Zooming in on laboratory errors

UK NEQAS for Blood transfusion
Laboratory Practice

Clare Milkins, Scheme Manager
NMM Birmingham November 2007
What is EQA?

External assessment of results from a group of laboratories, where each laboratory tests identical specimens of ‘known’ but undisclosed content.
Purpose of UK NEQAS

• Monitor performance
  – Inter-laboratory - individual participants
  – Overall
  – Comparison by techniques etc.

• Provide advice and guidance

• Education through exercises, reports and meetings

• Promote high standards of practice

• Inform national guidelines
SHOT – actual errors

EQA – potential for error

Near miss
Antibody screening

ABO/D typing

Emergency testing

Crossmatching

Antibody identification

Red cell phenotyping

Practice (through questionnaires)
Automated Systems

Labelling (sample transposition)

Seroology (sensitivity)

Interpretation

Manual Edits

Result recording (Transcription)

Manual Systems
Unwanted area of assessment

EQA induced errors
Form filling
Non-standard testing protocols
UK NEQAS Error Rates (UK)

Improvement in performance
Improvement in performance

• Quality of reagents
• Automation
• BCSH guidelines
• Quality systems
• EQA
EQA errors 2006

• Demonstrate errors in all aspects
Number of errors by category in UK - 2006

64 Ab ID errors
Summary of Causes

• STAFF RESOURCES
  – “Insufficient staff”;
  – “Reliance on agency staff”
  – “Poor skill mix” - want all BMS staff to participate in recognised BT training scheme

• TRAINING
  – “Policy in place, but BMS did not follow it”
  – “More in-house training and competency assessment required”
Summary of Causes

• KNOWLEDGE
  – Interpretation
  – Understanding of reagents and test systems

• UNSAFE POLICIES AND PROCEDURES
  – Manual back-up procedures thought through?
  – Outwith guidelines

Human Error
Two Examples

RhD grouping of a rr DAT positive sample

Selection of blood in an emergency situation
Example 1

RhD grouping of a rr DAT positive sample
DAT+ rr sample – 07R8

- A D negative rr cells coated with anti-c (2-3+ DAT)
- 16 UK participants (3.5%) recorded D positive or D variant (weak or partial D)
DAT+ rr sample – 07R8

• All used BioVue anti-D reagent potentiated with sufficient PEG to give a false positive result
• 11 used full automation
  – All brought forward for review
  – 9 undertook confirmatory testing
  – 2 edited results to positive
• All recorded a positive reaction with the control reagent at least retrospectively
Confirmatory testing

• Five used ABD/ABD cassettes
  – Potentiated and no control
• Four (+ one above) used saline reacting IgM monoclonals in tubes
  – Four non repeatable false positives
  – One transcription error!
Incorrect interpretation - causes
• Latent conditions
  – Potentiated reagents
  – Reagent control giving weaker reactions
• Knowledge
  – Significance of pos control
  – Interpretation of D pos based on a wk or MF reaction
  – Understanding of test system
• Training
  – Policy for confirmatory policy not followed
• Policies and procedures
  – Using same/similar reagent for confirmatory testing
  – Editing cell group on automation
• Human error
  – Over-reading of confirmatory tests
Example 2

Selection of blood in an emergency situation
06R5 – UK NEQAS Emergency Exercise

The aim of this non-scoring emergency exercise and associated questionnaire was to establish what pre-transfusion testing is performed when blood is requested in an emergency situation.
SCENARIO

- You’re on your own in the laboratory at midnight
- Three family members arrive in your emergency room following a car accident
  - **Clark** (38 M) has internal injuries and requires 2 units of red cells for theatre in 10 - 15 minutes of sample receipt, and may need more later
  - **Jenny** (40 F) has leg fractures and requires 2 units of red cells for theatre in 1 hour from receipt of sample
  - **Dalila** (14 F) requires a group and save but may need blood for theatre in the morning
ABO and D Group

Using a rapid technique
- Cell group must include testing with anti-A, anti-B and anti-D
- Appropriate controls should be included

Confirmation before ABO matched blood is issued
- Either a reverse group (resample)
- Or repeat cell group (resample)
- Or an immediate-spin crossmatch

A 2nd shot at testing the right sample
ABO Grouping techniques

- CAT
- Tube
- LPM
- Tile

Routine
Emergency - rapid
Clark (40 yr old Male) - Group within 10 - 15 minutes

• No group: 4% - all gave O D negative
• Initial group: 96%
Further testing prior to issue

- 46% cell group only
- 394 O pos, 1 A pos
- 59% 2nd group
- 45% I/S xmatch
- 63 (16%) did neither
  - 25 did a cell group only, no control or auto
  - (3 checked the donor groups)

But 26 (12%) used the same aliquot

This included the lab that got it wrong – A D pos was selected for transfusion
“Jenny” (40 yr old female)
- A D negative with anti-D

- One hour available for testing but 9% of laboratories selected group O D negative (rather then A red cells)
  - all of these completed blood grouping, antibody screening and IAT crossmatching
- 90% selected group specific A D negative
- One selected A D positive blood
  - Used anti-A,B instead of anti-D
Conclusions

• EQA highlights potential for error
  – ‘free’ lesson
• Identifies weaknesses in test systems
• Demonstrates problems with resources, knowledge and training
• Supports and informs BCSH guidelines