

NEONATAL AND PEDIATRIC TRANSFUSION MEDICINE

Dr. Lani Lieberman

Transfusion Camp Day 1

Friday September 17th, 2021



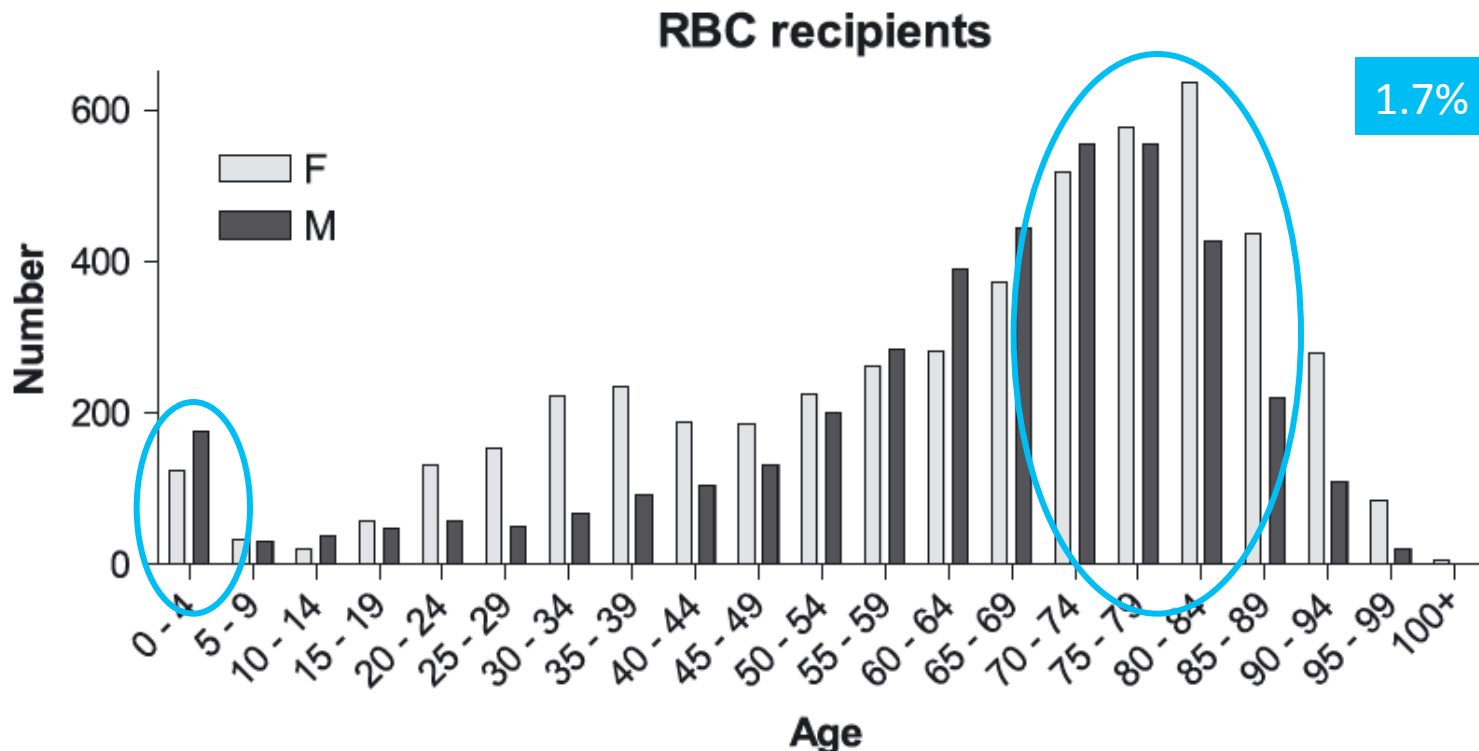
Objectives

- Highlight special considerations when ordering blood products for neonates and children
- Cases
 - PRBC
 - Platelet
- We will not be discussing
 - Use of plasma, cryoprecipitate or fractionated products
 - Intrauterine transfusions
 - Exchange transfusions
 - Blood product use in cardiac surgery

What proportion of blood supply is transfused to children?

4.2% RBC < 18 yo

1.7% RBC < 12 mo



Evidence based pediatric transfusion

- Limited
- Guidelines
 - Extrapolated from adult data
 - Expert opinion
 - Audit data



bjh guidelines

Guidelines on transfusion for fetuses, neonates and older children

Helen V. New,^{1,2} Jennifer Berryman,³ Paula H. B. Bolton-Maggs,⁴ Carol Cantwell,² Elizabeth A. Chalmers,⁵ Tony Davies,⁶ Ruth Gottstein,⁷ Andrea Kelleher,⁸ Sailesh Kumar,⁹ Sarah L. Morley¹⁰ and Simon J. Stanworth,¹¹ on behalf of the British Committee for Standards in Haematology

5 things to consider prior to ordering a transfusion for a neonate or child

1. Blood recipients: similar to adult
 - Oncology, hemoglobinopathy, OR, ICU
2. Consent - should be obtained from child's legal guardian (unless the child has capacity to consent)
3. Lab reference ranges are different for children and neonates

Transfusion 2014; 54, 627-632
 Blood 1987; 70: 165-72.
 Blood 1988; 72:1651-7.

Newborn laboratory values

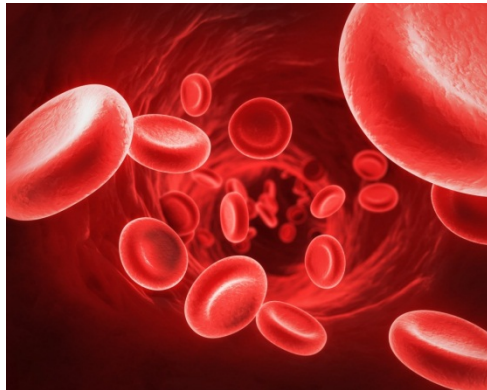


Table 1. Normal values for hemoglobin concentration and MCV in infancy and childhood. Adapted from Nathan and Orkin.¹¹

Age	Hemoglobin (g/L)		Hematocrit		MCV (fl)	
	Mean	-2 SD	Mean	-2 D	Mean	-2 D
1-3 days	185	145	0.56	0.45	108	95
3-6 months	115	95	0.35	0.29	91	74
0.5-2 years	120	105	0.36	0.33	78	70
2-6 years	125	115	0.37	0.34	81	75
6-12 years	135	115	0.40	0.35	86	77

MCV, mean corpuscular volume.

HEMOGLOBIN:168 (137-201 g/dl)

MCV:110 fl/cell
 (adult levels by 9 weeks)

Table 1 Infant reference ranges of common coagulation tests

Gestational age	<28 weeks ⁴	28-34 weeks ⁴	30-36 weeks ⁸	Term infants ¹³
Reference range—PT (s) 95th centile	>21	>21	>16	>16
Reference range—aPTT (s) 95th centile	>64	>57	>55	>55
Fibrinogen level (5th-95th centile, g/dL)	0.71-5.35	0.87-4.70	2.25-3.41	1.50-3.73

Reference ranges are taken from the Christensen *et al*⁴ paper for neonates <34 weeks' gestation and from the Andrew *et al*^{8,13} paper for those 30-36 weeks' gestation and term infants.

aPTT, activated partial thromboplastin time; PT, prothrombin time.

Pediatric resources & Reference ranges

Table 1: Normal hemoglobin values for neonates

Age	Hemoglobin concentration (g/L) (mean (- 2 SD))		
	Preterm*		Term
	1.0–1.5 kg	1.5–2.0 kg	
2 weeks	163 (117)	148 (118)	165 (125)
1 month	109 (87)	115 (82)	140 (100)
2 months	88 (71)	94 (80)	115 (90)
3 months	98 (89)	102 (93)	115 (95)

* Preterm infant is defined as an infant less than 37 week
Normal values for preterm infants will depend on gestation
values may differ depending on the laboratory performing

Table 2: Normal hemoglobin values for infants and children

Age	Sex	Hemoglobin concentration (g/L) (mean (- 2 SD))
0.5 to 2 years	Both	120 (105)
2 to 6 years	Both	125 (115)
6 to 12 years	Both	135 (115)
12 to 18 years	Female	140 (120)
	Male	145 (130)
> 18 years	Female	140 (120)
	Male	155 (135)

Bloody Easy

CBS – Clinical Guide

<https://professionaleducation.blood.ca/en/transfusion/guide-clinique/neonatal-and-pediatric-transfusion>

5 things to consider prior to ordering a transfusion for a neonate or child

1. Blood recipients: similar to adult
 - Oncology, hemoglobinopathy, OR, ICU
2. Consent should be obtained from responsible adult (unless the child has capacity to consent)
3. Lab reference ranges differ for children
4. Blood products should always be ordered by weight

Blood Products are ordered by weight (ml/ kg)

Product	Pediatric Dose (ml/kg)
RBC	10-15 ml/ kg
Platelets	10-15 ml/kg
Plasma	10-15 ml/kg
Cryoprecipitate*	1-2 U/10 kg



Blood Products are ordered by weight (ml/ kg)

Product	Pediatric Dose (ml/kg)	Typical Adult Dose
RBC	10-15 ml/ kg	1 Unit \approx 280-300 mL
Platelets	10-15 ml/kg	1 Unit \approx 250-350 ml
Plasma	10-15 ml/kg	3-4 Units \approx 750-1000ml
Cryoprecipitate*	1-2 U/10 kg	Adult Pool 150-200ml

Cryoprecipitate*

- Each unit = 8 -15 ml
- Adult Pool = 150 - 200 ml
- 8-10 units + 50cc NS



Maximum order for non-bleeding

- No more than adult dose

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2. Consent should be obtained from responsible adult (unless the child has capacity to consent)
3. Lab reference ranges differ for children
4. Blood products should always be ordered by weight
5. Irradiation guidelines – prevent TA-GVHD

Indications for irradiation

Indications

Neonates

Exchange transfusion

Previous IUT until 6 month post delivery

Small volume top up transfusion

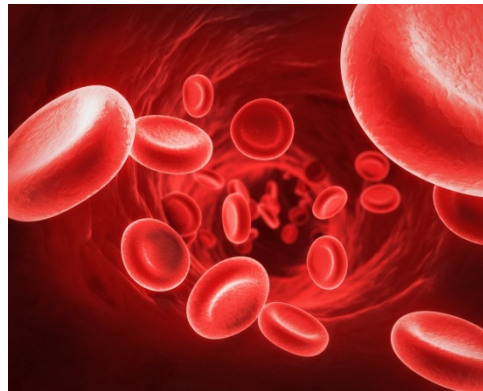
Very low birthweight infants
Previous intrauterine transfusion

Congenital severe T cell immune deficiency

Complex congenital cardiac abnormalities

Hematology/ Oncology indications = same as adult recommendations

RED BLOOD CELL TRANSFUSIONS

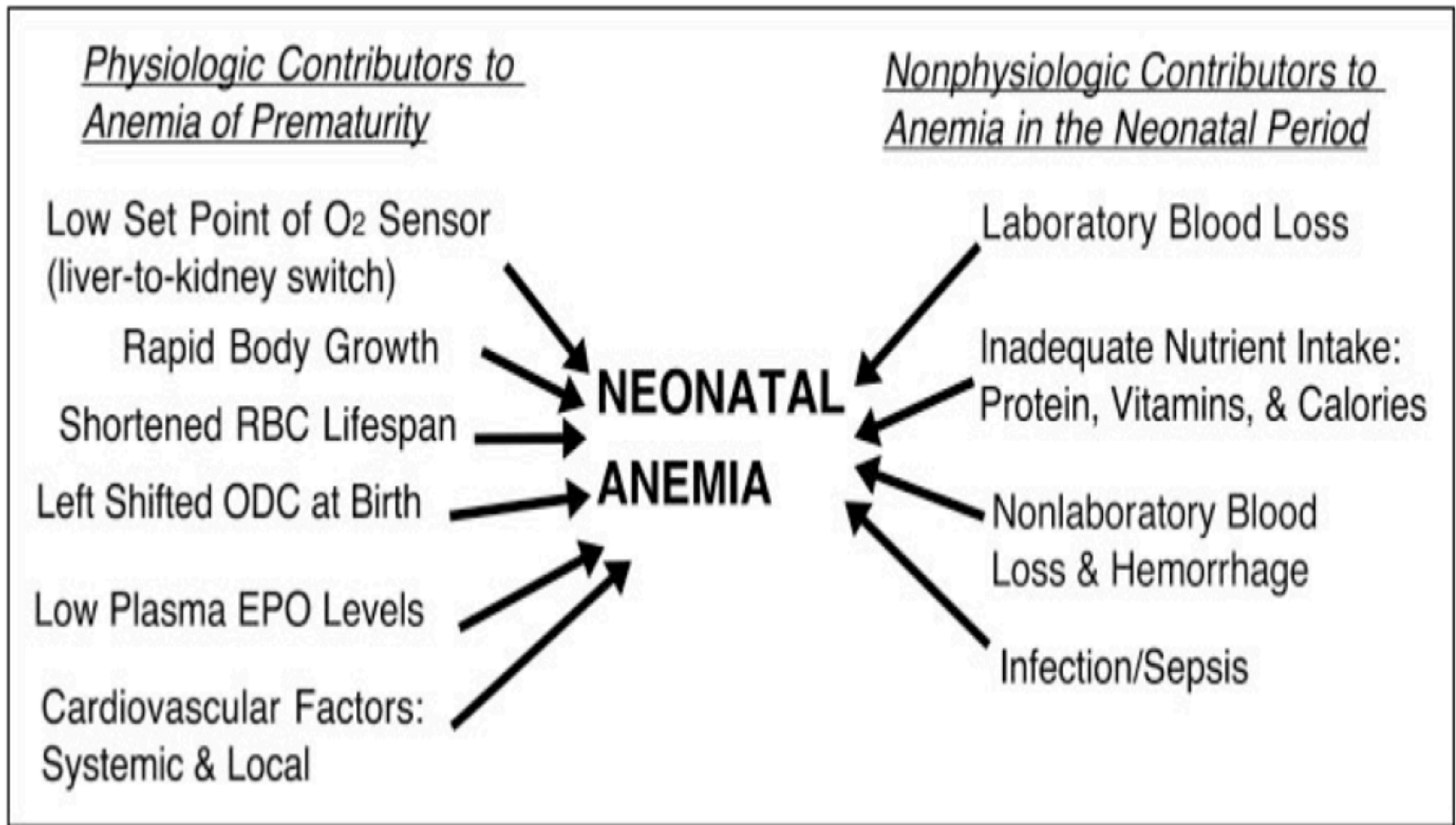


Case: Neonatal Anemia

- 25 week premature– 10 days old
- Intubated, NG fed, antibiotics, Grade 2 IVH
- Daily bloodwork since admission
- Hemoglobin has been gradually ↓
- 150 g/L80 g/L

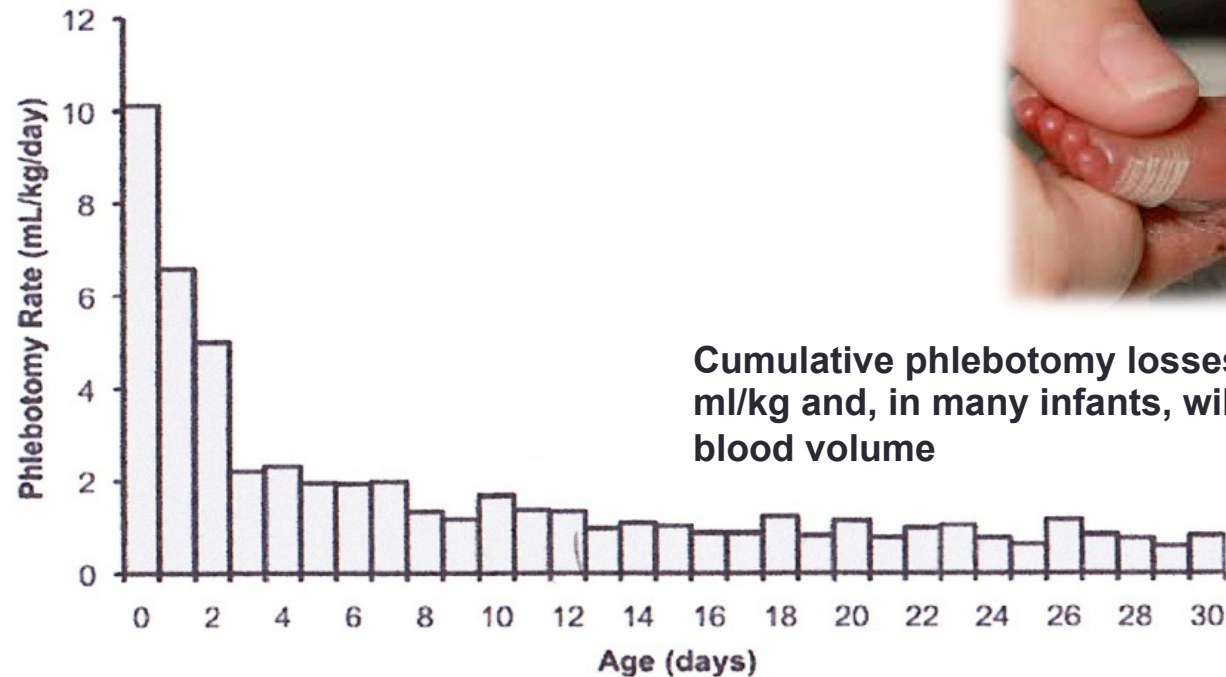


Neonatal Anemia



Phlebotomy Blood Loss in Very Low Birth Weight (VLBW) Infants (< 1500 grams)

Phlebotomy Blood Loss in VLBW Babies



Cumulative phlebotomy losses typically reach 40-80 ml/kg and, in many infants, will exceed the infant's blood volume

RBC transfusions in ELBW infants

- 50-80% of ELBW infants receive one or more RBCT during hospitalizations



Vlalieva et al. J Pediatr 2009; 155 (3): 331-337
Keir et al. Transfusion 2015; 55:1340-6

RBC Transfusion



Increased O₂ supply to brain



Decreased risk of apnea of prematurity frequency & severity



Intraventricular hemorrhage



Necrotizing enterocolitis



Bronchopulmonary dysplasia



Retinopathy of prematurity

Christensen et al. J Matern Fetal Neonatal Medicine. 2013; 26 (s2):60-63
Mohamed A, Shah PS. Pediatrics 2012; 129 (3): 529-540
Ghirardello S et al. Am J Perinatology. 2017; 34 (1):88-95
Slidsborg C et al. Ophthalmology. 2016; 123(4):796-803.

Neonatal pediatric RBC transfusion trials

PINT

**THE PREMATURE INFANTS IN NEED OF TRANSFUSION (PINT) STUDY: A
RANDOMIZED, CONTROLLED TRIAL OF A RESTRICTIVE (LOW) VERSUS
LIBERAL (HIGH) TRANSFUSION THRESHOLD FOR EXTREMELY LOW BIRTH
WEIGHT INFANTS**

HARESH KIRPALANI, MSc, FRCP(UK),¹ ROBIN K. WHYTE, MB, FRCP(C),¹ CHAD ANDERSEN, MBBS, FRACP,
ELIZABETH V. ASZTALOS, MSc, FRCP(C), NANCY HEDDLE, MSc, MORRIS A. BLAJCHMAN, MD, FRCP(C),
ABRAHAM PELIOWSKI, MD, FRCP(C), ANGEL RIOS, MD, MEENA LACORTE, MD, ROBERT CONNELLY, MD, FRCP(C),
KEITH BARRINGTON, MB, FRCP(C), ROBIN S. ROBERTS, M.Tech, FOR THE PINT INVESTIGATORS*

Short term
No statistically significant difference
in death or morbidity

Randomized Trial of Liberal Versus Restrictive Guidelines for Red Blood Cell Transfusion in Preterm Infants

IOWA/ BELL

Edward F. Bell, MD*; Ronald G. Strauss, MD*†; John A. Widness, MD*; Larry T. Mahoney, MD*;
Donald M. Mock, MD, PhD§||; Victoria J. Seward, MD*; Gretchen A. Cress, RN*; Karen J. Johnson, RN*;
Irma J. Kromer*; and M. Bridget Zimmerman, PhD¶

Kirpalani et al. J Peds. 2006; 149:301-7
Bell et al. Pediatrics 2005; 115: 1685-1691

Iowa Trial: Severe IVH and Cystic (Periventricular Leukomalacia) PVL

	Liberal	Restrictive	<i>P</i>
Grade-4 IVH	0	4	0.054
Cystic PVL	0	4	0.115
Grade-4 IVH or cystic PVL	0	6	0.012

Caution: Composite outcome combining grade-4 IVH and PVL was not planned; small numbers

Long Term Follow up Data - Cognitive

	PINT	Bell (Iowa)
Age at follow up	18-21 months	8-15 years
Cognitive testing	Better in LIB group	Better in RES group

Conflicting results – leads to variability in practice

Whyte et al. Pediatrics 2009; 123(1):207-213

McCoy et al. Child Neuropsychology, 2011; 17 (4): 347–367

JAMA | Original Investigation

Effects of Liberal vs Restrictive Transfusion Thresholds on Survival and Neurocognitive Outcomes in Extremely Low-Birth-Weight Infants The ETTNO Randomized Clinical Trial

Axel R. Franz, MD; Corinna Engel, PhD; Dirk Bassler, MD; Mario Rüdiger, MD; Ulrich H. Thome, MD; Rolf F. Maier, MD; Ingeborg Krägeloh-Mann, MD; Martina Kron, PhD; Jochen Essers, MD; Christoph Bühner, MD; Georg Rellensmann, MD; Rainer Rossi, MD; Hans-Jörg Bittrich, MD; Claudia Roll, MD; Thomas Höhn, MD; Harald Ehrhardt, MD; Stefan Avenarius, MD; Hans Thorsten Körner, MD; Anja Stein, MD; Horst Buxmann, MD; Matthias Vochem, MD; Christian F. Poets, MD; for the ETTNO Investigators

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Higher or Lower Hemoglobin Transfusion Thresholds for Preterm Infants

H. Kirpalani, E.F. Bell, S.R. Hintz, S. Tan, B. Schmidt, A.S. Chaudhary,

Methodology ETTNO

Inclusion
BWt 400-999g
GA <29 wks
Postnatal:

1013 neonates

Trigger varies
by : Postnatal
age & Critical
state of health

Liberal threshold = 492

Restrictive threshold = 521

RBC 20 ml/kg
Leucocyte
reduced

Exclusion

1. Major anomalies (cyanotic heart disease, chromosomal anomalies, syndromes) or malformations needing surgery
2. Lack of viability/comfort car
3. First neonate of multiples pregnancy

Secondary outcomes

Other measures of cognitive deficit
Measures of growth @ D/C & FU
Length of stay
Time from birth to dc respiratory support, resp stimulant gavage feeds
Complications of prematurity

Death or Neurological
impairment at 24 months

Transfusion thresholds (ETTNO)

Table 1. Red Blood Cell Transfusion Hematocrit Trigger Thresholds

Postnatal age	Red blood cell transfusion threshold, % ^a			
	Liberal		Restrictive	
	Critical health state	Noncritical health state	Critical health state	Noncritical health state
From randomization to 7 d after birth ^b	<41	<35	<34	<28
8-21 d	<37	<31	<30	<24
>21 d	<34	<28	<27	<21

- Critical health
- Exceptions to guidelines were permitted

Methodology TOP

Inclusion
BWt < 1000 g
GA 22 -29 weeks
Postnatal: < 48
hours

1824 neonates

Transfusion
thresholds:
postnatal age &
respiratory
support

Liberal threshold

Restrictive threshold

Exclusion

1. Cyanotic heart disease
2. Received IUT
3. Lack of viability
4. Parent with hgbopathy or congenital anemia
5. RBCtxn within 6 hours of life
6. Twin- twin transfusion
7. Isoimmune hemolytic disease
8. Concerns re: follow up
9. RBC txn within 6 hours of life
10. Congenital condition
- 11.

RBC 15 ml/kg

Death +/- Neurodevelopmental
impairment at 22-26 months

Secondary outcomes

Other measures of cognitive deficit
Measures of growth
Survival without complications of prematurity
Number of RBC txns
Administration of RBC as per protocol
Length of stay

Transfusion thresholds (TOP)

Table S2. Intervention Algorithm, Hemoglobin^a RBC Transfusion Thresholds in g/dL by

Postnatal Age and Received Respiratory Support

	High hemoglobin threshold		Low hemoglobin threshold	
	Respiratory	No respiratory	Respiratory	No respiratory
	support ^b	support	support	support
<i>Post-natal Age</i>				
Week 1	13.0	12.0	11.0	10.0
Week 2	12.5	11.0	10.0	8.5
Weeks ≥3	11.0	10.0	8.5	7.0

Results: Death or neurocognitive deficits

ETTNO

Outcomes	No./total (%)		Absolute difference, % (95% CI)	Odds ratio (95% CI)	P value
	Liberal threshold	Restrictive threshold			
Death or neurodevelopmental impairment by 24 mo	200/450 (44.4)	205/478 (42.9)	1.6 (−4.8 to 7.9)	1.05 (0.80-1.39)	.72
Death by 24 mo	38/460 (8.3)	44/491 (9.0)	−0.7 (−4.3 to 2.9)	0.91 (0.58-1.45)	.70
Cognitive deficit	154/410 (37.6)	148/430 (34.4)	3.1 (−3.3 to 9.6)	1.12 (0.83-1.51)	.47
Cerebral palsy	18/419 (4.3)	25/443 (5.6)	−1.3 (−4.2 to 1.5)	0.75 (0.40-1.40)	.37

No difference
Death
Neurodevelopmental
Impairment
Fewer transfusions

TOPS

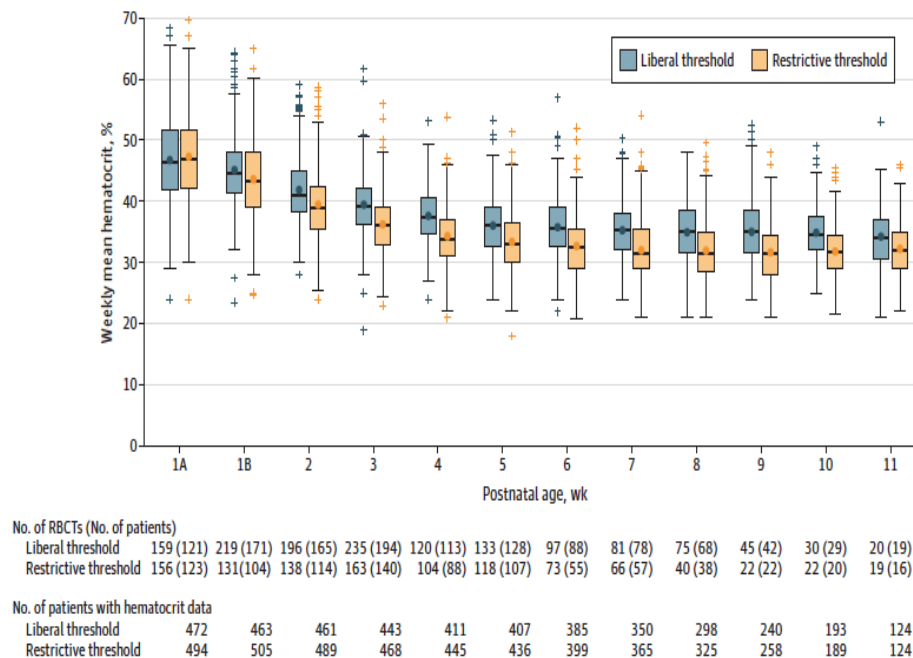
Table 2. Primary Composite Outcome and Components of the Primary Composite Outcome at 2 Years.*

Outcome	Higher Hemoglobin Threshold (N=845) no. of infants/total no. (%)	Lower Hemoglobin Threshold (N=847) no. of infants/total no. (%)	Adjusted Relative Risk (95% CI)	P Value
Primary outcome: death or neurodevelopmental impairment	423/845 (50.1)	422/847 (49.8)	1.00 (0.92–1.10)	0.93
Components of primary outcome				
Death†	146/903 (16.2)	135/901 (15.0)	1.07 (0.87–1.32)	
Neurodevelopmental impairment	277/699 (39.6)	287/712 (40.3)	1.00 (0.88–1.13)	
Cognitive delay‡	269/695 (38.7)	270/712 (37.9)	1.04 (0.91–1.18)	
Moderate or severe cerebral palsy§	48/711 (6.8)	55/720 (7.6)	0.87 (0.60–1.26)	
Severe vision impairment	5/713 (0.7)	6/720 (0.8)	0.83 (0.25–2.76)¶	
Severe hearing impairment	14/710 (2.0)	25/715 (3.5)	0.56 (0.29–1.07)¶	

Results

ETTNO Weekly median pre-transfusion Hct was 3% higher in liberal group

Figure 2. Treatment Effect on Hematocrit and Number of Red Blood Cell Transfusions (RBCTs)

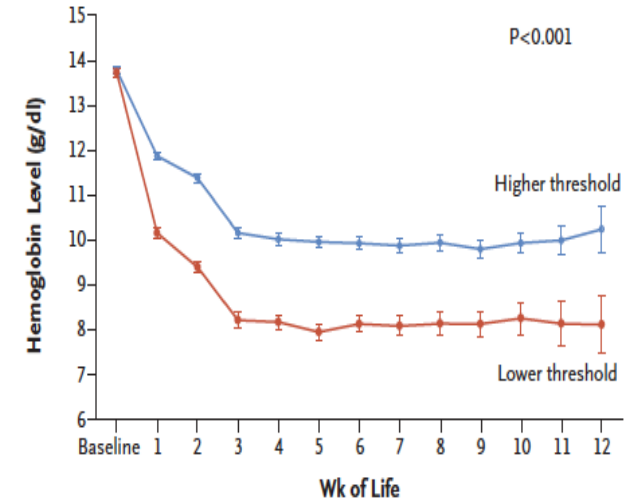


Fewer transfusions

Pre-transfusion mean Hgb different by 1.9 g/dL

TOPS

A Pretransfusion Hemoglobin Levels



B All Measured Hemoglobin Levels to 36 Wk of Postmenstrual Age

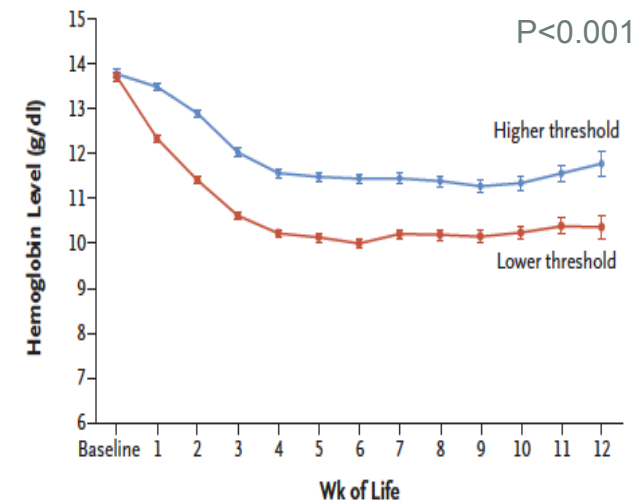


Figure 2. Separation of Hemoglobin Levels between the Treatment Groups.

Neonatal RBC thresholds

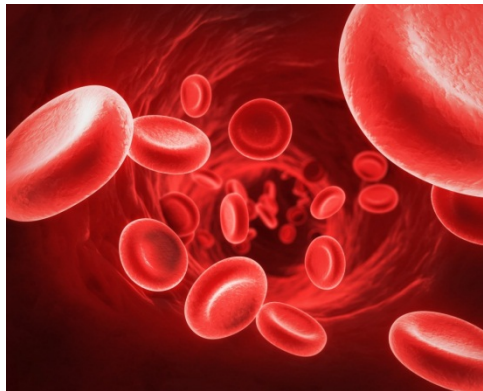
Bottom line

- No difference in cognitive outcome in neonates receiving RBCT in restrictive or liberal group
- Decreased transfusions for neonates in restrictive group

NICU RBC Transfusion Threshold (TOPS)

Age of neonate	Respiratory Support	No respiratory support
Week 1	110 g/L	100 g/L
Week 2	100 g/L	85 g/L
Week 3	85 g/L	70 g/L

RBC TRANSFUSIONS IN OLDER CHILD



The NEW ENGLAND JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

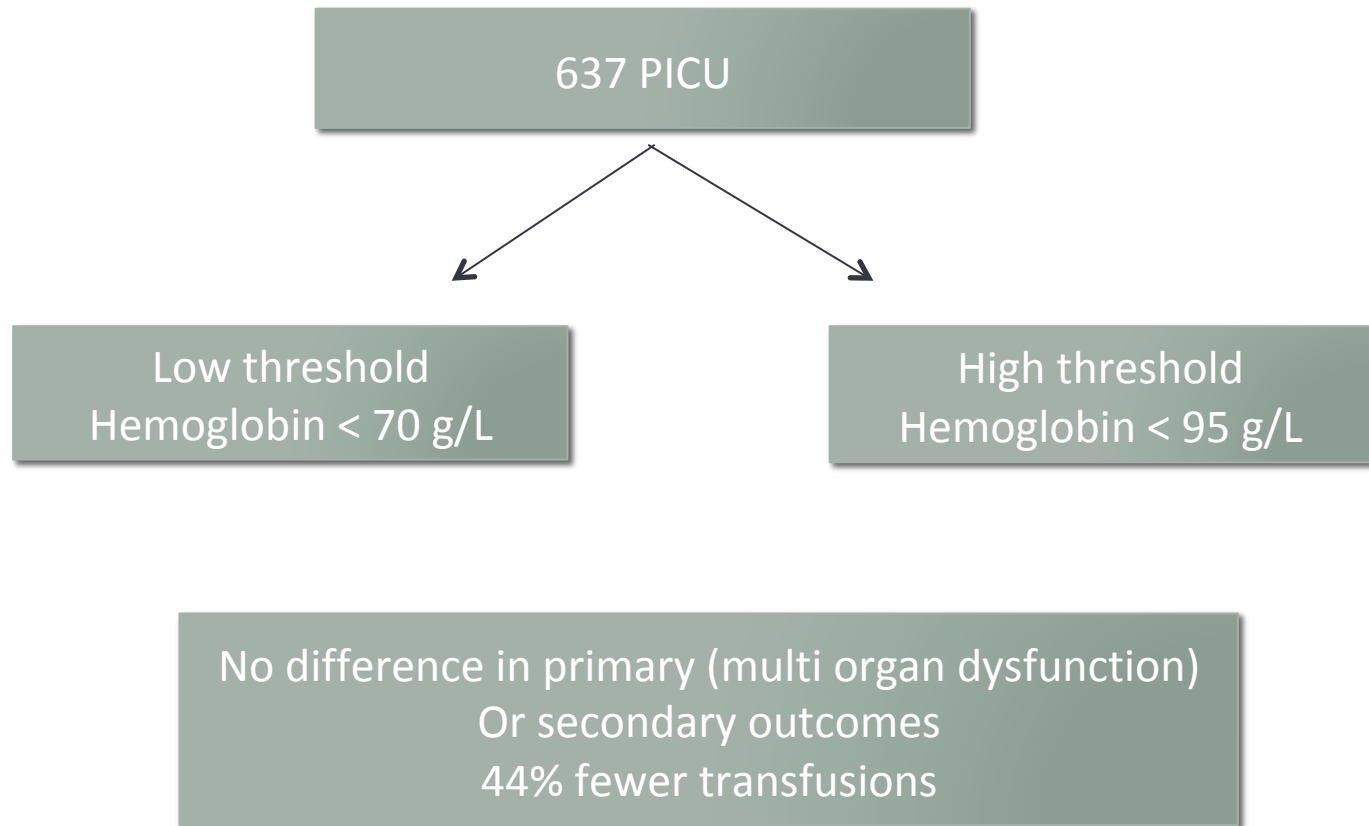
APRIL 19, 2007

VOL. 356 NO. 16

Transfusion Strategies for Patients in Pediatric Intensive Care Units

Jacques Lacroix, M.D., Paul C. Hébert, M.D., James S. Hutchison, M.D., Heather A. Hume, M.D.,
Marisa Tucci, M.D., Thierry Ducruet, M.Sc., France Gauvin, M.D., Jean-Paul Collet, M.D., Ph.D.,
Baruch J. Toledano, M.D., Pierre Robillard, M.D., Ari Joffe, M.D., Dominique Biarent, M.D.,
Kathleen Meert, M.D., and Mark J. Peters, M.D., for the TRIPICU Investigators,* the Canadian Critical Care
Trials Group, and the Pediatric Acute Lung Injury and Sepsis Investigators Network

TRIPICU



RBC Threshold Guidelines for Children

Pediatric Patient type	Threshold	Evidence grade
PICU (stable, non-cyanotic)	70 g/L	1B
Oncology	70 g/L (typical practice) Insufficient literature	2C
Perioperative non-cardiac surgery (stable, non-bleeding)	70 g/L	1C
Chronic anemia (Diamond Blackfan anemia)	80 g/L Consensus based	2C

* Hemoglobinopathies

The following should be considered for children undergoing surgery with significant risk of bleeding:

Tranexamic acid (1B)

Red cell salvage (2C)

Case: Pediatric anemia

- 22 month old healthy boy
- Symptoms
 - Pale
 - Eating paper
 - Otherwise active and energetic
- Diet history – drinks 48 oz of homo milk / day; picky eater
- PE: Patient alert, interactive and chasing brother in ER, VSS
- Hemoglobin = 52 g/L ; MCV = 62

What is the etiology of the microcytic anemia?

TAILS

- Thalassemia
- Anemia of chronic disease
- **Iron deficiency**
- Lead poisoning
- Sideroblastic anemia



Iron deficiency anemia (IDA)

Who? 3.5-11% of Canadian children- COMMON

Why? Multifactorial

- Increase needs due to rapid growth
- Inadequate intake of iron rich foods
- Malabsorption

Outcome

- Impairs physical functioning, infant growth & development and immune function
- Clear association between IDA and impaired neurocognitive development

Prevention and treatment are essential

How do we treat it?

- Oral iron
 - 3-6 mg/kg/day ELEMENTAL iron
 - 😊 inexpensive
 - ☹️ 10% absorption, poor compliance due to GI side effects
- IV iron
 - Failure of oral iron therapy
 - Iron intolerance
 - Need for quick recovery
 - Iron sucrose (venofer) = 7 mg/kg (max 300 mg dose)
 - Safe but \$\$
- PRBC Transfusion – should not be used in stable patient

NEONATAL PLATELET TRANSFUSIONS

Thrombocytopenia:

Factors to consider

Cause

Meds

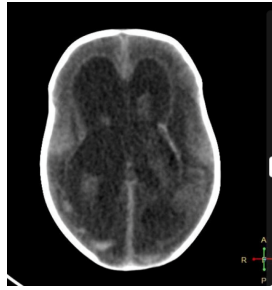
Age
Premature
Or term

Procedure

Bleeding



Neonatal Thrombocytopenia



Premature infants

- Thrombocytopenia occurs frequently
 - 73% < 1000 g
- Bleeding is common
 - 30% will develop intraventricular hemorrhage (IVH)
 - Leading cause of death & disability
- Because of increased risk, neonatologists have been liberal with respect to platelet transfusion thresholds



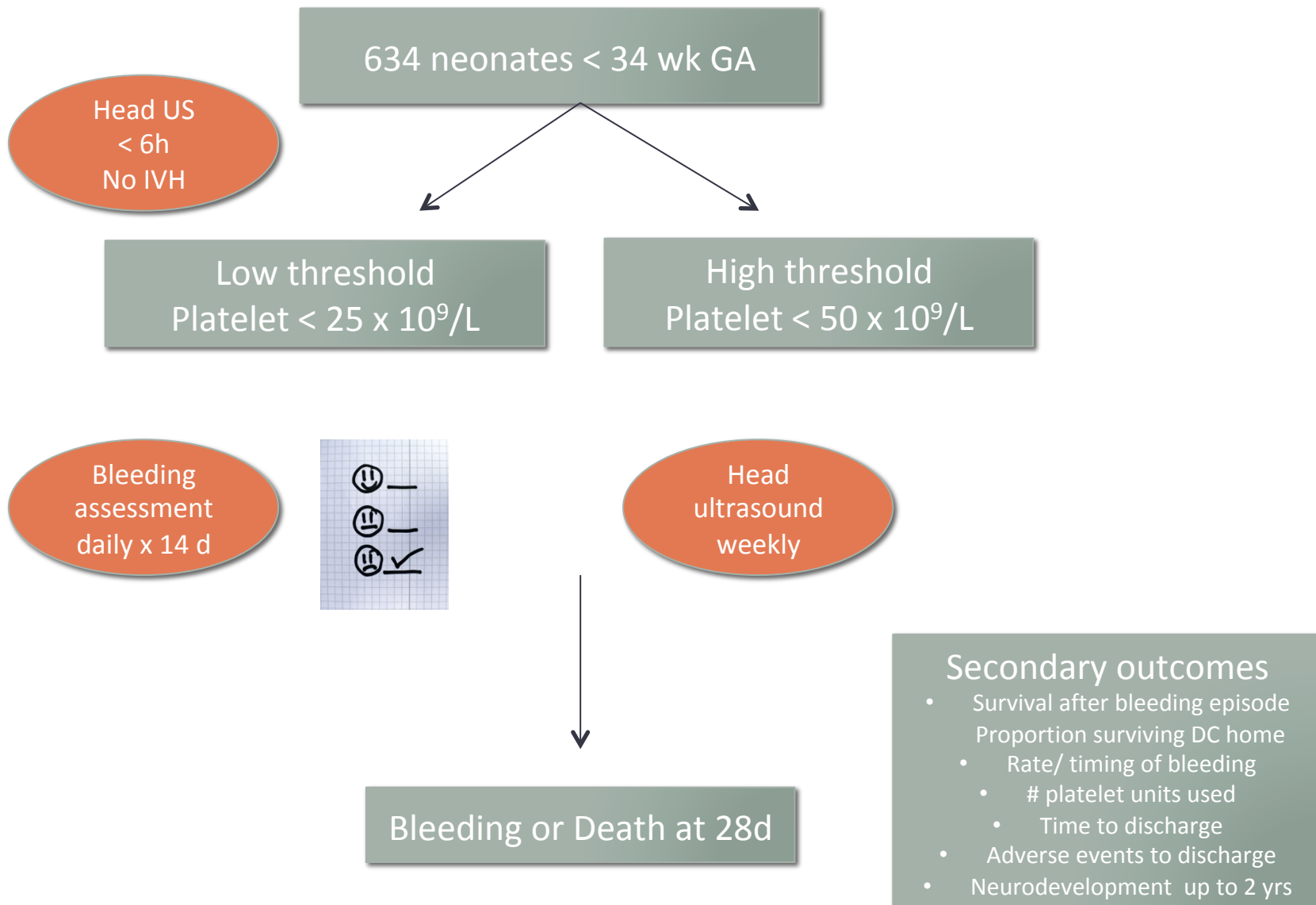
The NEW ENGLAND JOURNAL *of* MEDICINE

ORIGINAL ARTICLE

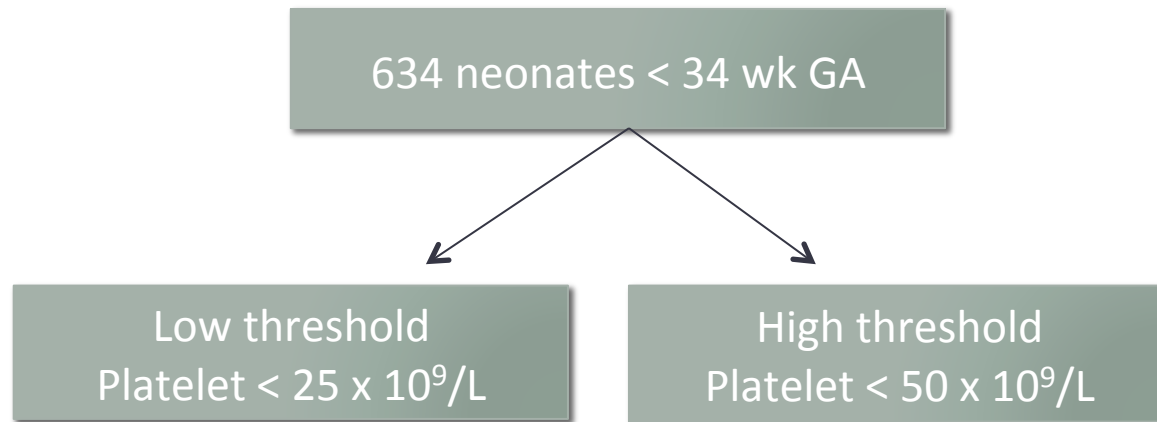
Randomized Trial of Platelet-Transfusion Thresholds in Neonates

Anna Curley, M.D., Simon J. Stanworth, F.R.C.P., D.Phil., Karen Willoughby, B.Sc.,
Susanna F. Fustolo-Gunnink, M.D., Vidheya Venkatesh, M.D., Cara Hudson, M.Sc.,
Alison Deary, M.Sc., Renate Hodge, M.Sc., Valerie Hopkins, B.Sc.,
Beatriz Lopez Santamaria, M.Sc., Ana Mora, Ph.D., Charlotte Llewelyn, Ph.D.,
Angela D'Amore, M.D., Rizwan Khan, M.R.C.P.I., Wes Onland, M.D., Ph.D.,
Enrico Lopriore, M.D., Ph.D., Karin Fijnvandraat, M.D., Ph.D.,
Helen New, F.R.C.Path., Ph.D., Paul Clarke, M.D., and Timothy Watts, M.D.,
for the PlaNeT2 MATISSE Collaborators*

PLANET 2: Methodology



PLANET 2: Results



Outcome	N = 331 (%)	N = 329	Odds ratio or hazard ratio (95% CI)
Death to day 28(N, %)	33/330 (10)	48/326 (15)	OR = 1.57 (0.95-2.55)
New major bleeding episode (N, %)	35/330 (11)	45/328 (14)	HR 1.32 (1.0-1.74)
Adverse events	92 in 74 infants (22%)	94 in 81 infants (25%)	OR 1.14 95% CI (0.78-1.67)
At least one platelet txn (N, %)	177/331 (53)	296/328 (90)	HR 2.75 (2.36-3.21)

Overall conclusions

- More deaths and major bleeding occurred when a higher prophylactic platelet count was used

Bottom line

- In neonates, a prophylactic threshold of $25 \times 10^9/\text{L}$ should be used prior to transfusing platelets

Proposed NICU Platelet Transfusion Thresholds

Clinical status	Platelet threshold	Grade Comment
Major bleeding or requiring major surgery (e.g. neurosurgery)	$< 100 \times 10^9/\text{L}$	No RCT in prems
Bleeding, current coagulopathy, sx, exchange transfusion	$< 50 \times 10^9/\text{L}$	
No bleeding (including NAIT if no bleeding and FHx of ICH)	$< 30 \times 10^9/\text{L}$	Grade 2C

Special considerations for NAIT – neonatal alloimmune thrombocytopenia

BJH 2013; 160: 421–433

BJH 2019; 185(3):549-562,

PLATELET TRANSFUSIONS FOR CHILDREN

Pediatric platelet transfusions

- Who receives platelet transfusions?
 - Critically ill in the PICU, Hematology/oncology, Stem cell transplant, cardiac surgery
- Systematic review assessed effect of platelet transfusions on platelet count increment, bleeding and morality (only 1 study)
 - Prospective cohort (N = 138) found no difference in mortality between transfused and non- transfused critically ill children
- Oncology and procedural recommendations
 - Based on adult studies
 - Expert opinion

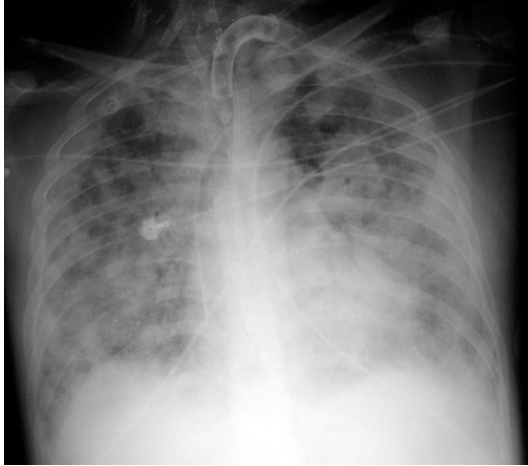
Indian Journal of Critical Care
Medicine, 2008; 12: 102-108
NEJM 1997;337:1870–1875
JCO 2001;19:1519-1538
<http://www.c17.ca>

Suggested platelet thresholds for platelet transfusion in children

Platelet threshold (x 10 ⁹ /L)	Clinical situation
< 10	Irrespective of signs of hemorrhage (excluding ITP, TTP/HUS, HIT)
< 20	Severe mucositis Sepsis Laboratory evidence of DIC in the absence of bleeding Risk of bleeding due to a local tumour infiltration
< 40	Prior to lumbar puncture
< 50	Moderate hemorrhage (e.g. GI bleeding) Surgery, unless minor (except at critical sites)
< 75-100	Major hemorrhage or significant post-op bleeding Surgery at critical sites: CNS including eyes

** expert opinion

What is the harm?



\$1158

Adverse reactions



Supply

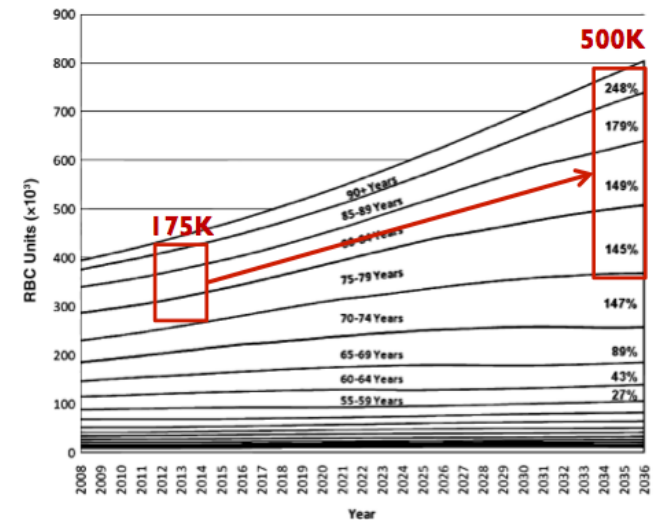


Fig. 7. Demand forecast stratified by 5-year age cohort: Ontario, 2008 through 2036.

TRIM
Transfusion related
immunomodulation

Pediatr Blood Cancer 2011;57:217–223

Is the Number of Blood Products Transfused Associated With Lower Survival in Children With Acute Lymphoblastic Leukemia?

Iron overload

Pediatr. Blood Cancer 2011;56:368–371

Insidious Iron Burden in Pediatric Patients With Acute Lymphoblastic Leukemia

Transfusion Associated Necrotizing Enterocolitis: A Meta-analysis of Observational Data

Adel Mohamed and Parkesh S. Shah

Pediatrics 2012;129;529; originally published online February 20, 2012;

TA-NEC

Teaching points

- Laboratory reference ranges (hematology and coagulation) specific for neonates and children should be used
- Always consider the etiology of the anemia and thrombocytopenia prior to ordering a transfusion
- Order blood products using child's weight

Questions



Key recommendations re: Fresh Frozen Plasma (FFP) transfusions in neonates

Neonatal

1. FFP should NOT be used to correct abnormal coagulation testing in non-bleeding neonates(1C)
2. FFP may benefit neonates with clinically significant bleeding or prior to invasive procedures (high risk of bleeding) if the neonate has an abnormal coagulation profile (2C)
3. FFP should not be used for simple volume replacement or routinely to prevent IVH(1B)

Key recommendations re: Fresh Frozen Plasma (FFP) transfusions in Children

- Prophylactic FFP should NOT be administered to non-bleeding children with minor coagulation abnormalities including prior to surgery (2B) although it may be considered for surgery to critical sites (2C)
- Prophylactic cryoprecipitate should NOT be used routinely in non bleeding patients with low fibrinogen including prior to surgery (2C).
- Prophylactic cryoprecipitate may be considered if fibrinogen < 1g/L for surgery at risk of significant bleeding or to critical sites (2C)