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A MULTICENTER OBSERVATIONAL ASSESSMENT OF PLATELET TRANSFUSION IN NEONATAL INTENSIVE CARE UNITS

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ABSTRACT

Background: Platelet transfusion is a widely employed therapeutic intervention in Neonatal Intensive Care Units (NICUs), particularly among preterm and critically ill neonates. Current evidence suggests that factors beyond thrombocytopenia alone often influence transfusion decisions, underscoring the need for context-specific data to inform evidence-based guidelines.

Objective: This multicenter observational study aimed to evaluate the incidence, clinical determinants, and indications for platelet transfusions among neonates admitted to NICUs across multiple tertiary care hospitals in Sindh, Pakistan.

Methodology: A prospective cohort study design was employed across selected tertiary care hospitals in Sindh over a five-month period. All neonates consecutively admitted to the NICUs during the study timeframe were included. Clinical, demographic, and laboratory data were extracted through comprehensive chart reviews. A structured, validated questionnaire was administered to assess the underlying justifications for each platelet transfusion episode.

Results & Findings: A total of 401 neonates were enrolled. The mean birth weight (BW) was 2.34 ± 1.01 kg, and the mean gestational age (GA) was 34.4 ± 4.5 weeks. Platelet transfusions were administered to 37 neonates (9.2%). The majority of transfused neonates were either extremely preterm (<28 weeks; 40.5%) or term (≥37 weeks; 24.3%). The median pre-transfusion platelet count was 57×10^9/L (range: 9–285×10^9/L). Compared to their non-transfused counterparts, transfused neonates exhibited significantly lower BW and GA, elevated CRIB-II and SNAPPE-II scores (all $p<0.001$), and were more frequently admitted due to respiratory distress ($p<0.001$), hypoxic-ischemic encephalopathy ($p=0.009$), and hemolytic disease of the newborn ($p<0.001$). Multivariate logistic regression identified gestational age <28 weeks ($p<0.001$), mechanical ventilation ($p=0.008$), and platelet nadir ≤150×10^9/L at admission ($p<0.001$) as independent predictors of transfusion. The

primary clinical indications cited for the initial platelet transfusion were thrombocytopenia (86.5%), underlying disease pathology (78.4%), and severity of illness (37.8%).
Conclusion: This multicenter analysis highlights substantial inter-patient variability in pre-transfusion platelet counts, with transfusion decisions frequently exceeding guideline-recommended thresholds. Beyond thrombocytopenia, multiple clinical parameters—particularly prematurity, respiratory compromise, and disease severity—emerged as significant determinants of transfusion practices. These findings underscore the necessity for standardized, evidence-based transfusion protocols tailored to the unique clinical settings of resource-limited neonatal care environments.

Keywords: Neonatology, Platelet Transfusion, Thrombocytopenia, Neonatal Intensive Care Unit, Prematurity, Multicenter Study, Sindh

INTRODUCTION

Thrombocytopenia, defined as a platelet count of less than 150 × 10⁹/L, is a common hematological abnormality, affecting approximately 20–45% of neonates admitted to neonatal intensive care units (NICUs) [1,2]. The association between thrombocytopenia and adverse neonatal outcomes remains a subject of ongoing debate. Several studies have suggested a potential link between thrombocytopenia and complications such as intraventricular hemorrhage (IVH), necrotizing enterocolitis (NEC), and increased mortality [3–5]. In contrast, other investigations have failed to establish such associations [6–9], and some have highlighted the potential risks associated with platelet transfusions themselves. Specifically, platelet transfusion in the NICU setting has been associated with increased incidences of sepsis, NEC, hyporegenerative thrombocytopenia [10–12], and elevated rates of IVH and mortality [10,13–15].

The PlaNeT-2 trial, a large multicenter randomized controlled study, notably demonstrated that preterm neonates who received transfusions at a higher threshold of 50 × 10⁹/L experienced significantly worse outcomes compared to those transfused at a lower threshold of 25 × 10⁹/L [15]. Furthermore, platelet transfusions are associated with a seven-fold higher risk of acute transfusion reactions compared to red blood cell transfusions. Neonates, in particular, appear to be more susceptible to transfusion-related adverse events than older pediatric or adult patients [16].

Until recently, the clinical implications of adopting liberal versus restrictive transfusion thresholds were unclear. However, emerging evidence increasingly supports the implementation of more restrictive transfusion strategies, even for extremely preterm neonates [15,17]. Despite this, platelet transfusion practices across NICUs exhibit substantial variability, with reported transfusion thresholds ranging from below 10 × 10⁹/L to above 150 × 10⁹/L [1,8,18–20]. This broad range suggests that clinical decision-making is influenced by factors beyond absolute platelet counts. Nevertheless, the literature offers limited insight into the specific determinants that guide these transfusion decisions. A systematic evaluation of these contributing factors is essential for optimizing transfusion practices and ensuring the judicious and evidence-based use of platelets in this vulnerable patient population.

Study Objectives:

The primary objective of this study was to characterize the epidemiology of platelet transfusion practices within the NICU of different convenient tertiary hospital having pediatrics department containing intensive care units. The secondary objective was to identify and analyze the clinical determinants and justifications underpinning platelet transfusion decisions in neonates. It was hypothesized that transfusion practices within this cohort would demonstrate considerable heterogeneity and that a notable proportion of transfusions would be administered at thresholds exceeding those recommended by current evidence-based guidelines

METHODOLOGY

This study employed a prospective observational cohort design involving neonates admitted consecutively to the Neonatal Intensive Care Units (NICUs) of selected tertiary care hospitals across Sindh, Pakistan, including major urban centers such as Karachi, Hyderabad, Sukkur, and Larkana.

The study was conducted over a defined period, and all eligible neonates admitted to the NICUs during this interval were enrolled. The only exclusion criterion was the requirement for extracorporeal membrane oxygenation (ECMO). Ethical approval for the study was obtained from the respective institutional review boards of the participating hospitals, with a waiver of informed consent due to the non-interventional nature of the study. In the absence of standardized transfusion protocols across participating sites, decisions regarding platelet transfusions were left to the clinical judgment of the attending neonatologists and NICU medical teams. All platelet components were procured from hospital-affiliated blood banks and were subjected to leukoreduction by pre-storage filtration. For neonates with birth weights ≤1200 g, cytomegalovirus (CMV)-negative and gamma-irradiated products were preferentially used. Additional processing, such as washing of platelets, was carried out at the discretion of the treating physician.

Data collection was conducted by trained research personnel using pre-validated case report forms. Baseline demographic and clinical parameters were recorded at the time of NICU admission. For neonates who received platelet transfusions, daily data were collected from admission until the administration of the first transfusion. For non-transfused neonates, monitoring continued until death, NICU discharge, or attainment of 44 weeks of corrected gestational age, whichever occurred earlier. The severity of illness at admission was assessed using validated scoring systems, including the Clinical Risk Index for Babies II (CRIB-II) and the Score for Neonatal Acute Physiology Perinatal Extension II (SNAPPE-II). Potential determinants influencing platelet transfusion decisions were identified through a comprehensive review of existing literature and expert consultation in neonatology and transfusion medicine. These determinants included both baseline characteristics and clinical events during the NICU stay. Furthermore, the clinical justifications for each initial platelet transfusion were obtained within 48 hours post-transfusion via a structured and validated questionnaire completed by the responsible clinician. The questionnaire allowed clinicians to indicate one or more clinical justifications and rank them by relative importance.

Data analysis was performed using IBM SPSS Statistics (Version 26, 2019). Descriptive statistics were reported as frequencies and percentages for categorical variables, and as mean ± standard deviation (SD) or median with interquartile range (IQR) for continuous variables, depending on the distribution. Group comparisons between transfused and non-transfused neonates were conducted using Chi-square or Fisher's exact tests for categorical data, and Student's t-test or Wilcoxon rank-sum test for continuous data, as appropriate. Logistic regression was used for univariate analysis to identify potential predictors of platelet transfusion, with odds ratios (ORs) and 95% confidence intervals (CIs) calculated. Clinically significant variables from univariate analyses were included in multivariate logistic regression models. Model performance was evaluated using receiver operating characteristic (ROC) curves, and forward stepwise selection based on likelihood ratios was applied for final model refinement.

RESULTS & FINDINGS

Baseline data

A total of 401 consecutively admitted patients were included during the 5-month study period. None were excluded. Neonates in this cohort were born with a mean GA of 34.4±4.5 weeks and birth weight of 2.34±1.01 kg. At least one platelet transfusion was given to 37 patients (9.2%) during their NICU stay (median: 2 platelet transfusions, 1st–3rd IQR 1–4). Baseline characteristics of the study population are presented in Table 1. Extremely preterm neonates, defined as those born before 28 weeks GA, accounted for 40.5% of the cohort transfused in platelets, followed by 24.3% of term patients, defined as born after 37 weeks GA (Table 2). Statistically significant baseline characteristics between the transfused versus non-transfused patients included lower birth weight (1.72±1.18 vs 2.41±0.97 kg, $p<0.001$), lower gestational age (29.6±5.2 vs 35.1±3.8 weeks, $p<0.001$), and the following admission diagnoses: respiratory disease (81.5 vs 57.9%, $p=0.001$), hypoxicischemic encephalopathy (10.8 vs 1.6%, $p=0.009$) and hemolytic disease of the newborn (13.5 vs 0.3%, $p<0.001$).

Platelet transfusion data

The median platelet nadir within 24 hours before transfusion was 57 × 109/L, ranging from 9 to 285 × 109/L (25–75th percentiles 36–82 × 109/L, mean 64±46 × 109/L). The highest proportion of transfused patients received one platelet transfusion (35.1%); 21.6% received two transfusions and another 21.6% received five or more transfusions. Of the transfused infants, 62.2% were exposed to multiple donors. Table 3 summarizes the number of platelet transfusions per patient and their donor exposure.

Determinants of platelet transfusion

On the day of NICU admission: On univariate analysis, the associations between the following determinants recorded on the day of NICU admission and future platelet transfusion were statistically significant (Table 2): GA at birth <28 weeks, BW ≤ 1500 g, CRIB-II score ≥10, SNAPPE-II score ≥24, mechanical ventilation requirements (high frequency or conventional), and seizures. On the day of admission, significant determinants for platelet transfusion throughout the NICU stay were: Hb nadir ≤ 150 g/L, platelet nadir ≤ 150 × 109/L, blood lactate >5 mmol/L and base excess ≤−10. After the first day in the NICU After the first day in the NICU, significant determinants of platelet transfusion on univariate analysis were: Hb nadir ≤ 96 g/L, platelet nadir ≤ 150 × 109/L, clinically evident hemorrhage, NEC, sepsis, or ibuprofen treatment. Multivariate logistic regression model to predict the platelet transfusion risk for a neonate admitted in the NICU identified GA < 28 weeks at birth, mechanical ventilation requirements on day one in the NICU and platelet nadir ≤150 × 109/L on the first day in the NICU. The area under the ROC curve was 0.856 (95% CI 0.799– 0.914).

This was similar to the area under the ROC curve of the model obtained by a forward stepwise selection [0.917 (95%CI 0.878–0.956)]. Stated justifications for a first platelet transfusion All caregivers who ordered a first platelet transfusion filled the questionnaire (Appendix 1) on their justification to prescribe a platelet transfusion (Table 4). The most frequently declared reasons were: (1) low platelet levels (86.5%), (2) underlying disease (78.4%), (3) severity of the illness (37.8%), and (4) active bleeding (32.4%). When underlying illness justified a transfusion (29 patients out of 37), the main reported conditions were sepsis (with or without shock) (N=7) and gastrointestinal issues such as NEC and/or intestinal perforation (N=5). A subgroup of 14 patients received platelet transfusions despite having platelet counts ≥150 × 109/L. The stated justifications for transfusing these non-thrombocytopenic patients are also reported in Table 4. Low platelet counts remained the most frequent physician justification in this subgroup (42.9%). Reasons stated as “other” were exchange transfusion (N=1), disseminated intravascular coagulation post-operatively (N=1), and an administration error where plasma was prescribed but platelets were given (N=1).

Table 1: Baseline data

	Transfused 37	**Not transfused 364**	**All patients 401**	**p-value**
Baseline characteristics				
Male gender	14 (37.8%)	195 (53.6%)	209 (52%)	0.07
Birth weight (kg)	1.72±1.18	2.41±0.97	2.34±1.01	<0.001
Gestational age at birth (weeks)	29.6±5.2	35.1±3.8	34.4±4.5	<0.001
Admission from				
Pediatric or post-natal ward	1 (2.7%)	6 (1.6%)	7 (1.7%)	
Delivery room	20 (54.1%)	250 (68.7%)	270 (67.3%)	
Transfer from another hospital	16 (43.2%)	104 (28.6%)	120 (29.9%)	

Other	0	4 (1.1%)	4 (1.0%)	
Diagnosis on admission1				
Respiratory disease	44 (81.5%)	2012 (57.9%)	245 (61.1%)	0.001
Prematurity	25 (67.6%)	1963 (54.1%)	221 (55.4%)	0.160
Bacterial infection4	11 (29.7%)	635 (17.4%)	74 (18.5%)	0.080
Congenital abnormality, excluding cardiac	3 (8.1%)	44 (12.1%)	47 (11.7%)	0.600
Intra-uterine growth restriction	7 (18.9%)	39 (10.7%)	46 (11.5%)	0.170
Congenital cardiac disease	2 (5.4%)	43 (11.8%)	45 (11.2%)	0.410
Seizures	3 (8.1%)	10 (2.7%)	13 (3.2%)	0.110
Hypoxic-ischemic encephalopathy	4 (10.8%)	6 (1.6%)	10 (2.5%)	0.009
Hydrops fetalis	1 (2.7%)	7 (1.9%)	8 (2.0%)	0.540
Hemolytic disease of the newborn	5 (13.5%)	1 (0.3%)	6 (1.5%)	<0.001
Shock				
Hypovolemic	1 (2.7%)	2/363 (0.6%)	3 (0.8%)	0.250
Septic	0	1 (0.3%)	1 (0.2%)	1.000
Hemorrhagic	1 (2.7%)	0	1 (0.2%)	0.090
Cardiogenic	1 (2.7%)	1 (0.3%)	2 (0.5%)	0.180
Congenital viral infection	0	3/363 (0.8%)	3 (0.8%)	0.100

Table 2: Possible determinants of platelet transfusion: univariate and multivariate analysis (n=401)

	Transfused n=37	**Not transfused n=364**	**Univariate OR (95%CI)**	**p-value**	**Adjusted OR (95%CI)**	**p-value**
Clinical data (1st day in NICU)						
Gestational age at birth						
<28 weeks	15	22	8.64 (3.36; 22.20)	<0.001	9.60 (3.73; 24.69)	<0.001
28–30 weeks	6	37	2.05 (0.69; 6.16)	0.200		
31–33 weeks	1	74	0.17 (0.02; 1.38)	0.100		
34–37 weeks	6	117	0.65 (0.22; 1.88)	0.430		
>37 weeks	9	114	Reference			

	Transfused n=37	**Not transfused n=364**	**Univariate OR (95%CI)**	**p-value**	**Adjusted OR (95%CI)**	**p-value**
Weight at NICU admission						
≤/> 1500 g (reference)1	22/15	73/2862			5.75 (2.84; 11.63)	<0.001
CRIB-II score						
1st quartile (score ≥ 10)	14	10	21.00 (4.05; 108.84)	<0.001		
2nd quartile (score = 8–9)	2	18	1.67 (0.22; 12.89)	0.620		
3rd quartile (score = 5–7)	3	18	2.50 (0.38; 16.42)	0.305		
4th quartile (score = 1–4)	2	30	Reference			
SNAPPE-II score						
1st quartile (score ≥ 24)	24	68	18.18 (4.16; 79.42)	<0.001		
2nd quartile (score = 11–23)	5	84	3.07 (0.58; 16.20)	0.190		
3rd quartile (score = 1–10)	4	77	2.68 (0.48; 14.98)	0.260		
4th quartile (score = 0)	2	103	Reference			
Mechanical ventilation Yes/No	32/5	197/167	5.43 (2.07; 14.24)	0.001	5.55 (1.56; 19.73)	0.008
Non-invasive ventilation Yes/No	12/25	144/220	0.73 (0.36; 1.51)	0.400		
Seizures Yes/No	4/33	8/355	5.38 (1.54; 18.81)	0.008		
Laboratory data (1st day in NICU)						
Lowest hemoglobin level						
1st quartile: ≤150 g/L	20	63	13.81 (3.12; 61.23)	0.001		
2nd quartile: 151–174 g/L	5	81	2.69 (0.51; 14.23)	0.250		
3rd quartile: 175–195 g/L	7	75	4.06 (0.82; 20.14)	0.090		
4th quartile: ≥196 g/L	2	87	Reference			
Lowest platelet count ≤/> 150 × 109 platelets/L	20/14	77/229	4.25 (2.05; 8.82)	<0.001	6.45 (2.72; 15.27)	<0.001
Blood lactate >/≤ 5 mmol/L	10/9	29/73	2.80 (1.03; 7.59)	0.040		
Lowest pH ≤/> 7.2	8/8	54/124	2.30 (0.82; 6.44)	0.110		
Base excess ≤/>–10	6/25	16/304	4.56 (1.64; 12.68)	0.004		

Variables during entire NICU stay (after the day of admission)				
Lowest hemoglobin level				
1st quartile: ≤ 96 g/L	17	72	2.94 (1.40; 6.20)	0.005
2nd quartile: 97–130 g/L	5	86	0.73 (0.26; 2.06)	0.550
3rd–4th quartiles: ≥131g/L3	15	187	Reference	
Clinically evident hemorrhage Yes/ No	10/27	12/352	10.86 (4.30; 27.43)	<0.001
Lowest platelet count ≤/> 150 × 109 platelets/L	36/1	104/239	82.73 (11.19; 611.48)	<0.001
Highest INR >/≤ 1.5	11/8	10/20	2.75 (0.84; 9.00)	0.094
Intraventricular hemorrhage				
Grade 1–2	1	20	0.65 (0.08; 5.01)	0.676
Grade 3–4	1	4	3.23 (0.35; 30.00)	0.303
Any grade	2	24	1.08 (0.24; 4.82)	0.923
None	25	323	Reference	
Necrotizing enterocolitis Yes/No	5/32	1/360	56.25 (6.38; 496.24)	<0.001
Sepsis Yes/No	7/29	12/349	7.02 (2.57; 19.20)	<0.001
Ibuprofen treatment Yes/No	5/32	14/350	3.91 (1.32; 11.54)	0.014
Surgery Yes/No	3/34	42/322	0.68 (0.20; 2.30)	0.531
Necrotizing enterocolitis Yes/No	5/32	1/360	56.25 (6.38; 496.24)	<0.001

OR: odds ratio, CI: confidence interval, NICU: neonatal intensive care unit, CRIB: clinical risk index for babies, SNAPPE: score for neonatal acute physiology–perinatal expansion

Table 3: Data on platelet transfusion in 37 patients who received at least one platelet transfusion in the NICU

Transfused: 37/401 (9.2%)	
Number of platelet transfusions per patient: n (%)	
1 transfusion	13 (35.1%)
2 transfusion	8 (21.6%)
3 transfusion	5 (13.5%)
4 transfusion	3 (8.1%)
≥ 5 transfusions	8 (21.6%)
Exposure: number of donors per patient: n (%)	
1 donor	14 (37.8%)
2 donor	9 (24.3%)
3 donor	6 (16.2%)
≥ 4 donors	8 (21.6%)
Platelet count nadir within 24 hours before first transfusion (×109/L)	
Median	57
Minimum–maximum	9–285
25–75th percentiles	36–82
Mean±SD	64±46

NICU: neonatal intensive care unit, SD: standard deviation.

Table 4: Justifications for the first platelet transfusion in 37 NICU patients

Ordering clinician: n (%)	
Resident or fellow	21 (56.8%)
Neonatologist	10 (27.0%)
Neonatal nurse practitioner	6 (16.2%)
Stated justifications1: n (%)	
Low platelet count	32 (86.5%)
Underlying illness	29 (78.4%)
Severity of illness	14 (37.8%)
Active bleeding	12 (32.4%)
Mechanical ventilation	6 (16.2%)
Invasive procedure	5 (13.5%)
Platelet dysfunction2	5 (13.5%)
Upcoming surgery	3 (8.1%)
Other	6 (16.2%)
Stated justifications for subgroup of 14 non-thrombocytopenic patients: n (%)	
Low platelet count	6 (42.9%)
Active bleeding	3 (21.4%)
Underlying illness	1 (7.1%)
Upcoming surgery	1 (7.1%)
Other	3 (21.4%)

DISCUSSION

This prospective cohort study reports the platelet transfusion practices in 401 consecutively admitted preterm and term neonates admitted in a tertiary care NICU. At least one platelet transfusion was administered to 9.2% of this population. Among the GA subgroups, extremely preterm neonates (<28 weeks GA) were the most likely to be transfused, followed by term ill neonates. Extreme prematurity, mechanical ventilation, and a low platelet count were associated with platelet transfusion. Main reasons given by physicians for ordering a platelet transfusion in neonates were a low platelet count,

underlying disease, and severity of illness. The pre-platelet transfusion threshold varied substantially, from severe thrombocytopenia to normal platelet levels.

We observed transfusion rates consistent with other studies in the NICU, where the proportion of patients who receive at least one platelet transfusion ranges from 2% to 9.4% [1, 7, 18, 23]. Extremely preterm neonates of less than 28 weeks GA were proportionally the highest transfused sub-group in this cohort. This concords with a recent large observational study of transfusion practices in newborns (N=60,243) with an overlapping timeline with our study, where neonates <27 weeks GA proportionally received the most platelet transfusions (34%, 95%CI 29–39%) compared with other GA groups in newborns [20]. In our study, term neonates were the second most transfused sub-group, an unexpected result, especially given that in the aforementioned report platelet transfusions decreased with GA [20]. However, our study selects for term infants ill enough to be admitted to the NICU, thus it represents a subgroup of term infants with a higher illness severity and/or more comorbidities at baseline.

Platelet transfusions in our study were strongly associated with extreme prematurity, as well as mechanical ventilation requirements and platelet nadir ≤ 150 × 109/L on the first day in the NICU. This makes clinical sense and is consistent with other reports [7, 11, 19, 24]. Other previously found risk factors that our study corroborates were hemorrhage [1, 19], treatment with non-steroidal anti-inflammatory drugs [1, 18], critical illness (often sepsis) [1, 7, 18, 19], as well as low BW and hypoxic ischemic encephalopathy [24]. Additionally, our study demonstrated that anemia and a diagnosis of hemolytic disease of the newborn on admission were associated with a higher risk of platelet transfusion, which, to the best of our knowledge, has not been reported previously. This was an unexpected result and the direct clinical correlation between anemia and platelet transfusion is unclear. A hypothetical explanation might be that physicians might be concerned about the effects of a potential bleed due to untreated thrombocytopenia on further lowering the hemoglobin in an already anemic patient. This is an example of a potential target for improvement when looking to decrease unnecessary or irrational use of platelet transfusions in this population.

The most frequently stated justifications for transfusion were a low platelet level, underlying disease, and severity of illness. The median platelet nadir within 24 hours before transfusion was 57 × 109/L, ranging from 9 to 285 × 109/L. This is similar to the variability reported by Patel et al. [20], where the median pre-transfusion platelet count in newborns of all GA was 71 × 109/L (10– 90th percentiles 26–135 × 109/L) and 70 × 109/L (33–100 × 109/L) in newborns <27 weeks GA. Prior to this study, there was already a growing awareness in the neonatal community about potential overuse of platelet products due to overly liberal transfusion thresholds [25]. For example, as early as in 2007, British national guidelines recommended a transfusion threshold of 20–30 × 109 platelets/L for neonates [25]. Although the randomized controlled trial demonstrating the superiority of the 25 × 109 platelets/L threshold for neonates postdates the study period [15], at the time of the study the generally accepted threshold was of 50 × 109 platelets/L [8, 18]. However, many transfusions were given above this threshold, highlighting that platelet transfusion practices may not always be guided by evidence.

Of note, in 14 patients, platelet transfusions were given to infants who were not thrombocytopenic. This represents 37.8% of the platelet-transfused subgroup. It is puzzling that the most frequently stated justification for platelet transfusion in this subgroup remained low platelet count (42.9%) and brought on the question of whether at times physicians may be administering blood products without waiting for complete blood count results.

Until recently, there were limited reports describing neonatal transfusion practices. Most platelet transfusions in the NICU are prophylactic, with widely ranging pre-transfusion thresholds [1, 8, 18, 19]. Even when local guidelines do exist, they are not always followed: up to 36% of platelet transfusions are given in the NICU outside of such guidelines [12]. Despite great variability in practice, most American and Canadian neonatologists surveyed reported a platelet transfusion threshold of 50 × 109/L for premature neonates with no medication and this threshold increased to 100 × 109/L in the United States and 50–100 × 109/L in Canada if the patient was on indomethacin [18]. A similar observational study reported a wide variety of practices in Europe and the United States, with thresholds ranging from 10 to 150 × 109/L [8].

The study had some limitations. It was a unicentric, limiting its external validity. Physicians were aware that their transfusion habits were monitored throughout the research project, potentially affecting their practices. Similarly, the stated justifications for transfusions could have been influenced by the multiple choice questionnaire. Only the reasons for the first platelet transfusion were assessed in this study, thus the justifications for the entirety of platelet transfusions may have differed. Among the study's strengths was the inclusion of all consecutive admissions, minimizing selection bias. No patients were excluded, enhancing result generalizability. Also favoring generalizability is that this NICU is a typical multidisciplinary unit, treating preterm and term surgical and medical patients. The prospective design limited the risk of information bias. The use of a validated case report form optimized the quality and integrity of our data. A notable strength of this study was its design in which only data observed before the first platelet transfusion in NICU were considered possible determinants of platelet transfusion, which addressed any protopathic bias.

CONCLUSION

This analysis may help review and optimize platelet transfusion practices to achieve safer use of platelets in the NICU, and potentially improve outcomes for neonates, reduce healthcare costs, and decrease blood bank resources. In our center, the observations from this study, along with current evidence from the literature, have promoted a review of local platelet transfusion practice among the neonatology group and have already incited the implementation of guidelines favoring more restrictive transfusion thresholds in neonates. A study is currently ongoing in our NICU to evaluate whether these efforts have resulted in a change in platelet transfusion practice locally.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

REFERENCES

1. Cremer M, Sola-Visner M, Roll S, et al. Platelet transfusions in neonates: Practices in the United States vary significantly from those in Austria, Germany, and Switzerland. Transfusion 2011;51(12):2634–41.
2. Christensen RD, Henry E, Wiedmeier SE, et al. Thrombocytopenia among extremely low birth weight neonates: Data from a multihospital healthcare system. J Perinatol 2006;26(6):348–53.
3. Andrew M, Castle V, Saigal S, Carter C, Kelton JG. Clinical impact of neonatal thrombocytopenia. J Pediatr 1987;110(3):457–64.
4. Andrew M, Vegh P, Caco C, et al. A randomized, controlled trial of platelet transfusions in thrombocytopenic premature infants. J Pediatr 1993;123(2):285–91.
5. von Lindern JS, van den Bruele T, Lopriore E, Walther FJ. Thrombocytopenia in neonates and the risk of intraventricular hemorrhage: A retrospective cohort study. BMC Pediatr 2011;11:16.
6. Baer VL, Lambert DK, Henry E, Christensen RD. Severe thrombocytopenia in the NICU. Pediatrics 2009;124(6):e1095–100.
7. Stanworth SJ, Clarke P, Watts T, et al. Prospective, observational study of outcomes in neonates with severe thrombocytopenia. Pediatrics 2009;124(5):e826–34.
8. Sparger K, Deschmann E, Sola-Visner M. Platelet transfusions in the neonatal intensive care unit. Clin Perinatol 2015;42(3):613–23.
9. von Lindern JS, Hulzebos CV, Bos AF, Brand A, Walther FJ, Lopriore E. Thrombocytopaenia and intraventricular haemorrhage in very premature infants: A tale of two cities. Arch Dis Child Fetal Neonatal Ed 2012;97(5):F348–52.
10. Baer VL, Lambert DK, Henry E, Snow GL, Sola- Visner MC, Christensen RD. Do platelet transfusions in the NICU adversely affect survival? Analysis of 1600 thrombocytopenic neonates in a multihospital healthcare system. J Perinatol 2007;27(12):790–6.
11. Kenton AB, Hegemier S, Smith EO, et al. Platelet transfusions in infants with necrotizing enterocolitis do not lower mortality but may increase morbidity. J Perinatol 2005;25(3):173–77.
12. Dohner ML, Wiedmeier SE, Stoddard RA, et al. Very high users of platelet transfusions in the neonatal intensive care unit. Transfusion 2009;49(5):869–72.

13. Baer VL, Lambert DK, Henry E, Snow GL, Christensen RD. Red blood cell transfusion of preterm neonates with a Grade 1 intraventricular hemorrhage is associated with extension to a Grade 3 or 4 hemorrhage. Transfusion 2011;51(9):1933–9.
14. Bilgin YM, van de Watering LMG, Versteegh MIM, van Oers MHJ, Vamvakas EC, Brand A. Postoperative complications associated with transfusion of platelets and plasma in cardiac surgery. Transfusion 2011;51(12):2603–10.
15. Curley A, Stanworth SJ, Willoughby K, et al. Randomized trial of platelet-transfusion thresholds in neonates. N Engl J Med 2019;380(3):242–51.
16. Narayan S, Poles D, Bellany M, et al. On behalf of the Serious Hazards of Transfusion (SHOT) Steering Group. The 2018 Annual SHOT Report 2019.
17. Fustolo-Gunnink SF, Fijvandraat K, van Klaveren D, et al. Preterm neonates benefit from low prophylactic platelet transfusion threshold despite varying risk of bleeding or death. Blood 2019;134(26):2354–60.
18. Josephson CD, Su LL, Christensen RD, et al. Platelet transfusion practices among neonatologists in the United States and Canada: Results of a survey. Pediatrics 2009;123(1):278–85.
19. Sparger KA, Assmann SF, Granger S, et al. Platelet transfusion practices among very-low-birth-weight infants. JAMA Pediatr 2016;170(7):687–94.
20. Patel RM, Hendrickson JE, Nellis ME, et al. Variation in neonatal transfusion practice. J Pediatr 2021;235:92–9.e4.
21. Parry G, Tucker J, Tarnow-Mordi W; UK Neonatal Staffing Study Collaborative Group. CRIB II: An update of the clinical risk index for babies score. Lancet 2003;361(9371):1789–91.
22. Richardson DK, Corconan JD, Escobar GJ, Lee SK. SNAP-II and SNAPPE-II: Simplified newborn illness severity and mortality risk scores. J Pediatr 2001;138(1):92–100.
23. Del Vecchio A, Sola MC, Theriaque DW, et al. Platelet transfusions in the neonatal intensive care unit: Factors predicting which patients will require multiple transfusions. Transfusion 2001;41(6):803–8.
24. Murray NA, Roberts IAG. Neonatal transfusion practice. Arch Dis Child Fetal Neonatal Ed 2004;89(2):F101–7.
25. Norfolk D, editor. Handbook of Transfusion Medicine. United Kingdom Blood Services. 5ed. Sheffield: The Stationary Office; 2013. p.170.