Highlights of Paediatric transfusion

Sláinte Leanaí Éireann
ag Cromghlinn
CHI
Children's Health Ireland
at Crumlin

Martina Williams
NHO 15.02.22

Outline of presentation

1. CHI at Crumlin
   - Data on neonate/infant transfusion

2. Developing national guidelines
   - Methodology
   - Data
   - Current status

Sláinte Leanaí Éireann
ag Cromghlinn

CHI

Children's Health Ireland
at Crumlin

2021

?? 2024

Neonatal/Paeds transfusion CHI at Crumlin

- Haemoglobinopathies
- Malignant Haematology/Oncology
- Cardiothoracic
- ICU
- General Surgery
- Orthopaedics
- General Medicine

Red cells transfused CHI at Crumlin ≤ 1 yr Jan to June 2019

	Clinical specialty per patient transfused						
Age	No. RCC used	No. patients transfused	Cardiothoracic /ECMO	General Surgery	Haem /Onc	Liver	Ortho
≤28 days	53	30	27	3			
>28 days ≤ 11months	173	137	110	10	14	2	1
Total	226	167	137	13	14	2	1

Excludes pedipack use

ECMO Neonates CHI at Crumlin

	2018	2019	2020	2021
Total cases	18	22	25	15
Cardiac (neonates)	9	13	12	11
Respiratory (neonates)	1	2	1	0
Duration	1-11 days	1-13 days	1-8 days	1-7 days

Platelet transfusions CHI 2019

			Clinical Specialty per patient transfused						
Age	No. platelets used	No. patients transfused	Cardiothoracic/ ECMO	General surgery	ICU	Haematology/ Oncology	Liver	HUS	Trauma
≤ 28 days	115	60	53 (88%)	1	4 (7%)	2 (3%)			
>28 days ≤ 11months	137	104	89 (86%)	1	8(8%)	5 (5%)	1		
1 to 17 yrs	1252	182	49 (27%)	1	6	119 (65%)	1	3	2
Total	1504	346	191 (55%)	3 (1%)	18 (5%)	126 (36%)	2	3	2

Plasma transfusions CHI 2019

			Clinical Specialty per patient transfused							
Age	No. units plasma used	No. patients transfused	CT/ ECMO	General surgery	ICU	Haem/ Onc	Liver	HUS	Trauma	Ortho
≤ 28 days	102	59	48 (81%)	8	2		1			
>28 days ≤ 11month	121	86	79 (94%)	3	2		1	1		
1 to 17 yrs	196	75	45 (60%)	4	2	18	2		1	3
Total	419	220	172 (78%)	15 (7%)	6 (3%)	18 (8%)	4 (2%)	1	1	3

Neonatal/Paediatric Guidelines available

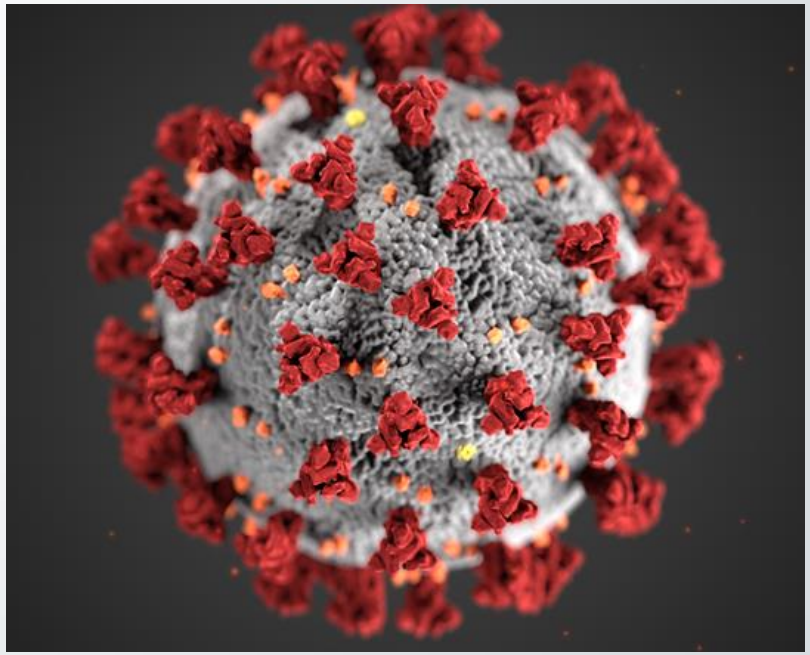
- **International**
  - BSH Guidelines on transfusion for foetuses, neonates and older children- 2016
  - American Association of Blood Banks
  - Canadian Blood Services
- **National**
  - National Blood Users Group (NBUG): Transfusion of Blood Components for infants under 4 months: review and guidelines 2007

NTAG Working Group: Transfusion support for Fetuses, Neonates and Paediatric patients

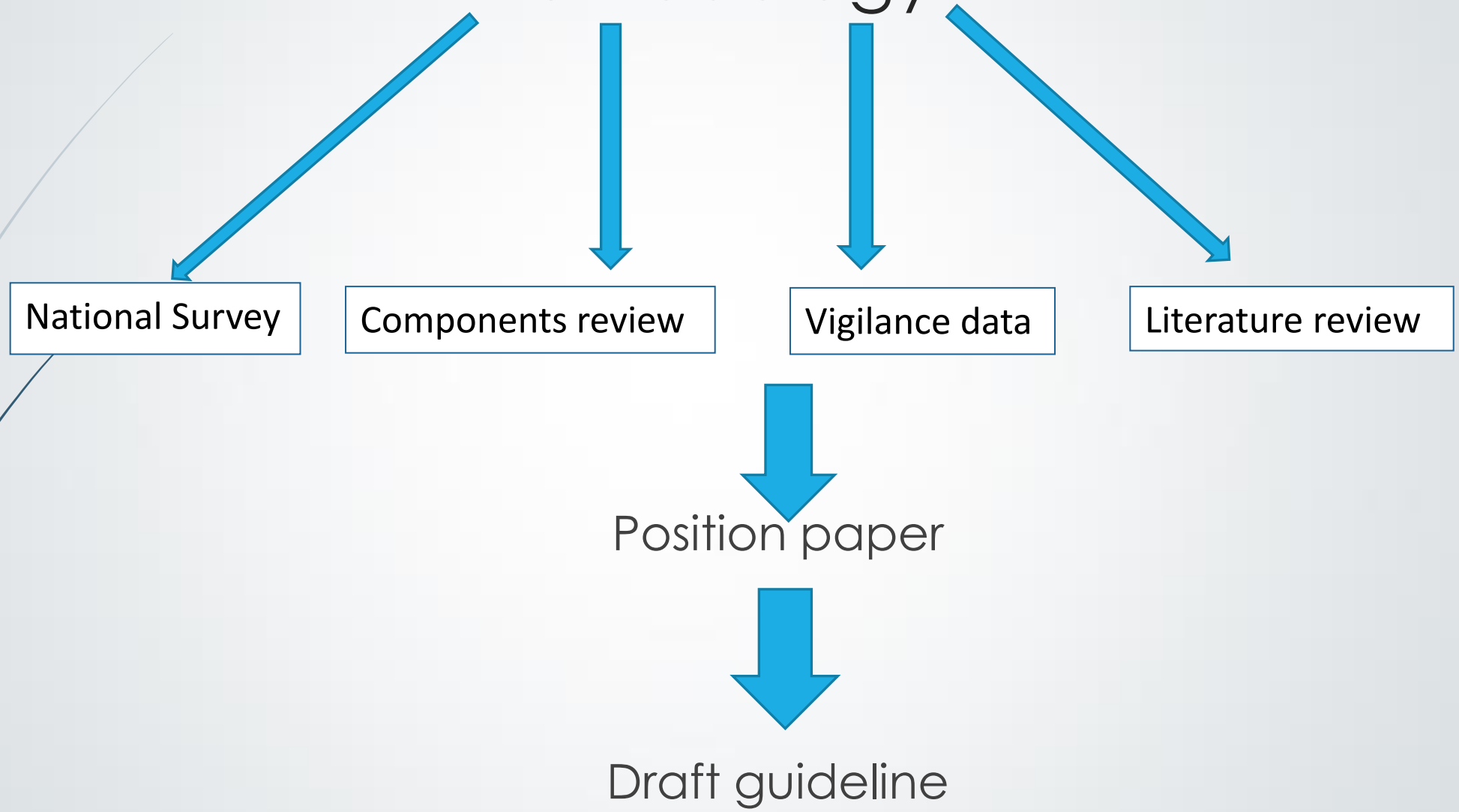
- Multidisciplinary membership
- Chair- Prof Corrina McMahon
  - Objectives
    - Develop a national guideline for transfusion support of Fetuses, neonates and Paediatric patients
    - Consider practice issues that may arise
    - Consider education and training requirements
    - Consider an associated National Audit programme
    - Consider the guideline review process

Timelines

1st meeting WG 22/07/20



Methodology



Work Streams

WS	Objectives
Haemovigilance	• Review NHO data neonates and paediatric patients • Advise Audit WS of key metrics • Review draft guideline
Components	• Review components available • Review issue trends • Advise Audit WS of key metrics • Propose changes and alternatives when 1st choice not available
Audit	• Develop national survey • Analyse and report on survey results

Neonatal Red Cell Components

- IUT
- Large Volume Transfusions
- Top ups

7 components +

irradiated versions = 13 options

IUT Component

PMF Ref	Product Name	Issued 2019	Issued 2020	Issued 2021
0210	RED CELLS, Suitable for Intrauterine Transfusion, Irradiated. HCT Range: 0.70→0.85	9	18	15

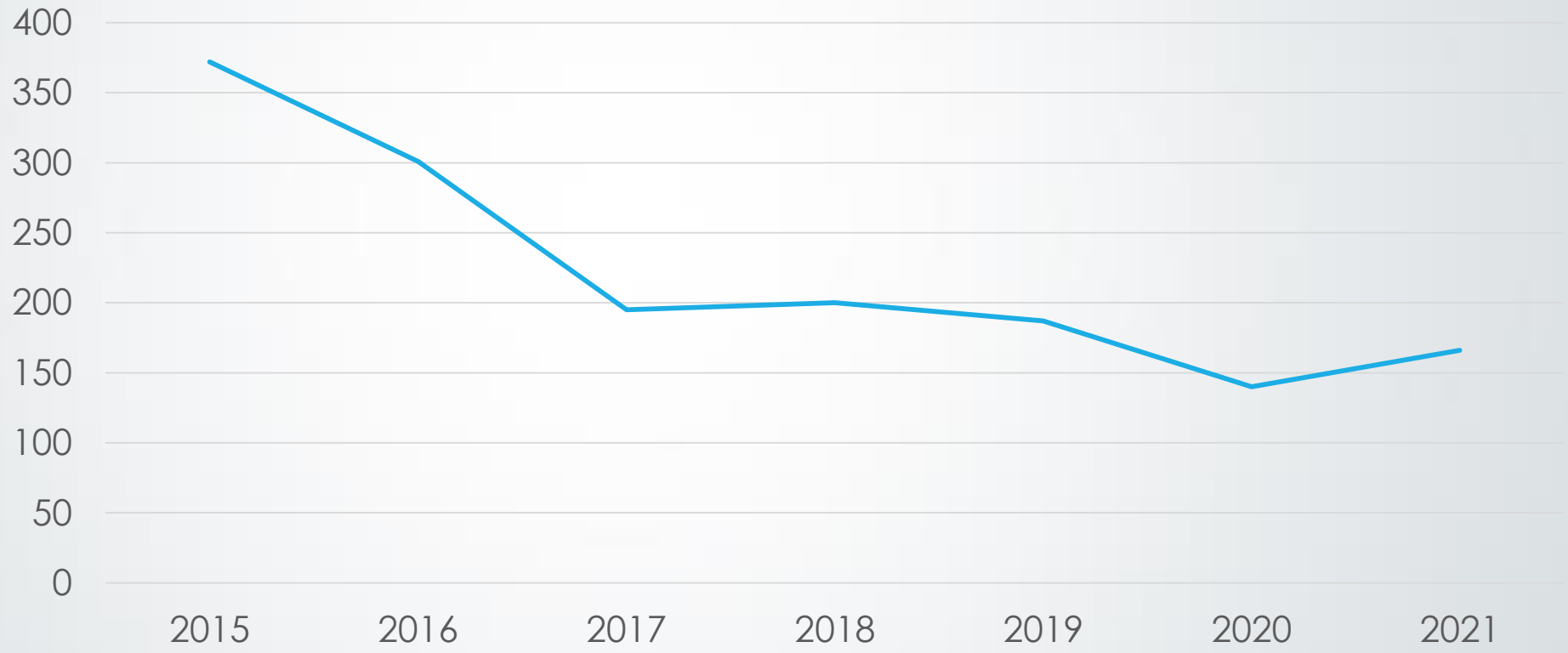
Courtesy Barry Doyle IBTS

Top up component

PMF Ref	Product Name	Issued 2019	Issued 2020	Issued 2021
0209	RED CELLS, Suitable for Neonatal Use, Split 1-5	648	600	686
0209	RED CELLS, Suitable for Neonatal Use, Irradiated, Split 1-5	44	34	30
Total		688	634	716

Courtesy Barry Doyle IBTS

Number of pedipacks received by CHI at Crumlin



Whole blood components

PMF Ref	Product Name	Issued 2019	Issued 2020	Issued 2021
0208	WHOLE BLOOD, Suitable for Neonatal Use for 5 days after Date Drawn. HCT Range: 0.50-0.60	224	130	168
0208	WHOLE BLOOD, Suitable for Neonatal Use, Irradiated. HCT Range: 0.50-0.60	2	3	2
0208	WHOLE BLOOD, Suitable for Neonatal Use for 5 days after Date Drawn. HCT Range: 0.50-0.55	0	0	2
0208	WHOLE BLOOD, Suitable for Neonatal Use, Irradiated. HCT Range: 0.50-0.55	0	3	1
0203	WHOLE BLOOD, Suitable for Neonatal Use for 5 days after Date Drawn	0	0	0
0203	WHOLE BLOOD, Suitable for Neonatal Use, Irradiated	1	0	1
0207	WHOLE BLOOD, Reconstituted, Suitable for Neonatal Use HCT…..	0	0	0
0207	WHOLE BLOOD, Reconstituted, Suitable for Neonatal Use, Irradiated. HCT…	0	0	0

Courtesy Barry Doyle IBTS

SAG M Red Cells suitable for neonatal use for 5 days from date drawn

PMF Ref	Product Name	Issued 2019	Issued 2020	Issued 2021
0232	RED CELLS, Suitable for Neonatal Use for 5 Days after Date Drawn	3765	3764	3266
0232	RED CELLS, Suitable for Neonatal Use for 5 days after Date Drawn, Irradiated	296	218	227

- *Approx. 2000 units issued as O RhD negative standing orders in 2019 and 2020. Reduced midway through 2021 due to supply issues
- Standing Orders 21 hospitals x 2 per week

Courtesy Barry Doyle IBTS

Neonatal Large Volume Transfusion

- **Definitions**
  - BSH
    - 80ml/kg in 24 hours
    - 40ml/kg in 3 hrs
    - 2-3ml/kg/min
  - NBUG
    - Greater than 25ml/kg
    - 80ml/kg in 24 hours

NB: Rate of transfusion is critical

Examples of LVT

- Intrapartum acute life threatening haemorrhage
  - acute feto-maternal haemorrhage
  - twin-twin transfusion
  - bleeding from vasa praevia
  - placental abruption
  - birth injury
- Postpartum acute life threatening haemorrhage in the first days of life
- Exchange transfusion
- Major surgery e.g. cardiac surgery
- Extra Corporeal Membrane Oxygenation (ECMO)
  - cardiac
  - respiratory

Frequency of LVT in neonates?

LVT	Frequency	Reference
Intrapartum acute life threatening haemorrhage	Rare	Wyckoff et al Finn et al
Postpartum acute life threatening haemorrhage	Rare	
Exchange transfusion	Rare	IBTS
Major surgery e.g. cardiac surgery	Frequent	CHI at Crumlin
Extra Corporeal Membrane Oxygenation (ECMO)	Infrequent*	CHI at Crumlin

Age of red cells for neonatal LVT

Guideline	Red cell age
NBUG 2007	5 days
BSH	5 days
AABB	5- 7 days
Canadian Blood Service	7-14 days

Red cell storage lesion

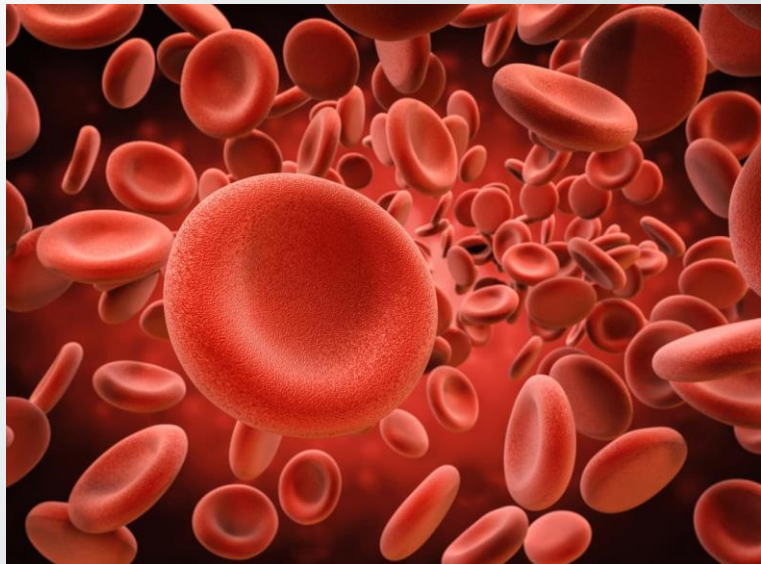
- Glucose used up
- Decrease in ATP
- Decrease in 2,3 DPG
- Na/K pump

↓ O2 carrying capacity

↑ rigidity

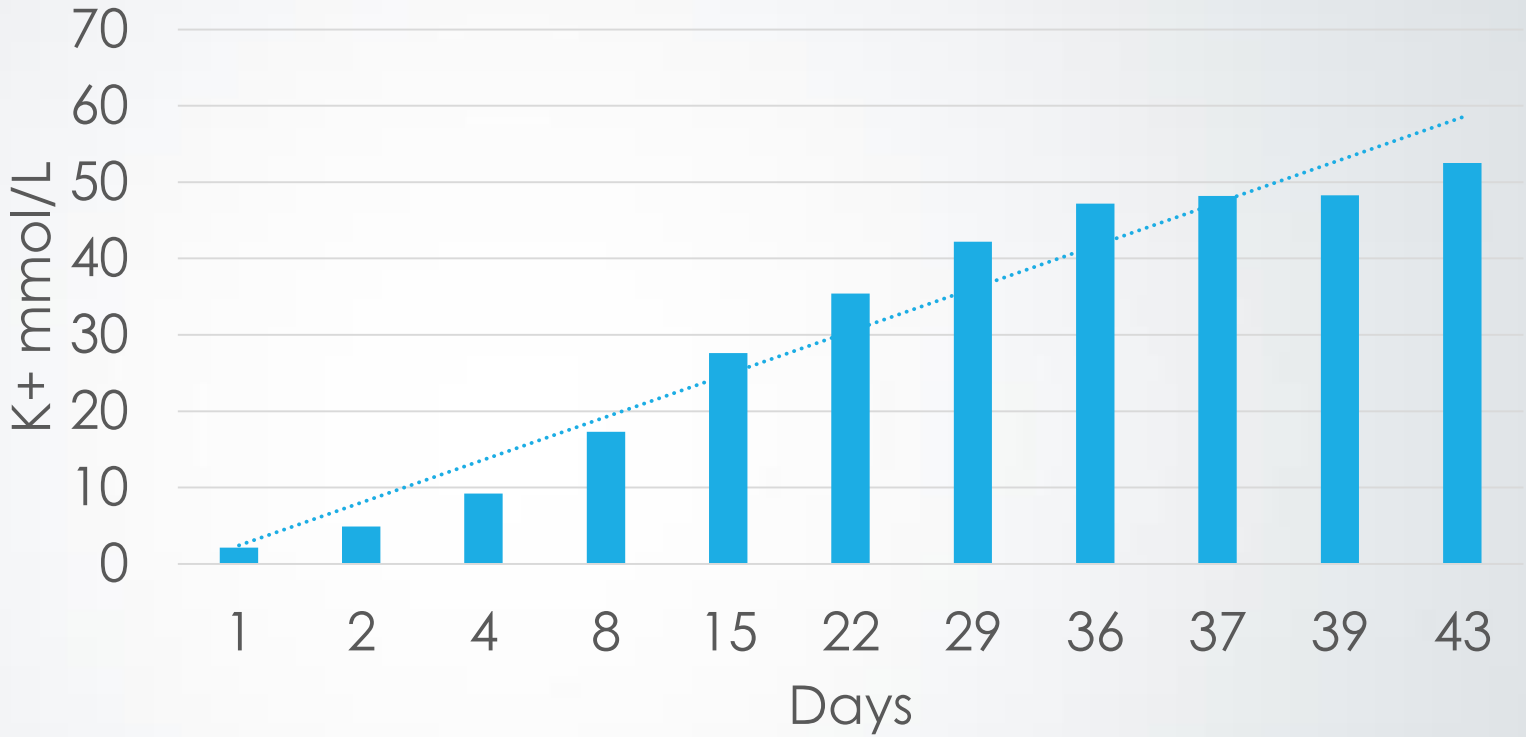
↑ fragility

K leakage from red cell



Potassium levels in stored red cells

– IBTS & Sanquin Data



K+ increases during storage in linear fashion

Dirk de Korte et al. Biomedical Excellence for Safer Transfusion (BEST) Collaborative (2018). Timing of gamma irradiation and sex of blood donor influences in vitro characteristics of red cell concentrates. *Transfusion 58 (4) 917-926.*

Questions ??????

- Why so many different red cell components?
- Can we rationalise component choice?
- How frequently SAG M red cells used for LVT?
  - What happens to these units?
- Can we make better use of a scarce resource?

National survey- 2022

- Participants
  - Maternity hospitals/ hospitals with maternity units
  - Hospitals treating neonates, infants and/or paediatric patients
- 2 parts
  - Structure and process
    - Survey
      - 3 sections
        - Clinical
        - Laboratory
        - Haemovigilance
  - Outcome
    - Data Collection

Current Policies

- General
  - Patient identification
  - Baby naming
  - Sampling
  - Re admission
- Transfusion
  - Patient blood management
  - CMV-, Irradiation
  - Life threatening haemorrhage

Current Practise

- Near Patient Testing
- Laboratory testing- antenatal, neonates
- Component selection
- Component use
- HDFN management

Haemovigilance

- Education
  - Training for different staff groups
- Transfusion Practice
  - Administration
  - Patient identification

- Practise review
  - Audits
  - benchmarking
- Oversight

Where are we now?

- Survey questions being finalised
- To be piloted in Coombe and Crumlin
- Draft position paper Q1 2022

Summary

- Neonatal/Paediatric transfusion is complex
  - Babies are not little adults
- National multidisciplinary approach to paediatric transfusion