Managing patients who experience transfusion reactions
Have you ever managed patients who have experienced an adverse reaction to transfusion?

A. Yes, often
B. Yes, occasionally
C. No
How common are ATRs in the UK?

A. 1 in 30 units?
B. 1 in 100?
C. 1 in 1000?
D. 1 in 10,000?

○ SHOT collects reports on moderate and severe ATRs.
○ Incidence varies according to component type
○ Are all cases reported?
SHOT ATR reports, 2013

Incidence per 10,000 units issued

Red cells: 0.9
Platelets: 3.1
Plasma components: 0.8
An patient with myelodysplasia has a 2 unit red cell transfusion as a day case
- History of complex red cell antibodies
- With the second unit, she complains of feeling unwell, with mild nausea and chills
- Her temperature rises from 37.8 to 39 C, BP and pulse both increase
- The transfusion is stopped and symptoms and signs improve within 30 minutes
A. A haemolytic transfusion reaction due to complex red cell antibodies
B. A haemolytic reaction due to incorrect component transfused
C. A febrile transfusion reaction
D. Bacterial contamination of the unit
Figure 4.2: Cumulative data for SHOT categories 1996/7-2013
n=13141
So this is most likely to be a non-haemolytic febrile reaction

But

Consider other causes
What clinical features suggest a patient is reacting adversely to a transfusion?

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<td>Raised venous pressure, pulmonary signs</td>
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Patient exhibiting possible features of an acute transfusion reaction, which may include:
Fever, chills, rigors, tachycardia, hypoor hypertension, collapse, flushing, urtica, 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

SEVERE/LIFE-THREATENING
- Call for urgent medical help
- Initiate resuscitation-ABC
- Is hemorrhage likely to be causing hypotension? If not-
  discontinue transfusion (do not discard implicated units)
- 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)

No

Inform medical staff

MODERATE
- Temperature > 39°C or rise > 2°C and/or
- Other symptoms/signs apart from 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

MILD
- Isolated temperature > 38°C and rise of 1-2°C and/or
- Pruritus/rash only
- Consider 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
management

Transfusion-related event

Transfusion unrelated

Document in notes that no HTT/
HTC review/SHOT report
necessary
Immediate management

- Recognise patient experiencing adverse reaction
- Stop transfusion, keep line open, retain component
- Airway, Breathing, Circulation and Bag, Band, Blood
- How severe is this reaction?
  - Minor - e.g. itch. Should you restart the transfusion?
  - More serious. Do not restart the transfusion. Establish most likely cause
Fever
Fever, chills and rigors during or soon after transfusion: possible causes

- Febrile non-haemolytic transfusion reaction
- Acute haemolytic reaction
- Bacterial contamination
- Underlying condition
Case history from SHOT

- Patient with haematuria being transfused with platelets
- 20 minutes into transfusion:
  - 2.2C rise in temperature, vomiting, tachycardia, chest pain
  - Hypoxia
  - Rigors prevented BP measurement
- Urine positive for haemoglobin but patient has haematuria
Which investigations would you do?

A. Blood cultures of the patient, send the platelet unit for culture
B. Repeat group and antibody screen the patient
C. All the above
D. None of the above
Culturing the platelet unit:

A. Perform culture in hospital lab, refer to blood service if positive result

B. Contact nearest blood service to discuss next steps

C. Perform culture locally but at the same time inform blood service
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A. Perform culture in hospital lab, refer to blood service if positive result

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C. Perform culture locally but at the same time inform blood service
With a severe febrile reaction such as this, the most important step is to **contact the blood service**.

- Any associated components can be withdrawn from issue.
- Unit sampling and culture requires expertise.
Learning points

- Febrile reactions are more commonly seen with red cell transfusions
Febrile reactions are more commonly seen with red cell transfusions.

The incidence has been reduced since universal leucodepletion.

Less severe reactions can be treated with paracetamol or anti-inflammatory medication.

In severe reactions the most important differential diagnosis is transfusion-transmitted infection although very uncommon.
Figure 20.1
Number of bacterial TTI incidents, by year of report and type of unit transfused (Scotland included from 10/1998)

No cases from 2010-2014
Patient with AML received a unit of apheresis platelets

Developed chills, nausea and feeling of impending doom

Recall: one other apheresis unit
  - Transfused to young male with ALL
  - Had also had symptoms
Patient with AML received a unit of apheresis platelets
Developed chills, nausea and feeling of impending doom
Recall: one other apheresis unit
  - Transfused to young male with ALL
  - Had moderate allergy-like symptoms
 Packs sent to NBL
Both packs and donor showed Lancefield group G streptococcus
Patient receiving red cell transfusion
felt unwell with temperature rise of 2.8°C to 39.4°C
- Rigors
- Increased respiratory rate
- Tachycardia
- $O_2$ fell from 97% to 75%
What do you think this is?

A. Severe febrile transfusion reaction
B. Bacterial contamination
C. Severe haemolytic reaction
D. I don’t know!
ABO incompatibility

- Post-transfusion group not interpretable
- DAT positive
- Patient was group O pos, unit was A pos
- Failure of two person bedside check
- Both staff already competency assessed
Respiratory symptoms
Case from SHOT 2013

- 67 year old female with myelodysplasia
- Transfused 3 units as a day case
- Felt ill on her journey home and returned immediately to A and E
- Had respiratory arrest
Most likely cause?

A. Transfusion Related Acute Lung Injury (TRALI)
B. Allergic reaction
C. Transfusion Associated Circulatory Overload (TACO)
D. Unrelated to transfusion
Outcome

- Chest X Ray appearances consistent with left ventricular failure
- Probable TACO
- Patient made a full recovery with treatment
Acute respiratory distress, tachycardia, hypertension, acute or worsening pulmonary oedema, evidence of positive fluid balance

- At least 4 of the above features
- Occurring within 6 hours of transfusion

- Tends to be seen in over 70s
- Almost certainly under-reported
  - Recent series of 8/247 transfusions in this age group (3%) Bartholomew and Watson, 2014
Age and gender distribution: national figures
Age and gender distribution: national figures

3% of all those to the right of the line!!
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 8g/dl before procedure to 18 after

Required cardio-respiratory support on ITU

When ET tube inserted, developed fountain like pulmonary oedema
What is the most likely diagnosis?

A. TACO (Transfusion Associated Circulatory Overload)
B. Chest infection
C. Acute myocardial infarction
D. TRALI (Transfusion-Related Acute Lung Injury)
TRALI

- Serious complication of transfusion, almost always with plasma rich components
- Donor has antibody to recipient leucocytes
  - HLA or HNA
- Reduced incidence
  - Universal leucodepletion
  - Male donors for FFP and the plasma used to resuspend platelet pools
  - Female apheresis donors screened for HLA and HNA antibodies
- Dyspnoea, hypoxia (pyrexia) usually within 6 hours
- Commoner in certain groups of patients—“two-hit” hypothesis
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.
9 cases in 2014-none were FFP or platelets

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# Features of TACO and TRALI

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<tr>
<td>Type of component</td>
<td>Usually plasma or platelets</td>
<td>Any</td>
</tr>
<tr>
<td>BP</td>
<td>Often reduced</td>
<td>Often raised</td>
</tr>
<tr>
<td>Temperature</td>
<td>Often raised</td>
<td>Normal</td>
</tr>
<tr>
<td>Echo</td>
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<td>Abnormal</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Worsen</td>
<td>Improve</td>
</tr>
<tr>
<td>Fluid loading</td>
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Respiratory symptoms 2
Case from SHOT 2013

- Patient with PPH received a unit of FFP
- Previously, 3 units red cells and 1 FFP transfused without problems
- 8 minutes into transfusion, she began to cough and had swollen eyes, lips and throat
- Bronchospasm
- Oxygen saturation dropped
- Blood pressure unrecordable and briefly lost consciousness
- Responded well to treatment
What was the reaction likely to be?

A. TRALI
B. TACO
C. Moderate allergic reaction
D. Anaphylaxis
What was the reaction likely to be?

A. TRALI

B. TACO

C. Moderate allergic reaction

D. Anaphylaxis
What is the immediate management?

A. Call the haematologist
B. Hydrocortisone and antihistamine
C. Antihistamine only
D. Adrenaline
What is the immediate management?

A. Call the haematologist

B. Hydrocortisone and antihistamine

C. Antihistamine only

D. Adrenaline
Learning point

- Anaphylaxis is characterised by
  - rash and/or mucous membrane involvement
  - followed rapidly by respiratory and/or circulatory distress
- A medical emergency
- Treatment is adrenaline: IM unless you are an anaesthetist or intensivist
Learning point

- Although anaphylaxis is rare, patients should only be transfused when and where there is the ability to recognise and manage a reaction

Cases of anaphylaxis reported to SHOT since 2005
Management of patients who have reacted before

- A female patient with bone marrow failure and epistaxis has regular (appropriate) platelet transfusions.
- With last two transfusions, she complained of itch.
- Now has urticaria.
How can you avoid future reactions?

A. Give HLA matched platelets
B. Give antihistamine premed
C. Give washed platelets
D. Give apheresis platelets rather than pooled
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D. Give apheresis platelets rather than pooled
Learning points

- 25% of women, and at least 10% of multitransfused male patients have HLA antibodies
- No evidence that reactions are reduced with HLA matched platelets
- Washed platelets do reduce reactions
- IV Hydrocortisone takes 8 hours to act!!
- Little evidence for antihistamine but if washed platelets do not work, worth trying
- No reduction in ATRs with apheresis platelets
And finally, reporting

Internal
External to SHOT and SABRE
Internal reporting

- How well was the incident managed?
- Appropriately documented?
- Review investigations
- Is there a management plan for future transfusions in this patient?
- Was the transfusion appropriate?
- Does the incident need to be reported externally?
External reporting: the benefits of SHOT reporting are:

- Learn about unexpected or undesirable effects from transfusion
- Identifying trends in reactions and events, including effects of new components
- Identifying areas for improvement
- Informing transfusion policy
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A new component in 2015: plasma reduced platelets