NEONATAL OMISSION OF CROSSMATCH (NEOXM) – Take Less, Give More: An Improvement Initiative To Neonatal Transfusion

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INTRODUCTION

Packed red blood cell (PRBC) transfusion is often considered a life-saving measure in very low birth-weight (VLBW) neonates due to anaemia of prematurity and iatrogenic blood loss. The smaller and less mature neonates tend to receive larger amount of transfusions to maintain an optimal haemoglobin level. In our institution, a blood sample for full cross-matching is required prior to every blood transfusion.

AIMS

We aim to minimise blood sampling from VLBW neonates by revising the institution's neonatal transfusion guidelines, allowing transfusions of PRBC to neonates born with birth-weight less than 1.5kg without full cross-match of donor blood with their blood specimens.

METHODOLOGY

A quality improvement initiative termed Neonatal Omission of Crossmatch (NeoXM) was introduced in November 2017. All VLBW neonates were tested for eligibility upon admission to KK Hospital NICU. If specified pre-transfusion criteria were met, full cross-match of donor blood with neonatal blood was not needed. VLBW neonates born 3 months before and after implementation of NeoXM were studied. Demographic data, incidence of blood testings and PRBC transfusions, duration for specimen processing to administration to patient, and any transfusion related reactions were analysed. Potential cost reduction after protocol implementation was also calculated.

Pre-Transfusion Selection Criteria & Workflow:

Neonate: Birthweight <1.5kg, Chronological age <4 months
Mother: Maternal ABO and Rh (D) grouping, no maternal antibodies present

→ **Pre-Transfusion Testing:** Ensuring Neonatal ABO and Rh(D) grouping and Direct Anti-globulin Test negative

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Red Cells Selection: Leucocyte-reduced Group O red cells for transfusion

← **Omission of Full Crossmatch (NeoXM):** No compatibility testing required for subsequent blood transfusion up to 4 months of age

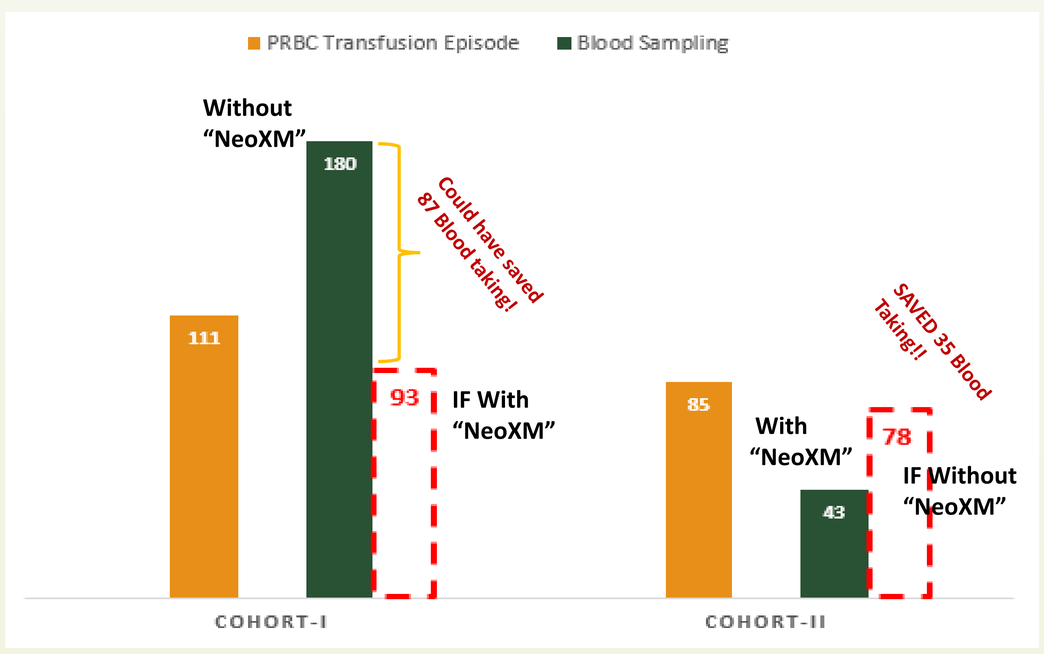
RESULTS

A total of 100 cases were reviewed, 58 pre-NeoXM (cohort-I) and 42 post-NeoXM (cohort-II). Mean gestational age and birthweight were similar in both cohorts. 2 cases were ineligible for NeoXM due to unavailability of maternal sample or cord blood. Percentage of VLBW neonates needing blood transfusions were similar between cohorts (62.1 % vs 66.7%, p=0.64). In cohort-1, 180 blood samplings for crossmatch were done and 111 unit of PRBCs transfused. In cohort-II, only 43 blood samplings were performed for 85 transfusion episodes. 50 blood samplings for crossmatch were saved due to NeoXM. Maximum blood samplings done per patient pre-NeoXM was 10, reduced to 2 post-NeoXM. Median time taken from blood ordering to administration to patient was shortened by 2hours 25minutes. No adverse reactions were reported from uncross-matched transfusions. The total cost savings for patients were $4420.

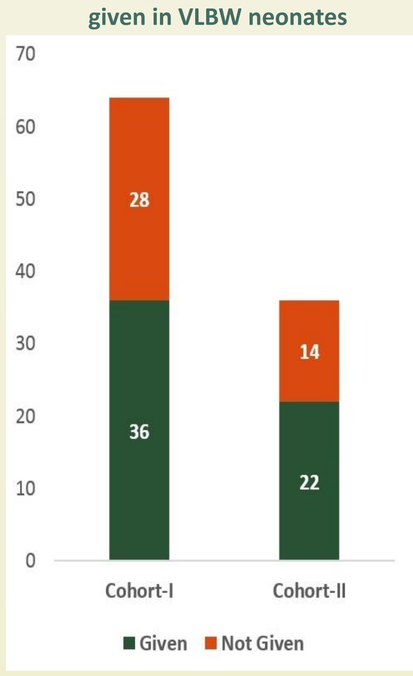
	Cohort 1 (Pre-NeoXM) (n=58)	Cohort 2 (Post-NeoXM) (n=42)
Mean Birthweight (g)	1135.95 (± 268.63)	1066.31 (± 257.10)
Mean Gestational Age (weeks)	29.27 (± 2.78)	28.52 (± 2.27)

Comparisons were made between the 2 cohorts on several aspects as showed below:

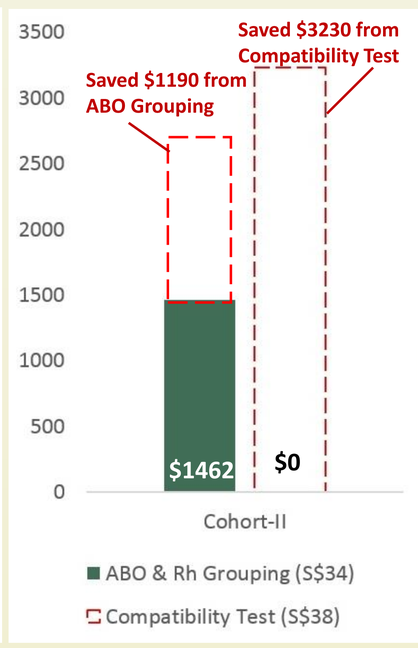
Number of Blood Sampling vs Unit of PRBC Transfusion given



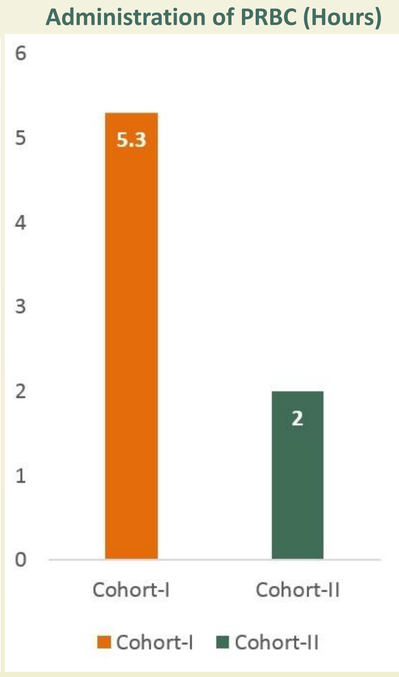
Percentage of PRBC Transfusion given in VLBW neonates



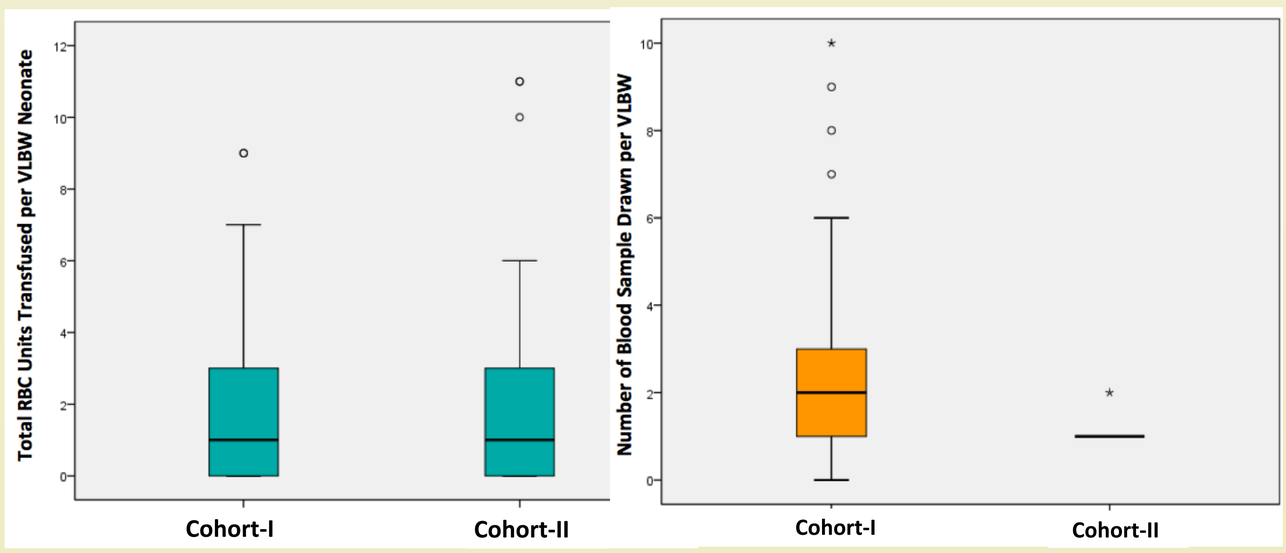
Total Cost Savings (SGD) after NeoXM



Mean Duration from Ordering to Administration of PRBC (Hours)



Other benefits observed from Post-NeoXM cohort included manpower, time and consumables (needles, alcohol swabs, blood tubes, cotton balls) saved from each blood sampling for crossmatch, and most importantly, less painful procedure for VLBW neonates.



Box plots comparing the total number of blood taken for crossmatch and unit of transfusion given in each VLBW neonate in Cohort-I and Cohort-II.

CONCLUSIONS

In conclusion, the NeoXM protocol has achieved significant cost savings, less painful blood-samplings with faster blood administration of PRBC transfusion in VLBW neonates.

REFERENCES

1. Australian & New Zealand Society of Blood Transfusion (ANZSBT) Guideline Accessed via https://www.anzsbt.org.au/pages/anzsbt-guidelines.html