**Autumn Meeting, 10th November 2022**

Royal Society of Medicine, 1 Wimpole Street, London, W1G 0AE

*Meeting Virtual Link: To be emailed to delegates on 9 November 2022*

**Session 1**

9:00. Dr Fran Conti-Ramsden, King’s College London  
The contribution of hypertensive disorders of pregnancy to the burden of late preterm and term admissions to neonatal units in the UK

9:15. Julia Lanoue, Imperial College London  
Longitudinal analysis of neonatal admissions and outcomes of very and extremely preterm babies in England and Wales 2013 - 2021

9:30. Dr Behrouz Nezafat Maldonado, Imperial College London  
Admissions and early transfers of infants with congenital diaphragmatic hernia in England and Wales 2012-2020

9:45. Dr George Bethell, University of Southampton  
Comparison of outcomes with and without trans-anastomotic tube insertion in congenital duodenal obstruction – a systematic review and meta analysis

10:00. Tea / coffee

**Session 2**

10:30. Dr David Odd, University of Cardiff  
Ethnicity, deprivation, and infant mortality: findings from the National Child Mortality Database

10:45. Dr N. Khan, University College London  
Assessing the use of neonatal bloodstream infection guidelines in two sub-Saharan African countries using routine data collected via Neotree

11:00. Dr Jay Banerjee, Imperial College London  
Non-invasive continuous measurement of cardiac output in neonatal intensive care using regional impedance cardiography

11:15. Tea / coffee

**Session 3**

11:45. **Keynote Lecture**  
Professor Sarah Stock, University of Edinburgh  
Antenatal steroids – the good, the bad and the unknown
12:30. **Annual General Meeting** (Open to members of the Neonatal Society)
*In-person at the Royal Society of Medicine and via a virtual breakout session*

13:30. **Lunch break**

**Session 4**

14:30. Andre Chew, King’s College London  
Executive functions in preschool children with congenital heart disease and controls

14:45. Julia Gundersen, University of Oslo  
Restraint stress during neonatal hypoxia-ischemia alters brain injury following normothermia and hypothermia

15:00. Dr Gemma Sullivan, University of Edinburgh  
Sex differences in human iPSC-derived microglia

15:15. **Afternoon Tea / Coffee**

**Session 5**

15:45. Haoxuan Zhang, University College London  
Complexity of broadband near infrared spectroscopy signals in term newborn infants relates to outcome following neonatal encephalopathy

16:00. Yesenia Santana, Barts and the London School of Medicine and Dentistry  
The feasibility and value of using video with the cerebral function monitor for seizure detection in newborns on the neonatal unit

16:15. Dr Fahad Arattu Thodika, King’s College London  
Respiratory function monitoring during early resuscitation and prediction of outcomes in prematurely born infants

**Session 6**

16:40. **Prizes for best presentations**

16:45. **Widdowson Lecture**  
Professor Marianne Thoresen, University of Bristol and University of Oslo  
Therapeutic hypothermia: what we know and what we need to know

17:45. Close of meeting
THE CONTRIBUTION OF HYPERTENSIVE DISORDERS OF PREGNANCY TO THE BURDEN OF LATE PRETERM AND TERM ADMISSIONS TO NEONATAL UNITS IN THE UK

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

E Conti-Ramsden¹, J Fleminger¹, LC Chappell³, C Battersby²* and the UK Neonatal Collaborative.
*Neonatal Society Member

Corresponding author e-mail address: Franconti-ramsden@kcl.ac.uk

Institution(s)

¹ Department of Women and Children’s Health, King’s College London.
² Neonatal Medicine, School of Public Health, Faculty of Medicine, Imperial College London.

Introduction (include hypothesis)

Infants born to mothers with hypertensive disorders of pregnancy (HDP) are at an increased risk of morbidity and mortality due to complications from the disease and it’s management. These include stillbirth, preterm birth, fetal growth restriction and hypoglycaemia secondary to low birthweight and/or maternal anti-hypertensive medication. This increases the risk of neonatal unit admission for infants born late preterm or term who otherwise would not have been separated from their mothers. The population burden of HDP on neonatal units in the UK has not been quantified. We aimed to define the burden of maternal HDP in late preterm and term infants admitted to neonatal units in England and Wales, identify primary reasons for admission and assess opportunities to avoid admission in this cohort.

Methods (include source of funding and ethical approval if required)

This was a retrospective observational study using deidentified, routinely recorded neonatal electronic health record data from the National Neonatal Research Database (NNRD). Infants born at a gestational age of 34 weeks or more between 1 January 2012 and 31st December 2020 admitted to an NHS neonatal unit in England or Wales for their first episode of neonatal care were eligible for inclusion in this study. This study has been approved by the National Research Ethics Service (study specific ref: 21/ES/0081, NNRD ref 10/H0803/151). The project was funded by an Isaac Schapera Trust grant.

Results

Overall 30,944/420,866 (7.4%) of admitted infants born at ≥ 34 weeks’ gestation meeting inclusion criteria were exposed to a maternal HDP (HDP group), with the highest prevalence in late preterm (34+0 – 36+6 weeks, 16,059/136,220 (11.8%)) versus term infants (≥37 weeks, 14,885/284,646 (5.2%)). The most common primary reasons for admission in the HDP group were respiratory disease (28.3%), prematurity (22.7%) and hypoglycaemia (16.4%) (Figure 1). Infants in the HDP group had over twice the odds of admission with hypoglycaemia compared to infants in the non HDP group (OR 2.1, 95% CI 2.0-2.2). The proportion of all primary hypoglycaemia admissions associated with a maternal HDP has increased from 11.9% in 2012 to 15.3% in 2020. Few primary respiratory admissions in the HDP group were assessed to be avoidable (74.9% of infants received mechanical or non-invasive ventilation). Similarly, the majority of infants in the HDP group admitted with primary hypoglycaemia received IV dextrose (67.9%).

Conclusions

Over 1 in 10 late preterm and 1 in 20 term infants admitted to neonatal units in England and Wales are associated with a maternal HDP. Preterm birth, respiratory morbidity and hypoglycaemia are the primary drivers for HDP infant admission. Further research is required to assess whether modifiable factors such as antenatal antihypertensive agent selection could avoid admissions in this cohort.

References (include acknowledgement here if appropriate)

This work was supported by the Medical Research Council [grant number MR/V006835/1].

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously.
Supporting Figures:

**Figure 1.** Barplot of proportion of infant admissions to a neonatal unit with primary diagnosis of prematurity, respiratory disease, hypoglycaemia, infection and growth restriction by gestational age (Late preterm (34<sup>00</sup> to 36<sup>06</sup>) by gestational week, early term (37<sup>00</sup> to 38<sup>06</sup>), term (39<sup>00</sup> to 41<sup>06</sup>) and post-term (42<sup>00</sup> onwards)) stratified by exposure to maternal hypertensive disorder of pregnancy (HDP).
LONGITUDINAL ANALYSIS OF NEONATAL ADMISSIONS AND OUTCOMES OF VERY AND EXTREMELY PRETERM BABIES IN ENGLAND AND WALES 2013 - 2021

Julia Lanoue1, Mohammad Chehrazi1, Cheryl Battersby1,2, Sabita Uthaya1,2, Chris Gale1,2, Neena Modi1,2 on behalf of the UK Neonatal Collaborative

Corresponding author e-mail address: n.modi@imperial.ac.uk

1 Neonatal Medicine, School of Public Health, Faculty of Medicine, Imperial College London
2 Chelsea and Westminster Hospital London

Introduction (include hypothesis)

Neonatal conditions are a leading cause of mortality and morbidity with potential to influence life-long health. Data from other countries indicate that outcomes for very and extremely preterm babies have improved over recent years. We aimed to investigate longitudinal changes in neonatal admissions and outcomes in England and Wales from 1st Jan 2013 to 31st Dec 2021.

Methods (include source of funding and ethical approval if required)

We utilised data on all admissions of extremely (<28 weeks) and very (28 to <32 weeks) preterm babies in England and Wales between 2013 and 2021 from the National Neonatal Research Database. We analysed direction and magnitude of changes in mortality and morbidities using two non-parametric tests, the Mann-Kendall trend test and Sen’s Slope estimator, without adjustment for case mix. We used previously published and validated definitions for Bronchopulmonary Dysplasia (BPD), severe necrotising enterocolitis (NEC), brain injury, late onset sepsis, treated Retinopathy of Prematurity (ROP), and survival without major morbidity (survival to discharge without any of the above morbidities). Research Ethics Committee approval 21/LO/0024

Results

There were 834,125 babies admitted between 2013 and 2021 of which 21,101 (2.5%) were extremely preterm and 46,145 (5.5%) were very preterm. The number of admissions of both extremely and very preterm babies was consistent over time, however, a sharp decrease in admissions was seen in 2020 as previously described. In extremely preterm babies, we observed a borderline statistically significant increase in the rate of BPD [+0.4%/year (95% CI 0.0%, +0.7%)]. Rates of severe NEC [+0.1%/year (95% CI -0.1%, +0.2%)], late onset sepsis [+0.3%/year (95% CI +0.1%, +0.5%)], severe brain injury [-0.1%/year (95% CI -0.3%, +0.2%)], treated ROP [-0.2%/year (95% CI -0.4%, 0.1%)], and mortality [-0.1%/year (95% CI -0.4%, 0.1%)] showed no change over time. The rate of survival without morbidity in extremely preterm babies showed no substantial improvement over time [-0.3%/year (95% CI -0.6%, 0%]. In very preterm babies, morbidity rates showed similar changes with the exception treated ROP which reduced [-0.05%/year (95% CI -0.08%, -0.02%)]; mortality decreased over time [-0.07%/year (95% CI -0.13%, -0.01%)].

Conclusions

Despite government prioritisation and a number of national quality improvement programmes, there has been little improvement in very and extremely preterm survival and key morbidities in England and Wales since 2013.

References (include acknowledgement here if appropriate)


Check box if presenting author is a trainee: basic science trainee ☒ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Dr Chris Gale
ADMISSIONS AND EARLY TRANSFERS OF INFANTS WITH CONGENITAL DIAPHRAGMATIC HERNIA IN ENGLAND AND WALES 2012-2020

Authors

Behrouz Nezafat Maldonado¹, Chris Gale¹, Cheryl Battersby¹, on behalf of the UK Neonatal Collaborative

Corresponding author e-mail address: b.nezafat-maldonado@imperial.ac.uk

Institution(s)

1. Neonatal Medicine, School of Public Health, Faculty of Medicine, Imperial College London, UK

Introduction (include hypothesis)

Infants with congenital diaphragmatic hernia (CDH) require specialist intensive and surgical care. Infants may deliver 1) in a unit with co-located surgical services (defined as not requiring ambulance transfer), 2) a designated tertiary unit linked to a stand-alone surgical centre and requiring postnatal transfer (5 centres), 3) a medical tertiary unit (non-designated for delivery of surgical neonates) or 4) a non-tertiary neonatal unit. Infants born in non-co-located surgical centres require postnatal transfer, which may lead to adverse outcomes. We aimed to report neonatal unit admissions and early transfer (defined as <48 hours) for infants with CDH in England and Wales to explore associations between place of delivery and outcomes.

Methods (include source of funding and ethical approval if required)

We extracted data from the National Neonatal Research Database (NNRD) for babies born and admitted to neonatal units in England and Wales between 01/01/2012-31/12/2020 with a diagnosis of CDH. We excluded babies with missing data on transfer to surgical site and report missing data for infants cared for in standalone unit not in NNRD. We explored admission and transfer characteristics as well as survival by different place of delivery. This study is part of neoWONDER project (REC approval 21/EM/0130, IRAS 293603) and is funded by NIHR personal fellowship (ACF-2020-21-011) and CSOR funding NIHR127844.

Results

1319 infants with CDH during the nine-year period met the inclusion criteria. 3 infants born in non-tertiary centres were excluded due to missing data on transfer to surgical unit. 619 (50%) were born in a maternity unit with co-located surgical services, whilst 721 (55%) were born outside a co-located surgical centre and required postnatal transfer. Birth and clinical characteristics are shown in Table 1. Infants born in co-located or designated tertiary units appear to be more unwell at birth, requiring resuscitation drugs and nitric oxide compared to those born in non-designated tertiary units or non-tertiary units. This may reflect postnatal versus antenatal diagnoses of CDH. While most infants born in tertiary-non designated centres or non-tertiary centres are transferred within the first 48 hours, the majority born in designated tertiary centres are not, and the median age of transfer to the standalone centre is 4 (2.9) days.

Survival to discharge was similar across the groups born in co-located or designated tertiary units, whilst we found higher survival for those babies delivered in non-designated tertiary units or non-tertiary centres. 379 infants (30%) had missing survival data as they may have been discharged from units not included in NNRD e.g. paediatric wards or PICU.

Conclusions

Almost half of infants with CDH are delivered in co-located surgical centres. We report similar population characteristics between babies born in co-located surgical units and designated tertiary units, which will enable future comparison across place of birth. We demonstrate that complete population data capture for this population of infants is available on the NNRD but national collaboration is necessary to facilitate robust data collection involving standalone paediatric surgical centres not contribute to NNRD.

References (include acknowledgement here if appropriate)

Acknowledgements: Julia Lanoue, NDAU data analyst, UK Neonatal Collaborative and the neoSTAR advisors: Nigel Hall, Nick Lansdale, Nimish Subhedar, Ingo Jester, Rachel Harwood, Alex Macdonald, Benjamin Allin.

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☒

Senior author supporting presentation on day of meeting: Dr Cheryl Battersby
All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Table 1: Infant characteristics and outcomes

<table>
<thead>
<tr>
<th></th>
<th>Co-located unit (N=660)</th>
<th>Designated tertiary unit (N=337)</th>
<th>Non-designated tertiary unit (N=89)</th>
<th>Non-tertiary unit (N=233)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born ≥37 weeks</td>
<td>493 (75%)</td>
<td>267 (79%)</td>
<td>62 (70%)</td>
<td>166 (71%)</td>
</tr>
<tr>
<td>Born ≥32-36+6 weeks</td>
<td>132 (20%)</td>
<td>63 (19%)</td>
<td>20 (22%)</td>
<td>46 (20%)</td>
</tr>
<tr>
<td>Born &lt;32 weeks</td>
<td>35 (5%)</td>
<td>7 (2%)</td>
<td>7 (8%)</td>
<td>21 (9%)</td>
</tr>
<tr>
<td>Birthweight Z-score</td>
<td>-0.420 (-1.08, 0.282)</td>
<td>-0.396 (-1.03, 0.247)</td>
<td>-0.380 (-1.11, 0.206)</td>
<td>-0.368 (-1.03, 0.379)</td>
</tr>
<tr>
<td>Neonatal admission &lt;2h of life</td>
<td>627 (95%)</td>
<td>330 (98%)</td>
<td>69 (78%)</td>
<td>173 (74%)</td>
</tr>
<tr>
<td>Mother received antenatal care</td>
<td>486 (89%)</td>
<td>225 (87%)</td>
<td>68 (76%)</td>
<td>162 (70%)</td>
</tr>
<tr>
<td>First transfer &lt;48h of life</td>
<td>41 (6%)</td>
<td>71 (26%)</td>
<td>64 (72%)</td>
<td>204 (88%)</td>
</tr>
<tr>
<td>Age 1st transfer (days)</td>
<td>17 (9, 31)</td>
<td>4 (2, 9)</td>
<td>1 (0, 2)</td>
<td>0.3 (0.2, 0.6)</td>
</tr>
<tr>
<td>Received drugs at resuscitation</td>
<td>133 (20%)</td>
<td>34 (10%)</td>
<td>4 (4.5%)</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>Received inotropes on day 1</td>
<td>332 (50%)</td>
<td>169 (50%)</td>
<td>27 (30%)</td>
<td>61 (26%)</td>
</tr>
<tr>
<td>Received nitric oxide on day 1</td>
<td>287 (43%)</td>
<td>149 (44%)</td>
<td>22 (25%)</td>
<td>25 (11%)</td>
</tr>
<tr>
<td>Received mechanical ventilation on day 1</td>
<td>601 (91%)</td>
<td>309 (92%)</td>
<td>66 (74%)</td>
<td>148 (64%)</td>
</tr>
<tr>
<td>Received ECMO</td>
<td>22 (3.3%)</td>
<td>6 (1.8%)</td>
<td>2 (2.2%)</td>
<td>2 (0.8%)</td>
</tr>
<tr>
<td>Survival to discharge</td>
<td>329 (63%)*</td>
<td>98 (56%)**</td>
<td>48 (77%)**</td>
<td>148 (82%)*****</td>
</tr>
</tbody>
</table>

n (%); Median (IQR)
Incomplete data— * denominator n=525 ** denominator n= 175 *** denominator n= 62 ****denominator n= 178
Title (Upper case)

COMPARISION OF OUTCOMES WITH AND WITHOUT TRANS-ANASTOMOTIC TUBE INSERTION IN CONGENITAL DUODENAL OBSTRUCTION – A SYSTEMATIC REVIEW AND META ANALYSIS

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

George Bethell*, Jonny Neville1, Mark Johnson2, Joanne Turnbull3 and Nigel Hall1

Corresponding author e-mail address: g.s.bethell@soton.ac.uk

Institution(s)

1. University Surgery Unit, University of Southampton and Southampton Children’s Hospital. 2. NIHR Southampton Biomedical Research Centre, University Hospital Southampton NHS Foundation Trust and University of Southampton. 3. School of Health Sciences, University of Southampton.

Introduction (include hypothesis)

Congenital duodenal obstruction (CDO) consisting of duodenal atresia/web requires operative repair within the first days of life to restore intestinal continuity. After repair there is need to establish gastric feeds however this is delayed due to resolving gastroparesis from longstanding obstruction. Early enteral feeding can be achieved by placement of a trans-anastomotic tube (TAT) beyond the duodenal anastomosis at time of surgical repair. It is hypothesised that TAT insertion allows earlier establishment of full enteral feeds (FEF) versus no TAT.

Methods (include source of funding and ethical approval if required)

This systematic review was registered on PROSPERO (ref:CRD42022328381). Search strategy included “CDO and TAT or feeding” using Medline, CINAHL, Embase and Cochrane Library. Duplicates were removed and articles were screened by two reviewers. Articles comparing insertion of TAT versus no TAT were included. Outcomes of interest were time to FEF, use of parenteral nutrition (PN), length of inpatient stay and complications from either treatment method. Meta-analyses were undertaken using random effects models (mean difference and risk ratio) in RevMan v5 and risk of bias was assessed using the ROBINS-I tool.

Results

There were 330 unique articles identified of which 24 were selected for review of full text. Nine articles met the inclusion criteria and were included in this study. These were all observational with no interventional study designs. Overall, 543 infants were included of which 226 (42%) had a TAT and 317 (58%) didn’t. Six studies concluded that TAT placement is beneficial in CDO. Eight studies contained sufficient data to allow meta-analysis however 2 were excluded due to serious or critical risk of bias. TAT placement was associated with reduced time to FEF (-3.34; 95%CI -4.48 to -2.20 days) and reduced duration of parenteral nutrition (PN) (-6.32; 95%CI -7.93 to -4.71 days). Mortality (0.26; 95%CI 0.03-2.09), sepsis rate (0.95; 95%CI 0.35-2.53), time to pre-anastomotic feeds (-3.02; 95%CI -6.35 to 0.31 days), inpatient stay (2.57; 95%CI -5.42 to 10.57 days), requirement for repeat surgery (1.63; 95%CI 0.36-7.31) and central venous catheter (CVC) complication rate (0.61; 95%CI 0.23-1.62) were similar in infants with and without a TAT.

Conclusions

TAT placement in CDO may be beneficial, without increased risk of adverse events. Earlier enteral feeding and reduced PN use is known to decrease CVC associated risks whilst significantly reducing cost of care. Further work is required to understand variations in practice regarding feeding in CDO and barriers to TAT usage.

References (include acknowledgement here if appropriate)


Check box if presenting author is a trainee: basic science trainee □ clinical trainee ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Nigel Hall
ETHNICITY, DEPRIVATION, AND INFANT MORTALITY: FINDINGS FROM THE NATIONAL CHILD MORTALITY DATABASE

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

David Odd1,2, Peter Fleming2, Karen Luyt2

Corresponding author e-mail address: karen.luyt@bristol.ac.uk

Institution(s)
1. University of Cardiff, UK
2. National Child Mortality Database, Child Mortality Analysis Unit, Bristol Medical School, University of Bristol

Introduction (include hypothesis)

England has the highest infant mortality rate in Western Europe. Much of the variation may be due to socioeconomic factors. Since infant mortality among the most deprived populations continues to rise, effective policies and other interventions are either lacking or have not been successfully implemented. The links between deprivation and poor perinatal health outcomes are complex, and how they relate to ethnicity is unclear.

The aim of this work is to investigate the relationship between infant mortality (deaths below 1 year of age) and the ethnicity of the child; and how this is related to preterm birth and measures of deprivation.

Methods (include source of funding and ethical approval if required)

Deaths of children under 1 year of age, born at, or after 22 weeks gestation, occurring from 1st April 2019 until 31st of March 2022 were identified. Provisional category of death and baseline characteristics of the child were derived from death notifications. We calculated the risk of death for all ethnic groups, the relative risk of death compared to the reference group (white ethnicity) and the population attributable risk fraction (PAF). This was repeated for each provisional category of death. The analyses were then repeated, adjusting for population structure in each deprivation (IMD) decile, and the gestational age of children born to each ethnic group.

Results

Over the 36 months a total of 5621 deaths under 1 year of age were reported to NCMD, of which 5149 (91.6%) had ethnicity and deprivation data available. In the unadjusted risk analysis, the relative risk of death, compared to white infants, was higher for Black (RR 1.92 (1.74-2.12)) and Asian (RR 1.66 (1.54-1.78)) infants. The population attributable risk (PAF) for all infant mortality, with ethnicity other than white was 11.8% (10.0 to 13.6%). There was some attenuation of the point estimates after adjusting for the deprivation level the children lived in (PAF 9.6% (7.7% to 11.4%)). After adjusting for the gestational age at birth the overall PAF reduced to 7.8% (2.3% to 9.7%).

Conclusions

The proportion of infant deaths is heavily patterned by ethnicity, with a population impact of 12%. A conservative adjustment for deprivation did not explain the patterns seen. Around half of the population impact may be due to increased risk of preterm birth in Asian and Black communities, and urgent work is needed to identify what can be done to reduce this: once preterm birth has occurred neonatal deaths appears unrelated to ethnicity.

References (include acknowledgement here if appropriate)

The National Child Mortality Database Programme is commissioned by the Healthcare Quality Improvement Partnership (HQIP) and funded by NHS England.

Check box if presenting author is a trainee: ☐ basic science trainee ☐ clinical trainee

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting:
Assessing the use of neonatal bloodstream infection guidelines in two sub-Saharan African countries using routine data collected via Neotree


Corresponding author e-mail address: m.heys@ucl.ac.uk

Introduction

Neonatal bacterial bloodstream infections are estimated to cause 200,000–deaths each year, most of which are in low-resource settings (Fleischmann et al., 2021). In the frequent absence of microbiological diagnostics, identification of possible bloodstream infection is usually clinical, with guidelines prioritising sensitivity over specificity. These guidelines vary between countries, with little evidence on how they are applied in practice. We set out to assess how neonatal sepsis guidelines were used clinically in two facilities in Zimbabwe, (Sally Mugabe Central Hospital, SMCH; and Chinhoyi Provincial Hospital, CPH) and at Kamuzu Central Hospital (KCH) in Malawi.

Methods

Using routine data collected using the digital quality improvement tool Neotree, we retrospectively reviewed concordance of national and World Health Organization (WHO) guideline recommendation for commencement of antibiotics for bloodstream infection with clinicians’ contemporaneous decisions. Clinical features and outcomes of neonates that would have received antibiotics as per guideline versus those who actually received them were compared.

Results

From January 2021 to June 2022, data were collected on 10868 neonates, 6045 admitted to SMCH, 1094 to CPH and 3729 to KCH. The Case Fatality Rate (CFR) was 17% in both Zimbabwean sites and 19% at KCH. Actual antibiotics prescription rates in all three sites were lower than clinical guidelines suggested antibiotics prescription rate based on risk factors present in neonates at the time of admission. At SMCH, national guidelines recommended commencement of antibiotics in 3813 (64%) neonates, compared with 2253 (38%) who were prescribed. At CPH, national guidelines recommended antibiotics in 852 (79%), while 472 (44%) received them. At KCH, findings were similar, with antibiotics as per guideline recommended in 3043 (82%) neonates, while 1519 (41%) received them. In both countries, clinical features suggesting bloodstream infection were similarly distributed between both groups, but the CFR was lower in the group not prescribed antibiotics. Application of WHO guidelines would lead to an increase in antibiotic prescription to 70% at SMCH, 63% at CPH (both Zimbabwe) and 76% in KCH, Malawi.

Conclusions

Current guidelines for bloodstream infection are inconsistently applied, with clinicians using other features to identify the neonates most in need of antibiotics. Work is needed to derive clinical diagnostic algorithms that are used and useful in low-resource settings.

References


All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ❓

Senior author supporting presentation on day of meeting: Dr Michelle Heys
NON-INVASIVE CONTINUOUS MEASUREMENT OF CARDIAC OUTPUT IN NEONATAL INTENSIVE CARE USING REGIONAL IMPEDEANCE CARDIOGRAPHY

Authors (Presenting author underlined. If no author is a Society member, please provide the name of the member introducing the author to the Society)

Banerjee J (MD (Res): FRCPCH)1,2,3,4 Khatib N (PhD), Mansfield R (BA (Hons); BM BCh)1,2, Sathiyamurthy S (MD, FRCPCH)1, Karholu U (MD, FRCPCH)1, Lees C (MD; FRCOG)2,3,5

Corresponding author e-mail address: j.banerjee@imperial.ac.uk

Institution(s)

1Department of Neonatology, Queen Charlotte’s and Chelsea Hospital, Imperial College Healthcare NHS Trust, London, UK; 2Biomedical Research Centre, Imperial College Healthcare NHS Trust; 3Institute of Reproductive and Developmental Biology, Imperial College London, London, UK; 4Origins of Health and Disease, Centre for Child Health, Imperial College London, London, UK; 5Department of Fetal Medicine, Queen Charlotte’s and Chelsea Hospital, Imperial College Healthcare Trust, Du Cane Rd, London W12 0HS

Introduction (include hypothesis)

Blood pressure (BP) and vital parameters (heart rate and arterial saturation) are the mainstay of haemodynamic monitoring of vulnerable neonates in intensive care settings. Echocardiography can measure cardiac function at bedside but requires significant expertise and has well-known inter and intra-operator variability. Biimpedance and bioreactance has been used in adult and paediatric intensive care to measure continuous cardiac output (CO) non-invasively, but not validated in neonates.

Methods (include source of funding and ethical approval if required)

Regional impedance cardiography (RIC) was used to measure CO continuously in neonates with two skin probes using NiCaS (NI Medical) device. The primary objective was to compare time-matched echo and RIC derived CO. Secondary objective was to develop indicative normative ranges of CO for gestational age groups over the first 72 hours of age. The study received approval from national research ethics committee (19/LO/1290). All data handling and statistical analysis including correlation plots with regression lines were performed using R Statistical Software (v3.6.2; R Core Team 2022). The percentage error (PE) and limits of agreement (LoA) between NiCaS and Echo measurements were assessed using Bland-Altman plots.

Results

127 infants were included to the study (extremely preterm <27+6=22, very preterm 28+0-32+6=46, late preterm 33+0-36+6=29 and term >37+0=30). Four infants (4 with grade 3 IVH, of whom 1 died) were excluded from the normative measures. Out of the 367 paired RIC and echo measurements, 34 were invasively ventilated; 189 were on non-invasive ventilation, and 144 breathing in air. Echo and RIC derived weight normalised cardiac output (cardiac output index = COI) measurements showed a strong positive correlation (r=0.58, p<0.001). The Bland-Altman measurement bias was +27.5ml/min/kg, with LoA from -355.6 to 300ml/min/kg and PE 4.1%. The median COI, Stroke volume (SV) per kg of weight and HR were significantly higher (p<0.05) in lower gestational age groups at 6, 12, 24, 48 and 72h post-birth. The continuous indicative normative measures of COI demonstrated an initial decline in the first 12-18 hours followed by a steady increase over postnatal age in all gestational age groups and was overall higher in lower gestational age infants over 72h. The COI continued to increase after the first week in extremely preterm infants while plateaued in very and late preterm infants.

Conclusions

Cardiac output can be measured continuously non-invasively in neonatal intensive care to inform haemodynamic status and correlates reliably with echocardiography measured values. Alongwith HR and BP measurement, the indicative CO nomograms may help clinicians to target use of volume, inotropes, or vasopressors to optimise haemodynamic status and prevent pulmonary and brain haemorrhage in the first 72 hours.

References (include acknowledgement here if appropriate)


Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: J Banerjee
EXECUTIVE FUNCTIONS IN PRESCHOOL CHILDREN WITH CONGENITAL HEART DISEASE AND CONTROLS

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

Andrew TM Chew 1, Alexandra F. Bonthrone 1, Christopher Kelly 1, Kuberan Pushparajah 2, John Simpson 2, Mary Rutherford 1, A. David Edwards 1, Chiara Nosarti 1,3, Serena J. Counsell 1.

Corresponding author e-mail address: andrew.chew@kcl.ac.uk

Introduction (include hypothesis)

Executive functions (EF) in preschool children are related to successful learning during school years and beyond. Children born with congenital heart disease (CHD) are at risk of impaired EF but, to date, few studies have assessed EF in pre-schoolers with CHD. We aimed to investigate the association between EF and demographic, environmental and clinical factors in children with CHD and controls aged between 4 to 6 years.

Methods (include source of funding and ethical approval if required)

Parents completed the Behavior Rating Inventory of Executive Function-Preschool Version (BRIEF-P) questionnaire and Cognitively Stimulating Parenting Scale (CSPS). Index of multiple deprivation (IMD) was calculated from participants’ postal address as a measure of socioeconomic status. Children with critical or serious CHD who had surgery in their first year were included. Controls were recruited from participants in the developing Human Connectome Project. Children born before 31 weeks gestational age (GA) were excluded. In the newborn period infants underwent brain MRI on a 3-T scanner, and any brain injury rated.

Results

50 children with CHD (TGA n=20, truncus arteriosus n=1, coarctation of the aorta n=11, Tetralogy of Fallot n=11, pulmonary stenosis number n=3, pulmonary atresia n=3, Tricuspid atresia n=1) and 118 controls were included. There were no significant differences in all three composite EF scores (ISCI, FI, EMI) between CHD and control children. Higher CSPS scores were significantly associated with lower ISCI (p=0.003) and EMI scores (p=0.003) after controlling for age of assessment, sex, GA at birth and IMD. There was no relationship between EF scores and CHD type, surgical factors or brain MRI injury rating.

Conclusions

There were no significant differences in EF scores between children with CHD and controls. All preschool children have better EF scores (ISCI and EMI) when within a more stimulating home environment. There were no significant relationships between EF scores and surgical factors, CHD type or brain MRI injury scores in the CHD group. Encouraging parents to provide a stimulating home environment may support executive function development in both children with CHD and typically developing children.

References (include acknowledgement here if appropriate)


Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: x ☐

Senior author supporting presentation on day of meeting: Prof Serena Counsell
RESTRAINT STRESS DURING NEONATAL HYPOXIA-ISCHEMIA ALTERS BRAIN INJURY FOLLOWING NORMOTHERMIA AND HYPOTHERMIA

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

Julia K. Gundersen¹, Hemmen Sabir¹,2, Thomas R. Wood¹,3, Damjan Osredkar¹,4, Mari Falck¹,5, Else M. Loeberg⁶, Lars Walloe¹, David A. Menassa¹,6, Marianne Thoresen¹,7*

Corresponding author e-mail address: * marianne.thoresen@bristol.ac.uk

Introduction (include hypothesis)

Rodent models of neonatal hypoxic-ischemic (HI) injury require some animals to be restrained for continuous temperature monitoring during insult and subsequent treatment. Restraining, a physiological stressor in rodents, may alter the injury during normothermia (NT). However, the effects of restraint during post-insult hypothermia (HT) remain unexplored. Clinically, intensive care patients undergoing HT needs some restraining due to endotracheal intubation, invasive lines and certain cooling equipment. We examined HI brain injury in rats restrained for superficial skin or rectal temperature monitoring.

Methods (include source of funding and ethical approval if required)

We analysed 23 historical experiments comparing probe rats (skin n=42, rectal n=35) and free-moving matched non-probe controls (n=80) that underwent HI injury (left common carotid artery ligation and 90 min 8% O₂) at postnatal day 7 followed by 5 h of normothermia (NT:37°C) or HT (32°C). Following 1 week survival, the brain injury was assessed with neuropathology (range 0.0-4.0)¹, microglial nearest neighbour distance (NND) and protein expression of brain-derived neurotrophic factor. Non-parametric statistics (Wilcoxon-van-Elteren, Mann-Whitney and Kendall’s Tau) were employed. Results presented as median (IQR).

Results

Global pathology score, fig.: After NT, injury in non-probe controls scored 3.31 (2.38-3.88). The injury was significantly mitigated in NT skin-probes: 2.81 (0.48-3.50) p=0.03, and even more so in NT rectal probes 1.22 (0.13-3.03) p<0.001. The protection was retained after HT in skin probes: 0.75 (0.0-2.38) relative to HT non-probe controls: 2.25 (0.19-3.38) p=0.01. In contrast, injury in HT rectal probes was unexpectedly exacerbated in comparison: 2.69 (1.13-3.69) p=0.04.

Neuroinflammation: microglial reactivity correlated strongly with injury severity (p<0.001). Microglia were less reactive after HT than NT in non-probe controls (p=0.07) and skin probes (p=0.04). We observed no differences between non-probe controls, skin-probes and rectal probes within the same treatment.

Conclusions

Our findings suggest a protective effect from restraint during physiological temperature (NT), which becomes harmful when combined with HT and presumed additional discomfort from the rectal probe. The results are useful in highlighting potential unforeseen effects of common experimental designs or clinical management.

References (include acknowledgement here if appropriate)


Check box if presenting author is a trainee: basic science trainee ☒ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Marianne Thoresen (corresponding author).
SEX DIFFERENCES IN HUMAN IPSC-DERIVED MICROGLIA

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

G. Sullivan, P. Banerjee, K. Burr, O. Dando, K. Emelianova, D. Story, B. Selvaraj, JP. Boardman, S. Chandran

Corresponding author e-mail address: gemma.sullivan@ed.ac.uk

Institution(s)

Centre for Clinical Brain Sciences, University of Edinburgh, EH16 4TJ

Introduction (include hypothesis)

Male sex is an established determinant of adverse outcomes following preterm birth and is included in validated outcome prediction tools for neurodevelopmental impairment and survival. Male sex is associated with a two-fold increased risk of cerebral palsy when compared with female infants born at comparable gestational age, cognitive scores of preterm born males are on average 9 points below those of females from infancy through to adulthood, and male sex is associated with increased neuropsychiatric diagnoses after preterm birth. The reasons for these sex differences are unknown but multiple lines of evidence implicate a role for sex-dependent immune dysregulation. In this study, we tested the hypothesis that human microglia have a sexually dimorphic transcriptional profile in the context of inflammation.

Methods (include source of funding and ethical approval if required)

Highly enriched human induced pluripotent stem cell derived microglia (iPSC-MG) were generated from 2 male and 2 female lines using established protocols. To model inflammation, iPSC-MG were activated with lipopolysaccharide (LPS), at 100ng/ml for 12 hours. RNA was extracted and sequenced at a depth of 30 million reads and differential gene expression analysis was performed using DESeq. Ranking and prioritisation of targets was achieved by comparing log2 fold change in response to LPS (FDR<5%) and functional annotation using gene ontology (GO) pathway analysis. This study was funded by the RS Macdonald Trust.

Results

Transcriptomic analysis revealed 118 genes with sexually dimorphic expression (Log2fc>2, FDR<5%). GO sets associated with the immune response (cytokine activity, chemokine activity, defense response) were upregulated in male iPSC-MG.

Figure 1. Volcano plot demonstrating differentially regulated iPSC-MG genes with sexually dimorphic expression.

Conclusions

Human male iPSC-MG have a pro-inflammatory phenotype when compared to female iPSC-MG, suggesting that the microglial response to neuroinflammation is sexually dimorphic.

References (include acknowledgement here if appropriate)


Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting:
Title (Upper case)

COMPLEXITY OF BROADBAND NEAR INFRARED SPECTROSCOPY SIGNALS IN TERM NEWBORN INFANTS RELATES TO OUTCOME FOLLOWING NEONATAL ENCEPHALOPATHY

Authors

Haoxuan Zhang1, Kelly Harvey-Jones2, Vinita Verma2, Frederic Lange3, Ilias Tachtsidis3, Subhabrata Mitra2

Corresponding author e-mail address: subhabrata.mitra.13@ucl.ac.uk

Institution(s)

1. Institute for Neurology, University College London, United Kingdom
2. Institute for Women's Health, University College London, United Kingdom
3. Department of Medical Physics and biomedical engineering, University College London Hospital, United Kingdom

Introduction (include hypothesis)

Decreased complexity of brain near-infrared spectroscopy signals has been associated with the poor outcome both for intraventricular haemorrhage in preterm infants1 and in traumatic brain injury in adults2. This study aims to evaluate the complexity of broadband near-infrared spectroscopy (BNIRS) signals in relation to outcome following neonatal encephalopathy (NE). BNIRS is a novel brain monitoring and imaging technique developed recently to monitor cerebral mitochondrial oxidative metabolism along with cerebral oxygenation and haemodynamics. Multi-scale entropy (MSE) is a non-linear tool for complexity analysis that can reveal the magnitude of changes in physiological signals accurately. We hypothesise that the complexity of BNIRS signals measured by MSE (a) will correlate with the outcome surrogated by the thalamic lactate/NAA ratio on 1H MRS, and (b) will differentiate between the good and poor outcome groups following NE as an independent predictor.

Methods (include source of funding and ethical approval if required)

Data were collected from 22 term newborn infants (36-44 weeks) who underwent therapeutic hypothermia after neonatal encephalopathy. BNIRS monitoring was performed at 48 hours after birth. MSE was adopted to assess the complexity of five BNIRS signals: oxy- and deoxy-haemoglobin (HbO2 and HHb), haemoglobin total (THb), haemoglobin difference (HbD) and cytochrome-c-oxidase (oxCCO) over one hour of recordings for each infant. Binary logistic regression was conducted to evaluate if the complexity index of these signals independently predicts the outcome. Thalamic Lac/NAA on proton magnetic resonance spectroscopy was used as the outcome biomarker with a cut off 0.39. Group analyses were performed using Wilcoxon matched pair test.

Results

13 infants had good outcome (Lac/NAA <0.39) and 9 infants had poor outcomes (Lac/NAA>=0.39). Higher signal complexities were noted in the better outcome group for all brain signals (figure 1). Sample entropy was significantly different between the good and poor outcome groups following NE (two-tailed P value <0.0001 for HbO2, HHb and HbD, 0.03 for oxCCO). The complexity index of HbT and HbO2 reached the statistical significance for independent predictors of the outcome group (P value = 0.03 and 0.04, respectively).

Conclusions

Loss of BNIRS brain signal complexity following NE was significantly correlated with poor outcome following NE. Complexity analysis can be a useful tool for early assessment of injury severity and predict outcome following NE.

References (include acknowledgement here if appropriate)


Check box if presenting author is a trainee: basic science trainee ☒ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☐

Senior author supporting presentation on day of meeting: Subhabrata Mitra
THE FEASIBILITY AND VALUE OF USING VIDEO WITH THE CEREBRAL FUNCTION MONITOR FOR SEIZURE DETECTION IN NEWBORNS ON THE NEONATAL UNIT

Authors
Yesenia M C Santana, Anup C Kage, Ivone Lancoma-Malcolm, Caroline Francia, Michael Yoong, David Wertheim and Divyen K Shah

Corresponding author e-mail address: d.shah@qmul.ac.uk

Institution(s)
Barts and the London School of Medicine and Dentistry; Royal London Hospital, Barts Health NHS Trust; Kingston University.

Introduction
Seizures in newborns may not only reflect underlying brain pathology but may potentiate brain injury. Although continuous conventional EEG-video represents the gold standard for seizure detection in newborns, its availability is limited. Digital cerebral function monitors (CFM) typically displaying two channels of raw and amplitude-integrated EEG (aEEG) are commonly used for monitoring seizures and electrocortical background. To our knowledge, the utility of video with the CFM has not been explored.

Methods
Newborns at risk of seizures presenting to the neonatal unit, Royal London Hospital, London were prospectively recruited to an observational seizures study between June 2021 and June 2022. Ethics approval (REC reference 20/PR/0969) was granted for retrospective use of the CFM recording subject to parental consent, but only for prospective use of video after written consent was obtained. aEEG activity was recorded using a CFM Olympic Brainz Monitor (Natus Medical Inc., USA) and video recorded with a small camera connected to a laptop.

Results
Of 35 infants recruited who had CFM monitoring, simultaneous video recordings were obtained for 11 (median;[IQR] GA 39 [37,40] wks and BWt 3430[3022,3500] g). Of the other 24 babies, 17 families refused consent, and prior to consent being obtained, the recording ended in five, one baby died and one was transferred to another hospital. A total of approximately 800 hours of video were reviewed for these 11 babies. Five of the 11 had electrographic seizures identified on the CFM. Of these five, three had corresponding evidence of clinical seizures on video. In addition, three babies were noted to have abnormal movements on video with no corresponding electrical seizure activity.

Conclusions
Our pilot study shows that the use of simultaneous video and CFM recordings in newborns at risk of seizures is feasible. It not only helps confirm the presence of seizures but may also assist in identifying movements associated with abnormal neurology that are not seizures. Attitudes of parents and ethics committees on filming videos of babies as part of clinical care require further exploration to understand acceptability. A larger study is required.

References
This study was kindly supported by a grant from Barts Charity. We are grateful to Ms Judy Moore, Mr Mike Powderly and Natus Medical for lending the CFM equipment for the study.

Check box if presenting author is a trainee: basic science trainee ☒ clinical trainee ☐

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Dr Divyen K Shah
RESPIRATORY FUNCTION MONITORING DURING EARLY RESUSCITATION AND PREDICTION OF OUTCOMES IN PREMATURELY BORN INFANTS

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

Fahad M S Arattu Thodika, Shannon Gunawardana, Vadivelam Murthy, Prashanth Bhat, Emma E Williams, Theodore Dassios, Anne Greenough

Corresponding author e-mail address: fahad.shareef@nhs.net

Institution(s)

aDepartment of Women and Children's Health, King's College London; bNICU, Barts Health NHS Trust; cNICU, Brighton and Sussex University Hospital, Sussex; dNICU, King’s College Hospital NHS Foundation Trust; eNIHR Biomedical Centre at Guy’s and St Thomas NHS Foundation Trust and King’s College London

Introduction (include hypothesis)

Background: Over the last decade, there has been increased use of end-tidal carbon dioxide (ETCO2) and oxygen saturation (SpO2) monitoring during resuscitation of prematurely born infants in the delivery suite.

Aims: We tested the hypotheses that low end-tidal carbon dioxide (ETCO2) levels, low oxygen saturations (SpO2) and high expiratory tidal volumes (VT) during the early stages of resuscitation would be associated with adverse outcomes in preterm infants.

Methods (include source of funding and ethical approval if required)

Study design: Respiratory recordings made in the first ten minutes of resuscitation in the delivery suite of infants born before 34 weeks of gestational age (GA) were analysed.

Subjects: Sixty infants, median GA 27 (interquartile range 25-29) weeks, were assessed.

Outcome measures: Mortality, development of intracerebral haemorrhage (ICH) and bronchopulmonary dysplasia (BPD). Ethical approval was given by the Outer London Ethics Committee for the data collection.

Results

Twenty-five infants (42%) developed an ICH and 23 (47%) BPD; 11 (18%) died. ETCO2 at approximately five minutes after birth was lower in the infants that developed an ICH (28.5 mmHg, IQR: 17.3-34.7 mmHg) than those who did not (43.1 mmHg, IQR: 29.9-53.4 mmHg). The difference remained significant after adjusting for gestational age, coagulopathy and chorioamnionitis (p=0.03). SpO2 at approximately five minutes was lower in the infants who died (42.8%, IQR: 20.6-72.5%) compared to those who survived (84%, IQR: 69-95.0). This remained significant after adjusting for the 5-minute Apgar score and chorioamnionitis (p=0.021). VT at 5 minutes did not correlate with any of the adverse outcomes. There was no significant association of any of the respiratory function data and BPD development.

Conclusions

ETCO2 and SpO2 levels during early resuscitation in the delivery suite were associated with adverse outcomes.

References (include acknowledgement here if appropriate)

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Yes
RESPIRATORY FUNCTION MONITORING DURING EARLY RESUSCITATION AND PREDICTION OF OUTCOMES IN PREMATURELY BORN INFANTS

Authors (Presenting author underlined. If no author is a Society member please provide the name of the member introducing the author to the Society)

Fahad M S Arattu Thodika\textsuperscript{a}, Shannon Gunawardana\textsuperscript{a}, Vadivelam Murthy\textsuperscript{b}, Prashanth Bhat\textsuperscript{c}, Emma E Williams\textsuperscript{a}, Theodore Dassios\textsuperscript{a,d}, Anne Greenough\textsuperscript{a,e}

Corresponding author e-mail address: fahad.shareef@nhs.net

Institution(s)
\textsuperscript{a}Department of Women and Children’s Health, King’s College London,\textsuperscript{b}NICU, Barts Health NHS Trust; \textsuperscript{c}NICU, Brighton and Sussex University Hospital, Sussex; \textsuperscript{d}NICU, King’s College Hospital NHS Foundation Trust; \textsuperscript{e}NIHR Biomedical Centre at Guy’s and St Thomas NHS Foundation Trust and King’s College London

Introduction (include hypothesis)

Background: Over the last decade, there has been increased use of end-tidal carbon dioxide (ETCO\textsubscript{2}) and oxygen saturation (SpO\textsubscript{2}) monitoring during resuscitation of prematurely born infants in the delivery suite.

Aims: We tested the hypotheses that low end-tidal carbon dioxide (ETCO\textsubscript{2}) levels, low oxygen saturations (SpO\textsubscript{2}) and high expiratory tidal volumes (VT\textsubscript{E}) during the early stages of resuscitation would be associated with adverse outcomes in preterm infants.

Methods (include source of funding and ethical approval if required)

Study design: Respiratory recordings made in the first ten minutes of resuscitation in the delivery suite of infants born before 34 weeks of gestational age (GA) were analysed.

Subjects: Sixty infants, median GA 27 (interquartile range 25-29) weeks, were assessed.

Outcome measures: Mortality, development of intracerebral haemorrhage (ICH) and bronchopulmonary dysplasia (BPD). Ethical approval was given by the Outer London Ethics Committee for the data collection.

Results

Twenty-five infants (42%) developed an ICH and 23 (47%) BPD; 11 (18%) died. ETCO\textsubscript{2} at approximately five minutes after birth was lower in the infants that developed an ICH (28.5 mmHg, IQR: 17.3-34.7 mmHg) than those who did not (43.1 mmHg, IQR: 29.9-53.4 mmHg). The difference remained significant after adjusting for gestational age, coagulopathy and chorioamnionitis (p=0.03). SpO\textsubscript{2} at approximately five minutes was lower in the infants who died (42.8%, IQR: 20.6-72.5%) compared to those who survived (84%, IQR: 69-95.0). This remained significant after adjusting for the 5-minute Apgar score and chorioamnionitis (p=0.021). VT\textsubscript{E} at 5 minutes did not correlate with any of the adverse outcomes. There was no significant association of any of the respiratory function data and BPD development.

Conclusions

ETCO\textsubscript{2} and SpO\textsubscript{2} levels during early resuscitation in the delivery suite were associated with adverse outcomes.

References (include acknowledgement here if appropriate)

Check box if presenting author is a trainee: basic science trainee ☐ clinical trainee ☒

All authors have approved the abstract, actual or potential conflicts of interest have been declared to the meetings secretary, and the abstract has not been presented previously: ☒

Senior author supporting presentation on day of meeting: Yes