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When transfusions go wrong

The Serious Hazards of Transfusion Scheme

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Haemovigilance

- Surveillance procedures from the collection of blood and its components to the follow up of recipients
- To collect and assess information on unexpected and undesirable effects (of transfusion)
- And prevent their occurrence or recurrence

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The UK national haemophilia database from 1968

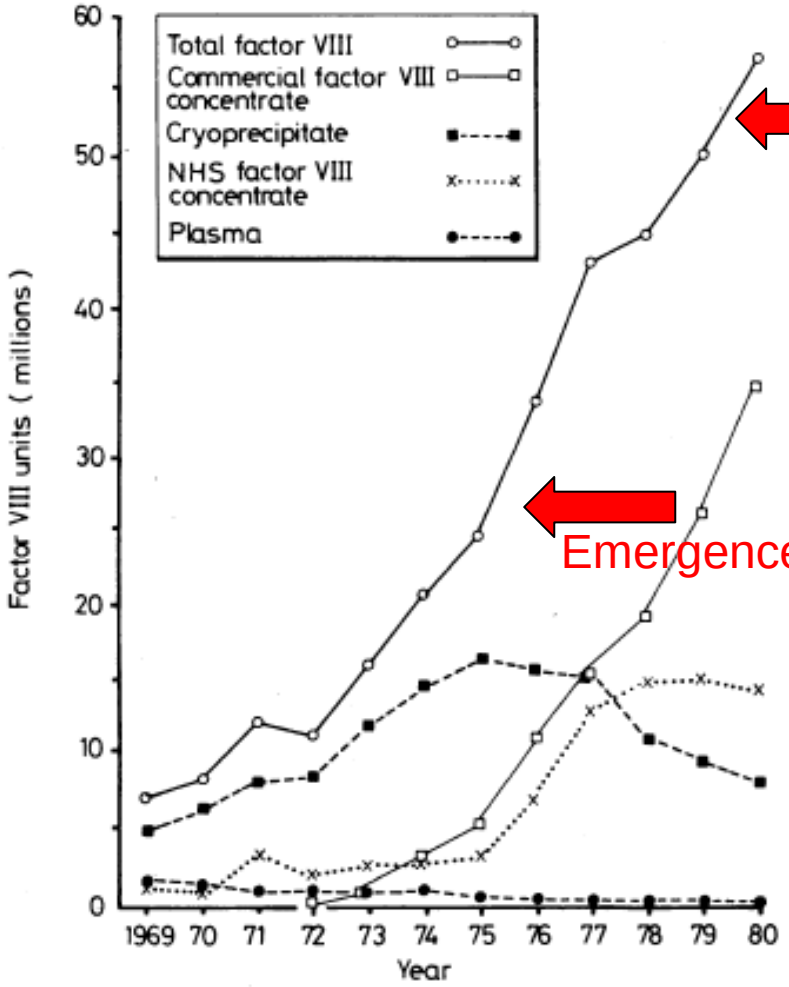

FIG 2—Amount of different types of materials containing factor VIII and total amount of factor VIII activity units used each year during 1969-80 by haemophilia centres in United Kingdom to treat patients for haemophilia A.

HIV seroconversions

Emergence of hepatitis

Thanks to Dr Bolton-Maggs

Confirmed link between transfusion and AIDS –

2157 patients with AIDS:

There were 64 individuals with no risk factors,

18/64 (28%) had previously been transfused

NEJM

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ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS) ASSOCIATED WITH TRANSFUSIONS

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Abstract Of 2157 patients with the acquired immunodeficiency syndrome (AIDS) whose cases were reported to the Centers for Disease Control by August 22, 1983, 64 (3 per cent) with AIDS and *Pneumocystis carinii* pneumonia had no recognized risk factors for AIDS. Eighteen of these (28 per cent) had received blood components within five years before the onset of illness. These patients with transfusion-associated AIDS were more likely to be white ($P = 0.00008$) and older ($P = 0.0013$) than other patients with no known risk factors. They had received blood 15 to 57 months (median, 27.5) before the diagnosis of AIDS, from 2 to 48 donors (median, 14). At least one high-risk donor was identified by interview or T-cell–subset analysis in each of the seven cases in which investigation of the donors was complete; five of the six high-risk donors identified during interview also had low T-cell helper/suppressor ratios, and four had generalized lymphadenopathy according to history or examination. These findings strengthen the evidence that AIDS may be transmitted in blood. (N Engl J Med 1984; 310:69-75.)

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Aims of SHOT

- Identify trends in adverse reactions and events
- Inform policy within transfusion services, DH and EU
- Target areas for improvement of practice
  - Aid production of clinical guidelines for use of components
  - Promote development of suitable education and training
  - Identify and promote standards of practice
- Stimulate research and detailed audit
- Raise awareness of transfusion hazards and their prevention
- Be an “early warning” of new complications
- Improve safety of transfusion for patients

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Is transfusion a good thing?

- Potentially saves lives in major haemorrhage
- Can prevent major morbidity
- Improves quality of life in chronic bone marrow failure
- Associated with adverse events and reactions
- Some evidence that transfusion worsens outcome in certain procedures

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Major hazards of transfusion: What do you think?

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- Infection?
- Giving someone blood intended for someone else?
- Causing heart failure by transfusing too much blood?
- Severe respiratory problems due to transfusion of antibodies?
- Anaphylactic shock?

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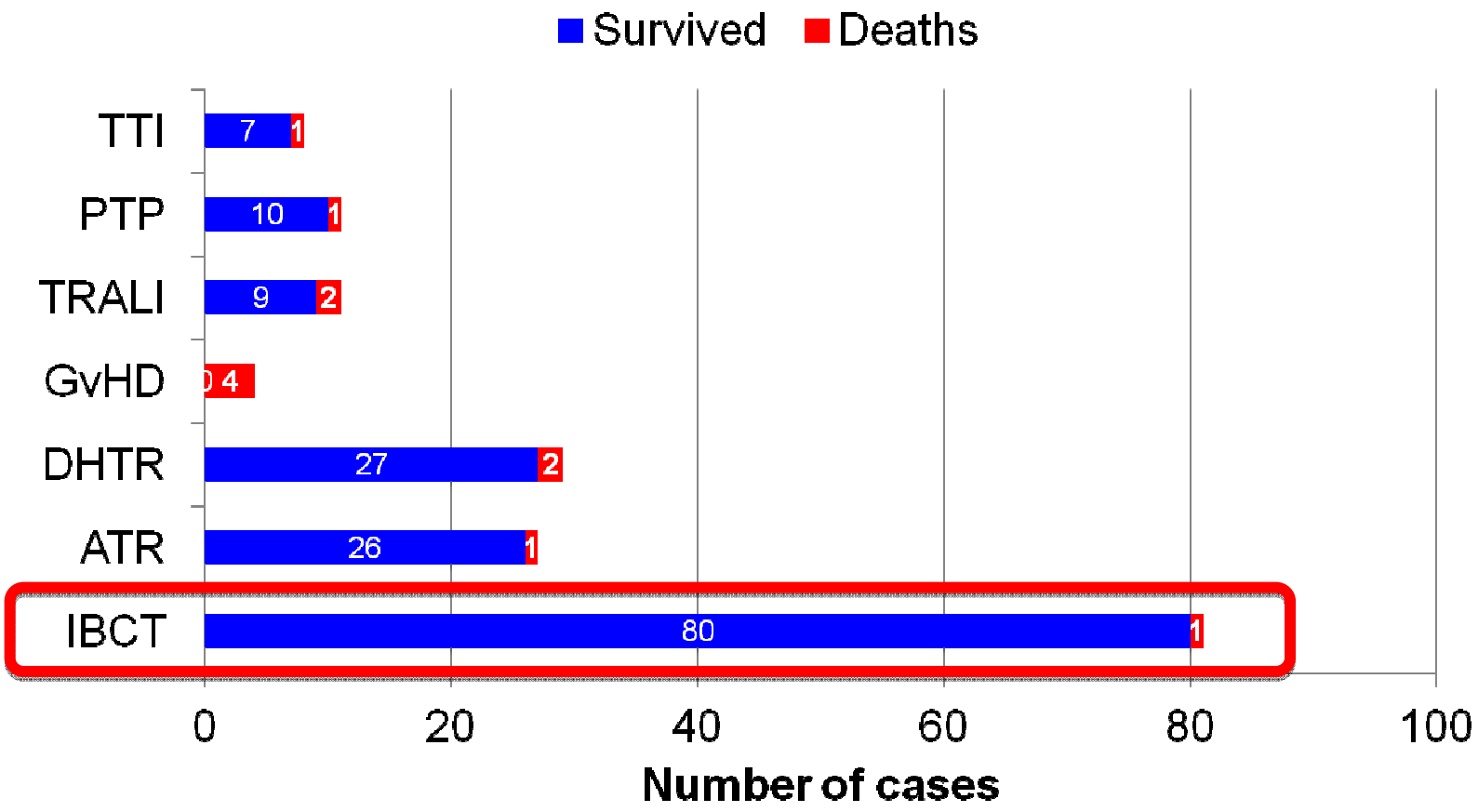
Data from 1st SHOT Report 1996



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Cumulative categories 2014-from SHOT

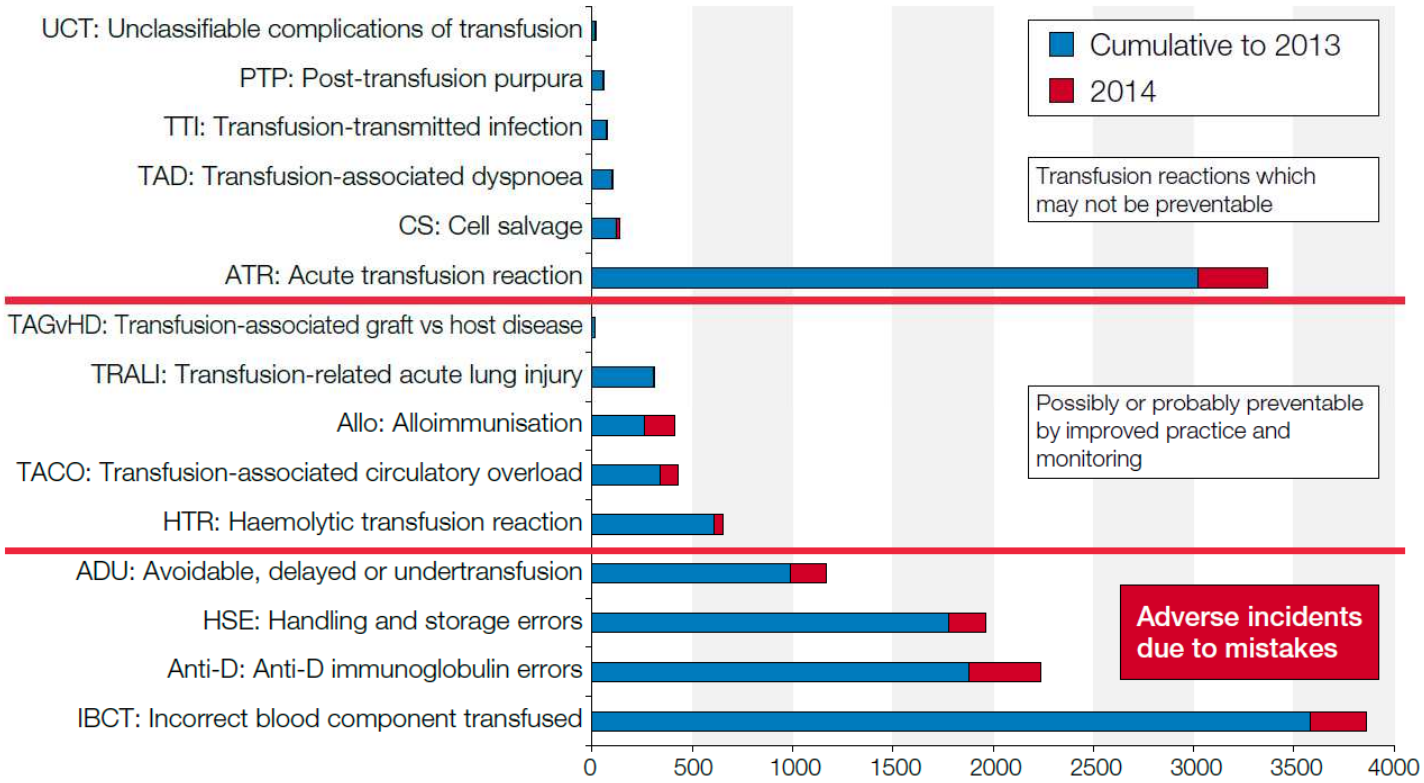

Figure 4.2: Cumulative data for SHOT categories 1996/7-2014 n=14822

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Giving blood intended for someone else can lead to an ABO incompatible transfusion

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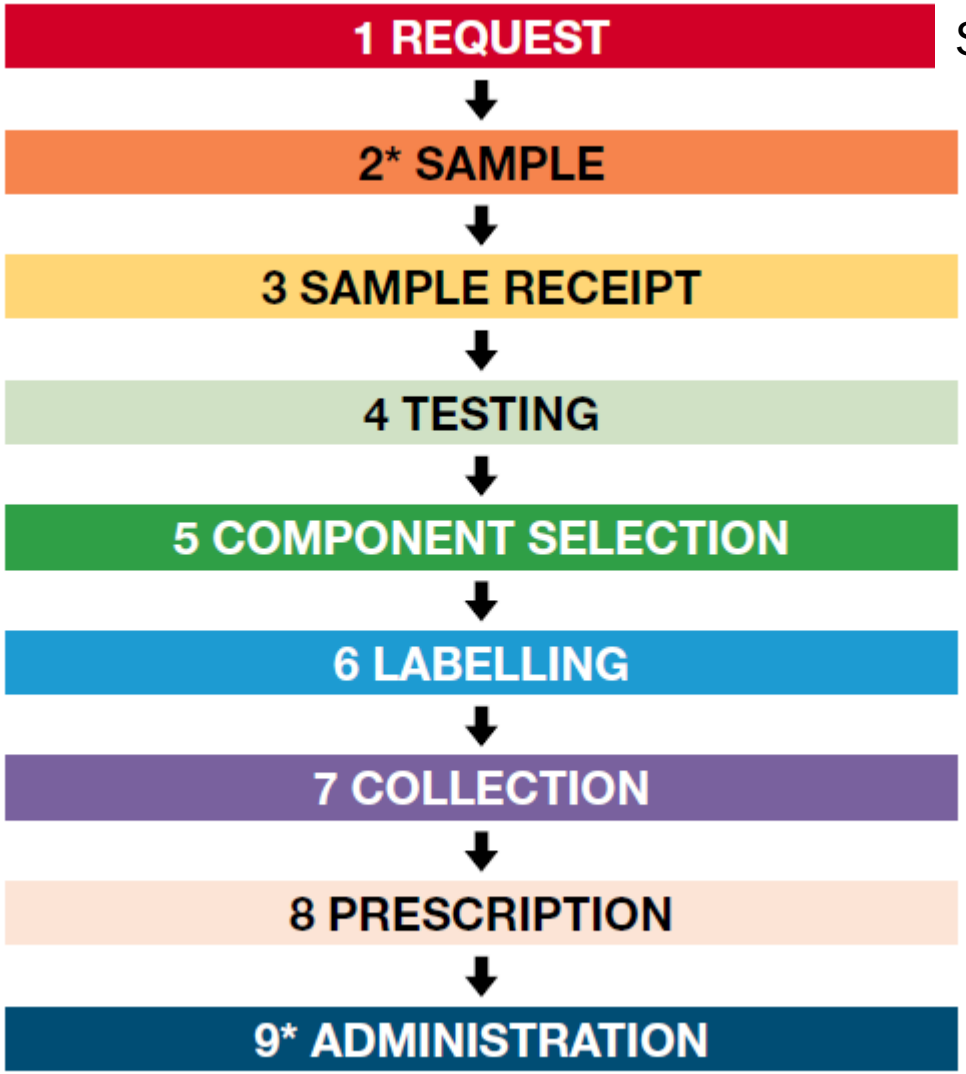
How does it happen? Case from 2013

- Two patients with the same surname in adjacent beds
- Blood intended for patient M (group AB RhD pos) was transfused to patient J (O Rh D pos)
- J was already unwell, but after only 35 ml blood he developed
  - Chest pain
  - Unrecordable blood pressure
  - Deteriorating conscious level
  - Stopped passing urine
- Blood samples all showed severe red cell destruction (haemolysis)
- Died 3.5 hours later
- He was already very ill but it is likely this reaction contributed to his death

Why do ABO-incompatible transfusions occur?

Graphic from SHOT



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Disaster averted (SHOT 2013)

- A sample from the Emergency Department (ED) grouped as A
- The patient needed surgery 3 days later
- He had no history of transfusion and no previous groups
- The hospital had not yet instituted a “two sample” rule
- However, the anaesthetist did a repeat sample preop
- This was group B
- The first sample had been a “Wrong Blood in Tube”
- This occurs in approximately 1 in 2000 samples

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Improvements to practice

- Increased awareness of positive patient ID
- Two sample rule
- Patient involvement

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Two samples: and how not to do it!

Thanks to Dr Jane Keidan

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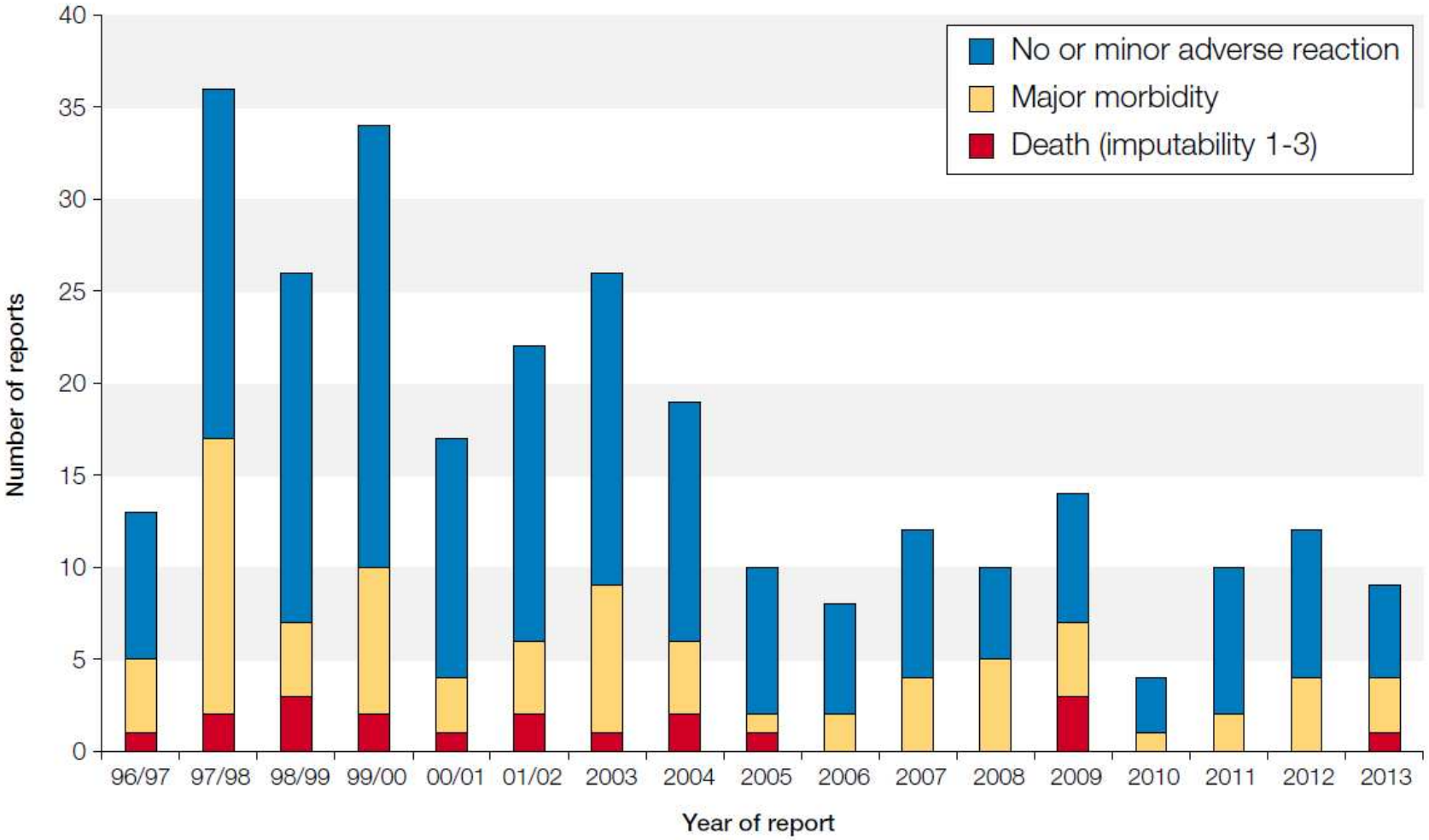
ABO incompatible transfusions by year-from SHOT



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Serious Respiratory Complication

- Teenage boy with history of liver disease transfused with female apheresis platelets for an elective surgical procedure
- Developed hypoxia, hypotension and pyrexia within 30 minutes of transfusion. Hb increased from 80g/L before procedure to 180 after
- Required cardio-respiratory support on ITU
- When ET tube inserted, developed fountain like pulmonary oedema

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Transfusion-Related Acute Lung Injury (TRALI)

- A serious condition
- Acute respiratory distress arising during or within 6 hours of starting transfusion
- Caused by antibodies in the donor reacting to patient white cells
  - These antibodies occur in 25% female donors, increasing with number of pregnancies
- Was considered commoner with FFP and platelets
- Typically, fever, dyspnoea and hypotension
- Fluid moves out of the vascular space into tissues

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TRALI reports 1997-2013 from SHOT

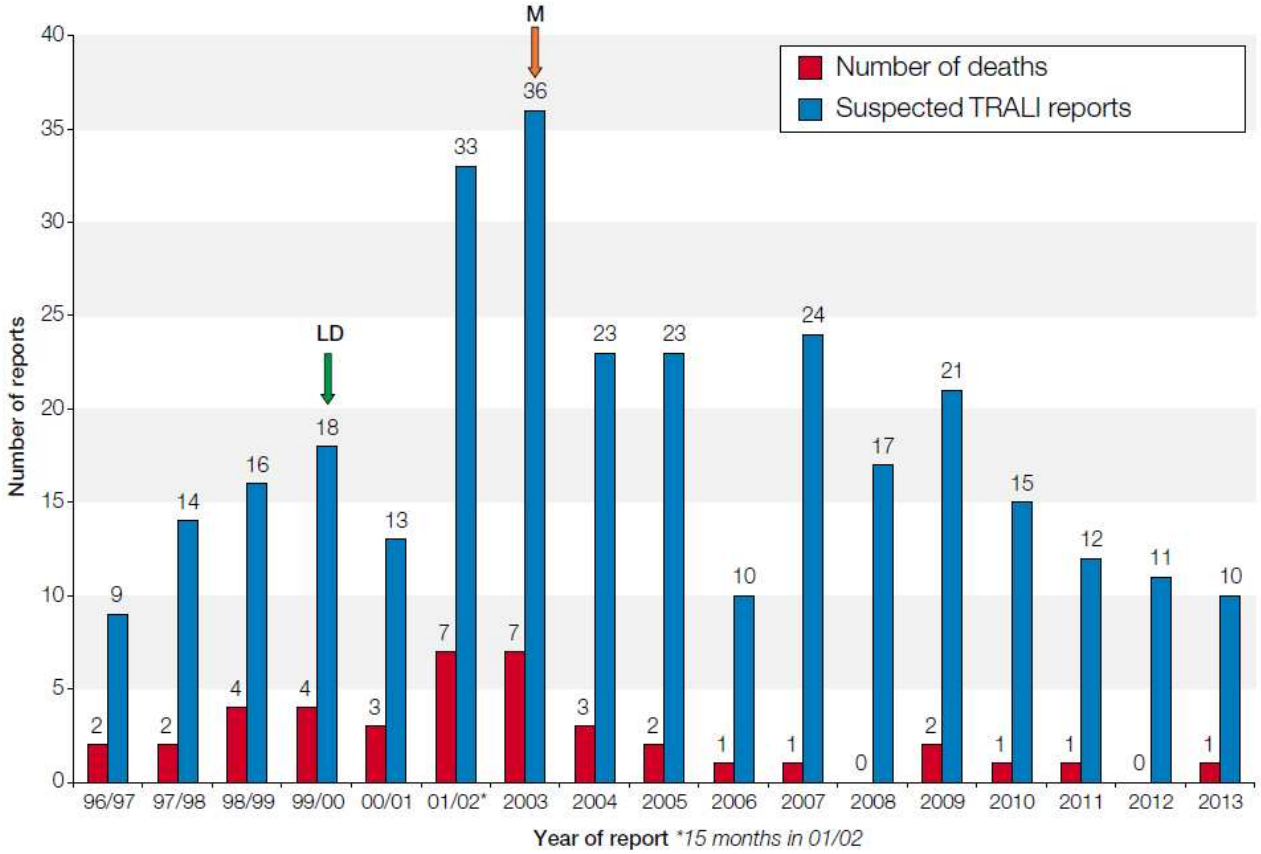

Figure 22.1: Number of suspected TRALI cases and deaths at least possibly related to TRALI by year of report

LD marks the date when universal leucodepletion was introduced (during 1999). M marks the date (from September 2003) when National Health Service Blood and Transplant (NHSBT) introduced use of male donor plasma only for FFP and preferential use of male plasma for suspending pooled platelets. Hospital stocks of female FFP were not recalled.

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What happened?

- 2000 Universal leucodepletion of blood components
- 2003 Female plasma phased out, including suspension medium in platelets

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Leucoreduction

- Introduced as a measure to reduce transfusion-transmitted variant Creutzfeldt Jakob Disease (vCJD)
- Also:
  - Reduces Transfusion Related Acute Lung Injury (TRALI)
  - Reduces Cytomegalovirus (CMV) transmission
  - Reduces TA-GvHD
  - Reduces febrile reactions to blood and components

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Transfusion-transmitted graft versus host disease

- Male patient developed HIV-negative acquired immunodeficiency syndrome-exact cause not found
- Had Gastro Intestinal haemorrhage and was transfused
- Developed progressive pancytopenia, weight loss and rash
- Bone marrow cytogenetics showed 100% XX cells
  - Marrow engraftment by female donor cells
- Patient died (100% TA-GvHD cases fatal)

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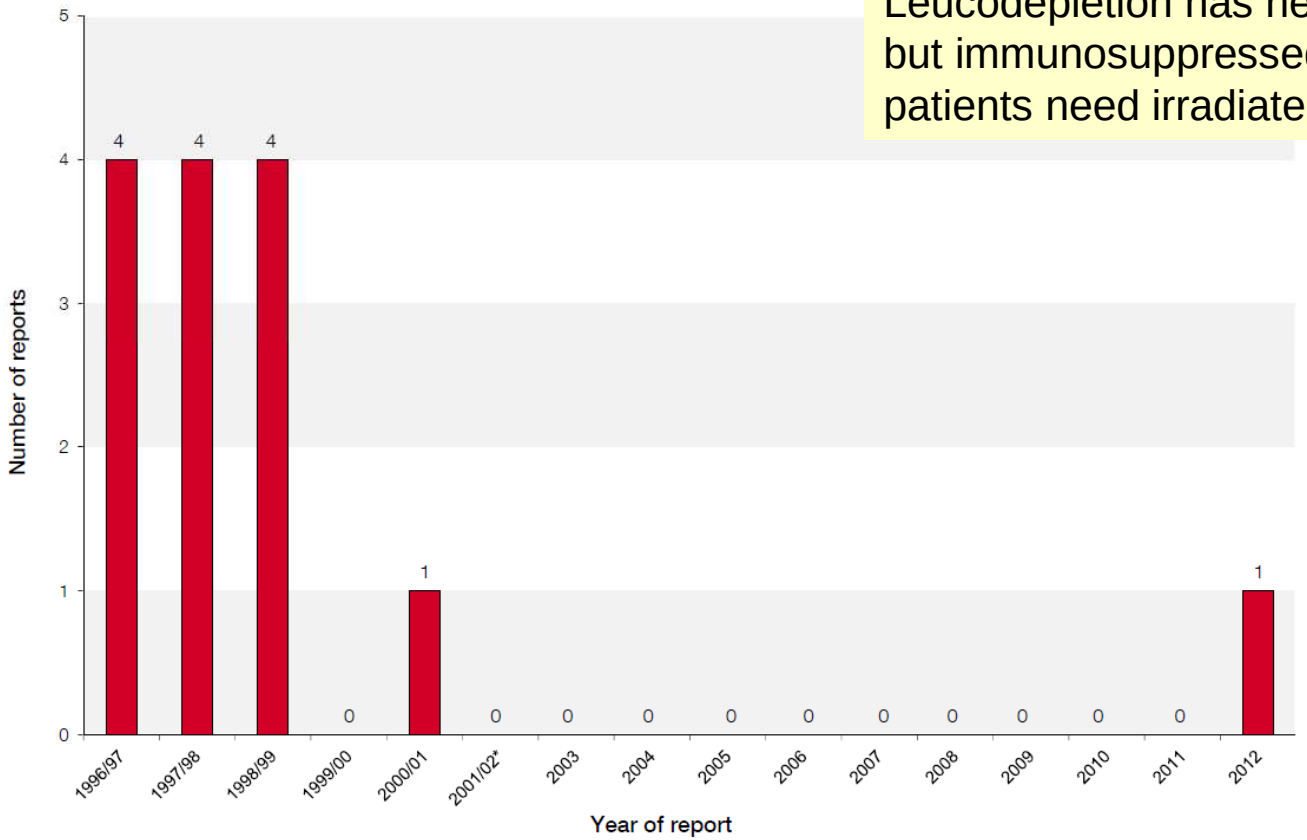
Trends in TA GVHD-data from SHOT

Figure 20.1: Number of cases of TA-GvHD reported to SHOT each year



Leucodepletion has helped but immunosuppressed patients need irradiated blood

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Transfusion-transmitted bacterial infection

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Case from 2007 SHOT report

- 62 year old female had diabetes and renal failure
- Transfused red cells for anaemia
- Soon after the start, she developed pain at the IV site, rigors, tachycardia
- Enterobacter cloacae was isolated from the patient's blood cultures and the pack

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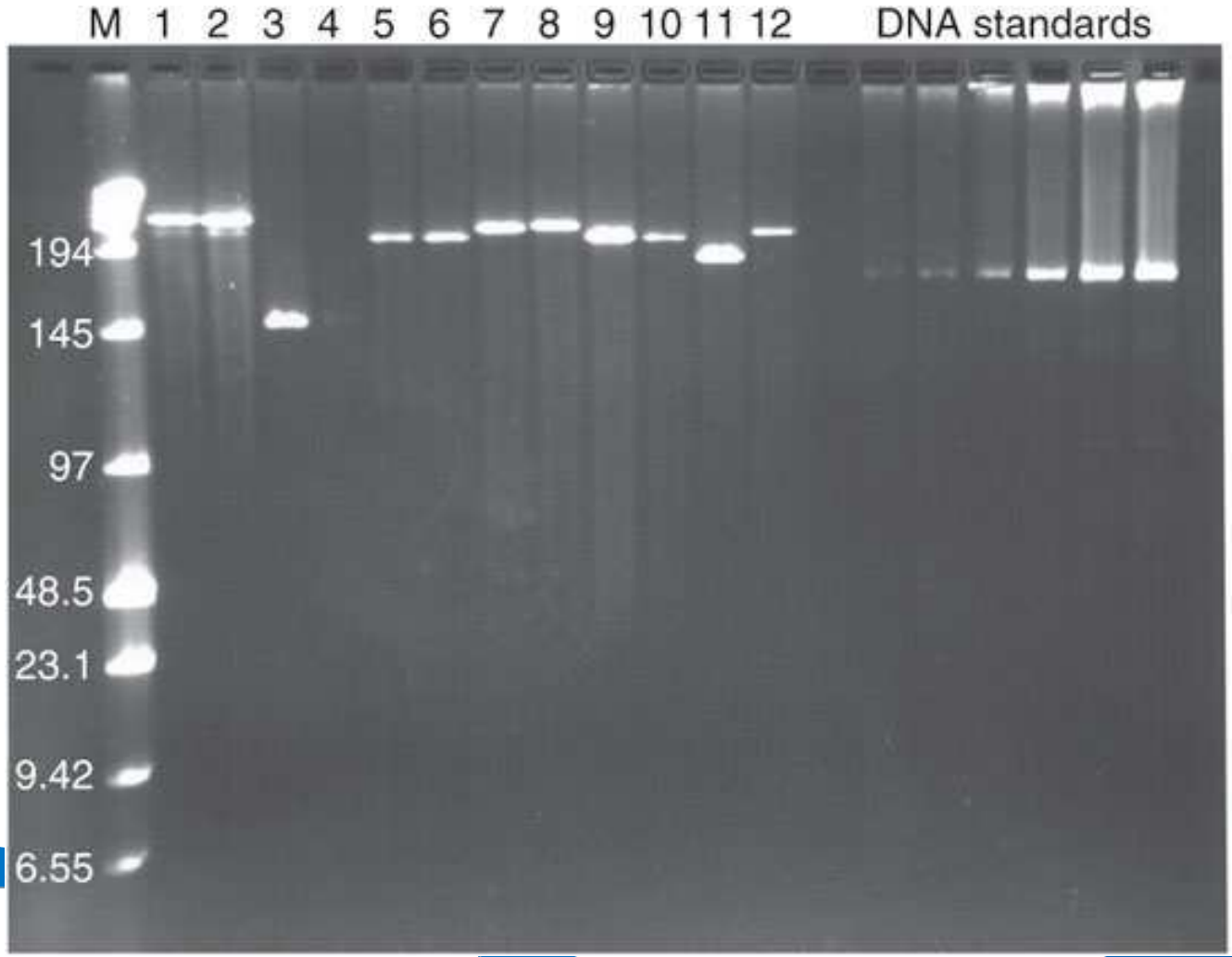
Pulsed field gel electrophoresis



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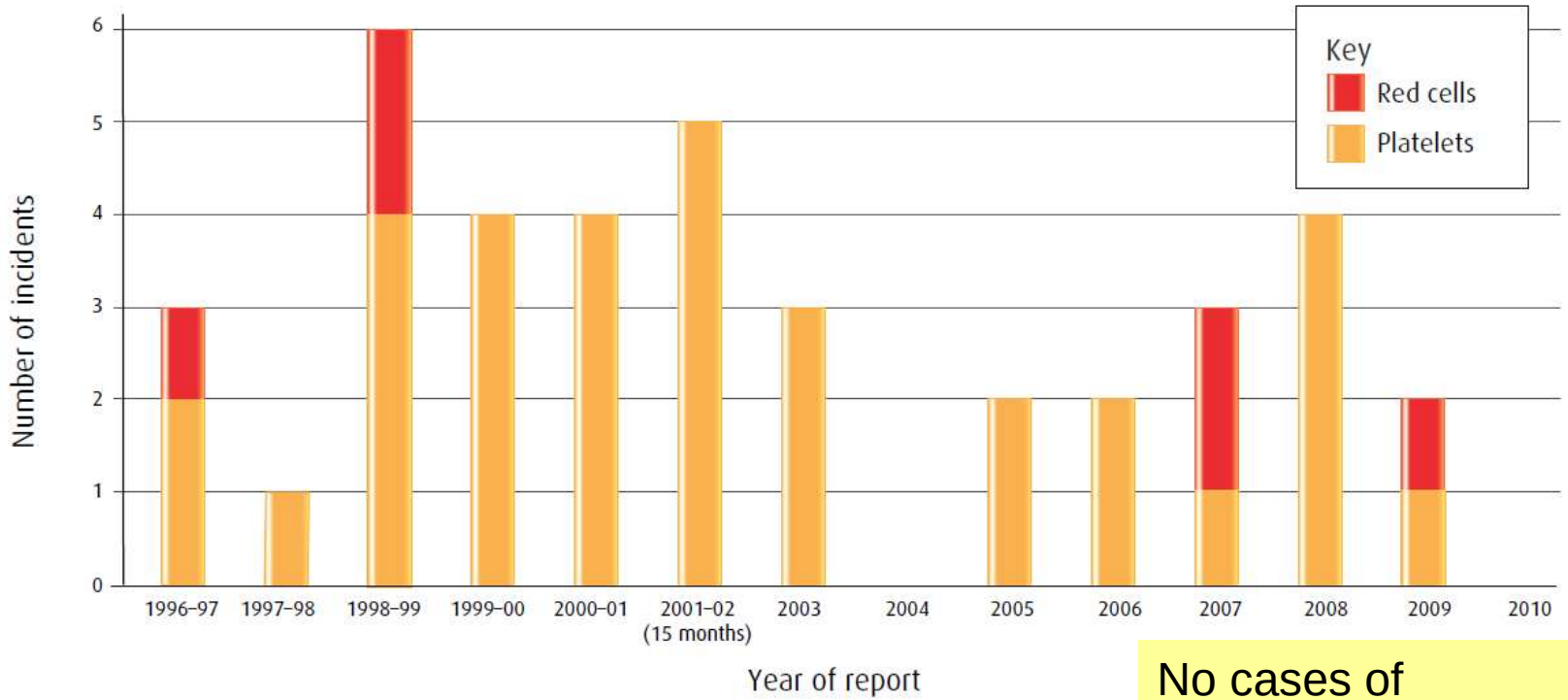
Trends in bacterial transfusion-transmitted infections

Figure 18
Number of bacterial TTI incidents, by year of report and type of unit transfused (Scotland included from 10/1998)



No cases of bacterial TTI 2009-2014

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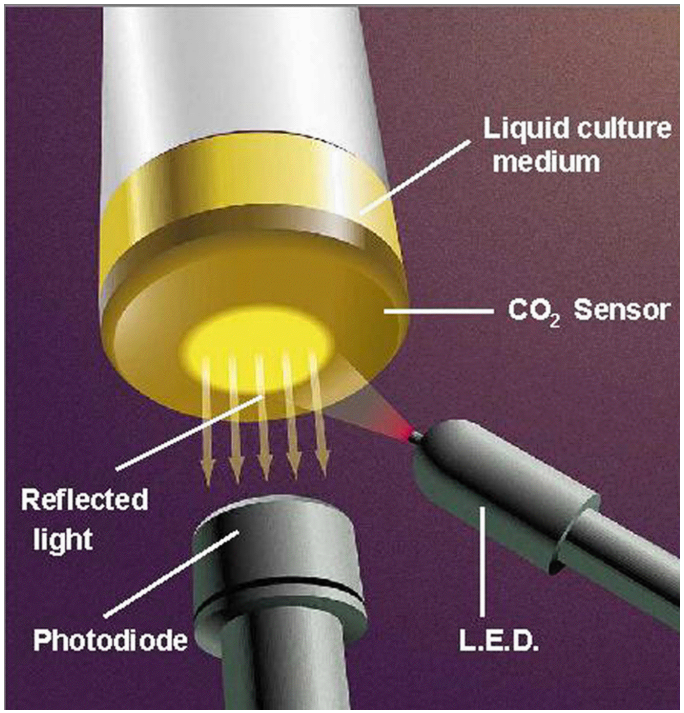
Measures to stop bacterial TTI

- Donor health check
- Stringent arm cleansing
- Diversion pouch
- Post donation information
- Recall procedure
- Bacterial screening



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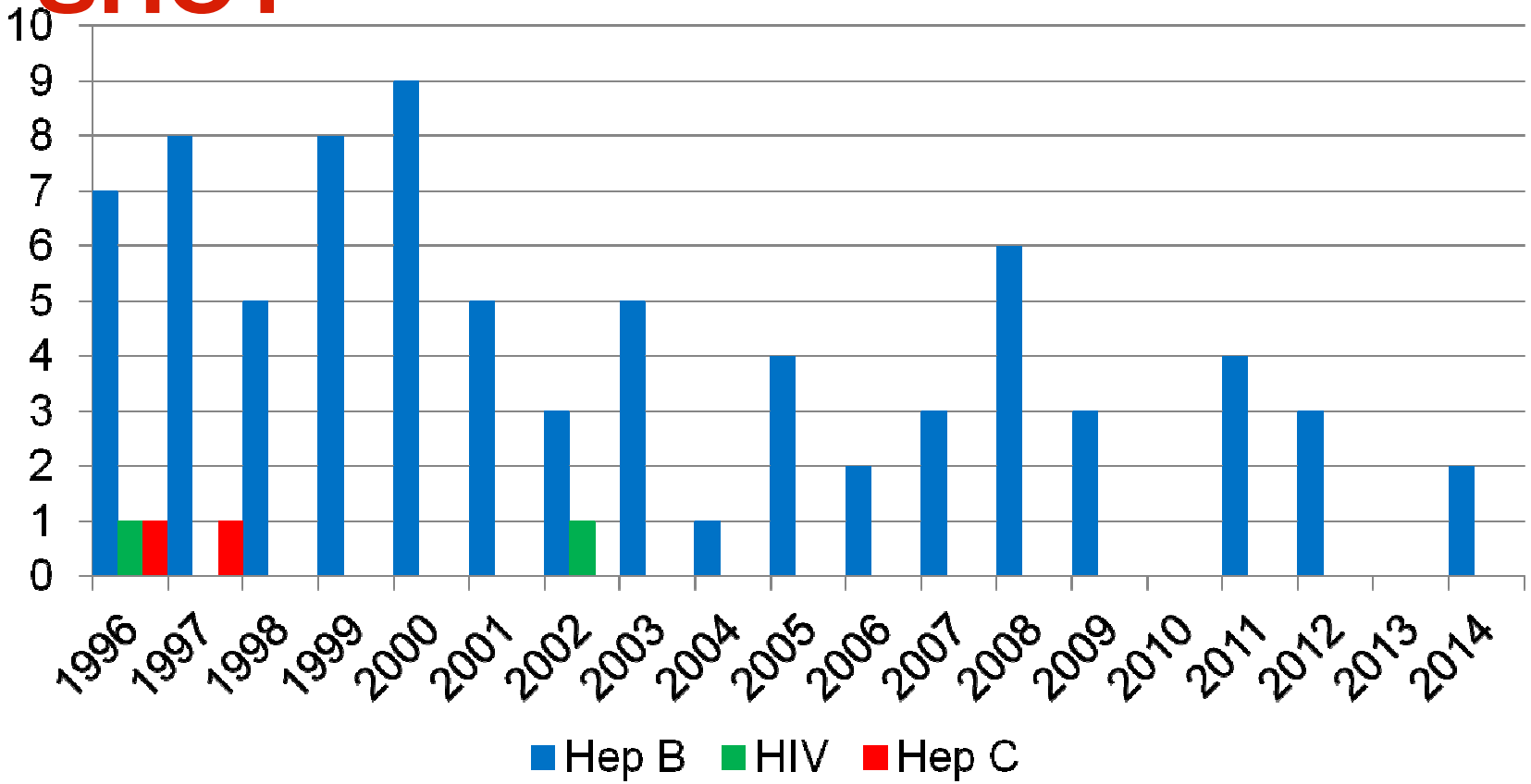
Viral infections since start of SHOT



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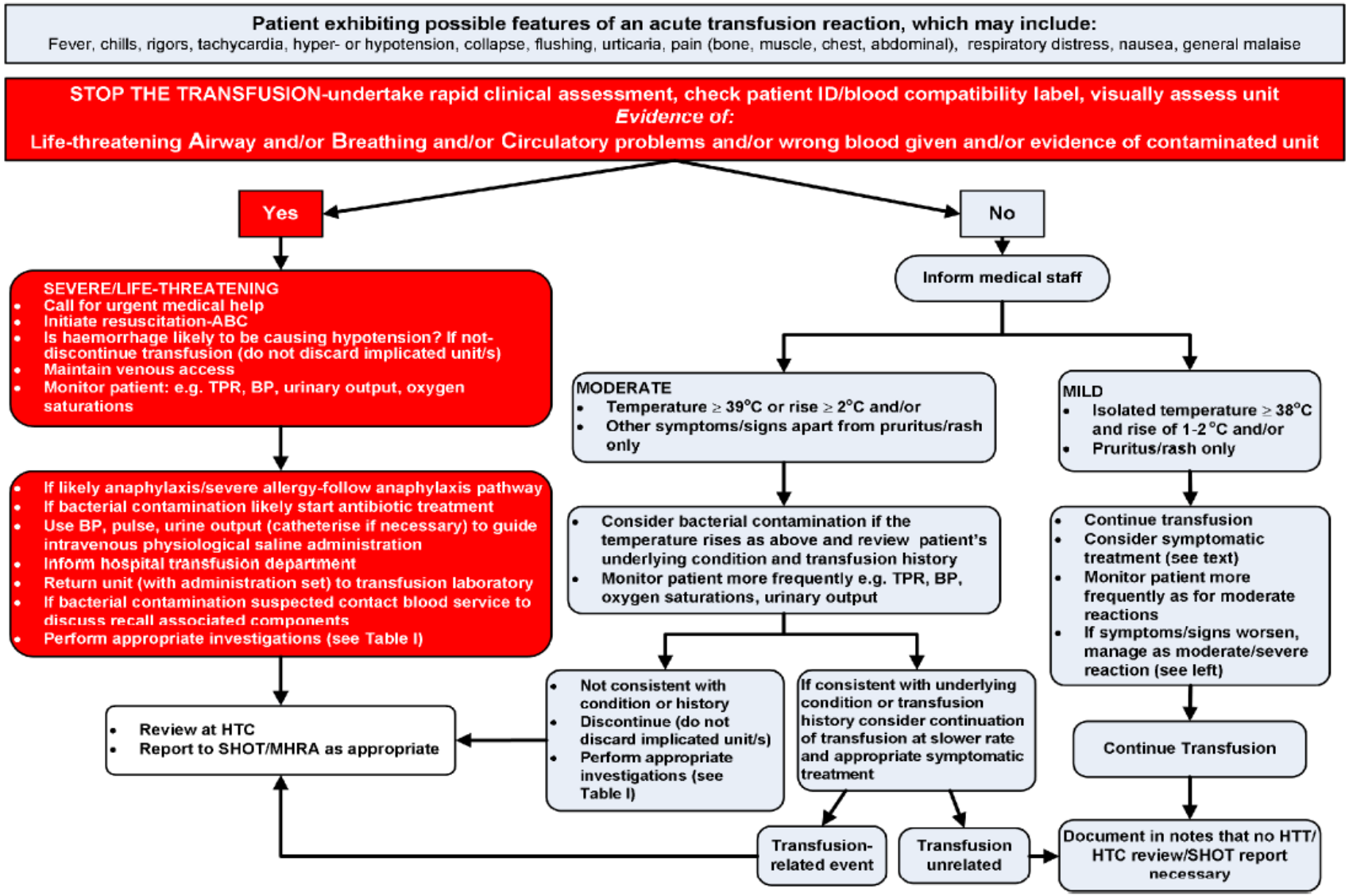
Patient exhibiting possible features of an acute transfusion reaction, which may include:
Fever, chills, rigors, tachycardia, hyper- or hypotension, collapse, flushing, urticaria, pain (bone, muscle, chest, abdominal), respiratory distress, nausea, general malaise
STOP THE TRANSFUSION-undertake rapid clinical assessment, check patient ID/blood compatibility label, visually assess unit
Evidence of:
Life-threatening Airway and/or Breathing and/or Circulatory problems and/or wrong blood given and/or evidence of contaminated unit
Yes
No
SEVERE/LIFE-THREATENING
Call for urgent medical help
Initiate resuscitation-ABC
Is haemorrhage likely to be causing hypotension? If not-discontinue transfusion (do not discard implicated unit/s)
Maintain venous access
Monitor patient: e.g. TPR, BP, urinary output, oxygen saturations
If likely anaphylaxis/severe allergy-follow anaphylaxis pathway
If bacterial contamination likely start antibiotic treatment
Use BP, pulse, urine output (catheterise if necessary) to guide intravenous physiological saline administration
Inform hospital transfusion department
Return unit (with administration set) to transfusion laboratory
If bacterial contamination suspected contact blood service to discuss recall associated components
Perform appropriate investigations (see Table I)
Review at HTC
Report to SHOT/MHRA as appropriate
Inform medical staff
MODERATE
Temperature ≥ 39°C or rise ≥ 2°C and/or
Other symptoms/signs apart from pruritus/rash only
MILD
Isolated temperature ≥ 38°C and rise of 1-2 °C and/or
Pruritus/rash only
Consider bacterial contamination if the temperature rises as above and review patient's underlying condition and transfusion history
Monitor patient more frequently e.g. TPR, BP, oxygen saturations, urinary output
Continue transfusion
Consider symptomatic treatment (see text)
Monitor patient more frequently as for moderate reactions
If symptoms/signs worsen, manage as moderate/severe reaction (see left)
Not consistent with condition or history
Discontinue (do not discard implicated unit/s)
Perform appropriate investigations (see Table I)
If consistent with underlying condition or transfusion history consider continuation of transfusion at slower rate and appropriate symptomatic treatment
Continue Transfusion
Transfusion-related event
Transfusion unrelated
Document in notes that no HTT/HTC review/SHOT report necessary

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A severe transfusion reaction

- Young male patient required massive transfusion due to stabbing
- Received 3 red cells, 4 Methylene Blue FFP (MB FFP), 2 units cryoprecipitate
- With one cryo unit, developed itch, urticaria

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Urticaria

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A severe transfusion reaction

- Young male patient required massive transfusion due to stabbing
- Received 3 red cells, 4 MB FFP, 2 units cryoprecipitate
- With one cryo unit, developed itch, urticaria, severe hypotension
- What would you call this?

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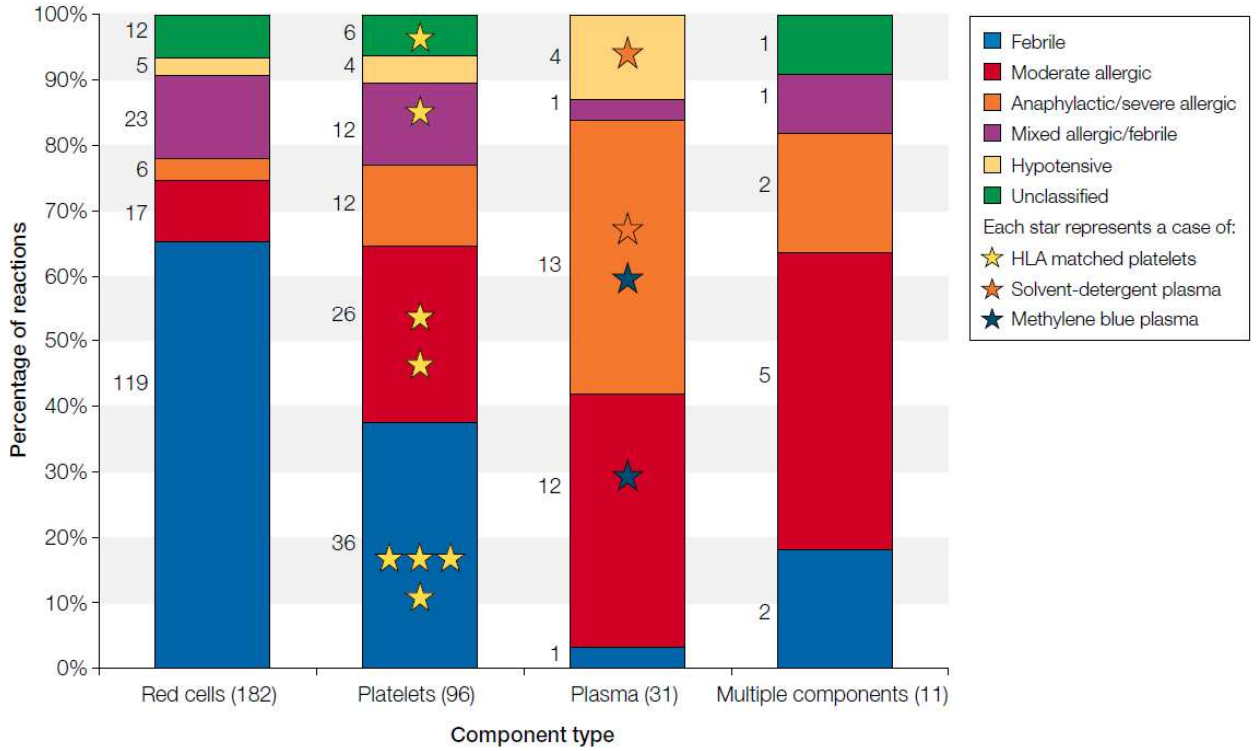
A severe transfusion reaction

- Young male patient required massive transfusion due to stabbing
- Received 3 red cells, 4 MB FFP, 2 units cryoprecipitate
- With one cryo unit, developed itch, urticaria, hypotension
- What would you call this?
- Anaphylactic reaction
- Treatment is IM adrenaline 0.5 mg
- About 50 SHOT reports per annum, very occasional deaths

Figure 15.2: Reaction by component type



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You can’t have too much blood??

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You can’t have too much blood?

- Elderly woman admitted with Hb of 42 g/L-appeared to be chronic iron deficiency
- Given 4 units of red cells each over 2.5 hours
- Became acutely dyspnoeic, oxygen saturation dropped to 54%, tachycardic
- BP initially rose, then dropped to 50/20
- Required ventilation and treatment with noradrenaline and frusemide

Transfusion Associated Circulatory Overload

Figure 23.1: Number of cases of TACO reported to SHOT each year

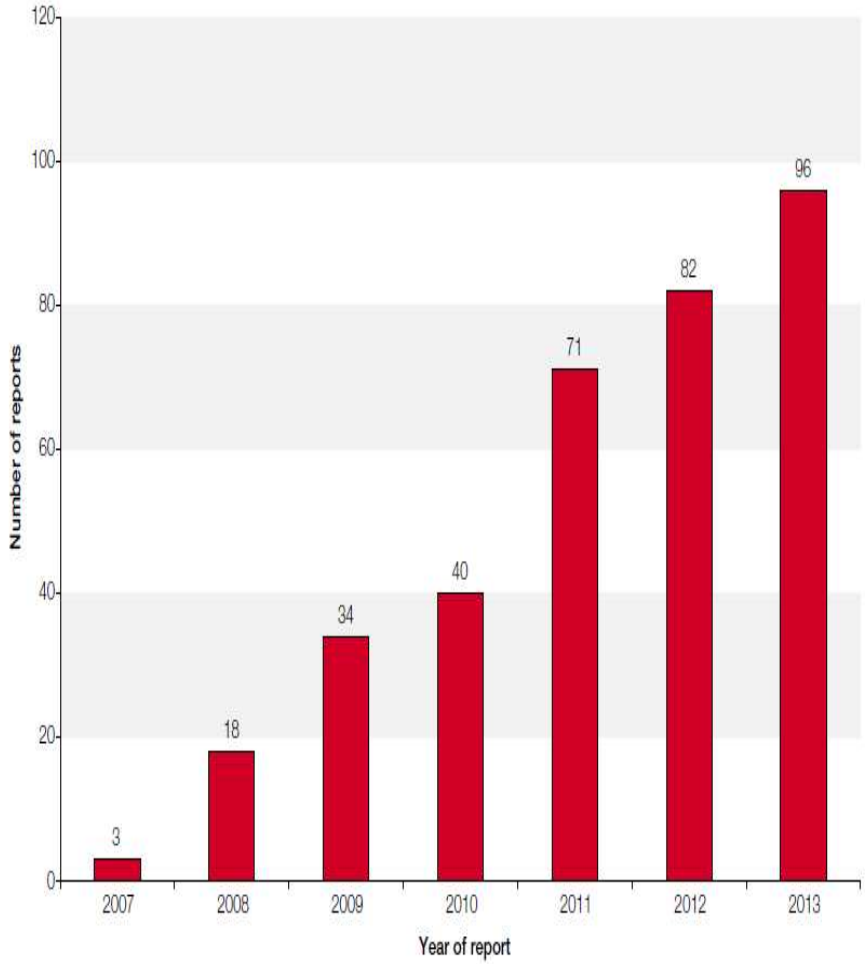

Chart from SHOT

- Acute respiratory distress and signs of fluid overload
- Often seen in frail elderly patients with small stature
- May occur in 3% of all transfusions in patients >70
- 10% mortality
- 30% morbidity

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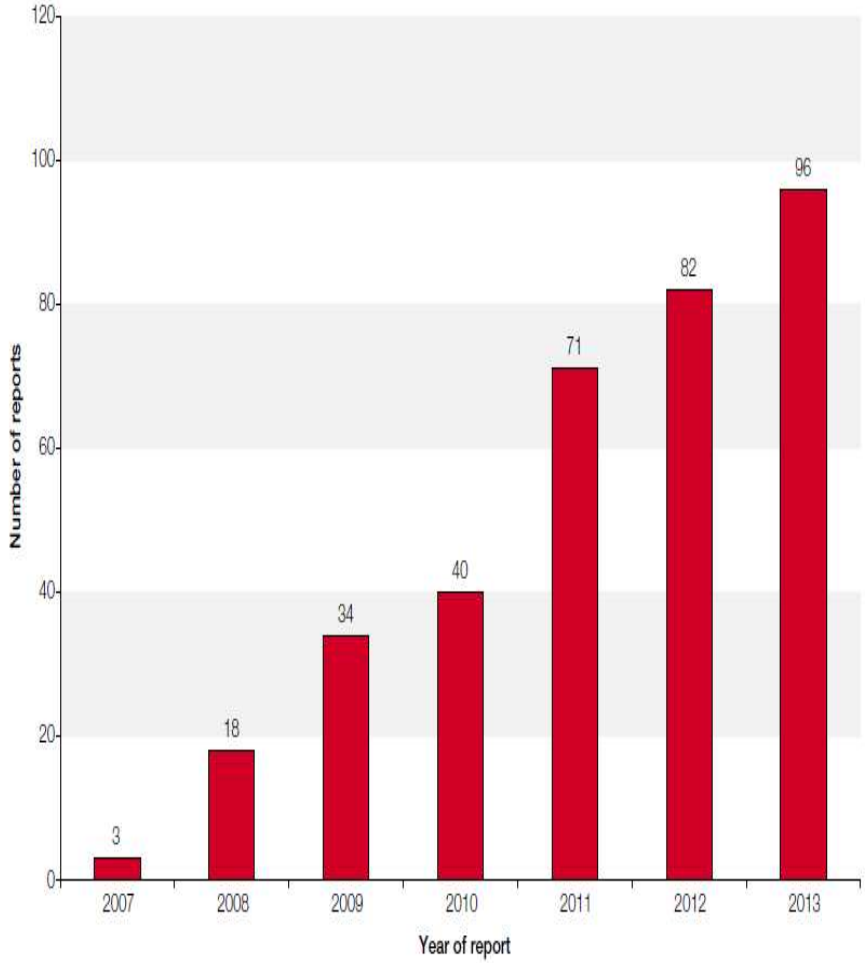
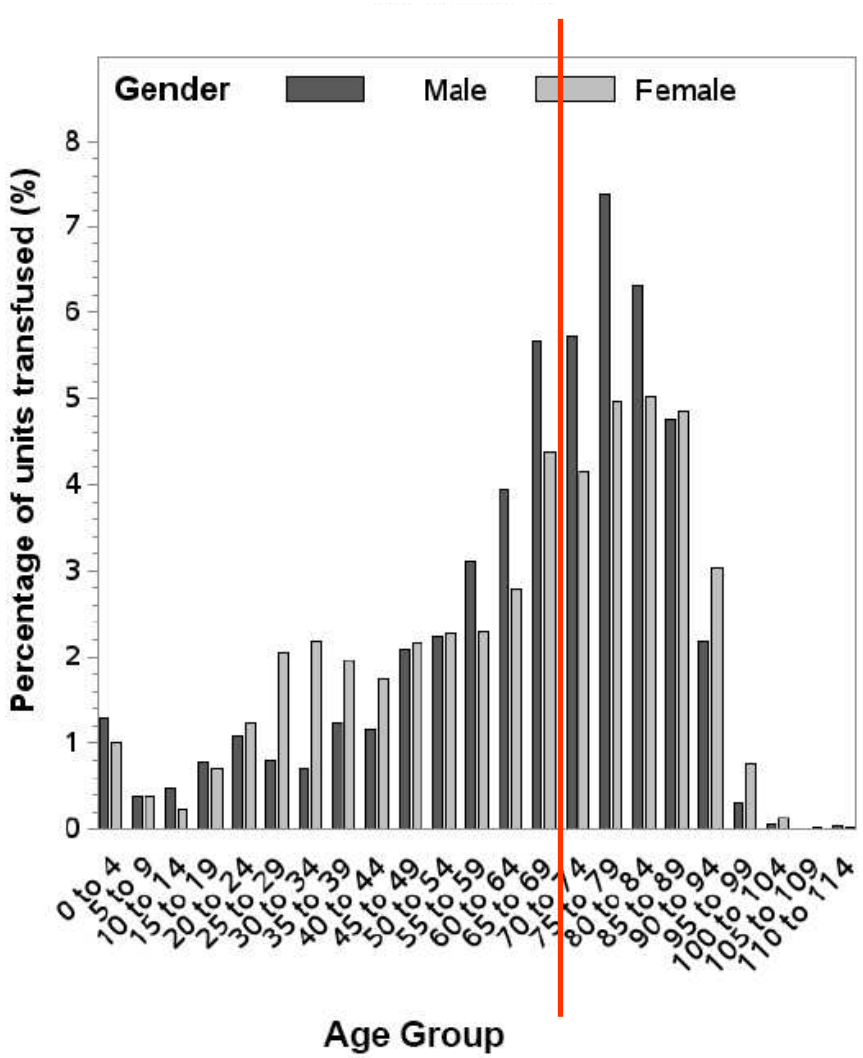


- Acute respiratory distress and signs of fluid overload
- Often seen in frail elderly patients with small stature
- May occur in 3% of all transfusions in patients >70
- 10% mortality
- 30% morbidity

We think it's under-reported!

Age and gender distribution: national figures



3% of all those to the right of the line at risk of TACO

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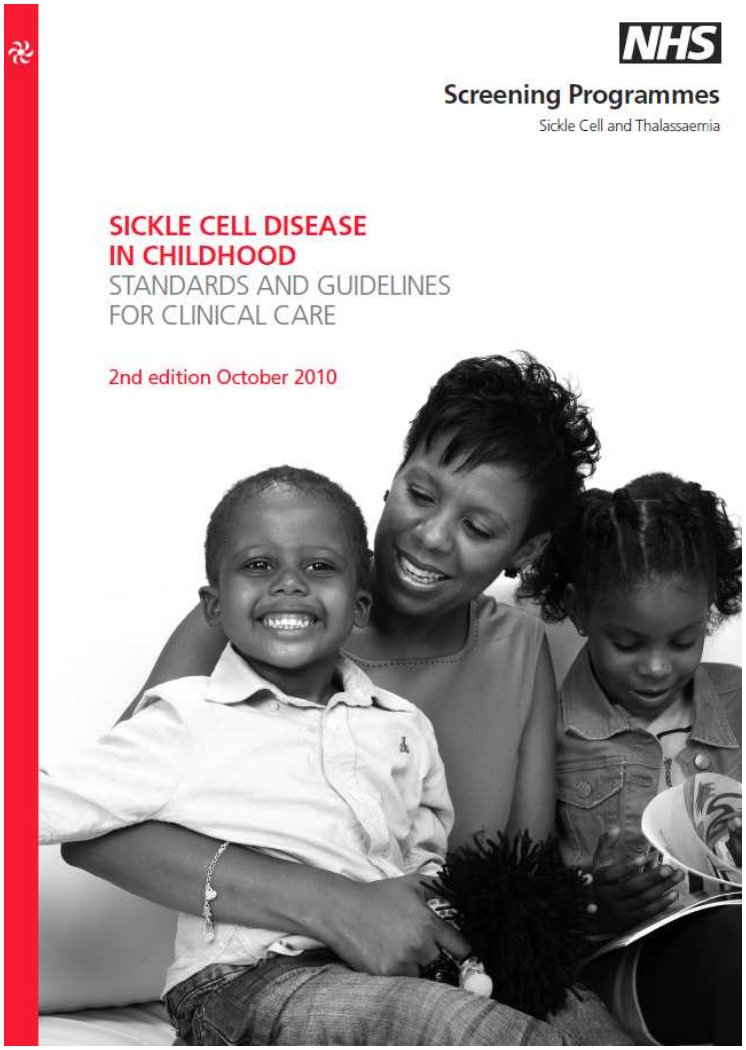
- SHOT data show particular problems with sickle cell disease
  - Delayed haemolysis due to antibodies
  - Delayed transfusion can lead to severe morbidity/death



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Hepatitis E

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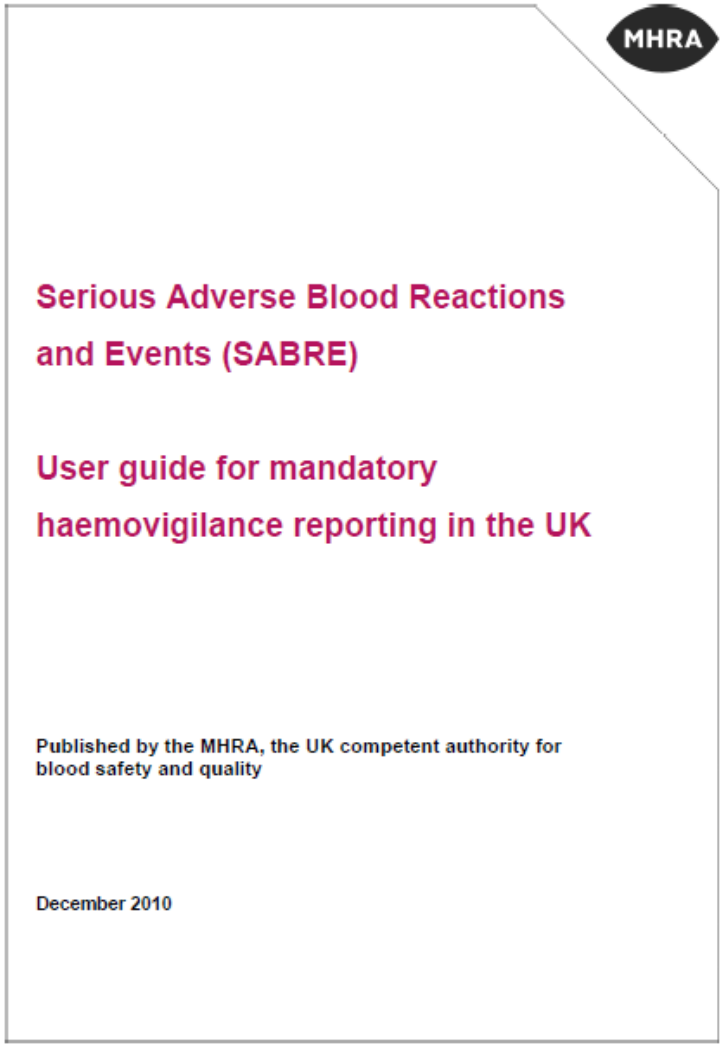
Two haemovigilance systems!



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- Severe respiratory problems due to transfusion of antibodies?
- Anaphylactic shock?

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Thank you
To SHOT
To reporters
To you!

Any questions?