

National UK survey of blood warming devices for neonatal exchange transfusion



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Red cell double volume exchange transfusion is the mainstay of treatment in severe haemolytic disease of the newborn to prevent kernicterus due to severe hyperbilirubinaemia. With the success of maternal anti-D prophylaxis and efficacy of intensive light emitting diode phototherapy, exchange transfusion is now a rarely performed procedure. The UK's Joint Blood Transfusion and Tissue Transplantation Services Professional Advisory Committee suggests blood should be warmed to 37°C prior to exchange transfusion.¹ Current guidelines from the British Committee for Standards in Haematology also advise blood warming to avoid neonatal hypothermia with an approved blood warming device and in a controlled manner to avoid over-heating and an increased risk of haemolysis.² Despite these recommendations, there is so far no published evidence to support the safety, efficacy or necessity of blood warming devices in neonates. A British Paediatric Surveillance Unit study in 2015-2016 surveyed the incidence of neonatal exchange transfusion but did not evaluate the use of blood warming devices or any potential associated complications.³

The neonatal intensive care unit (NICU) at Norfolk and Norwich University Hospital NHS Trust had two near-miss cases of neonatal collapse during exchange transfusion of warmed blood. Both cases were reported to the UK's Serious Hazards of Transfusion (SHOT) national haemovigilance scheme (www.shotuk.org). Local root cause analysis in each case considered the cause of collapse to be unrelated to the blood component transfused and concluded that the aetiology may instead be related to a complication of blood warming.

In light of these incidents, the authors were interested in finding out how commonly blood warming is practised in UK NICUs and so they surveyed (by telephone) tertiary-level NICUs to ask about:

- current practices regarding blood warming during exchange transfusion
- the equipment used and its provenance
- awareness of any adverse incidents.

Data were obtained from all 58 units contacted and responses were received from the in-charge nurse, nurse manager or a senior clinician. All units reported performing only one or two exchange transfusions per year.

- 40 out of 58 (69%) routinely used a blood warmer for exchange transfusion

- 34 of the 40 units (85%) had their own dedicated warmer with variable regional distribution (**FIGURE 1**)
- six units (15%) borrowed warming equipment ad hoc from operating theatres, labour ward or the paediatric intensive care unit for the procedure
- 34 (100%) units were able to provide specific details of their warming equipment; at least six different devices were in current clinical use in UK NICUs (**TABLE 1**).

Importantly two units reported associated adverse incidents: one was a neonatal collapse during transfusion and one was an unspecified reaction during transfusion that led to the discontinued use of the blood warmer by the unit.

The survey revealed that two-thirds of tertiary UK neonatal units currently practise routine blood warming for neonatal exchange transfusion, while a third do not practise blood warming. There is little research into the thermal or cold stress associated with use/non-use of blood warming equipment in neonates. A meta-analysis of 17 studies in adults demonstrated safety of use of blood warmers⁴ but similar studies and randomised controlled trials are absent in neonates.

Conclusion

The authors propose that this vulnerable patient population is being put at risk by a lack of dedicated warming equipment in some centres, and by borrowed and infrequently used adult blood-warming devices in others. This, coupled with the relative

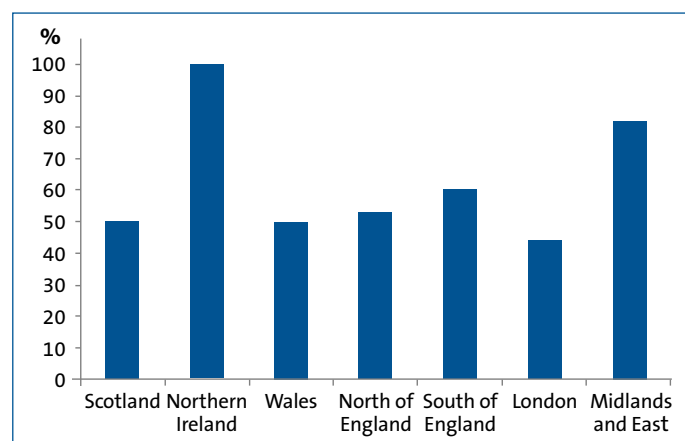


FIGURE 1 The percentage of NICUs with dedicated blood warmers.

infrequency with which the procedure is performed nowadays, entails inherent risks to patient safety associated with limited

Blood warmer	Number of units
Ranger 3M Europe, Belgium	13 (38%)
Astoflo Stihler Electronic GmbH, Germany	6 (18%)
Enflow BD Worldwide, CareFusion, UK	6 (18%)
Hotline Smith's Medical, UK	2 (6%)
Biegler Biegler GmbH, Austria	6 (18%)
Gaymar Medi Temp II Gaymar Industries, USA	1 (3%)

TABLE 1 The type and percentage of blood warmers used in neonatal units across the UK.

exposure, training and competency of staff. In conclusion, the authors believe there is a need for studies into the safety and efficacy of blood warming devices and practices in neonates.

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