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Title:

Electrical Cardiometry and Near-Infrared Spectroscopy During Transfusion: A Prospective Observational Study

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ACCEPTED

Session Title:

Rising Stars of Research and Scholarship Invited Student Posters

Slot:

RS PST1: Sunday, 17 November 2019: 11:45 AM-12:15 PM

Applicable Category:

Clinical, Researchers

Keywords:

Electrical cardiometry, Near infrared spectroscopy and Premature Infant

References:

1. Ajayi, O. O., Davis, N. L., Saleem, B., Kapoor, S., Okogbule-Wonodi, A. C., Viscardi, R. M. . . . Sundararajan, S. (2019). Impact of packed red blood cell transfusion on intestinal barrier function in preterm infants. *Journal of Neonatal-Perinatal Medicine*, *12*(1), 95-101. doi: 0.3233/NPM-1828
2. Hasanbegovic, E., Cengic, N., Hasanbegovic, S., Heljic, J., Lutolli, I., & Begic, E. (2016). Evaluation and treatment of anemia in premature infants. *Medical Archives*, *70*(6), 408-412. doi: 10.5455/medarh.2016.70.408-412
3. Heeger, L. E., Counsilman, C. E., Bekker, V., Bergman, K. A., Zwaginga, J. J., Te Pas, A. B., . . . Lopriore, E. (2018). Restrictive guideline for red blood cell transfusions in preterm neonates: effect of a protocol change. *Vox Sanguinis*, *114*(1), 57-62. doi: 10.1111/vox.12724

4. Ibonia, K. T., Bada, H. S., Westgate, P. M., Gomez-Pomar, E., Bhandary, P., Patwardhan, A., . . . Abu Jawdeh, E. G. (2018). Blood transfusion in preterm infants: changes in perfusion index and intermittent hypoxemia. *Transfusion*, 58(11), 2538-2544. doi: 10.1111/trf.14808
5. Jasani, B., Rao, S., & Patole, S. (2017). Withholding feeds and transfusion-associated necrotizing enterocolitis in preterm infants: A systematic review. *Advances in nutrition* (Bethesda, Md.), 8(5), 764-769. doi: 10.3945/an.117.015818
6. Liu, L., Xu, S. H., Lu, C. M., & Cheng, G. Q. (2018). Effect of red cell transfusion on the oxygenation of mesenteric tissue in premature infants. *Chinese Journal of Pediatrics*, 56(9), 680-685. doi: 10.3760/cma.j.issn.0578-1310.2018.09.009.

Abstract Summary:

This presentation reviews a single center prospective observational study investigating cardiovascular hemodynamics and perfusion in anemic and non-anemic premature infants during the transfusion. Topics include the use of electrical cardiometry and near infra-red spectroscopy, and statistically significant changes seen before and after transfusion unseen by current bedside neonatal monitoring.

Content Outline:

Introduction to the problem

- Null hypothesis

Methods

- Study population
- Parameters
- Measurement protocol

Results

- Demographics
- Hemodynamic measurements
- Graphs

Discussion

Conclusions

Future Research

Topic Selection:

Rising Stars of Research and Scholarship Invited Student Posters (25201)

Abstract Text:

Background: Anemia remains common among premature infants in the neonatal intensive care unit. Premature infants frequently require erythrocyte transfusions.¹⁻³ Current neonatal transfusion guidelines vary across institutions and practitioners and lacks empirical evidence on which premature infants would benefit most from transfusion.^{4,5} Transfusions pose multiple risks to premature infants.⁶ The current literature exposes the need for more empirical data related to the impact of a transfusion on the hemodynamic status and organ perfusion of premature infants.

Objective: To compare the physiological changes in hemodynamics and tissue oxygen extraction in premature infants with anemia receiving erythrocyte transfusion and premature infants without anemia. The null hypothesis was that hemodynamic measurements of premature infants with anemia who received an erythrocyte transfusion would not differ over time from those of a control group of non-anemic premature infants who did not receive a transfusion.

Methods: This institutional review board approved, prospective single-center observational cohort study compared 75 premature infants before, during and after transfusion with a control group of non-anemic premature infants. The control group included 40 premature infants without anemia, and the observational group included 35 premature infants with anemia and packed red blood cell transfusion orders. Current bedside neonatal monitoring provides heart rate, respiratory rate, non-invasive blood pressure, and saturated pulse oximeter. This investigation added hemodynamic parameters including cardiac output, fractional tissue oxygen extraction, heart rate complexity, heart rate variability, splanchnic regional oxygen saturation, stroke volume, and thoracic fluid content.

Results: Electrical cardiometry and near-infra-red spectroscopy measurements revealed changes in hemodynamic parameters not detected by standard neonatal bedside monitoring. The investigation found statistically significant differences in hemodynamics and regional tissue oxygen saturation.

Conclusions: Monitoring hemodynamic measurements using electrical cardiometry and oxygen extraction using near-infrared spectroscopy during red blood cell transfusion may offer more individualized care for anemic premature infants and could be used for the development of evidence-based guidelines to improve care.