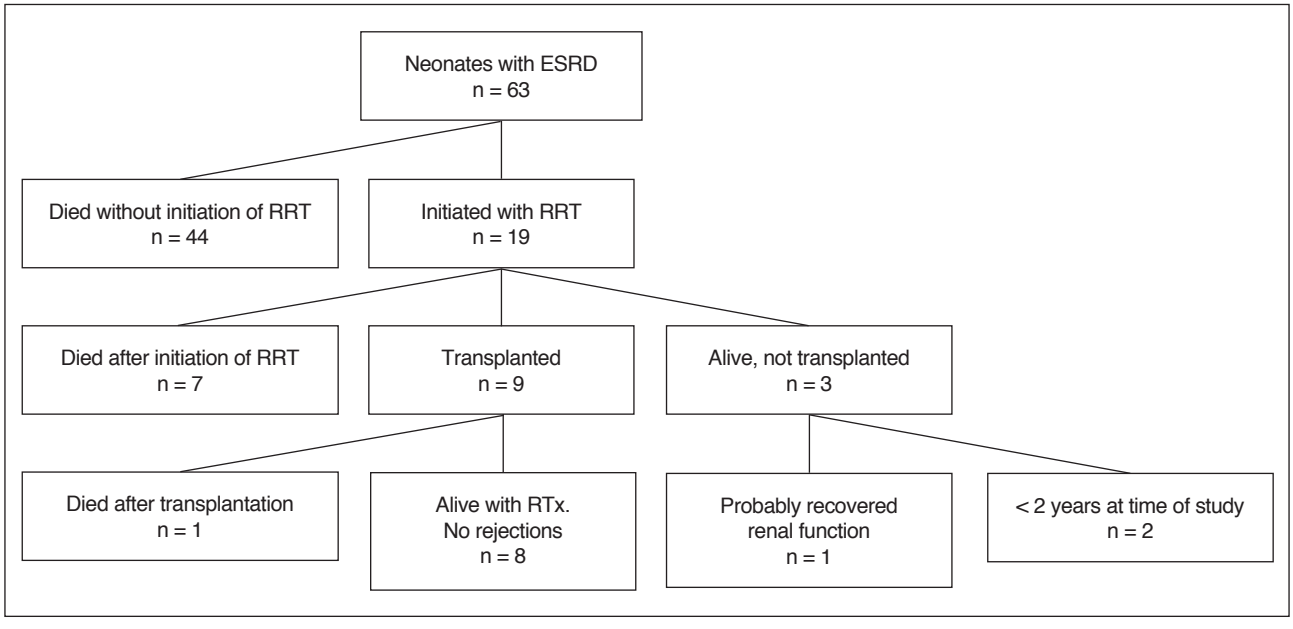

Figure 1 (ABS 42). Outcomes of patients with neonatal end stage renal disease (ESRD).
ESRD: neonatal end stage renal disease; RRT: renal replacement therapy.

injury, intracranial bleed, skull fracture and head injury re-attenders with headache. Age, gender, and mechanism of injury (at registration, triage, or CT order) were recorded. Re-attenders post head injury with headache, those admitted for observation, those requiring imaging, as well as those transferred to neurological centres were considered symptomatic of TBI compared to those discharged home.

RESULTS

Over 2 years 13,336 of 245,465 (5.5%) presentations to Dublin PED's had diagnoses of head injury, intracranial bleed, or skull fracture. The age distribution was as follows: < 1 year (12.8%); 1-5 years (48.2%); 5-12 years (27.6%); 12-16 years (14.8%). Overall 8.3% children were admitted, 1.3% were transferred and 4.4% had neuroimaging. Mechanisms of injury included: road traffic accident (2.6%); assault (1.4%), bang/fall (67.1%), recreation (14.2%), sport (11.8%), unspecified head injury, (2.6%). In the teenage population sport (47.9%), recreation (11.9%), fall/bang (24.1%), road traffic accident (3%) assault (7.2%), and unspecified head injury (3.3%).

CONCLUSIONS

10% of children with TBI were admitted or transferred and are considered symptomatic of TBI and at risk for post concussive syndrome. This is most likely an under-representation of the true incidence of TBI in children as < 10% of all concussion present to ED in the USA. Age-specific targeted interventions to reduce and mange TBI are warranted in view of the range of diagnoses in each group.

DECLARATION OF INTEREST

E. Ryan received funding from the National Children's Hospital Research Fund to Finance her PhD.