Transfusion triggers Indications for use Clinical scenarios Case studies Part 1

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Plan

- Background
- Red cells particular focus on medical patients
- Case studies
- Platelets and frozen components in part 2

Blood Transfusion should be...

Secure Appropriate Focussed



What is the most important word that leads to errors in medicine?

ASSUMPTION

Better Blood Transfusion



obstetric practice

Why is appropriate blood transfusion important?

- limited resource
- hazards
- variation in practice

GLOBAL RED CELL UTILIZATION RATES: 2008 - 09



Source: D Devine et al.: International Forum/Inventory Managementt, Vox Sanguinis 2009



red cells

platelets



cryoprecipitate



leucocytes

FFP is fresh frozen plasma

- What does it contain?
- What is it used for?

What is Cryoprecipitate

- What does it contain?
- What is it used for?

Red cells

CHANGE IN RED CELL USAGE 1999-2013



National Guidance

- NHS circulars 'Better Blood Transfusion'
 - Appropriate Use of Blood Components
 - Optimise pre-op haemoglobin
 - Promote use of **alternatives**

- SHOT Recommendations
 - Appropriate Use of Blood Components

Indication for red cells

- Acute blood loss
- Peri-operative transfusion
- Critical care
- Post chemotherapy and radiotherapy
- Chronic anaemia

Usage by broad category



■ Medicine ■ Surgery ■ O and G ■ Not recorded

Anaemia in Surgical or Critically III patients

- Often caused by acute blood loss
- Generally have a normal bone marrow
- Duration of anaemia is usually short
- Transfusion trigger is the lowest tolerable level of anaemia

Red cell transfusions

- When?
- Why?
- Why not?
- What did a national audit show?

Medical Anaemia

- Requires a different approach to management than
 does simple surgical anaemia
- Level of bone marrow function is crucial in determining the available options
- May be completely or partially corrected without transfusion
- Triggers should be appropriate to maintain activity levels and quality of life.

Age and gender distribution





National Comparative Audit of Use of Blood in Medical Patients 2011 - North West Regional Results

Breakdown of medical use by main category

Category	Number	% of total
Haematology	12589	27
GI Bleed	5410	12
Non-haematological anaemia	12704	28
Neonatal/fetal	584	1
Total	32187	68

Anaemia – what is the cause?

- **Cinical setting**
- Indices (MCV, MCH)
- Morphology

Normal ranges for adults

	Men	Women		
Haemoglobin	135 – 175g/ L	115-155gL		
MCV (mean cell volume)	80-95fL			
Ferritin	40-340ug/L	14-150ug/L		
Serum folate	3.0-15.0ug/L			
Serum B12	160-925ng./L			

Hb in children is lower and varies with age Iron deficiency in young children is very common

BEWARE of dilute samples taken from drip arms The Hb is falsely low

Microcytic hypochromic anaemia

- Iron deficiency
- Chronic inflammation or malignancy
- Thalassaemia trait (α or β)
- Sderoblastic anaemia

Differentiate with measurements of **ferritin**, HbA2 quantitation and bone marrow iron stores and pattern in erythroblasts if necessary

Causes of macrocytosis

- B12 or folate deficiency
- Reticulocytosis
- Liver disease
- Drugs (folate antagonists and cytotoxics)
- Marrow disorders (MDS, aplastic anaemia)
- Others rare in children (thyroid, alcohol)

Diagnostic approach to anaemia -Normochromic anaemia

- Low reticulocyte count -
- WBC and platelets
 - Normal PRCA
 - Normal or decreased
 - Infections
 - Renal disease
 - Drugs
 - Splenomegaly
 - Decreased
 - Marrow failure or infiltration

- <u>High reticulocyte count</u>
 - Haemorrhage
 - Haemolysis
 - Congenital
 - Spherocytic
 - Enzyme
 - Haemoglobinopathy
 - Acquired
 - Spherocytic (Immune)
 - Non-spherocytic

Anaemia - excessive breakdown

- Hereditary spherocytosis characteristic blood film
- Incompatible red cell transfusions
- G6PD deficiency (only rarely chronic haemolysis)
- Other red cell enzymes usually no clues on the blood film
- Sckle cell syndromes
- Thalassaemia syndromes
- Malaria
- Other infections (pus)

Associated with jaundice, dark or black urine

_	Red cell abnormality	Causes		Red cell abnormality	Causes
\bigcirc	Normal			Microspherocyte	Hereditary spherocytosis, autoimmune haemolytic anaemia, septicaemia
\bigcirc	Macrocyte	Liver disease, alcoholism. Oval in megaloblastic anaemia		Fragments	DIC, microangiopathy, HUS TTP, burns, cardiac valves
\bigcirc	Target cell	Iron deficiency, liver disease, haemoglobinopathies, post-splenectomy	\bigcirc	Elliptocyte	Hereditary elliptocytosis
\bigcirc	Stomatocyte	Liver disease, alcoholism	\bigcirc	Tear drop poikilocyte	Myelofibrosis, extramedullary haemopoiesis
	Pencil cell	Iron deficiency	\bigcirc	Basket cell	Oxidant damage– e.g. G6PD deficiency, unstable haemoglobin
5	Echinocyte	Liver disease, post-splenectomy. storage artefact		Sickle cell	Sickle cell anaemia
	Acanthocyte	Liver disease, abetalipo- proteinaemia, renal failure	\bigcirc	Microcyte	Iron deficiency, haemoglobinopathy

From: *Essential Haematology*, 6th Edn. © A. V. Hoffbrand & P. A. H. Moss. Published 2011 by Blackwell Publishing Ltd.

Ineffective haemopoiesis

- Primary marrow failure (haematological malignancies and their treatment)
- Secondary
 - Exogenous poisons lead, drugs eg.
 sulphonamides and chloramphenicol
 - Endogenous infections, chronic illness, marrow infiltration eg. malignancy



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Medical Trigger Values?

- Haematological malignancies
- Myelodysplastic syndrome
- Cancer patients
 - post-chemotherapy
 - QOL increases at
 - during radiotherapy
- IHD / ACS / Angina
- Renal disease

85 - 90 g/l90 - 100 g/l90 - 100 g/l> 80 g/l100 - 110 g/I>120 g/l $>90 \, g/l$ 90 - 100 g/l

Case 1

- 75 y old woman referred to ED with
 - Hb 60g/ L
 - B12 75pg/mL
 - Folate 3.1ug/L
- How would you manage her?
- She received 4 units of red cells



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Case 2

- A 57 year old woman attended a pre-op assessment dinic before a total hip replacement
- Her Hb was 56g/L, MCV 62fL
- What do you want to know next?
- How would you manage her?
- She was transfused and developed 2 different irregular antibodies
- One month after this, and iron therapy, Hb 105g/L, MCV 77fL and ferritin 25 ug/L

Alternatives to Transfusion

• Correct anaemia with



- Fe tablets
 - IV iron
 - Folate
- Vit B₁₂ Diet
- Promote erythropoiesis with erythropoietin (EPO) and iron
- Autologous Transfusion Techniques cell salvage
 In iron deficiency, oral iron can result in Hb rising by 10g/L each week

Case 3: Inappropriate transfusion of red cells to an asymptomatic iron deficient patient

- A 78 year old man felt unwell and had a Hb 58g/L He was otherwise asymptomatic and was known to have iron deficiency anaemia
- The attending doctor authorised a 3 unit red cell transfusion
- The post transfusion Hb was 76g/L

The Decision to Transfuse

- Individual assessment engage with the patient
 - Good patient history
 - Sze, weight, age, sex
 - Co-morbidities
 - Symptoms
 - Balance risks and benefits of transfusion
 - Alternatives to transfusion
 - Iron / B12 / Folate
 - Diet
 - Cell Salvage
Clinical errors related to poor knowledge and understanding

- Inadequate experience of assessing unstable patients e.g. those with gastro-intestinal haemorrhage
- Inadequate knowledge of the patient
- Use of outdated results
- Inadequate monitoring of Hb increments in an unstable patient
- Low body weight patient

Requesting Procedures

- Decision and reason to transfuse recorded in notes
- Communication with the patient
- Explain risks / benefits patient leaflets



The Prescription / Request

- Ensure patient details are complete and accurate
- Specify component, amount and date/time required – do you need to transfuse at night ?
- Specify special instructions / requirements
- Specify transfusion volume / rate / time
- Ensure sample and request is in / reach the lab
- Discuss with laboratory re urgency
 - Patients with antibodies will take longer
 - Patients with special requirements will take longer

Special requirements

- What special groups do you know?
- Neonates
- People with haemoglobin disorders
- People with immune suppression
 - Congenital immune deficiency
 - Acquired immune deficiency
 - Haemopoietic stem cell transplants
 - Post chemotherapy
 - Hodgkin's disease

Specific Requirement Not Met (SRNM)

- Officians ordering blood components unaware of the specific requirements - maybe unaware even of possibility of additional specification
- Failure to inform lab / updated computer record
- Failure to inform when patients transferred
- Many cases of SRNM related to patients undergoing shared care between 2 hospital sites in same or separate trusts

Irradiation requirements for haematology

Patient Condition/Treatment	Irradiated Blood	Commence	Additional Information	
Autologous Bone Marrow Transplant/Peripheral Blood Stem Cells	Yes Continue for 6 months post BMT/PBSC Or lifelong if had purine analogue chemotherapy	7 days before stem cell harvest 7 days before transplant	It is not necessary to irradiate fresh frozen plasma or cryoprecipitate All patients requiring irradiated blood products must be given an information leaflet & card which they must carry at all times in case they require blood products at another hospital. These are available in your ward area, the transfusion lab or from the Transfusion Practitioner.	
Allogenic Bone Marrow Transplant/Peripheral Blood Stem Cells	Yes	7 days before conditioning for transplant		
Hodgkin's Disease	Yes	From diagnosis- indefinitely		
Has received Purine Analogue Chemotherapy i.e. Fludarabine, Cladribine, Bendamustine and Deoxycoformycin, Clofarabine	Yes	From start of Chemotherapy- indefinitely		
Has received Alemtuzumab (MabCampath), Antithymocyte Globulin (ATG) and Antilymphocyte Globulin (ALG)	Yes	From start of Chemotherapy- indefinitely		
New Leukaemia Patients	No unless fall into any of the above		 * Discuss with attending Haematology consultant Pregnant patients must receive CMV- products 	

Collection and Administration

- Collection of wrong unit
 - training and understanding may be inadequate
- Total absence of a bedside check
 - Failure to understand the purpose of elements of 'checking the blood'
- Many reporters stated that the involved personnel had received transfusion training within the last year, often much more recently
- Don't make assumptions: CHECK, CHECK, CHECK

Recommendation 2014 Checklist at the bedside:

- 1 Positive patient identification
- 2 Check identification of component against patient wristband
- 3 Check the prescription: has this component been prescribed?
- 4 Check the prescription: is this the correct component?
- 5 Check for specific requirements does the patient need irradiated components or other specially selected units?

Case 4

- Sally Sunshine born 21 October 2008 at 40 weeks. Admitted for cardiac surgery 24 October 2008
- Cytogenetics has been sent off for confirmation of Di George syndrome
- The patient is now 2 days post cardiac surgery and needs a paediatric pack of red cells for top-up transfusion

What are the special requirements?

- 1. Irradiated only
- 2. OMV negative and irradiated
- 3. No special requirements
- 4. CMV negative only

Case 5

- Rebecca Rain born 6 October 2005. She was admitted and diagnosed with neuroblastoma 21st May 2008
- Admitted 4 Nov 2008, aged 3 yrs, and planned for stem cell harvest on 12 Nov 2008
- Previously tested and neg for CMV
- Due to oozing from her line, needs one adult dose of platelets

What are the special requirements?

- 1. Irradiated only
- 2. OMV negative and irradiated
- 3. No special requirements
- 4. CMV negative only

Surgery and critical care

Surgical / Critical Care Trigger Values?

- In continuing haemorrhage resuscitate and manage source of bleeding
- In a normovolaemic stable patient;
 - In absence of Ischaemic Heart Disease or Acute Coronary Syndrome 70 – 80 g/L
 - In **presence** of IHD or ACS > 90 g/L

Red cells

- Transfusion requirements in critical care Hebert et al NEJM 1999 (TRICCtrial)
 - using Hb <70g/Lasthreshold at least as effective and possibly superior to liberal transfusion strategy in critically ill patients with normovolaemia

Case 6: Cell Salvage procedures

- Two patients had undergone a total hip replacement (THR) and both were having postoperative cell salvage.
- The patients had units 'spiked' at the same time and both patients had rigors, temperature increase and vomiting within 15 minutes of the start of transfusion.
- What is the explanation?
- The staff nurse had transposed the units as both drains were removed from the patients at the same time and taken to a treatment room to be primed through the giving sets.
- How would you avoid this?

Case 7: Surgical case study

- 73 year old man taking rivaroxaban for DVT post left primary THR 3 months ago
- Attends pre op assessment clinic 4 weeks before right primary total hip replacement
- FBC results: Hb 110g/L, MCV 93fI, WBC and plts normal
- Haematinics: B12 202, serum folate 5.7, serum ferritin 35ug/L

Which of these apply?

- 1. Hb of 110g/Lis a satisfactory pre op Hb
- 2. Serum ferritin of 35ug/Lexcludes iron deficiency anaemia
- 3. Intravenous iron will be more effective than oral iron in improving the Hb
- 4. Erythropoietin is indicated in this case

Select all that apply

West Midlands RTC audit 2005





Anaemic patients use more blood

THE LANCET

Articles

Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospective cohort study



Khaled M Musallam, Hani M Tamim, Toby Richards, Donat R Spahn, Frits R Rosendaal, Aida Habbal, Mohammad Khreiss, Fadi S Dahdaleh, Kaivan Khavandi , Pierre M Sfeir, Assaad Soweid, Jamal J Hoballah, Ali T Taher, Faek R Jamali

US Veterans Database (NSQIP) Anaemia

30 day mortality 30 day composite morbidities (9 defined areas)

Multivariate regression (9 defined subgroups) (56 cofactors) (n=227,425) (n=69,229; 30.4%)

Anaemia is bad for outcome



FOCUS study

Liberal or Restrictive Transfusion in High-Risk Patients after Hip Surgery Jeffrey Carson et al NEJM December 29, 2011 365; 2453-62 Patients > 50 years with cardiovascular disease or risk factors

Variable	Liberal	Restrictive	
Hb pre-transfusion	9.2 ± 0.5	7.9 ± 0.6	P value <0.001
Median units transfused	2 (IQR 1-2)	0 (IQR 0-1)	
30-day death or inability to walk (Death)	46.1% (5.2%)	48.1% (4.3%)	Odds Ratio 0.92 0.73-1.16 (1.23,0.71- 2.12)
60-day death or inability to walk (Death)	35.2% (7.6%)	34.7% (6.6%)	P= 0.90 Odds Ratio 1.01, 0.84-1.2 (1.17, 0.75- 1.83)

RCTs of restrictive v liberal transfusion

	Hb threshold (g/L)	Patients transfused	Mean Hb g/L at transfusion	Participation of eligible patients
Intensive care	70 vs 100	67% vs 99%	85 vs 107	41%
Cardiothoracic surgery	80 vs 100	47% vs 78%	91 vs 105	75%
Repair of hip fracture	80 vs 100	41% vs 97%	79 vs 92	56%
Acute upper GI bleeding	70 vs 90	49% vs 86%	73 vs 80	93%

- 1. 4 best known high quality RCTs of restrictive v liberal transfusion
- 2. Clinical scenarios: ICU, cardiac surgery, hip fracture, and upper GI bleeding
- 3. Hb thresholds: 70 v 100; 80 v 100 x 2; 70 v 90g/L
- 4. Good separation of Hb in restrictive v liberal transfusion
- **5.** Consistent difference in % patients transfused

Evidence of benefit with use of restrictive strategy (adults) (updated)

Outcome	No of patients (studies)	Risk ratio	Absolute risk difference
No. of patients needing transfusion	6527 (19 studies)	RR 0.63 (0.54 to 0.72)	346 fewer per 1000 (from 262 fewer to 431 fewer)
No. of units transfused	2143 (10 studies)	-	1.13 units lower (1.67 to 0.59 lower)
30 day mortality	6356 (17 Studies)	RR 0.81 (0.67 to 0.98)	10 fewer per 1000 (from 1 fewer to 17 fewer
Adverse events	937 (2 studies)	RR 0.84 (0.72 to 0.97)	38 fewer per 1000 (from 7 fewer to 67 fewer)

Transfusions in Septic Shock (TRISS)

Holst et al. NEJM 2014; October 1, 2014 DOI: 10.1056/NEJMOA1406617

1005 ICU patients with septic shock randomised to receive 1 unit RBCs when Hb < 70 or <90g/L

At 90 days, mortality:-

43%: patients tx RBCs when Hb <70g/L

45%: patients tx RBCs when Hb <90g/L

Results similar after adjustment for risk factors



Transfusion Thresholds

Hb 70-80g/L

except:

- Symptomatic patients
- Patients with acute coronary syndrome
- Patients with major haemorrhage

'For every complex problem there is an answer that is clear, simple, and wrong' H.L. Mencken

Triggers for red cell transfusion Acute blood loss (BCSH) : transfuse if

– Blood loss >30-40% Total Blood Volume

Blood loss is difficult to assess visually BCSH guidelines: Pulse rate >110bpm BP <90mmHg systolic But in a fit young person these signs may be late

How do you assess how much blood has been lost?

Case 8: Overestimation of blood loss from acute Gl bleed

- A patient was admitted to the ED with a GI bleed.
- Hb on admission was 121 g/L
- 2 units of emergency blood were given, followed by 6 units of crossmatched blood over the next 12 hours.
- What is wrong with this?
- The FBC was not re-checked until all 8 units had been transfused, by which time the Hb was 185 g/L

Case 9

- A patient with haematemesis was in need of an urgent transfusion. The patient's wristband was contaminated with blood, could not be read, so the electronic bedside checking system was not used.
- The compatibility form filed in the patient's notes was used to provide the identifiers for collecting the blood.

Comments?

 The patient, group O RhD pos, was transfused with >50 mL of A RhD pos red cells before the error was recognised (the compatibility form belonged to another patient). The patient was admitted to ITU with intravascular haemolysis and renal impairment.

Acute blood loss is difficult to assess

- Emergencies are associated with panic, short cuts and mistakes
- Patients with gastrointestinal haemorrhage have died from over-transfusion, not bleeding
- Women with PPH have died after reassurance that bleeding has been controlled because the volume lost has not been replaced

Medical patients

Cinical Reason for Red Cell Use



Data from National Comparative Audit of blood use in medical patients 2011

Who made the decision to transfuse?



Reversible anaemia

- 747/1791 42% of those identified in part 1
- 395 cases of iron deficiency anaemia
- 107 cases of B12/ folate defy (48 B12, 64 folate defy)
- 49 cases possible autoimmune haemolysis
- 12 cases of possible renal anaemia definition changed after selecting part 2 cases – narrowed to those with CRF ticked only and no other diagnosis and eGFR < 30 – alternative would be to use wider definition – we have 65 cases with eGFR<30

Reversible anaemia – which service first noted the anaemia?



How transfusion could have been avoided in 187 patients with reversible anaemia


Triggers for red cell transfusion

- Critical care (see BCSH guidelines)
 - As for acute blood loss
- Chronic anaemia
 - Consider alternatives
 - Maintain Hb just above lowest concentration associated with no symptoms
 - Thalassaemia Hb max 95g/L
 - Sckle cell ?

Case 10: Death attributed to delayed transfusion in a child with sickle cell disease

- A young child with sickle cell disease was admitted with a sickling crisis. His Hb was 57g/Lon admission. This was rechecked later the same day when it was 50g/L
- The Hb was not checked the following day (a Sunday). On Monday the Hb was 28g/L (reported at midday)
- It was stated in the report that there was a delay of more than 4 hours in requesting red cells and starting the transfusion – the child suffered cardiac arrest and died during the transfusion in the evening

- Following iron deficiency during pregnancy, a woman delivered with a Hb of 78 g/L
- A decision was taken in conjunction with the patient not to transfuse her, but to discharge her on oral iron. Nine days later, her Hb was checked by the midwife and found to have risen to 89 g/L
- What would you do now?
- Two weeks later, without a further check on her Hb, she was admitted to the community hospital for a blood transfusion at the GP's request

- An elderly female patient of low body weight (29 kg) was admitted with an initial Hb of 70 g/L
- Three units of red cells were prescribed
- Comments?
- The post-transfusion Hb was 170 g/L, confirmed with a repeat sample the following day.
- What would you do?
- She sustained a cerebral infarct 48 hours following the transfusion, which resulted in long-term morbidity.

Case 13: Death follows failure to recognise and act on shock 4 days after major surgery in a patient on anticoagulants

- A 66 year old man had spinal surgery on a Thursday. He was at high risk of complications (ischaemic heart disease with previous coronary artery stenting, was on long-term warfarin for recurrent thromboembolic disease)
- Surgery was uneventful and he was returned from a planned overnight stay in the high dependency unit to the ward on Friday on a heparin infusion. His warfarin was restarted on this day. On Saturday his Hb was stable and international normalised ratio (INR) was 1.1
- He was apparently well until the middle of Sunday night when he developed hypotension and had a temporary loss of consciousness. The possibility of occult bleeding was raised early on Monday morning
- He continued to have hypotension; later tachycardia and poor urine output were noted, but the suspected and then confirmed diagnosis of a large retroperitoneal bleed was made several hours later at 17:00. The resuscitation was slow (two units of blood between 14:00 and 17:00 on Monday) and he died later the same day

Case 14: More haste less speed – wrong date of birth

- A 66 year old man with a ruptured aortic aneurysm had delayed provision of major haemorrhage packs as the ambulance staff transferring him from one hospital to another gave the wrong date of birth to the emergency department
- This was entered into the Trust information technology (IT) system. In addition, the blood sample was delayed reaching the laboratory and had not been marked as urgent (2 errors)

Case 15: Avoidable: How many errors?

- 75 yr old man visited at home by GP for unilateral swelling of the leg (Hb 124 g/Lthree weeks before)
- GP takes sample into syringe and walks 10 mins back to surgery to decant into sample tube
- Hb 76 g/L, so patient (no symptoms of anaemia) admitted overnight as an emergency by on call GP
- Repeat Hb and crossmatch sample at 0640, result available at 0700, Hb 114 g/l
- Transfusion started at 0955 without results review and stopped at 1120 (after 100 ml)
- Unnecessary emergency admission

Case 16: Delay

- Day 1: Patient with AML seen at 20:00 and prescribed 1 unit of RBCs Hb 40 g/L(ED)
- Day 2: Transferred with inadequate handover to ward at 02:30. Nurse assumed blood had been given, and ED assumed blood bank would phone when blood was ready
- 09:00 consultant haematology review; Hb 36 g/L; assumed and wrote in notes that 1 unit RBC given in ED, but had not

Delayed transfusion (cont.)

- 16:30 transferred to another hospital, reviewed and started on chemotherapy at 17:04
- 19:46 acutely unwell, fever, tachycardia and hypoxic. prescribed antibiotics but not given until 23:50
- 19:50 started 4 units FFP for coagulopathy
- Day 3: At 0:10 unit of RBCs given, 28h after prescribed
- 02:00 concern about increased RR, CXR and 06:30 pulmonary oedema from fluid overload (3240mLinput over 24h)
- Transfer to ITU
- 4h delay in further FFP transfusion after prescription
- Day 4: Death due to primary illness (AML)

How do you decide how much blood to transfuse?

- Adults
- Children

Medical Anaemia

- Requires a different approach to management than
 does simple surgical anaemia
- Level of bone marrow function is crucial in determining the available options
- May be completely or partially corrected without transfusion
- Triggers should be appropriate to maintain activity levels and quality of life.

Excessive transfusion follows misinterpretation of verbal instructions

- A 48 year old man was in resus with a major GI haemorrhage. Five units of blood arrived and a verbal order for 2 units was given by the doctor, who then wrote them up on a prescription chart
- Staff nurse asked the doctor if he wanted the blood given through the rapid transfuser, and he confirmed that 'all the blood can go though this'
- Five units were transfused instead of the intended 2 units

Timing

- What is the interval between collection and setting up the transfusion?
- What is the volume in a bag of blood?
- How long should one unit of blood take to transfuse?

- An 83-year-old male with refractory anaemia related to chronic renal failure received 2 units of RBCs, each over approximately 1.5–2.5 hours.
- Comments?
- He had continuing bradycardia during the second unit. He remained stable, but the bradycardia persisted at 40–45 bpm.
- Within 15 minutes of the start of the 3rd unit of RBC, he became unresponsive with no cardiac output. Resuscitation was ultimately unsuccessful.
- A post-mortem examination showed acute LVF, hypertensive heart disease with mitral valve prolapse and hypertensive nephropathy.
- Transfusion Associated Circulatory Overload following RBC transfusion to elderly male with renal impairment and cardiac failure

A particular risk in elderly patients >70 years

Number of patients in age range



Pattern of Hb increments/ unit by ranges of body weight



(Data from national comparative audit of red cell use in medical patients Courtesy of Dr. Kate Pendry)

White cell count mistaken for Hb resulting in unnecessary transfusion

- A 70 year old woman presented in A/Elooking very pale and had fainted at home. Full blood count run on a POCT analyser in A&E showed a WBC of 7.9 which was mistaken for the Hb and a two unit transfusion was prescribed. The error was identified when the post transfusion Hb was 16.3g/dl.
- The patient was informed of the error, but she stated that she was happy as she felt much better

Medical Trigger Values?

- Haem Malignancies
- Myelodysplasia
- Cancer patients
 - QOL increases at
 - during Radiotherapy
- IHD / ACS / Angina
- Renal Disease

- 85 90 g/L
- 90 100 g/ L
- 90 100 g/ L
- 100 110 g/ L
- >120 g/L
- > 90 g/L
- 90 100 g/L

- A patient who was group O RhD pos shared the same forename and surname as a group A RhD pos patient in another ward, for whom blood had also been prepared.
- The staff member collecting the unit, had been given a collection slip with the patient's full identifiers.
- The wrong unit was collected.
- How would this error be picked up?
- The patient was not positively identified at the bedside. The group O RhD positive patient received 1 unit of A RhD positive red cells and the error was not appreciated until the second unit was required 12 hours later. The patient suffered no adverse outcome

How do you set up a paediatric transfusion?

Neonate fails to respond to transfusion of red cells

- A top-up transfusion of 14 mL of RBCs administered to a neonate failed to increase the neonate's Hb, despite receiving a second aliquot of 14 mL.
- How would you investigate this?
- On investigation it is thought that the roller damp between the Y-connection and the syringe driver may not have been fully engaged, resulting in the red cells being drawn back into the red cell unit.

Administration error resulting in transfusion of entire paedipack

- A 24-day-old baby in the neonatal unit was prescribed a transfusion of 14.3 mL of red cells.
- The baby's Hb rose from 97g/Lpre transfusion to 200 g/L post transfusion. On examination of the paedipack it was noted the bag was empty, suggesting that the baby had received the full 50 mLpaedipack in error.
- This was felt to be due to the blood having been given via a neonatal Yblood-giving set and problems with the dosure of the roller damp, in the line connected to the roller damp.

Lack of communication between shifts in SCBU results in baby being transfused twice

- A 2-month old premature baby had a haemoglobin of 99 g/L, requiring top-up, and the team on duty that day administered 60ml of red cells.
- Three days later, another team on the unit noticed the same Hb result, made a decision to transfuse and gave a further 70 ml red cells.
- There was no indication on the treatment chart that the patient had been transfused, the prescription chart had been filed in the wrong place, and notes were not checked for evidence of previous transfusions.