



September 16th, 2021 11:00 - 13:00

PARALLEL SESSION 15 – CIRCULATION 2

ID 63. Impact of Packed Red Blood Cell Transfusions on Cerebral and Somatic Tissue Oxygenation in Premature infants with and without a Patent Ductus Arteriosus

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Background: Packed red blood cell (PRBC) transfusions treat anaemia and support adequate cellular metabolism. The impact of PRBC transfusions on left ventricular (LV) afterload and pulmonary vascular resistance (PVR), cerebral and somatic regional tissue oxygenation (rSO₂) in the context of a patent ductus arteriosus (PDA) warrants further investigation.

Methods: Infants <32 weeks gestation who received a PRBC transfusion beyond the first 10 days of life were included. Each infant underwent a 24 hour assessment of cerebral and somatic rSO₂ and fractional tissue oxygen extraction (FTOE), commencing at the start of the transfusion. Echocardiography was carried out at: baseline, 18 hours and 24 hours post transfusion, to measure PVR, LV end systolic wall stress (ESWS) in addition to LV and Right ventricular (RV) systolic strain. The impact of the presence of a PDA on cerebral and somatic rSO₂/FTOE was assessed.

Results: Thirty infants with a median [IQR] gestation and birthweight of 26.3 [24.8 – 28.0] weeks and 855 [659 – 1103] grams were included. Baseline haemoglobin was 10.0 [9.3 – 10.5] g/dL. There was an increase in pulmonary artery acceleration time (48 ± 13 to 57 ± 16 ms, p<0.01) from baseline to 24 hours post transfusion. LV ESWS did not change (378 ± 149 to 361 ± 132 dynes/cm², p=0.67). There was no change in LV or RV strain over the study period (p>0.05). Ten infants had a PDA (median diameter 2.1 [1.8 – 2.7] mm). Cerebral rSO₂ increased in a similar manner in infants with and without a PDA following PRBC transfusion with a corresponding fall in cerebral FTOE (Figure). Although somatic rSO₂ increased during the study period in the overall group, the rSO₂ values were significantly lower in those with an open PDA at baseline and following transfusion compared to those with a closed PDA. There was a significant decrease in somatic FTOE following transfusion in the closed PDA group only (Figure).

Conclusion: PRBC transfusion results in a fall in PVR without significant change in myocardial function or LV afterload. Cerebral oxygenation improved following transfusion regardless of PDA status. Somatic oxygenation improved to a greater extent in babies with a closed PDA.

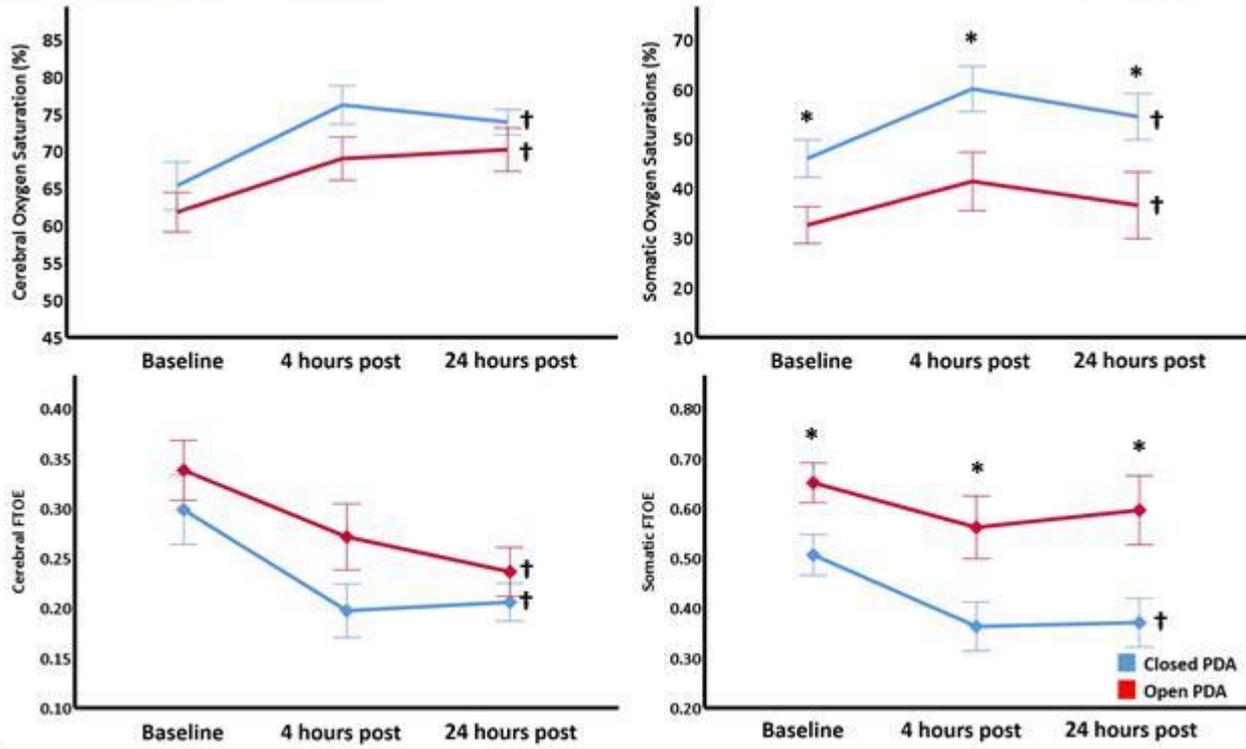


Figure: Cerebral and Somatic Regional Oxygenation and Fractional Tissue Extraction (FTOE) in the Cohort.
* p<0.05 between groups at each time point; † p<0.05 change over time within each group.

Cerebral and somatic rSO2 and FTOE
Cerebral and somatic rSO2 and FTOE
None Declared



ID 232. THROMBIN GENERATION IN THE PREMATURE INFANT; THE EFFECT OF PLATELETS

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BACKGROUND

Premature infants are at risk of haemorrhage, particularly intraventricular haemorrhage, and have reduced coagulation factor levels and hypo-reactive platelets in vitro. In spite of these recognized changes, plasma thrombin generation (characterized by Calibrated Automated Thrombography (CAT)) in preterm infants, is similar or enhanced compared with term infants. The aim of this study, the EVENT study, is to characterize platelet-dependent thrombin generation in premature infants.

METHODS

This was a prospective observational study, performed in platelet rich (PRP) and platelet poor (PPP) plasma obtained from umbilical cord blood, collected in sodium citrate (PRP: 200 xg x 10 mins; PPP: 3000 RPM x 6 mins x 2). Premature infants (24 - 31 weeks) and healthy term controls were recruited. Using a CAT assay, thrombin generation was stimulated by tissue factor only (final concentration 1pM), rendering the assay dependent upon the phospholipid content of plasma. Hospital ethical approval and parental consent was obtained.

RESULTS

In a preliminary analysis of the first thirty patients (n=13 preterm, n=17 term), CAT parameters in umbilical cord blood PRP were similar between preterm and term infants (Table 1). However, the time to peak thrombin was significantly shorter in premature infants, a marker of hypercoagulability.

In a subset of infants (n=7 term, n=6 preterm), thrombin generation was assessed in paired PPP and PRP using 1pM TF only, to evaluate the impact of platelets on neonatal thrombin generation. No difference was observed in any CAT parameters, suggesting that neonatal PPP phospholipid content (potentially from circulating extracellular vesicles) is sufficient to support thrombin generation in the absence of exogenous phospholipid.

CONCLUSION

These preliminary data suggest that thrombin generation in PRP is similar or enhanced in preterm compared with term infants. Moreover, neonatal plasma phospholipid appears to support thrombin generation in the absence of exogenous phospholipid. This ongoing large prospective study aims to further characterize the platelet-dependency of neonatal thrombin generation in both umbilical cord blood and neonatal peripheral blood.

	Preterm	Term	p
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	N=13	N=17	
Gestational age (weeks) IQR	29.6 (28 – 29.9)	39.3 (38.9 – 39.7)	<0.001
Birth weight (g)	1375 (1070 – 1450)	3830 (3400 – 4060)	<0.001
Whole blood platelet count (x10 ⁹ /L) (IQR)	247 (220 – 284)	255 (223 – 277)	0.86
PRP platelet count (x10 ⁹ /L) (IQR)	100 (61 – 142)	107 (93 – 179)	0.13
CAT parameters			
Lag Time (mins) IQR	3.83 (3.26 - 4.33)	4.28 (3.85 - 4.5)	0.13
ETP (nM.min) IQR	1002.94 (831.51 - 1182.74)	969.94 (898.28 - 1000.1)	0.34
Peak Thrombin (nM) IQR	80.81 (62.96 - 121.87)	76.47 (56.63 - 85.73)	0.22
Time to Peak (mins) IQR	9.25 (8.33 - 10.17)	10.45 (9.33 - 11.74)	0.046*

Table 1: CAT parameters in PRP in umbilical cord blood. Median values displayed (interquartile range).

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Prof. Fionnuala NíAinle has received research funding (paid to the University) from Bayer and Sanofi (unrelated to this study).



ID 579. SURVEY OF TRANSFUSION PRACTICES IN EUROPEAN PRETERM INFANTS (STEP SURVEY)

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BACKGROUND

Transfusions of red blood cells (RBC), platelets and plasma are often provided to infants born at less than 32 weeks' gestation. Although several randomized controlled trials on thresholds for RBC and platelet transfusions have recently been published, international consensus guidelines are lacking. As an initiative of the newly formed Neonatal Transfusion Network (NTN), a survey on current transfusion practice was performed across NICUs in 18 European countries.

METHODS

The survey was distributed amongst neonatal units in 18 European countries between October and December 2020, asking specifically about transfusion thresholds, indications, volumes and rates of transfusion for infants born <32 weeks.

RESULTS

The analysis included responses from 343 NICUs across 18 European countries: Austria, Belgium, Finland, Germany, Hungary, Italy, Malta, The Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom. The median response rate per country was 57% (range: 21 - 100%).

RBC transfusion thresholds varied (figure 1), and were usually higher in younger infants and those requiring a higher level of respiratory support.

In 53% of NICUs, clinically stable neonates without signs of bleeding were reported to receive platelet transfusion at a platelet threshold higher than $25 \times 10^9/L$, despite the results of the PLANET2 study. Platelet transfusion thresholds showed substantial variation between NICUs, trending towards higher thresholds in infants undergoing procedures, surgery or active bleeding.

Plasma is routinely given to infants with coagulopathy and active bleeding in 93% of NICUs, coagulopathy alone in 30%, active bleeding alone in 45%, and volume replacement in 26% of NICUs. Plasma is administered for sepsis in 26% of NICUs.



The median volumes of RBC, platelets and plasma given per transfusion were 15ml/kg. The rates of transfusion however varied significantly with interquartile ranges: RBC: 3.75-5ml/kg/hr, platelets: 7.5-20ml/kg/hr, plasma 5-15ml/kg/hr.

CONCLUSION

Blood component transfusion thresholds, indications, volumes and rates vary considerably across European NICUs. There is a rationale for assimilation of the existing evidence into guidelines. These findings may motivate quality improvement projects to bridge the evidence-practice gap and for further investigation to establish optimal rates and volumes for blood component transfusion in infants born preterm. Our survey provides a starting point for this work.

Clustered box plot showing packed red cell transfusion thresholds by age and mode of respiratory support

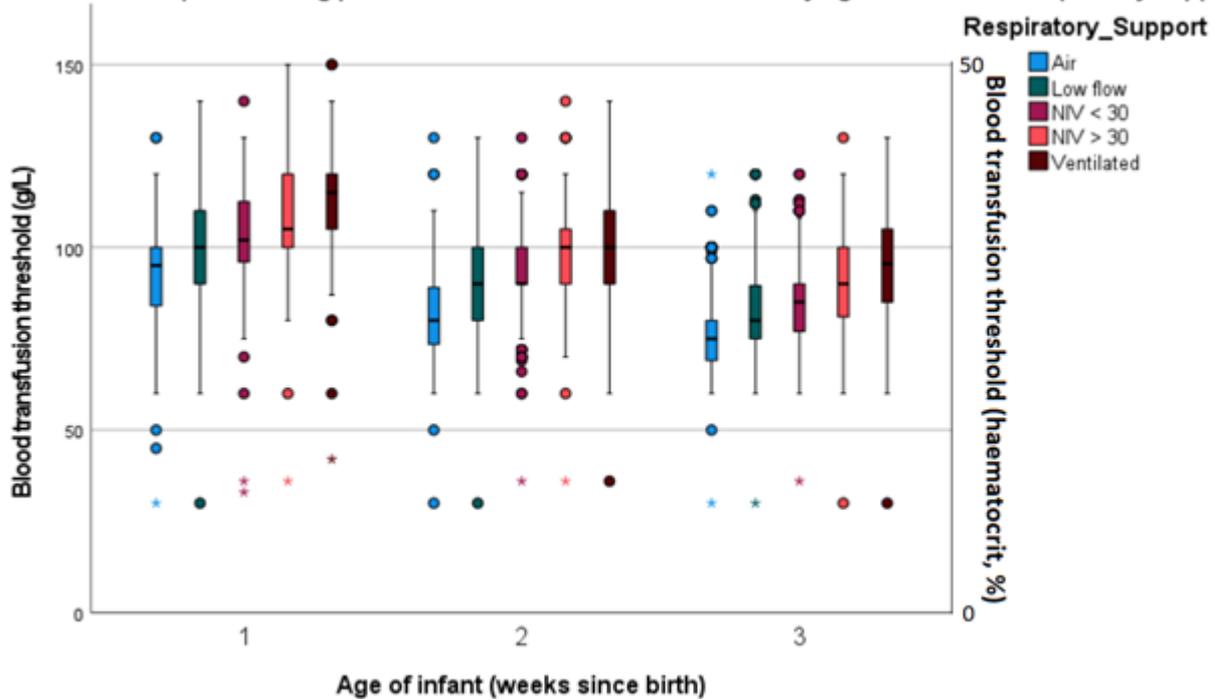


Figure 1: [Low flow = 0-2l/min nasal cannula oxygen; NIV <30 = non-invasive ventilation with FiO2 < 30%; NIV >30 = non-invasive ventilation with FiO2 > 30%]

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None declared



ID 300. DOES THE CURRENT GUIDANCE ABOUT MANAGEMENT OF THROMBOCYTOPENIA DELIVER THE DESIRED RESULTS?

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BACKGROUND

Platelet transfusions are a frequent procedure for premature neonates. There are a number of reasons why prematurity is a risk factor for requiring platelet transfusion; necrotising enterocolitis (NEC) and sepsis to name a few. While recent trials have addressed the question of ideal cut off for platelet transfusion, optimal dosing of the platelets remains contentious.

METHODS

This quality improvement project is a retrospective analysis of all neonates born or transferred into a tertiary neonatal intensive care unit (NICU). Very premature infants of less than 32 weeks' gestation who received platelet transfusion were selected (n=106) over a 12-month period in 2019. The primary outcome of increment in platelet counts was then analysed in relation to the dosing, indications and relationship to NEC or sepsis.

RESULTS

The study collected data for transfusions from January to December 2019. During the study period, we identified 106 neonates. 11 of these neonates received a platelet transfusion.

Our mean birth gestation of neonates was 25 weeks, gestational age at transfusion was 32 weeks and a mean weight of 1.27kg.

50 platelet transfusions were given to 11 eligible infants. Mean birth gestation and corrected gestation was 25 and 32 weeks respectively.

74% of the transfusions followed the guideline and 94% received 15ml/kg of platelets. The data revealed that 3/50 (6%) transfusions resulted in platelet count of $>150 \times 10^9$. On further subgroup analysis, inflammatory markers (CRP) demonstrated a low correlation co-efficient of -0.09 ($p=0.56$). Infants managed for NEC had a mean rise of $77.8 \times 10^9/L$ in comparison to $33.9 \times 10^9/L$ for infants without NEC. There was a trend towards statistical significance ($p=0.05$).

CONCLUSION

Our study showed that the current practice of 15ml/kg led to an inadequate rise in a significant proportion of babies. It also showed that while there is good compliance to national recommendation for platelet volume, about a quarter of babies are still being transfused inappropriately. It also did not reveal any correlation with sepsis while suggesting that infants without NEC appeared to have a suboptimal response. This did not reach statistical significance and hence warrants a larger study.

None declared