

Laboratory Lessons from SHOT

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Summary of key data for all IBCT cases $n=200$

- **Mortality** $n = 0$
- **Major morbidity** $n = 2$
 - One case, development of anti-K in a woman of child bearing potential
- **ABO incompatible RBC transfusions** $n = 4$
 - One ABO grouping error
- **RhD incompatible RBC transfusions** $n = 5$
 - Two RhD grouping errors

IBCT events originating in the hospital transfusion laboratory

- 107 cases in which the primary error occurred in the laboratory i.e.
 - 28% decrease in laboratory related errors in 2010 compared with 2009
 - 54% of the total 200 IBCT cases



Summary of laboratory related error from IBCT chapter

| Type of error | No. of cases in 2009 | No. of cases in 2010 |
|--|----------------------|----------------------|
| Wrong blood | 21 | 21 |
| Wrong sample selected | 2 | 2 |
| ABO grouping error | 5 | 2 |
| D grouping error | 4 | 4 |
| Incorrect component selected | 9 | 11 |
| Incorrect labelling | 1 | 2 |
| Wrong group selected for SCT patient | 13 | 15 |
| Wrong ABO group selected | 7 | 9 |
| Wrong D group selected | 2 | 2 |
| Procedural errors | 4 | 4 |
| Other pre-transfusion testing errors | 48 | 34 |
| Testing errors | 9 | 8 |
| Procedural errors | 39 | 26 |
| SRNM (Special Requirements Not Met) | 67 | 37 |
| Due to failure to consult patient records thoroughly | 40 | 18 |
| Due to poor serological knowledge/failure to recognise the special needs of a specific patient group | 27 | 19 |
| Total | 149 | 107 |



Trends in laboratory based ABO grouping errors, causes and sequelae

| Year | ABO errors | Wrong sample tested | Interpretation/transcription errors | Other | ABO-incompatible red cell transfusions | Sequelae |
|------|------------|---------------------|-------------------------------------|-------|--|------------------------------|
| 2010 | 3 | 1 | 1 | 1 | 1 | No morbidity |
| 2009 | 7 | 2 | 5 | 0 | 2 | 1 AHTR |
| 2008 | 8 | 3 | 5 | 0 | 4 | 1 AHTR |
| 2007 | 7 | 3 | 4 | 0 | 1 | No morbidity |
| 2006 | 6 | 2 | 3 | 1 | 0 | No morbidity |
| 2005 | 22 | 9 | 12 | 1 | 3 | 1 AHTR |
| 2004 | 18 | 5 | 12 | 1 | 6 | 1 death 1 major morbidity |
| 2003 | 17 | 8 | 9 | 0 | 6 | 2 major morbidity |



Trends in laboratory based RhD grouping errors, causes and sequelae

| Year | D errors | D errors from anti-D chapter | Wrong sample tested | Interpretation/transcription errors | Tx of D+ to D-individual | Other | Sequelae |
|------|----------|------------------------------|---------------------|-------------------------------------|----------------------------|-------|---|
| 2010 | 4 | 7 (3 weak D) | 0 | 4 | 2 | 0 | 1 patient produced anti-D but was not of childbearing potential |
| 2009 | 5 | NK (7 weak D) | 1 | 4 | 2 | 0 | No morbidity |
| 2008 | 11 | NK | 0 | 11 | 10 | 0 | 3 patients produced anti-D but none was of childbearing potential |
| 2007 | 4 | NK | 1 | 3 | 3 (1 x 33-year-old female) | 0 | No morbidity |



Learning points

- UKTLC recommends the use of 24/7 automation for ABO/D typing
- Variations in D typing of patients with a weak D antigen may be unavoidable as technologies differ in their sensitivity but it is important that the D type is determined by the most robust routine method available



Other pre transfusion errors

- Poor database maintenance
 - Failure to find patient records (legacy systems)
 - Failure to update patient history
- Testing unsuitable samples
- Incomplete testing
 - Tests resulted before being read
 - No antibody identification following a positive antibody screen
- Antibody identification errors
- Inappropriate electronic issue

Special Requirements Not Met - SRNM

- Due to poor serological knowledge/carelessness in selection
 - Incorrect phenotype selection
- Failure to recognise the needs of specific patient groups
 - K positive units against national recommendation/local protocol
 - Non MB-treated FFP and cryoprecipitate to children <16 yrs old
 - CMV unscreened units to children <1 yr old
 - CMV unscreened units to pregnant women
- Failure to consult patient records thoroughly:



Special Requirements Not Met - SRNM

| Failure | No. of cases 2009 | No. of cases 2010 |
|---|-------------------|----------------------------|
| Failure to provide irradiated components <ul style="list-style-type: none"> ■ Missed tick on request form ■ Missed flags ■ Clerical error ■ Flag required irradiated, CMV negative issued ■ NHSBT failed to irradiate buffy coats, not detected in the laboratory | 22 | 9 2 4 1 1 1 |
| Failure to provide CMV negative components <ul style="list-style-type: none"> ■ Missed tick on request form ■ Flag input error | 10 | 4 3 1 |
| Failure to provide CMV negative and irradiated components <ul style="list-style-type: none"> ■ Missed tick on request form ■ Failed to order correct special requirements on BTS order form and error not detected at issue | 4 | 3 2 1 |
| Failure to provide human leucocyte antigen (HLA) matched platelets <ul style="list-style-type: none"> ■ Missed flag - BMS busy | 4 | 1 |
| Failure to provide human platelet antigen (HPA) matched platelets <ul style="list-style-type: none"> ■ Flag input error as a result of inadequate handover | 0 | 1 |
| Total | 40 | 18 |



Paediatric cases

- Babies treated as neonates when they were > 4 months
- Blood issued electronically when maternal antibodies had been detected
- Failure to supply MB treated FFP/cryoprecipitate
- Patient <1 year old not receiving CMV neg components

Learning points

- Laboratories should critically assess:
 - the way in which mother and baby records are linked on the LIMS
 - the way in which alerts/warnings/algorithms are used on the LIMS
 - the process in place for alerting the laboratory to patient specific special requirements
- Training and competency based assessment must include:
 - actions to take on receipt of alerts/warnings on both the LIMS and on analysers
 - and highlight the less common transfusion scenarios

Laboratory errors and learning points from other chapters

Adverse events relating to Anti-D

| Type of event | Cases | No. of primary errors | | |
|--|------------|-----------------------|------------|-----------|
| | | Midwife | Laboratory | Doctor |
| Omission or late administration of anti-D Ig | 166 | 139 | 21 | 6 |
| Anti-D Ig given to RhD positive patient | 26 | 13 | 11 | 2 |
| Anti-D Ig given to patient with immune anti-D | 17 | 9 | 8 | 0 |
| Anti-D Ig given to mother of RhD negative infant | 8 | 4 | 4 | 0 |
| Anti-D given to wrong patient | 8 | 7 | 0 | 1 |
| Wrong dose of anti-D given | 12 | 4 | 6 | 2 |
| Anti-D Ig HSE | 4 | 2 | 1 | 1 |
| Total | 241 | 178 | 51 | 12 |

Case study

Change in laboratory reporting procedure results in significant delays in administration of RAADP

- A laboratory changed the mechanism of reporting blood groups from paper to electronic. Community midwives had relied on the paper reports to generate appointment lists for RAADP. The change in the reporting mechanism resulted in 15 reports of delayed RAADP and 1 omission
- Laboratories must employ formal change control procedures which must involve ALL stakeholders.

Haemolytic transfusion reactions

Learning point:

- Testing an eluate is an important part of investigating an HTR, and may be the only way of identifying any or all of the antibodies present
- Systematic exclusion of all antibodies of likely clinical significance is an essential part of the antibody identification process and may necessitate the use of further red cells or techniques



Near miss reporting

| Category of incidents | No. of cases |
|--|--------------|
| Sample errors | 409 |
| Request errors | 44 |
| Laboratory procedural or testing errors | 119 |
| Laboratory component selection errors | 100 |
| Component collection/administration errors | 50 |
| Expired components available | 29 |
| Cold chain events | 97 |
| Others | 15 |
| Total | 863 |



Near miss reporting

| Category of error | No of errors | Error detected by laboratory | Error detected at collection / bedside |
|--|--------------|------------------------------|--|
| Incorrect patient identifiers entered onto LIMS | 27 | 8 | 16 |
| Component mislabelled <i>(Transposed labels from RBRP chapter = 25)</i> | 34 | 0 | 24 |
| Special requirements or specification not met | 65 | 4 | 61 |



RBRP/Near miss reporting

Learning point:

- Training and competency based assessment must include basic manual checking procedures



Handling & storage errors

Learning point:

- Hospitals should have a robust policy in place for removing expired blood components and components past their suitability date from satellite fridges



Inappropriate, unnecessary & delayed/under transfusion

Learning point:

- 12% of the reported unnecessary transfusions could have been avoided if laboratories had not transmitted results they knew or suspected to be inaccurate, but instead requested a second sample
- A further 12% of the reported unnecessary transfusions could have been avoided if laboratories had required confirmation of correct transmission of telephoned results. CPA Standard G3 requires that the laboratory establishes a procedure for telephoned results that ensures confirmation of correct transmission

Inappropriate, unnecessary & delayed/under transfusion

Learning point:

- In accordance with Better Blood Transfusion 2007/001, protocols should be in existence which empower laboratory staff to question the appropriateness of requests for transfusion.



Recommendations

- Robust communication procedures are required both within the laboratory and at the laboratory/clinical interface

Action: Transfusion Laboratories, HTTs, HTCs

- Easily interpreted flowcharts should be considered to clarify existing policies and procedures

Action: Transfusion Laboratories, HTTs, HTCs



Recommendations

- Successive SHOT reports have demonstrated that the majority of ABO/D grouping errors are incurred with manual procedures. The UKTLC has therefore recommended the use of 24/7 automation. In the event that resources cannot be made to fund this development, a risk assessment must be conducted with clear mitigation strategies.

Action: Transfusion laboratories, pathology managers, clinical risk committees



Recommendations

- If there is any doubt as to the true RhD status of a patient, or whether anti-D detected in an antibody screen is immune or prophylactic in origin, and these questions cannot be resolved quickly, then prophylactic anti-D should be administered rather than placing the patient at risk of withholding it.

Action: HTC's



Main recommendations

- Organisations with transfusion laboratories should implement the recommendations of the UKTLC
Action: Trusts/hospitals
- Work should continue with suppliers of LIMS to improve the capability of IT systems to generate warning flags and implement component selection algorithms based on data incorporated in the component label. These improvements should be in line with the recommendations of the BCSH guidelines on laboratory IT systems currently in preparation

Action: Manufacturers of laboratory IT systems