Safety of Red Blood Cell Transfusion Using Small Central Lines in Neonates: An *in vitro* Non-inferiority Study

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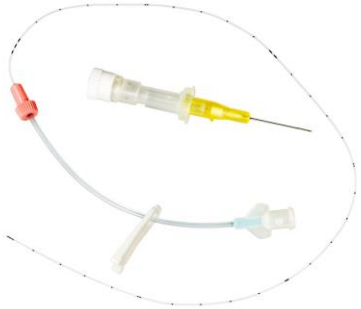
Background

Do you transfuse RBCC through 28G PICC lines in neonates?!



Is it a problem in Switzerland?
45% of units already transfused (rarely)
80% of units would transfuse if safe

Objectives

To investigate the **safety** of transfusing RBCC through neonatal PICC and to adapt the best clinical practice guidelines of RBC transfusion in premature infants.

Methods

- Non-inferiority in vitro study, preparing a mock RBCC neonatal transfusion (fig1) through 24G silicone and 28G polyurethane PICC lines, **compared** to a peripheral 24G short catheter.
- Primary endpoint was **hemolysis percentage**. Secondary endpoints were **catheter occlusion, inline pressure, and potassium and lactate values.**
- Signification level of 2.5%, and a power of 0.8 was 8 catheters in each group for a total of 24 catheters, 392 measures.

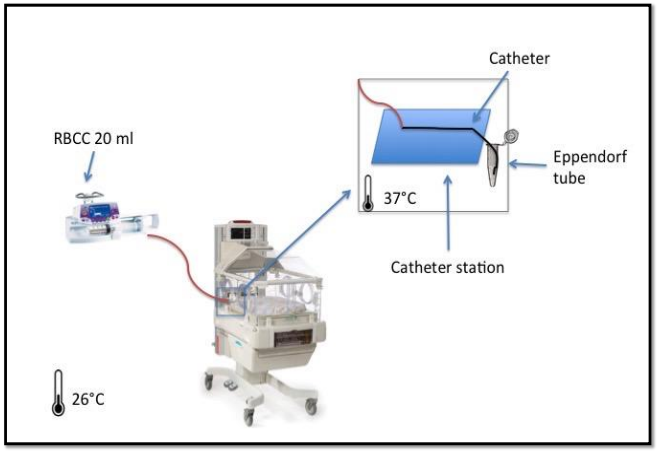


Fig1. System setup represents one RBCC infusion through a PICC line that lies on a support catheter station with the tip inserted on a collector for sampling. The same setup was used for the three groups simultaneously.

Results

Hemolysis values were not statistically different among groups (0.06% variation, p = 0.95) or over time (2.75% variation, p = 0.72). The highest hemolysis values in both groups were below the non-inferiority predefined margin. We did not observe catheter occlusion. Inline pressure varied between catheters but followed the same pattern of rapid increase followed by stabilization.

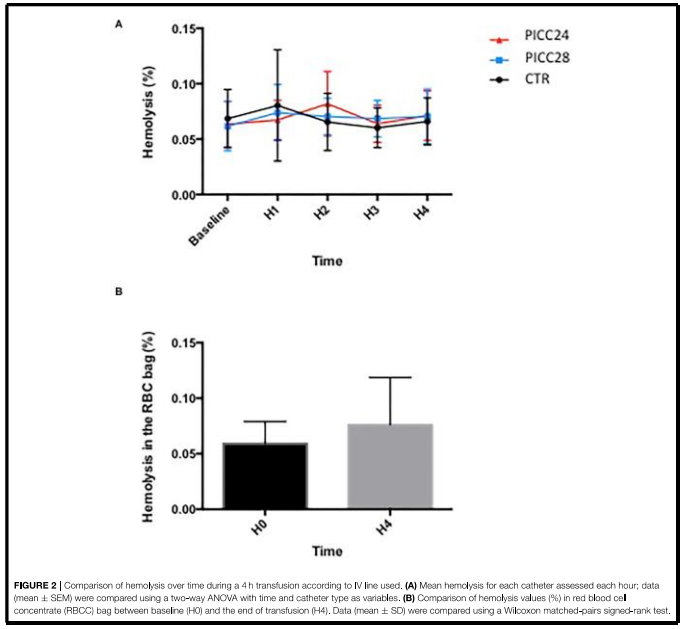


FIGURE 2 | Comparison of hemolysis over time during a 4 h transfusion according to IV line used. **(A)** Mean hemolysis for each catheter assessed each hour; data (mean ± SEM) were compared using a two-way ANOVA with time and catheter type as variables. **(B)** Comparison of hemolysis values (%) in red blood cell concentrate (RBCC) bag between baseline (H0) and the end of transfusion (H4). Data (mean ± SD) were compared using a Wilcoxon matched-pairs signed-rank test.

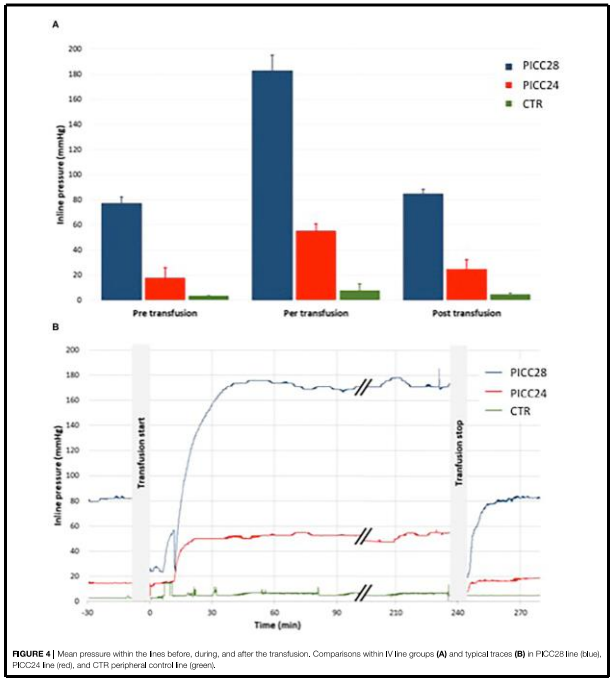


FIGURE 4 | Mean pressure within the lines before, during, and after the transfusion. Comparisons within IV line groups **(A)** and typical traces **(B)** in PICC28 line (blue), PICC24 line (red), and CTR peripheral control line (green).

Discussion

RBCC transfusion performed in vitro through 24G silicone and 28G polyurethane PICC lines is feasible **without detectable hemolysis or pressure concerns**.

Hemolysis during transfusion of RBCC in studied PICC lines is non-inferior to peripheral 24G catheters.

Clinical prospective assessment in preterm infants is needed to confirm these data further.