AAP DISTRICT VIII SECTION ON NEONATAL PERINATAL MEDICINE

2021 ANNUAL CONFERENCE **ORIGINAL RESEARCH** (BASIC SCIENCE or CLINICAL) ABSTRACT SUBMISSION FORM

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If yes, type and year of training: Fellowship in Neonatology, PG5

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Signature: Farzana Hamid Date: 02/17/2021

Please paste abstract to the second page of this document, using the template provided. **Please do not exceed one page using font size of at least 10.**

DEADLINE FOR RECEIPT OF ABSTRACT IS FEBRUARY 19, 2021. Submissions will be accepted for either poster or oral presentation. Authors will be notified of acceptance and format for presentation (poster or poster symposium) by **March 12, 2021.**

Title: Effect of blood transfusion on outcomes of singleton preterm infants < 29 weeks gestation born small for gestation and appropriate for gestational age.

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Background: Oxidative stress plays a key role in diseases of prematurity such as bronchopulmonary dysplasia (BPD) and retinopathy of prematurity (ROP). Blood transfusions cause oxidative stress but their association with BPD and ROP is controversial. Small for gestation (SGA, < 10^{th} centile for birthweight and sex) infants have low antioxidant levels and are at higher risk for BPD and ROP. It is unknown if the effect of blood transfusion differs in SGA and appropriate for gestation (AGA) infants. The objective of our study was to determine the outcomes of SGA and AGA infants < 29 weeks gestation who receive blood transfusion compared to infants who do not.

Methods: Using the Canadian Neonatal Network Data base, we investigated the outcomes of singleton < 29 weeks gestation infants from 2015 to 2019. Moribund infants, major congenital anomalies and large for gestation age infants were excluded. Primary outcome was development of BPD. Secondary outcomes were death, ROP, severe brain injury (periventricular leukomalacia/grade 3-4 intraventricular hemorrhage), late onset sepsis and necrotizing enterocolitis. AGA infants who received blood transfusion were compared to AGA infants who did not and SGA infants who received blood transfusion were compared to SGA infants who did not. Adjusted odds ratio's (aORs) and 95% confidence interval (CI) were calculated using univariate and multivariate regression analysis. To assess differential effects of transfusion on SGA and AGA infants, ratio of aORs for SGA infants to AGA infants was calculated.

Results: Of 8540 infants admitted to Canadian NICUs, 3190 met exclusion criteria (Figure). Baseline characteristics are reported in Table 1. Table 2 shows the primary and secondary outcomes. Compared to infants who did not receive blood transfusions, the aORs of BPD were higher in AGA and SGA infants who received blood transfusions with ratio of the two aORs also significant (2.90 95% CI1.39,6.03). The aORs for mortality was higher in AGA infants who received blood transfusion. The ratio of the two aORs for mortality for the AGA and SGA groups was 0.42 (95%CI 0.18, 0.99). There was no difference in any of the other secondary outcomes between the two groups.

Conclusion: Compared to AGA infants who receive blood transfusion, SGA infants who receive blood transfusion are at higher odds for developing BPD. Mortality associated with blood transfusion in SGA and AGA infants needs further studies.

Figure

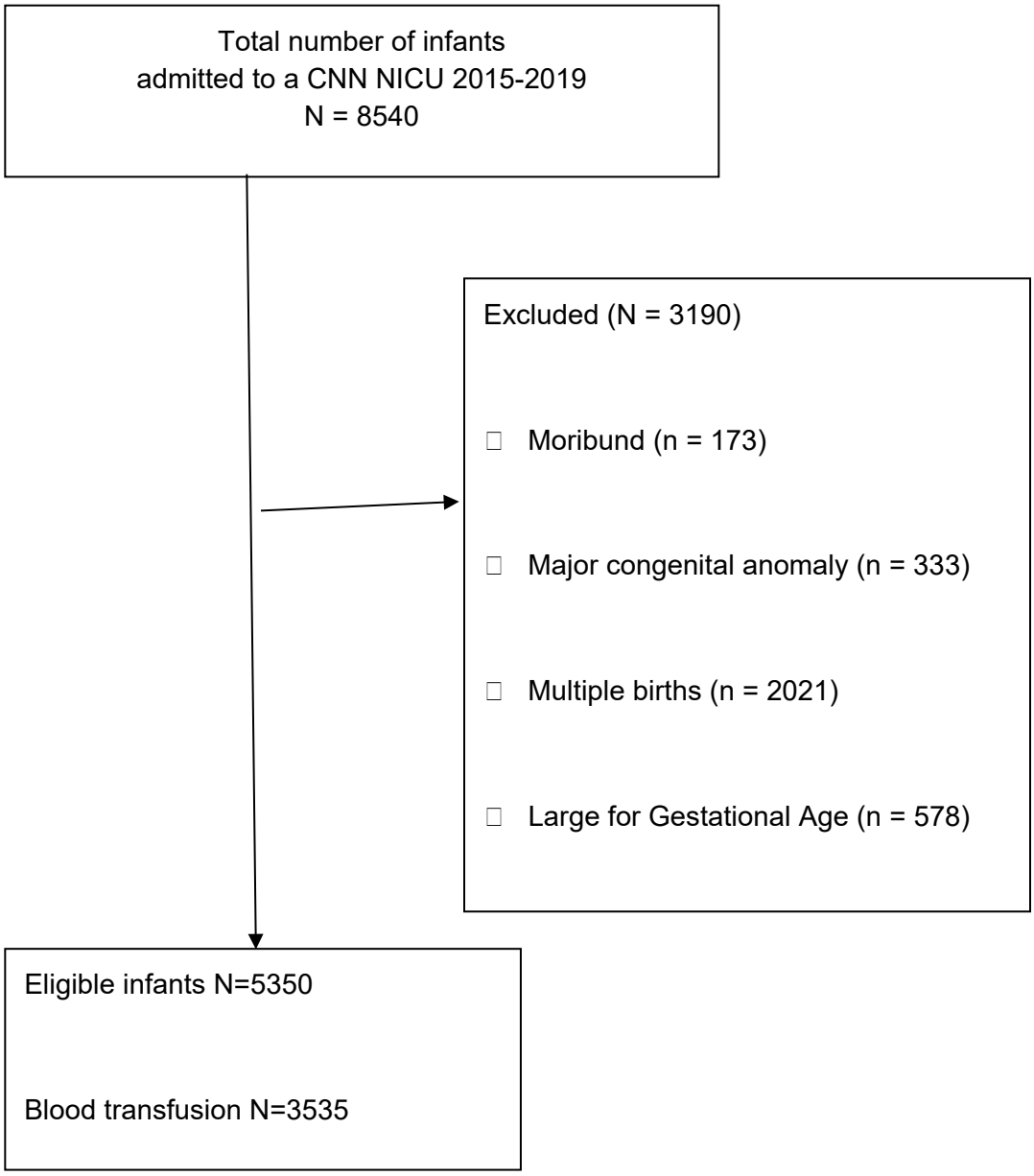
Total number of infants
admitted to a CNN NICU 2015-2019
N = 8540
Excluded (N = 3190)
Moribund (n = 173)
Major congenital anomaly (n = 333)
Multiple births (n = 2021)
Large for Gestational Age (n = 578)
Eligible infants N=5350
Blood transfusion N=3535

Table 1. Maternal and neonatal characteristics

Maternal	AGA Group Without BT N=1717	AGA Group BT N=3078	p-value	SGA Group Without BT N=98	SGA Group BT N=457	p-value
Maternal age (y), mean (SD)	31.1 (5.8)	30.9 (5.8)	0.19	32.3 (2.3)	31.4 (5.9)	0.18
Smoking	245 (14%)	430 (14%)	0.77	12 (12%)	60 (13%)	0.81
Maternal diabetes	213 (13%)	268 (9%)	<0.001	8 (9%)	47 (11%)	0.52
Maternal hypertension	281 (17%)	398 (13%)	<0.001	64 (67%)	277 (61%)	0.22
Antenatal steroid use	1524 (90%)	2627 (87%)	<0.001	86 (91%)	427 (94%)	0.14
Cesarean birth	894 (52%)	1717 (56%)	0.01	90 (93%)	417 (91%)	0.62
Delayed cord clamping	996 (65%)	1187 (45%)	<0.00!	50 (60%)	197 (48%)	0.05
NEONATAL						
Male sex	922 (54%)	1677 (54%)	0.60	48 (49%)	269 (59%)	0.07
Out born	264 (15%)	546 (18%)	0.03	10 (10%)	20 (4%)	0.02
Gestational age (wks.), mean SD	27.1 (1.1	25.4 (1.5)	<0.001	27.2 (1.3)	26.3 (1.4)	0.07
Birth weight (g) mean (SD)	1065 (193)	837 (193)	<0.001	670 (124)	590 (113)	0.07
SNAP-II scores (> 20)	192 (12%)	1150 (38%)	<0.001	80 (88%)	310 (68%)	<0.001
Age at first transfusion (day)	N/A	5 (2, 13)	N/A	N/A	4 (2,10)	N/A
Number of transfusions	N/A	3 (2,6)	N/A	N/A	4 (2, 7)	N/A

Abbreviations : BT, blood transfusion ; SD,standard deviation ; N/A, not applicable

Table 2 : Comparison of neonatal outcomes in AGA and SGA infants.

Outcomes	AGA Group (without BT)	AGA Group (BT)	Unadjusted OR (95% CI) (reference: without BT)	Adjusted* OR (95% CI) (reference: without BT)	SGA Group (without BT)	SGA Group (BT)	Unadjusted OR (95% CI) (reference: without BT)	Adjusted* OR (95% CI) (reference: without BT)	Ratio of two adjusted ORs SGA OR/AGA OR (95% CI) **
BPD	**481 (30%)**	**1701 (66%)**	**4.47 (3.91,5.11)**	**2.47 (1.90,3.21)**	**22 (31%)**	**312(81 %)**	**0.99(5.68, 17.55)**	**7.15 (3.60,14.19)**	**2.90 (1.39,6.03)**
Mortality	**83 (5%)**	**508 (17%)**	**3.89 (3.06, 4.95)**	**1.75 (1.15, 2.66)**	**21 (21%)**	**94 (21%)**	**0.95 (0.56, 1.62)**	**0.73 (0.35, 1.55)**	**0.42 (0.18, 0.99)**
ROP	**33 (3%)**	**449 (19%)**	**8.06 (5.62, 11.56)**	**2.02 (1.35, 3.03)**	**NR**	**93 (26%)**	**NR**	**4.46 (1.15, 17.29)**	**2.21 (0.54, 9.08)**
Severe brain injury (IVH > grade 2/PVL)	**56 (4%)**	**460 (15%)**	**4.98 (3.75, 6.62)**	**2.97 (2.06, 4.28)**	**NR**	**34 (8%)**	**NR**	**6.40 (1.01, 40.43)**	**2.15 (0.33, 14.10)**
NEC	**9 (1%)**	**328 (11%)**	**22.56 (11.60, 43.85)**	**16.76 (10.20, 27.52)**	**NR**	**46 (10%)**	**NR**	**9.21 (1.34, 63.37)**	**0.55 (0.08, 4.03)**
Late onset sepsis	**80 (5%)**	**877 (28%)**	**8.15 (6.43, 10.34)**	**5.33 (4.14, 6.85)**	**NR**	**137 (30%)**	**NR**	**7.52 (3.22, 17.59)**	**1.41 (0.58, 3.42)**

Abbreviations: AGA, appropriate for gestational age; BT, blood transfusion CI, confidence interval; BPD, bronchopulmonary dysplasia; IVH, intraventricular hemorrhage; n/N, number of cases/total number of infants assessed; NEC, necrotizing enterocolitis; N/R not reported due to small numbers; OR, odds ratio; PDA, patent ductus arteriosus; PVL periventricular leukomalacia; ROP, retinopathy of prematurity; SGA, small for gestational age;

*adjusted for gestational age, antenatal corticosteroid use, SNAP-II scores, sex, outborn. Correlation among subjects within site were accounted for in generalized estimating equation (GEE) in all models for adjusted OR

**if the 95% CI does not contain 1, the two adjusted ORs (AGA adjusted OR vs SGA adjusted OR) are statistically different from each other (their odds ratios are not equal).