

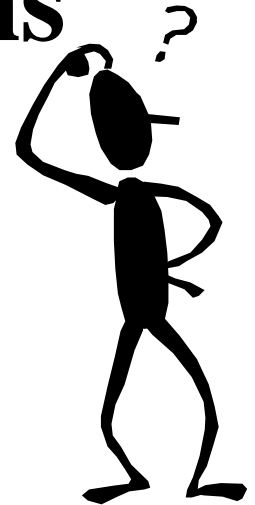
INVESTIGATION OF ACUTE TRANSFUSION REACTIONS

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Acute Transfusion Reactions



- What are they?
- How common are they?
- Who gets them (when, and from what)?
- Why is rapid recognition, investigation and treatment crucial?
- Why do we need guidelines for investigation and management and what are the key components of a protocol?
- Where do we go from here?

What are acute transfusion reactions (ATR)?

- Occur within 24 hours of transfusion
 - non-haemolytic febrile transfusion reactions (NHFTR)
 - hypotensive reactions
 - allergic reactions (mild to life-threatening)
 - haemolytic transfusion reactions
 - bacterial contamination and sepsis
 - Transfusion-associated circulatory overload
 - Transfusion-related acute lung injury

Classifying ATR

- ATR reported to haemovigilance schemes are often difficult to fit neatly into a category; different causes have overlapping clinical features and tests may be unhelpful or delayed
- Recently proposed *inflammatory* category to cover spectrum of *rigors, myalgia, hypotension, and shock* but no allergic features
- Where do cases with transient oxygen desaturation fit in?
- **we clearly need better basic research**

How common are ATR?

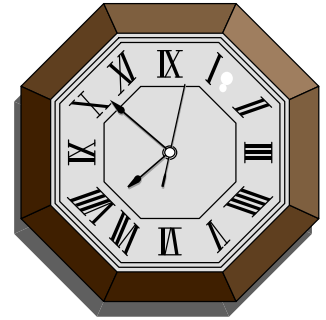
- Variably reported as 0.2-10% of Tx
- Pruritus/urticaria 1-3%
- NHFTR 1-5% (higher if no leucodepletion)
- TRALI maybe 1 in 5,000
- Bacterial sepsis fatal in 1 in 25-80,000
- Haemolytic 1 in 12-77,000
(fatal ABO 1 in 600,000-1,000,000)
- Anaphylaxis 1 in 20,000-170,000
- **Need better population-based data**

Are ATR more common in children?



- Probably:
 - 2003 SHOT Report noted excess in children (13% of ATR) (50% of these in first year of life)
 - prospective PICU study from Quebec:
 - 2509 components in 306 patients
 - 10.8% of patients had an ATR (1.6/100 components compared to 0.25/100 in adults)
 - 15% of these events were “life-threatening”, but no fatalities

When do ATR present?



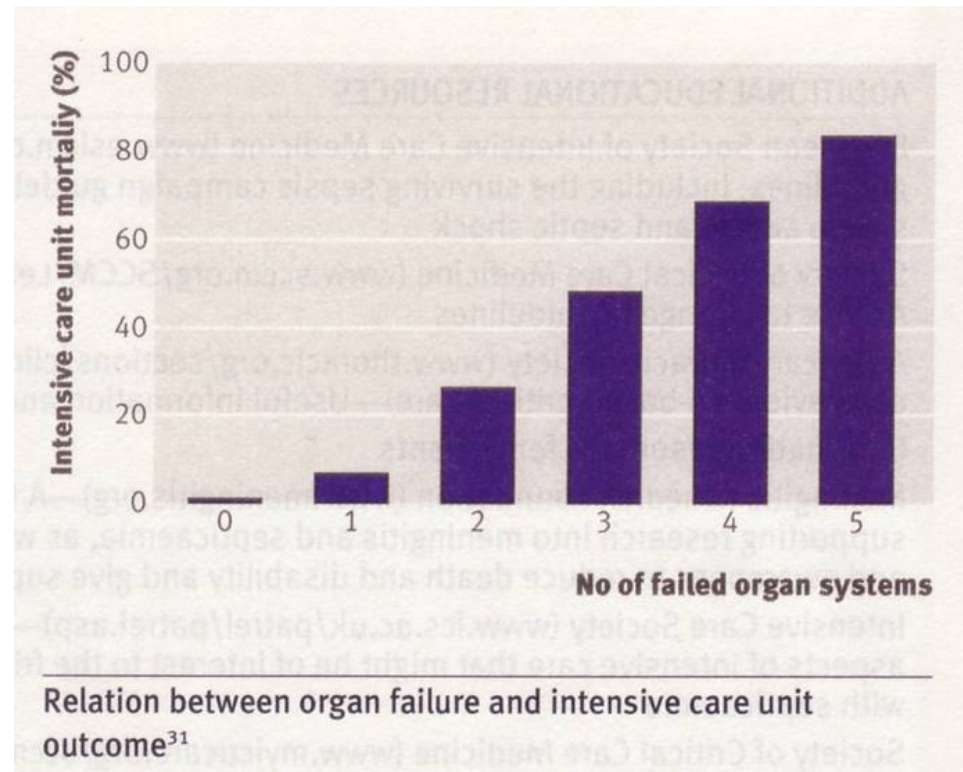
- Major ABO mismatch and bacterial transfusion reactions tend to occur very quickly - often within 15 min of start
- Only 1/3 of anaphylactoid reactions occur within first 15 min (can be 1-2 hours)
 - patients must remain visible and accessible to nursing staff during that time
- TRALI onset peaks around 6 hours
- TACO - during or soon after TX (but little systematic data)

Diagnosis of ATR

- Onset of new symptoms or signs during transfusion *may* be the first warnings of a life-threatening problem
- Often difficult to determine the type of reaction in early stages:
 - febrile and shocked: is it acute haemolysis or bacterial sepsis?
 - acutely breathless, cyanosed, hypotensive: is it TRALI or TACO (or severe allergic)?
- *Often badly managed if occur out of hours*

Speed of response is critical

- Most data are from study of major sepsis
- Early treatment reduces mortality and time in ICU
- In hypotensive patients, every hour delay in antibiotics increases mortality by 7.6%



Protocols must be:

- Accessible when needed
- Clear, short and didactic
- Reflect best current practice
- Known by the staff who have to use them
(who have been trained and competency assessed!)
- Maintaining awareness and competence is a major challenge, especially in low-use areas and transfusions in community

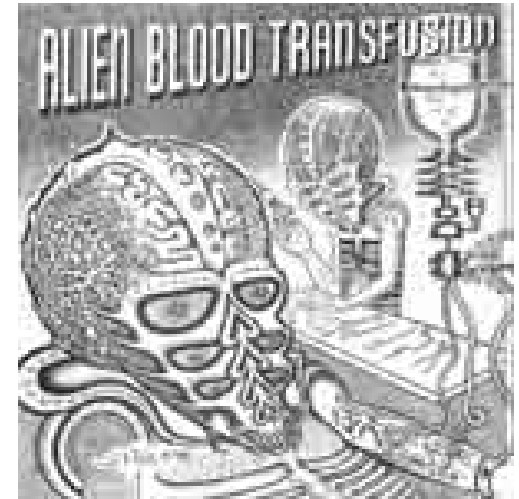


Figure 10 Acute transfusion reactions

Symptoms/signs of acute transfusion reaction

Fever; chills; tachycardia; hyper- or hypotension; collapse; rigors; flushing; urticaria; bone, muscle, chest and/or abdominal pain; shortness of breath; nausea; generally feeling unwell; respiratory distress

Stop the transfusion and call a doctor

- Measure temperature, pulse, blood pressure, respiratory rate, O₂ saturation
- Check the identity of the recipient with the details on the unit and compatibility label or tag

Febrile non-haemolytic transfusion reaction

- If temperature rise less than 1.5°C, the observations are stable and the patient is otherwise well, give paracetamol
- Restart infusion at slower rate and observe more frequently

Mild fever

Reaction involves mild fever or urticarial rash only

Urticaria

Mild allergic reaction

- Give chlorphenamine 10 mg slowly iv and restart the transfusion at a slower rate and observe more frequently

ABO incompatibility

- Stop transfusion
- Take down unit and giving set
- Return intact to blood bank
- Commence iv saline infusion
- Monitor urine output/catheterise
- Maintain urine output at > 100 ml/hr
- Give furosemide if urine output falls/absent
- Treat any DIC with appropriate blood components
- Inform hospital transfusion department immediately

Yes

Suspected ABO incompatibility

No

Severe allergic reaction

Yes

Severe allergic reaction

- Bronchospasm, angioedema, abdominal pain, hypotension
- Stop transfusion
- Take down unit and giving set
- Return intact to blood bank along with all other used/unused units
- Give chlorpheniramine 10 mg slow iv
- Commence O₂
- Give salbutamol nebuliser
- If severe hypotension, give adrenaline (0.5 ml of 1 in 1000 intramuscular)*
- Clotted sample to transfusion laboratory
- Saline wash future components (* equivalent to 0.5 mg im)

Haemolytic reaction/bacterial infection of unit

- Stop transfusion
- Take down unit and giving set
- Return intact to blood bank along with all other used/unused units
- Take blood cultures, repeat blood group/crossmatch/FBC, coagulation screen, biochemistry, urinalysis
- Monitor urine output
- Commence broad spectrum antibiotics if suspected bacterial infection
- Commence oxygen and fluid support
- Seek haematological and intensive care advice

Yes

Other haemolytic reaction/bacterial contamination

No

Acute dyspnoea/hypotension

Monitor blood gases
Perform CXR
Measure CVP/
pulmonary capillary pressure

Normal CVP

TRALI

- Clinical features of acute LVF with fever and chills
- Discontinue transfusion
- Give 100% oxygen
- Treat as ARDS – ventilate if hypoxia indicates

Fluid overload

- Give oxygen and frusemide 40–80 mg iv

Raised CVP



All guidelines should be read in conjunction with the Disclaimer at the beginning of this manual.

Infective Shock	Onset of high fever, Severe chills, hypotension or circulatory collapse during or soon after transfusion.	Bacterial contamination of blood component	Rare but very severe with high mortality rate. Usually during first 100mL. Treatment: management of septicæmia. Fluids and intravenous antibiotics.	Yes
TRALI	Acute respiratory reaction with fever, tachycardia, hypotension, hypoxia and pulmonary oedema.	Donor plasma containing antibodies to patient leucocytes.	Occurs during or within 6 hours of 1 in 5,000-10,000 transfusions. May be life threatening. Provide cardiovascular and airway support.	Yes

ATR Protocol

Women's and Children's
Health Service
Perth
Western Australia

Key elements of ATR Protocol

Immediate management

- All new symptoms and signs (especially fever) **must be taken seriously** during Tx
- Stop transfusion, keep line open with saline
- Check vital signs and initiate resuscitation
- Check ID of blood and patient
- Notify on-call medic immediately
- Except in very mild febrile or urticarial reactions, **do not continue same unit**



Key elements of ATR Protocol

- Doctor must:
 - assess (and document) the situation
 - follow clinical algorithm and seek appropriate clinical specialist advice
 - contact Blood Bank (who should also have a protocol to advise necessary tests/actions)
 - return blood bag(s) & giving set
 - EDTA & clotted samples + 1st urine
 - **All reactions with fever $\uparrow >1.5^{\circ}\text{C}$ or severe enough to stop transfusion must have blood cultures taken (SHOT)**



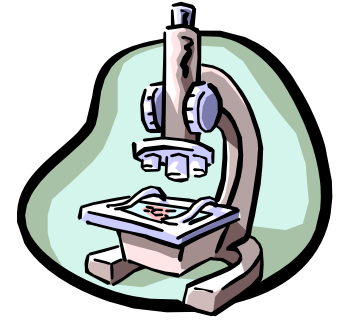
Key elements of ATR Protocol:

Laboratory aspects

- Staff must be adequately trained and have access to ATR protocol 24/7
- Must have SOPs for immediate investigation of all significant ATRs using “best practice” techniques or urgent referral to specialist lab
- Inform clinical area of samples needed for investigation
- **Ensure compatible blood is available**
- Liaise with Transfusion Practitioners and Haematologist



Laboratory aspects



- If *mistransfusion* identified, urgently check if another rogue unit is in the system
- If *bacterial infection* is suspected:
 - Send bag and segments for microscopy and culture (to Blood Service lab or *in house*)
 - following agreed protocols for storage, transport and testing
- If *anaphylactoid reaction* suspected arrange specimens for *mast cell tryptase* acutely (15 min to 3 hours) and at 24 hours (? utility)

Laboratory aspects

- **Excellent liaison with the Blood Service is crucial:**
 - support from RCI Lab in investigation of *haemolytic reactions* (initial or confirmatory tests) and provision of compatible blood
 - immediate contact if *bacterial contamination* suspected so that TM consultant can decide need for recall of other donations
 - investigation of possible TRALI and severe anaphylactoid reactions

Severe anaphylactoid reactions

- **Anti-IgA Abs** - need evidence-based protocol
 - partial IgA deficiency 1 in 700 -very low risk
 - rare severe IgA deficiency ($<0.5\text{g/l}$) - 1 in 200 have IgG anti-IgA but severe reactions only seen in 1 in 20,000-47,000 transfusions (routine assays don't measure IgE anti-IgA)
 - need protocol for: *who to screen? what are the best tests and which blood components?* (washed cells, IgA deficient donors, standard components in emergency)

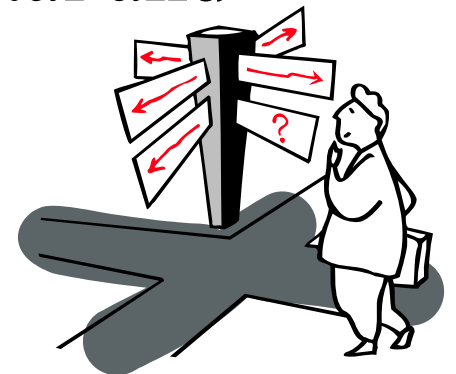
Key elements of ATR Protocol: review, analyse and report

- Transfusion Practitioner has a key role in liaising between clinical staff and the lab and investigating ATRs
- All ATRs should be reported to the Hospital Transfusion Team and serious events analysed and reviewed
- Learn lessons and change systems
- Report to SHOT/MHRA



Where do we go from here?

- Recurrent SHOT Reports have stressed the need for updated, evidence-based guidelines for investigation and management of ATR
- BCSH Writing Group now set up, chaired by Dr Hazel Tinegate (Newcastle)
- Multidisciplinary (including hospital and Blood Service laboratory input)
- All suggestions welcomed!



Thanks for your attention!



MANKOFF

"I'm sorry, dear. I wasn't listening. Could you repeat what you've said since we've been married?"