Transfusion Reactions

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BMS Education Day

28th January and 4th February 2013

This presentation provides realistic case studies which have been designed with audience participation in mind and should encourage discussion within the group. The cases are NOT designed for individual learning and if used in this way caution is advised. Each case unfolds as time goes on reflecting a true clinical situation and, as a result, there are no clear-cut correct answers until the case is concluded. Discussion of these case studies should use problem-solving skills, be based on effective communication between the laboratory and the clinicians and take into consideration national and local policies on the management and investigation of transfusion reactions.

Note: *It will be beneficial for staff to read the BCSH guidelines on the investigation and management of acute transfusion reactions and to review the local transfusion reaction policy.*

Disclaimer: *All of these cases reflect a similar case in clinical practice but they have been modified so that the hospital, the staff and the patient are not identifiable.*

The information given reflects current clinical and laboratory practice but local variations may be in place.

Slides 1-7 Introduction to the subject

This presentation is for Biomedical Scientists and assumes a basic knowledge of the adverse effects of transfusion. This brief introduction provides an overview of other support and learning materials.

Category of Reaction	Infectious	Non-infectious
[redacted]	**Bacterial contamination**	**<u>Immune</u>** **Febrile Non-Haemolytic** **Allergic** **Acute Haemolytic Reaction -**ABO **Anaphylactic -**anti-IgA **Transfusion Related Acute Lung Injury**
		<u>Non-immune</u> **TACO/TAD**
[redacted]	**Viral –** HIV, Hepatitis, Parvovirus **Protozoal –** Malaria, Syphilis **Prion -** vCJD	**<u>Immune</u>** **Delayed haemolytic reaction** **Transfusion Associated-GvHD** **Post Transfusion Purpura**
		<u>Non-immune</u> **Iron overload**

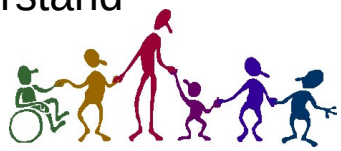
As you participate in this session please;

•Understand <u>your role</u> in when a patient has an adverse reaction to blood components

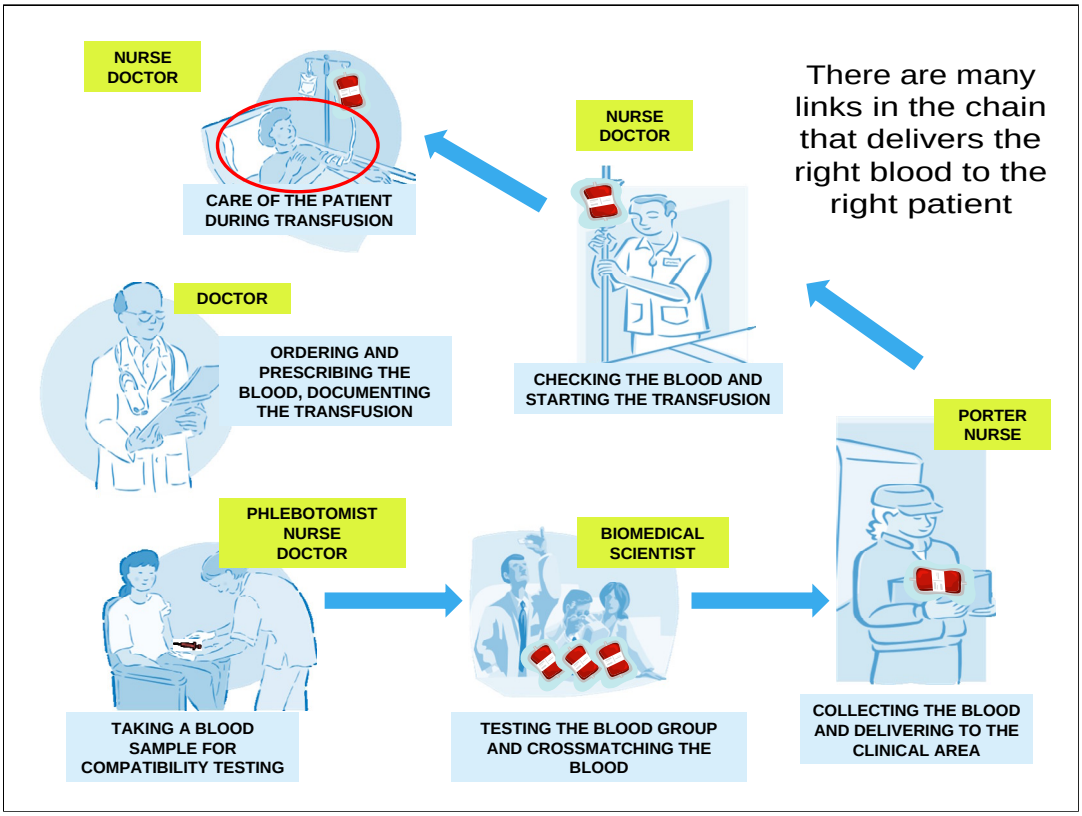
•At the same time try and understand <u>everyone else's role</u> too

DOCTOR, NURSE,

BIOMEDICAL SCIENTIST, PORTER



•Never forget the <u>patient</u> who is having the reaction. That's why we are all here.....


There are many links in the chain that delivers the right blood to the right patient
NURSE
DOCTOR
CARE OF THE PATIENT DURING TRANSFUSION
NURSE
DOCTOR
CHECKING THE BLOOD AND STARTING THE TRANSFUSION
DOCTOR
ORDERING AND PRESCRIBING THE BLOOD, DOCUMENTING THE TRANSFUSION
PORTER
NURSE
COLLECTING THE BLOOD AND DELIVERING TO THE CLINICAL AREA
PHLEBOTOMIST
NURSE
DOCTOR
TAKING A BLOOD SAMPLE FOR COMPATIBILITY TESTING
BIOMEDICAL
SCIENTIST
TESTING THE BLOOD GROUP AND CROSSMATCHING THE BLOOD

How do we know, what we know?

FIRSTLY: What can go wrong?

- We have been reporting **S**erious **H**azards **O**f **T**ransfusion to SHOT since 1996
- MHRA have been collecting **S**erious **A**dverse **B**lood **R**eactions and **E**vents via the SABRE website since 2005

Look at the SHOT definitions and the annual report on the website www.shotuk.org

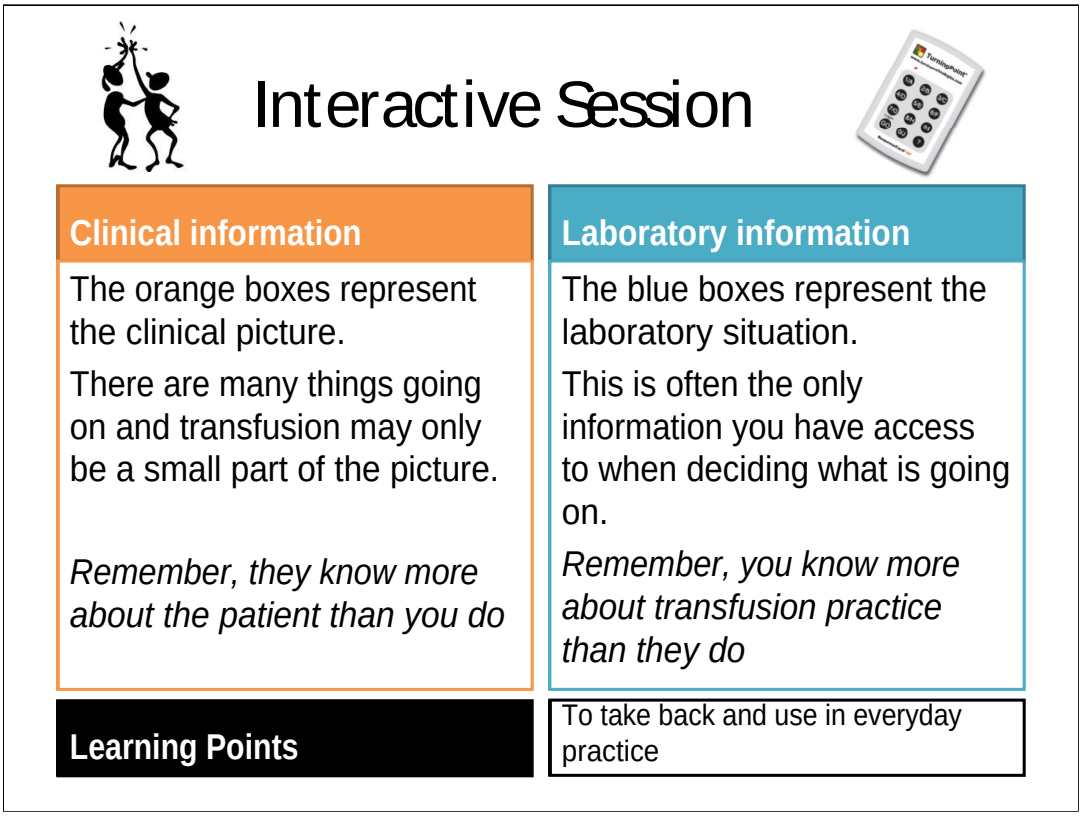
SECONDLY: What should we do about it?

- Transfusion Medicine Handbook (for clinicians)
  - Useful flow chart

- BCSH guidelines (for laboratory and clinici
  - Compatibility guidelines
  - Acute transfusion reaction guidelines

Look at websites www.bcshguidelines.com and www.transfusionguidelines.org.uk


Hospitals & Science
NHS
Blood and Transplant
Google™ Custom Se
Help
Search
hospital.blood.co.uk
Home
Safe & Appropriate Use of Blood Components
Diagnostic Services
Products
Specialist Therapeutic Services
Contingency Planning
Training-Education
Communications
Research
Library
Contact Us
Site Map
Download Adobe Acrobat Reader
Home > Library > Request Forms & Docum
adverse events & reactions
Requests for Investigation of Adv
All files are stored in a PDF format and req
Summary of actions for transfusi
The hospital blood transfusion laboratory m
reactions & events including those suspect
of a component. The laboratory must docu
the patient involved
the type of reaction or event
the reason for transfusion
the implicated component (includin
the contact details of the clinical st
A serious adverse reaction notification report must also be made as soon as possible via SABRE, to both MHRA and SHOT.
Advice on clinical management and investigation of serious adverse reactions can be obtained from the hospital consultant responsible for blood transfusion.
The NHSBT duty consultant for patients must be informed at once of serious adverse reactions to transfusion that require investigation or involvement by NHSBT. This is particularly important in cases of suspected bacterial contamination because other components may need recall. The NHSBT consultant is reached by contacting your local NHSBT Hospital Services department.
Please see the link below and refer to relevant request forms for minimum sample requirements for the investigation of Allo & Autoantibodies, Haemolytic Transfusion Reactions, IgA Deficiency, Transfusion Related Acute Lung Injury (TRALI), Transfusion-Associated Graft-versus-Host Disease (TA-GvHD), Post Transfusion Purpura (PTP), Febrile Non-Haemolytic Transfusion Reaction etc.
Request forms for investigation of adverse events and reactions:
Cases of suspected bacterial contamination
Cases of suspected viral and non bacterial contamination
hes and Policies from NHSBT
olicies from NHSBT
be Acrobat Reader.
onent supply:
Cell Immunohaematology
in D Neg Women and inadvertant transfusion of D
hors within NHS Blood and Transplant (NHSBT)
up Alloantibodies and Supply of Blood for Transfusion
ucts for Recipients of ABO/Rh Missmatched Stem Cell
Distinguishing Passive from Immune anti-D in Pregnancy (PDF)
Provision of Red Cell Transfusion Support for Transfusion Dependent Patients (PDF)
Investigation and Clinical Management of Suspected Reactions to IgA (PDF)
Investigation and Clinical Management of Patients with a positive DAT with and without Haemolysis (PDF)
Diagnosis and Management of T Antigen Activation (PDF)
Platelet and White Cell Transfusion, Histocompatibility and Immunogenetics
Transfusion Associated Graft Versus Host Disease (PDF)
Guidelines for The Management of Platelet Transfusion Refractoriness (PDF)
Transfusion Related Acute Lung Injury (TRALI) (PDF)
Post-Transfusion Purpura (PDF)
Clinical Guidelines for the use of Granulocyte Transfusions (PDF)
Neonatal Alloimmune Thrombocytopenia (PDF)
Thrombasthenia (PDF)



Slide 8 – Introduction to the cases

This part of the education session was interactive and examples were used to stimulate conversation and group learning. No answer was deemed incorrect but justification was needed for your answer. Notes have been added after the presentation to help with some guidance when delivering this back in the work place and used for learning. Discussion with your lab manager and/or training manager will aid learning.

There are learning points throughout the presentation (highlighted in black) containing knowledge that can be applied in daily practice.

Monday 9.30 am Transfusion Dept.

1

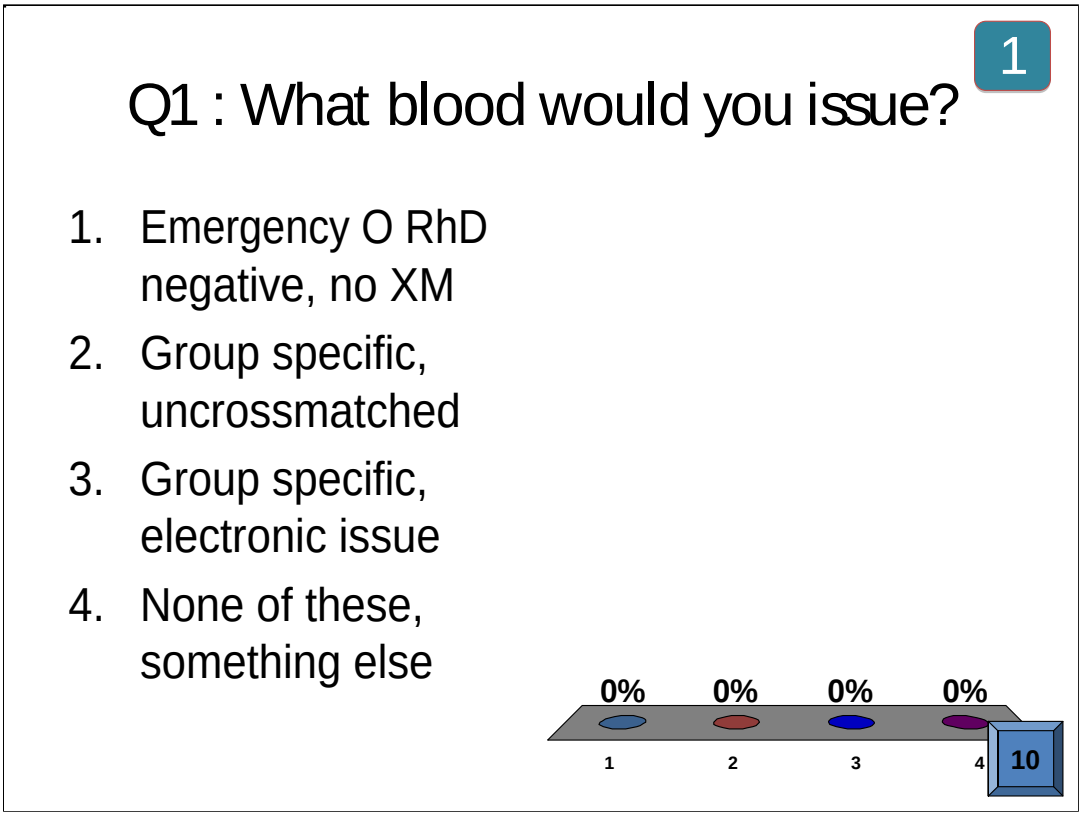
- 30 year old woman with suspected ectopic pregnancy came into the ED at 8.45
- Described as ‘in severe pain but stable’
- FBC, coag. screen, G&S already processed by out of hours BMS.
- Second G&S sample requested, received and tested
- All 4 core identifiers present on samples; not previously known to your hospital
- Hb 90g/L, coag. screen normal, A RhD positive
- Going to theatre in 10 minutes, request for 4 units of blood immediately

Slides 9-18 Case study 1

Monday 9.30 am Emergency Dept.

1

- 30 year old woman with severe left sided abdominal pain arrived 45 mins ago.
- Positive pregnancy test
- Scan suggests ectopic with free-fluid +++
- Following morphine is pain-free but very drowsy & clammy, hypotensive (80/? mmHg) and fast pulse (120/min)
- Decided to operate
- Urgent transfusion needed because of internal bleeding



Slide 11 – Case study 1, question 1

Option 1: (Emergency O RhD negative) Whilst O RhD negative is a safe option, it is appropriate to conserve O RhD negative blood for those patients where an alternative cannot be used. A group and screen on 2 samples was already available and, providing the samples were labelled according to the sample acceptance policy and had been taken from the right patient, group specific blood could have been given.

Options 2 and 3: The patient had a second sample taken which was received and tested so the patient should be eligible for electronic issue if this is the laboratory policy and all the other criteria have been met. As the case is an emergency it would not be inappropriate to release group specific uncrossmatched units as 2 samples have been tested.

Discussion point:

What processes do you have in the laboratory to issue blood in an emergency?

What crossmatching techniques are available in your laboratory?

What are the criteria for electronic issue?

Option 4: If this option was selected there should be discussion as to what the 'something else' is. Be aware that this is a female of childbearing potential so avoiding sensitisation to the D and K antigens should be considered.

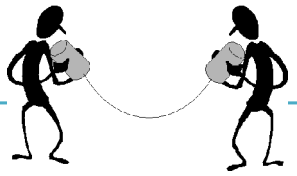
In an emergency situation the provision of blood should be a priority.

It may be beneficial to find out from the clinical team if other blood components are required.

Monday 9.45 am Transfusion Dept.

1

- You ask “do you want to activate the major haemorrhage protocol?”
- Gynae SpR says “no, but please issue 4 units of blood as soon as you can and send it straight to theatres”
- You issue 4 units of A RhD positive red cells by electronic issue by 9.55am



Monday 10 am Gynae. Theatre

1

- 2 units of blood are given over 10 minutes
- Surgery starts at 10.05am
- The ruptured ectopic in the left fallopian tube is removed and bleeding stops
- 1 litre of blood is drained and surgery is finished by 10.30am
- In recovery, patient is cold (35°C) and hypotensive. She is on oxygen and warmed iv fluids. She has produced no urine.

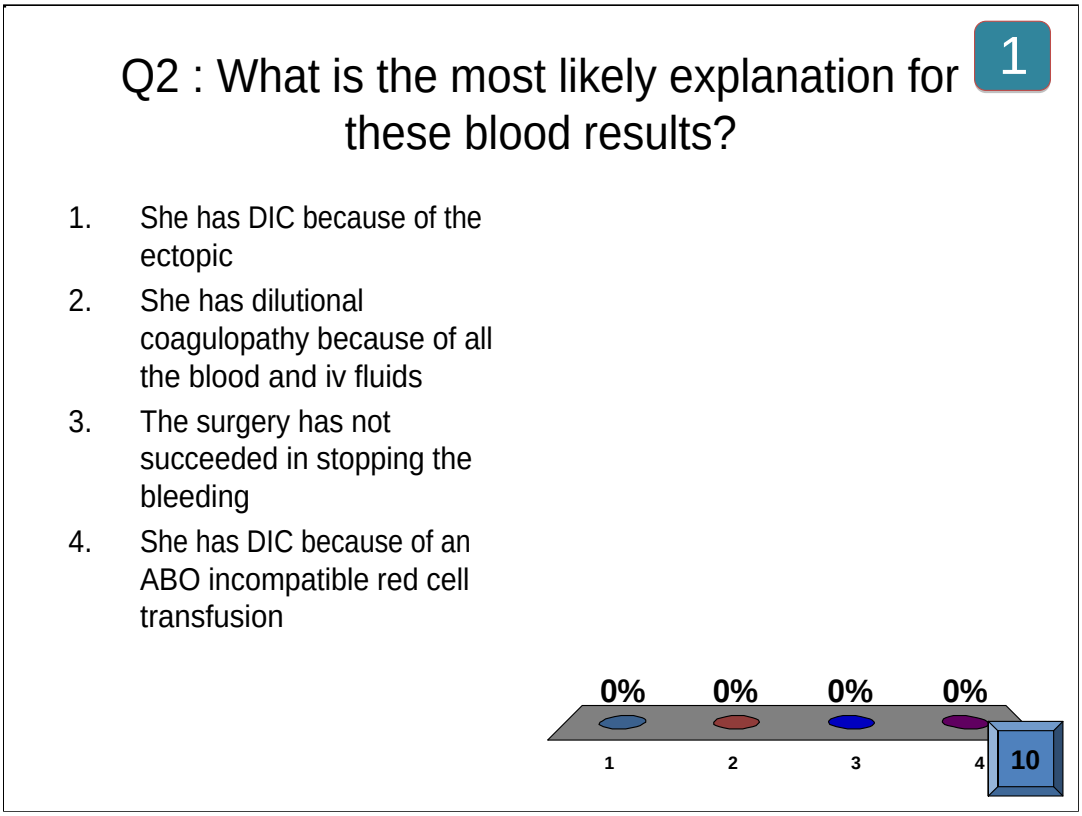
Monday 10.45 am Haematology Dept.

1

- Repeat FBC and coagulation screen arrive
- After 30 minutes you phone the results

  Hb 50g/L, platelets 45 $x10^9$/L,

  PT 20 seconds, APTT 60 seconds, fibrinogen 1.0 g/L
- She has moved to intensive care and they request 4 more units of blood, 4 FFP and 1 ATD platelets
- You issue group A blood, platelets and FFP



Slide 15 – Case study 1, question 2

There may be not enough information at this stage to give a full and complete answer and there should be a discussion with regards to which answers were chosen and why.

Option 1: Ectopic pregnancy can cause DIC, this option would not explain the drop in Hb.

Option 2: We do not have information on what other IV fluids, or the volume, the patient has received. A review of the patient's treatment may help support or exclude this diagnosis.

Option 3: This option may explain the drop in Hb in this case. This is a possibility.

Option 4: DIC and drop in Hb with no urine production are symptoms of acute haemolytic transfusion reactions. If a patient has had a blood transfusion this may be an option due to sampling/administration/checking errors. However, in this case there were 2 samples grouped for this patient and a two sample policy reduces the risk of WBIT.

Discussion points:

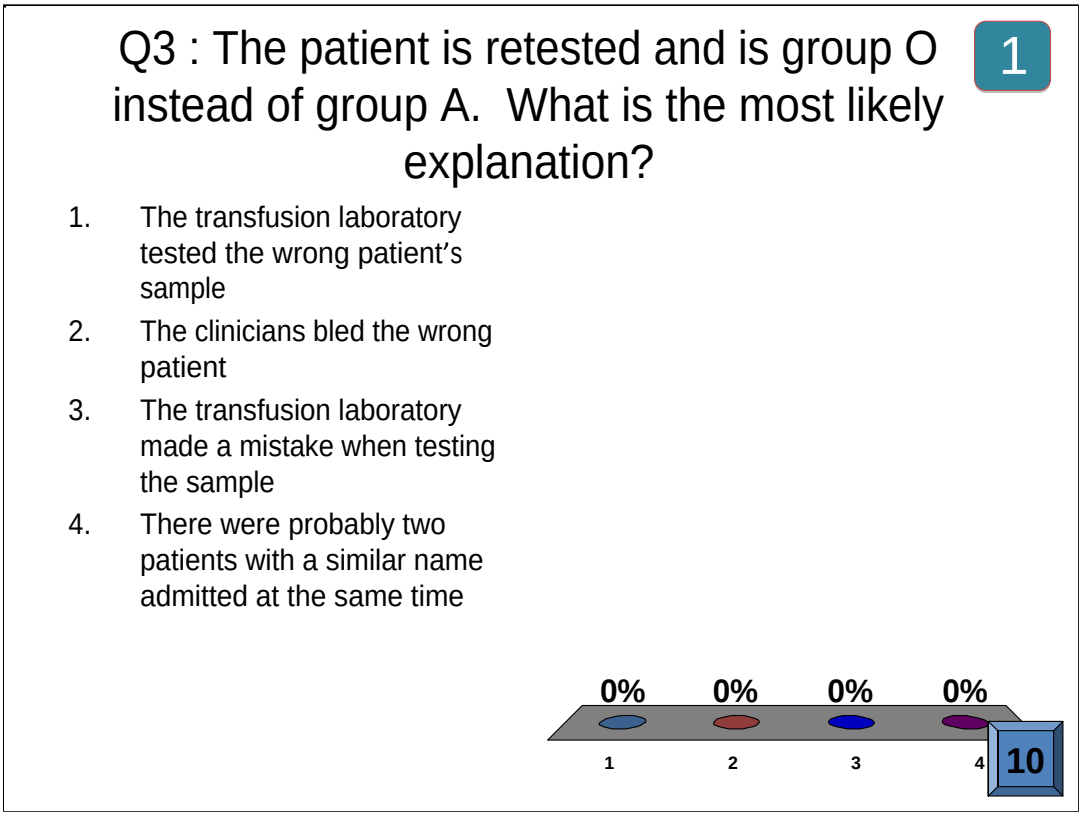
How confident are staff with the laboratory testing for ABO? What are the signs and symptoms of an ABO transfusion reaction?

What additional samples would you request and what tests would you perform?

Monday 11.15 Intensive Care Unit

1

- The lab phone to say the blood components are ready
- The lab is concerned that the blood is haemolysed
- You have noticed very poor urine output and very dark urine
- The patient is very sick and deteriorating rapidly
- You discuss with the haematology SpR and both of you are worried about an acute haemolytic reaction



Slide 17 – Case study 1, question 3

The options were given to encourage discussion and learning between the group of delegates.

Options 1 & 3: This is a possibility, but this would have meant that the same errors occurred twice on 2 different runs, as the laboratory received and tested 2 separate samples for this patient.

Discussion points:

How confident are you with regards to your laboratory ABO typing?

Could there be a possibility a mistake could be made on 2 separate samples?

Option 2: Wrong blood in tube (WBIT) has been reported in all Trusts. The new BSCH Guidelines state that 2 samples, taken at 2 separate times, should be tested prior to a transfusion. There has been reports of 2 samples been taken at the same time and one kept and sent later in order to save time and not bleed the patient twice – this practice does not reduce the risk of a wrong blood in tube incident. The Department of Health have listed an ABO incompatible transfusion as a 'never event'.

Discussion points:

Why might the person taking the blood take 2 samples at the same time?

Can you think of any safe guards to prevent an ABO incompatible transfusion?

Option 4: Failures in the final administration stage have occurred and have been documented in past SHOT reports. It may be that the wrong patient was bled at the time of admission although 2 samples were received in the laboratory. This is a likely source of error but the patient may have had a dedicated team involved in transfusion and communication with the lab as she was bleeding and in urgent need of treatment.

ABO-incompatible transfusions

1

- The ‘two-sample rule’ can prevent ABO incompatible transfusions IF the samples are taken at separate times (but you don’t always get this in a massive haemorrhage situation)
- Shift hand-over times are error-prone; incomplete handovers, hurrying and cutting corners
- In a complex clinical situation ABO incompatibility (or any transfusion reaction) can be missed because the symptoms are attributed to something else
- If you have any suspicions or clues in the lab there is a WBIT or that wrong blood has been given, always speak out immediately

Thursday 9pm, Care of the Elderly Ward

2

- Mrs. P is 75 and has had myelodysplasia for the last 18 months, requiring red cell transfusions every 3 weeks and occasionally requires platelets. She is refractory to random platelets as a result of HLA-antibodies
- She was admitted 2 days ago with a high fever and is now on iv antibiotics for pneumonia
- The nurse checks todays blood results and contacts the on-call doctor

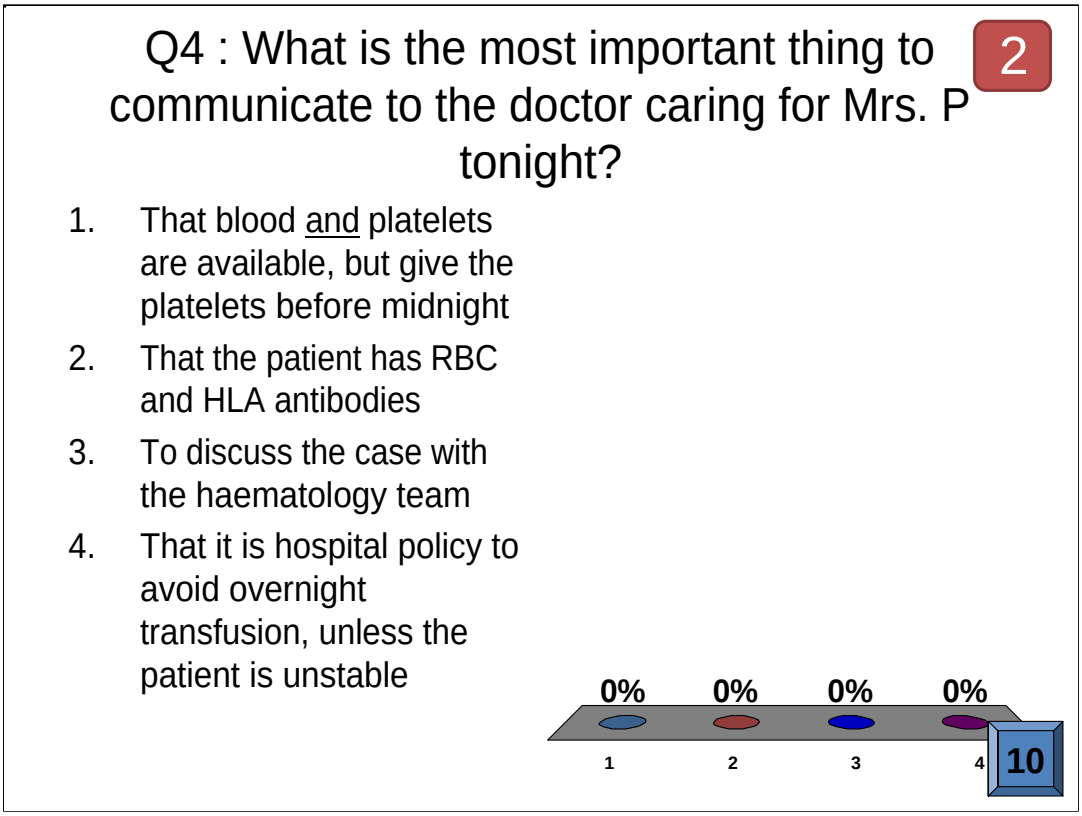
  Hb 75 g/L, platelets 23 $x10^9$/L, WBC 27 $x10^9$/L
- The doctor reviews the patient, who is quite breathless, and arranges 3 units of blood

Slides 19-29 – Case study 2

Thursday 10pm, Haematology Dept.

2

- The on-call BMS takes a verbal request for 3 units of red cells
- The patient is O RhD positive and has anti-Fy^{a}
- The last transfusion was 10 days ago
- 2 units of O+ Fya- blood have already been crossmatched for tomorrow
- There is also one unit of HLA-matched platelets for her, which expires at midnight tonight



Slide 21 – Case study 2, question 4

All the options contain information that would be useful for the Dr. Get the group to vote for the option and have a discussion regarding the choices made.

Option 1: This is useful information although the patient may have already been reviewed by the haematologist managing the patients care, hence the 2 units already crossmatched for tomorrow. The platelets have not been requested and by telling the Dr that they are expiring at midnight may mean that they decide to give these. Making sure all requests are appropriate should be the key concern.

Option 2: The fact that the patient has antibodies may not be something the Dr knows about his patient and is useful information.

Option 3: As the patient has MDS and has been treated for if for the last 18 months they will be under the care of the haematology team. Referral to this team to check the treatment plan would be important as there may be a good reason to wait and transfuse the patient in the morning as originally planned.

Option 4: Due to reduced number of staffing and patient safety it is not recommended that patients are routinely transfused at night. If a transfusion is not urgent it should be given during routine hours. In this scenario the patient is breathless and therefore may be deemed symptomatic.

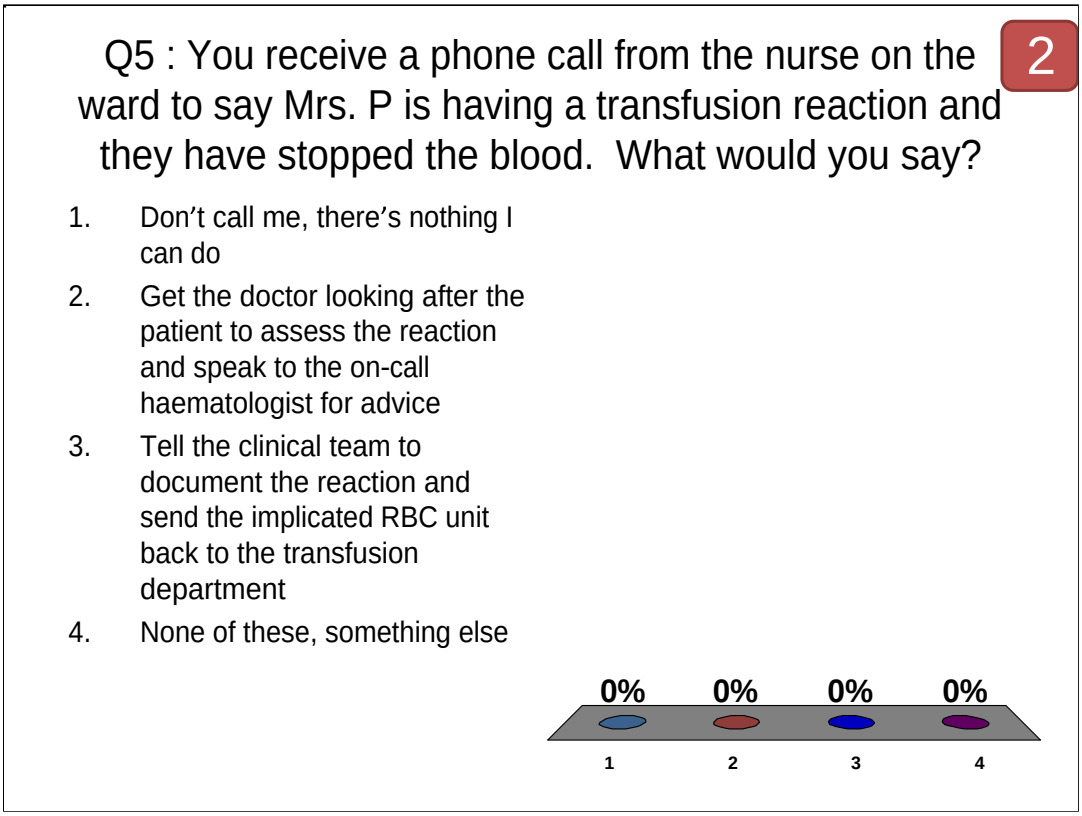
Discussion point:

If unsure of the appropriateness of a request who do you refer to?

Friday 2.30am, Care of the Elderly Ward

2

- The doctor prescribes the platelets over 30 minutes and each RBC unit over 2 hours, covered with oral furosemide (diuretic)
- The baseline pre transfusion obs. at 11pm were
  - BP 130/85, pulse 102, temp 37.5°C, resp. rate 28
- The platelets were given uneventfully
- Within 15 minutes of the first RBC unit the patient becomes more breathless
  - BP 140/90, pulse 110, temp 39.2°C resp. rate 32



Slide 23 – Case study 2, question 5

Patient has an increase in temperature, blood pressure and respiratory rate which are signs of a transfusion reaction.

Option 1: The transfusion labs are the experts in the transfusion medicine field and are the point of contact and support for the clinical area. If it is felt that dealing with this is not within your knowledge base you should be able to advise them who to contact.

Options 2 and 3: These are both considered correct actions. Reference to local policy should be made. Suspected transfusion reactions should always be referred to the haematologist.

Discussion points:

If you received the implicated unit in the laboratory what tests would you perform?

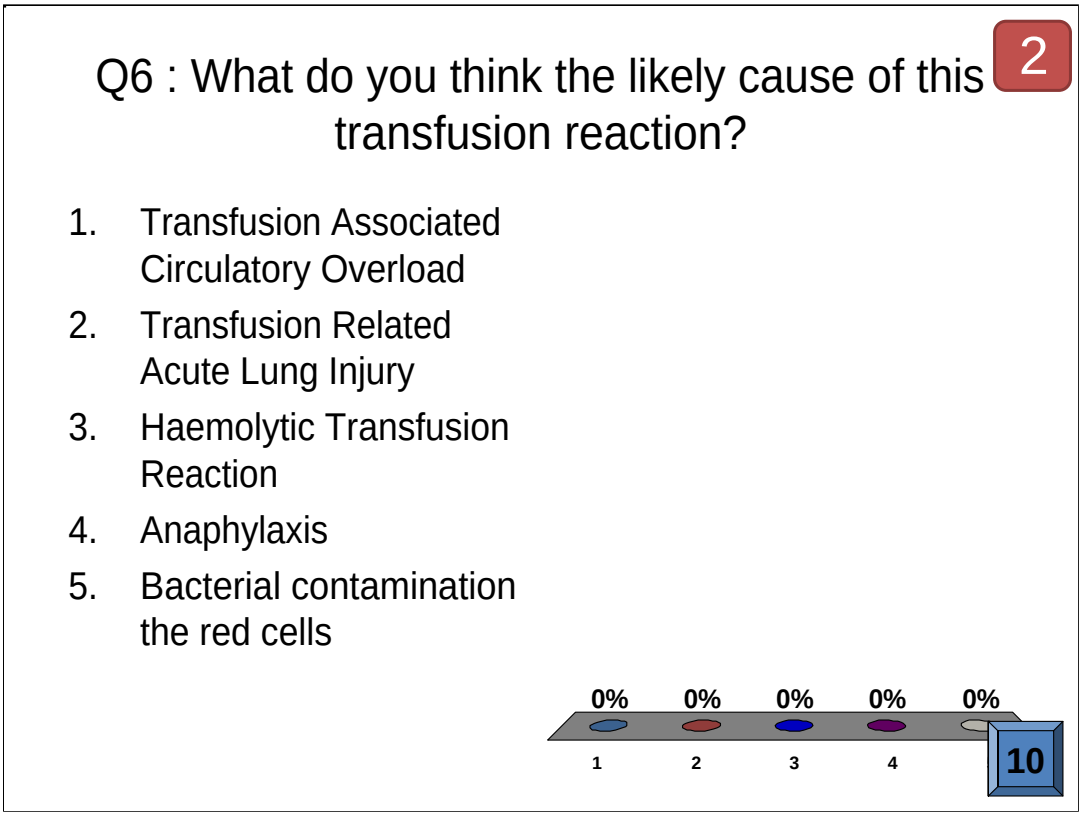
Would a post transfusion sample be requested?

Option 4: Discussion should be held as to what other actions would have been done at this point if this was selected by anyone in the group. It may be that this option has been chosen because both option 2 and 3 would have been selected.

Friday 9am, Haematology Dept.

2

- The haematology SpR reports that Mrs. P is now ventilated on the Intensive Care Unit
- She has had blood cultures and a change of iv antibiotics but is still pyrexial
- She had poor renal function before but this is now much worse
- At 8am her Hb was 60g/L, platelets 55 $x10^9$/L, WBC $12x10^9$/L



Slide 25 – Case Study 2, question 6

Option 1: The patient has had significant changes in observation without a significant fever and is breathless. These are signs of TACO. The weight of the patient has not been given and it is unclear what other fluids the patient has been given. The patient also has poor renal function.

Option 2: The patient has had significant changes in observation without a significant fever and is breathless. These are signs of TRALI. With TACO, the central venous pressure (CVP) will be raised and with TRALI the CVP will be normal.

Option 3: The patient has anti-Fya but the units transfused were Fya negative and crossmatch compatible. Haemolytic transfusion reactions related to non-ABO blood group systems do not tend to be immediate.

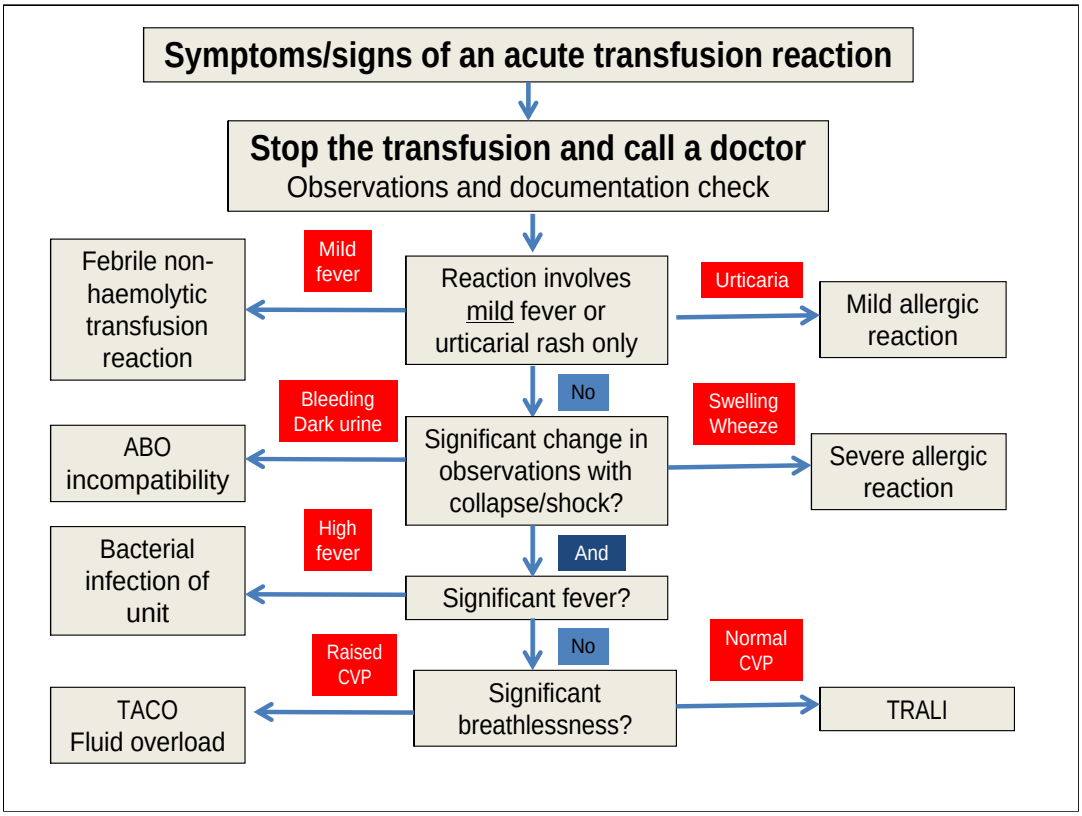
Option 4: Anaphylaxis causes shock/severe hypotension with a wheeze or stridor. This can be caused by transfusion in patients who are IgA deficient. The patient should be treated with adrenaline.

Option 5: The temperature rise was less than 2C but the temperature is above 39°C. Bacterial contamination presents with shock/severe hypotension without clinical sign of anaphylaxis or fluid overload.

Discussion points:

What would be the most likely diagnosis based on the results and clinical picture presented so far?

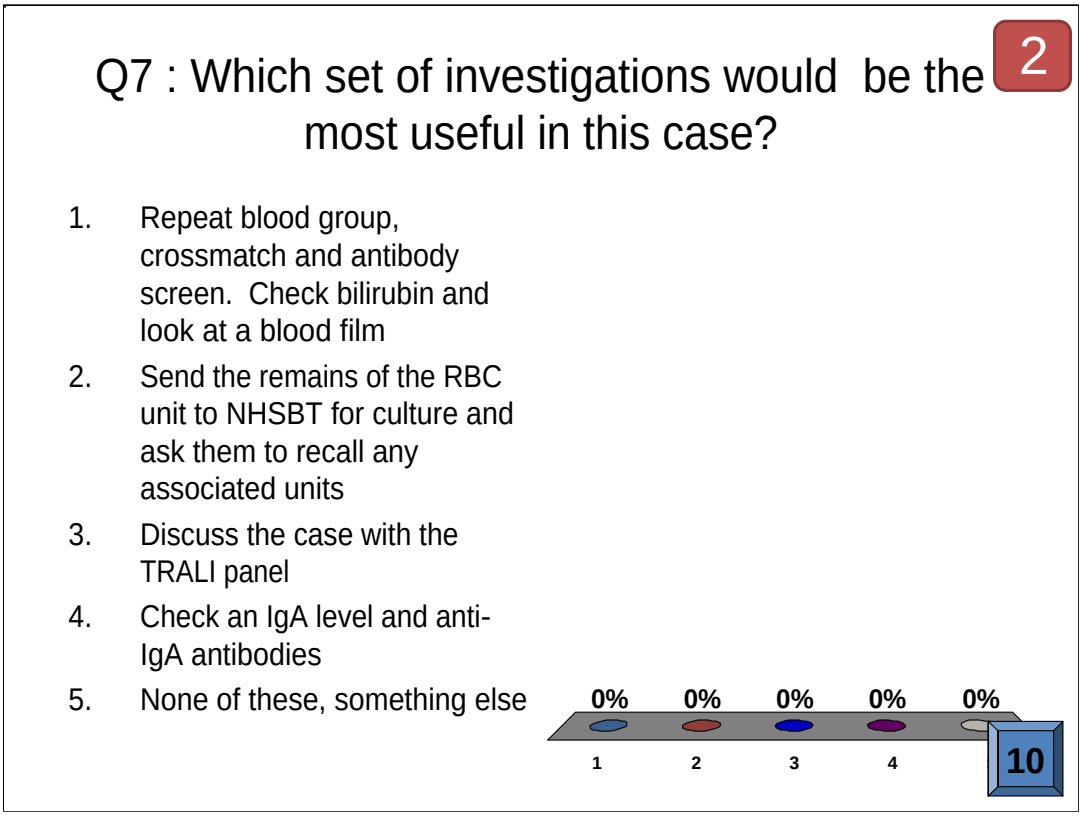
Could more than one diagnosis be possible?


Symptoms/signs of an acute transfusion reaction
Stop the transfusion and call a doctor
Observations and documentation check
Reaction involves mild fever or urticarial rash only
Mild fever
Febrile non-haemolytic transfusion reaction
Urticaria
Mild allergic reaction
No
Significant change in observations with collapse/shock?
Bleeding Dark urine
ABO incompatibility
Swelling Wheeze
Severe allergic reaction
And
Significant fever?
High fever
Bacterial infection of unit
No
Significant breathlessness?
Raised CVP
TACO Fluid overload
Normal CVP
TRALI

Friday 11.15am, Intensive Care Unit

2

- Blood cultures taken the night before grow pseudomonas, the same organism that was detected in the sputum on admission
- Chest X-ray suggests worsening pneumonia with bilateral infiltrates and a large heart
- She has clinical signs to suggest heart failure and is in positive fluid balance
- The haematology SpR reviews the patient and suggests a plan of investigation



Slide 28 – Case Study 2, question 7

Discuss all options bearing in mind the following notes, BCSH guidelines and local policy.

Option 1: These tests are useful when looking for a serological transfusion reaction. In this case these are not the most useful set of investigations.

Option 2: When bacterial contamination is suspected NHSBT should be informed to quarantine other products made form this donor. In this case the patient's blood cultures have shown no additional bacterial growth and the pseudomonas detected is the same as the organism detected on admission. Therefore it is very unlikely that the reason for the patient's deterioration is due to bacterial contamination of the transfusion.

Option 3: If a TRALI is suspected the case should be discussed with the TRALI panel at NHSBT. Samples will be requested and tested for neutrophil antibodies. If a TRALI is suspected treatment should not be delayed until the laboratory results are returned.

Option 4: IgA deficient patients may have anaphylactic reactions following a transfusion. This patient however has been transfused many time and therefore would have had a reaction previously.

Option 5: TACO. This patient has a positive fluid balance and has clinical signs to support cardiac failure. These are symptoms of TACO.

The patient also has impaired renal function

Respiratory Complications of Transfusion

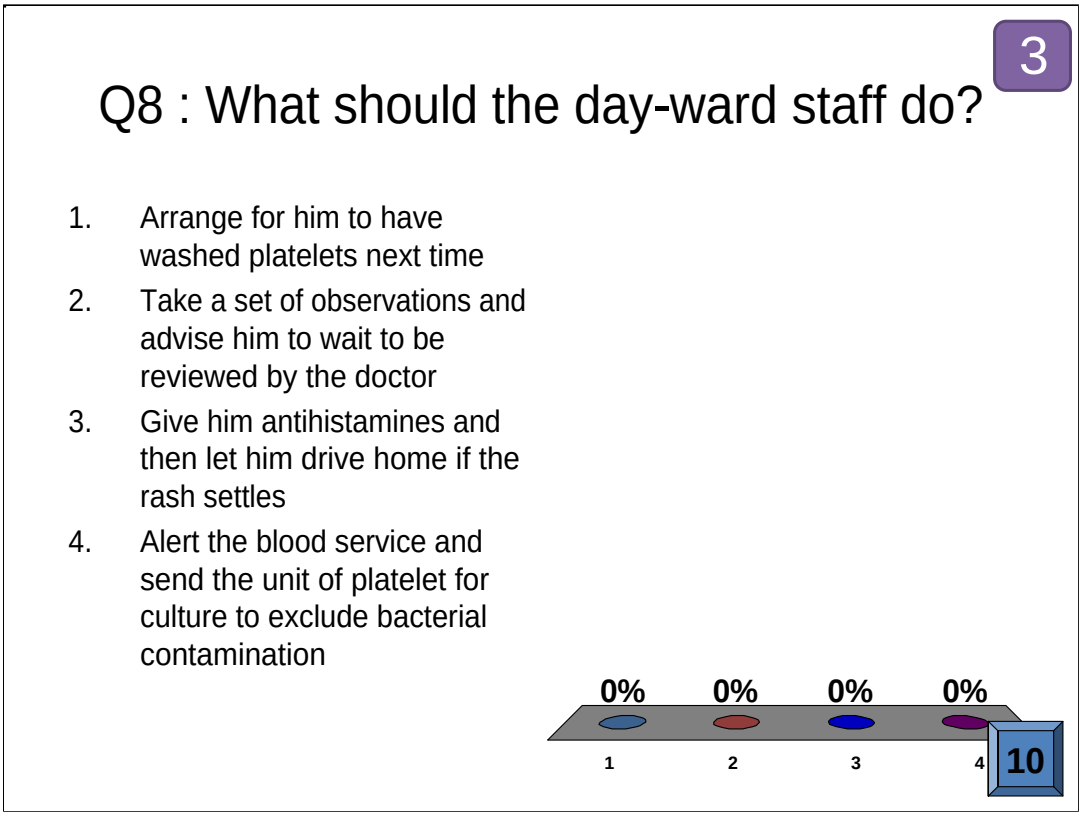
- Breathlessness is a feature of most severe acute reactions
- After resuscitating the patient, there needs to be a clinical review to guide further investigations
- It is important to focus investigations on the case – don't do every test on every case
- The pattern of symptoms and the time of onset after the start of transfusion is usually more helpful that laboratory investigations
- Not all breathlessness is transfusion-related!

Friday 4pm, Haematology Day Ward

3

- 21 year old male with very severe aplastic anaemia diagnosed 2 months ago
- He requires platelets twice a week and RBC transfusion every 2 weeks
- He continues to attend his university course and intends to finish his degree. The final exams are in 3 weeks
- He has not had any recent infections
- There have been no previous transfusion reactions
- He is about to go home when he starts to feel itchy and shows you a rash over his arms and body

Slides 30- 35 Case study 3



Slide 31 – Case Study 3, question 8

Option 1: it is possible he could have developed an allergy to the plasma in platelets although this is the first time the patient has had a reaction. Washed platelets should be considered if severe reactions occur on more than one occasion.

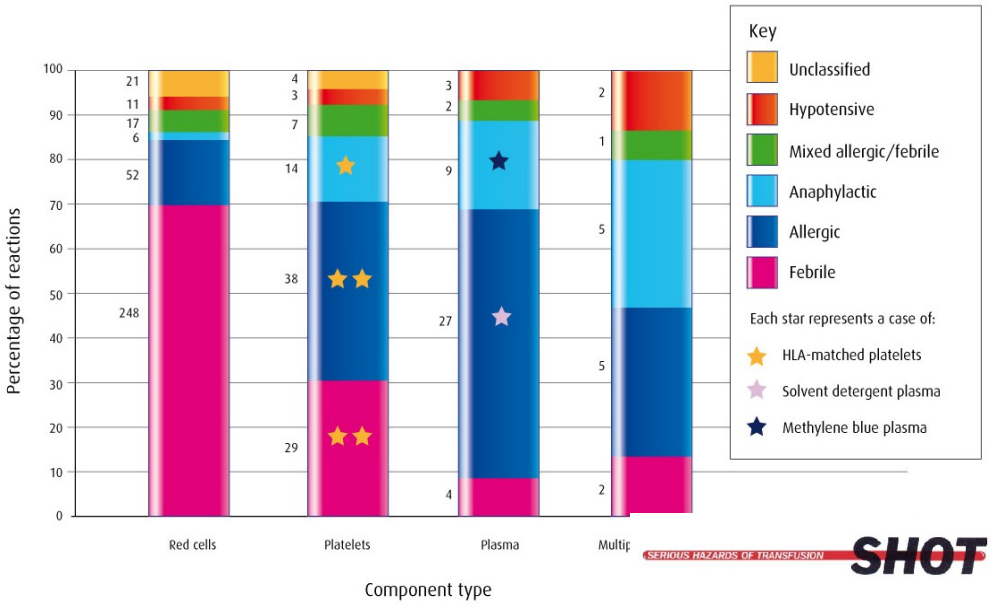
Option 2: The patient should wait and be reviewed by the doctor before being allowed to go home.

Option 3: Antihistamines can be given to deal with the allergy but this causes drowsiness so he should not be allowed to drive home

Option 4: Unlikely, but we do not have all the clinical details on the patient. If there had been a significant rise in temperature there may be reason to suggest bacterial contamination.

Category	Mild	Moderate	Severe
Febrile reaction	Temperature rise up to 2°C No other symptoms/signs	Temperature rise of 2°C or more Rigors, chills other inflammatory symptoms	Temperature rise of 2°C or more plus symptoms that require urgent medical review or prolong hospital stay
Allergic reaction	Transient flushing, urticaria or rash	Wheeze or angiooedema but no significant breathlessness or hypotension	Bronchospasm, stridor, angiooedema, circulatory problems. Anaphylaxis
Reaction with both allergic and febrile features	Features of mild febrile and mild allergic reactions	Features of both allergic and febrile reactions One feature in moderate category	Features of both allergic and febrile reactions One feature in severe category
Hypotensive reaction		Isolated fall in BP of 30mm or more No allergic or inflammatory symptoms	Shock without allergic or inflammatory symptoms

Reaction by Component Type



Allergic Reactions

- Are quite common
- Sometimes related to a factor in the donor
- Occur in patients with other allergies
- Sometimes mild reactions can get worse and patients should be observed for a period of time

Learning Points

1. **A multi-professional team approach to transfusion reactions produces the best results**
2. **Patients present with symptoms of their underlying disease as well as those of transfusion reactions**

   It is GOOD when clinical staff consider the possibility of a reaction, so be encouraging!
3. **Symptoms and timing of onset are clues to the cause of the reaction**

   Flowcharts are a useful complement knowledge of the type of reactions
4. **Mild reactions should be discussed and documented in the notes**

   But do not require extensive investigations