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Pre-Transfusion Testing Questionnaire - UK and Republic of Ireland
Data collected May 2016

Introduction

The purpose of this questionnaire was to update basic information on routine pre-transfusion testing procedures, last gathered in May 2015. We will continue to update this information on an annual basis.

Return rate

Responses were received from 272/382 (71%) laboratories, *cf.* 77% in 2014 and 2015, 72% in 2013, 75% in 2012, and 77% in 2011. Twelve respondents do not undertake routine pre-transfusion testing. Duplicate entries have been removed (with the most recent entry kept for inclusion in the analysis), as have incomplete entries from six hospital laboratories that did not answer any questions regarding details of testing. Data from 254 hospital transfusion laboratories has been analysed.

Summary and trend data

Table 1 shows a summary of current data compared to historical data, where available.

Table 1 – Trends in routine pre-transfusion testing

Process/procedure	2016 n=254	2015 n=279	2014 n=290	2013 n=278	2011 n=307
Full automation for 'group and screen'					
Used during core hours	90%	88%	86%	84%	74%
Proportion of full automation always used 24/7	94%	93%	91%	93%	84%
Routine ABO/D Grouping					
Liquid phase microplate	10%	13%	11%	10%	13%
Column Agglutination Technology (CAT)	86%	82%	85%	86%	82%
Omit reverse group on patients with historical groups	24%	24%	25%	22%	24%
Omit reverse group on patients without historical group	<1%	<1%	<1%	0%	<1%
D typing reagents					
Routinely include IAT for D typing on apparent D negatives	10%	7%	8%	6%	6%
Include an anti-CDE reagent	7%	7%	6%	3%	3%
Routine method of establishing compatibility					
Electronic issue	60%	59%	53%	55%	46%
ó immediate ô spin	4%	6%	5%	7%	8%
IAT (± other technique(s))	36%	35%	42%	39%	46%
'Group check' policy					
Group-check policy	67%	55%	44%	26%	No data
Secure electronic patient identification systems	9%	No data	No data	No data	No data
IAT technology antibody screening					
CAT	90%	87%	89%	91%	90%
Solid phase microplate	10%	13%	11%	8%	10%
IAT technology crossmatching					
CAT	98%	96%	97%	98%	96%
Tube	1%	2%	1%	1%	2%
Solid phase microplate	1%	2%	2%	1%	2%

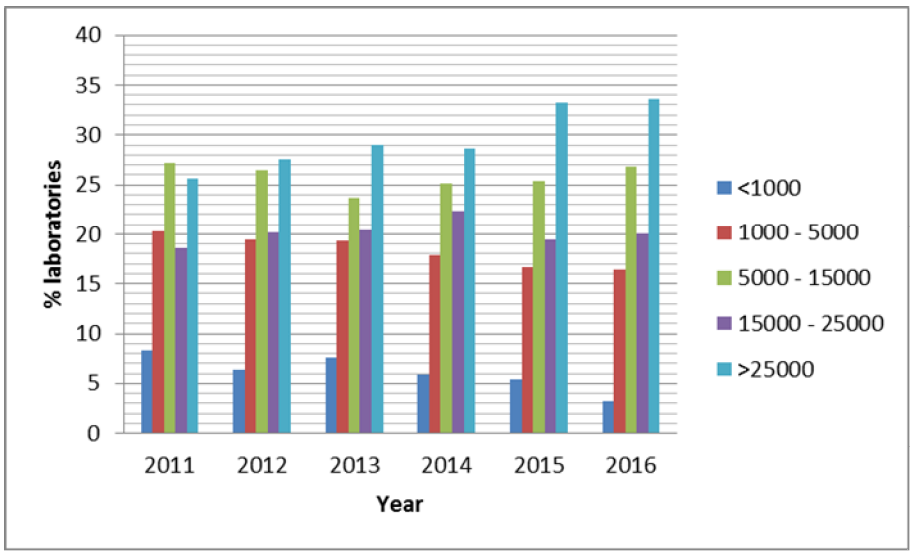
Analysis of 2016 data

Workload n=250

Number of group and screens performed per annum

Figure 1 shows the percentage of laboratories within workload categories based on the approximate number of group and screens performed per year for 2015 (with previous years for comparison).

Figure 1 – % of laboratories in each workload category by year



- 16/40 (40.0%) of laboratories in the Republic of Ireland test <5000 samples per year *cf.* 33/210 (15.7%) in the UK.

Rejected samples

Table 2 shows the number of laboratories within each percentage range of rejected patient samples due to incorrect/inadequate labelling or for other reasons.

Table 2 – number (%) laboratories rejecting samples in each given range

Range (% samples received)	Reason for rejection – number (%)	
	Incorrect / inadequate labelling	Other, e.g. haemolysed
0-1%	57 (23.4%)	183 (78.6%)
2-5%	146 (59.8%)	49 (21.0%)
6-10%	37 (15.2%)	1 (0.4%)
>10%	4 (1.6%)	0 (0%)
Total	**244 (100%)**	**233 (100%)**

IT and automation

Table 3 shows the LIMS used, with 76.4% using iSoft or Clinisys. There were 20 other commercial IT suppliers reported, with none of these having more than nine users.

Table 3 – Details of LIMS used (where stated)

IT system	Number (%)
iSoft (including CSC)	99 (39.0%)
Clinisys	93 (36.6%)
Other*	62 (24.4%)
Total	**254 (100%)**

* including five using in-house systems

Booking EQA samples into the LIMS

186/254 (73.2%) book EQA samples into the LIMS, with no obvious correlation with the LIMS in use. Table 4 shows the number of laboratories recording each reason why EQA samples are not booked into the LIMS; some laboratories recorded more than one reason.

Table 4 – Reasons cited for not booking EQA samples into the LIMS

Reason	Number
The format of the samples (e.g. group and antibody screen for one ópatientô are undertaken on separate samples)	38
Problems with cumulative data from EQA ópatientsô	23
Interference with workload statistics	13
Problems with holding EQA data on a database shared between sites	12
Custom and practice	28
Other	5

- 11 cited ócustom and practiceô as the only reason for not booking EQA samples into the LIMS.

Use of automation within core hours

228/254 (89.8%) laboratories are using automation that includes liquid handling for routine group and screening within core hours.

During core hours, approximately 98.7% of routine group and screens are tested with full automation. This has been calculated using the actual number of group and screens performed by each laboratory if stated, otherwise it has been estimated as the midpoint where the category is a range, using 500 for the <1000 category and 44500 for the >25000 category (this is the average number reported by those in the >25000 category who provided an actual figure). This does not take account of urgent testing which might be undertaken manually in a laboratory with automation, even during core hours.

Table 5 shows the number and percentage of laboratories with an interface between the automation and laboratory information management system (LIMS). Of the four with no interface, one was in the process of undergoing validation of an interface, one was awaiting a LIMS upgrade, and two stated that the functionality does not exist with their in-house LIMS.

Table 5 – LIMS interface with automation

Interface between automation and LIMS	Number (%)
Bi-directional	166 (73.5%)
Uni-directional	56 (24.8%)
Not interfaced	4 (1.8%)
Total	**226 (100%)**

Use of automation for other tests

Table 6 shows the number and percentage of the 228 laboratories with automation using it for tests other than ógroup and screenô

Table 6 – Use of automation by test

Test	Number (% of total using automation)
Antibody ID	148 (64.9%)
Crossmatching	79 (34.6%)
Phenotyping	95 (41.7%)
DAT	128 (56.1%)

Analyser used for group and screen
Table 7 shows the number and percentage of laboratories using each analyser for routine group and screens.

Table 7 – Analyser used for group and screen

Analyser	Number (%)
Bio-Rad ID Gelstation	63 (27.6%)
Bio-Rad IH 1000	46 (20.2%)
Grifols Erytra	14 (6.1%)
Grifols WADiana	1 (0.4%)
Immucor NEO	20 (8.8%)
Immucor Echo	3 (1.3%)
Immucor Galileo	2 (0.9%)
Ortho AutoVue Innova	53 (23.2%)
Ortho AutoVue	13 (5.7%)
Ortho Vision / Vision Max	13 (5.7%)
Total[1]	**228 (100%)**

Use of automation outside core hours

Overall, 246/254 (96.9%) stated that they undertake pre-transfusion testing outside core hours.

227 have full automation and stated whether it is used for testing out of hours:

- 214/227 (94.3%) always use the automation
- 7/227 (3.1%) sometimes use the automation outside core hours
- 6/227 (2.6%) never use the automation outside core hours.

Details of serological testing

Routine ABO/D typing technology
Table 8 shows the technology used by laboratories for primary ABO/D typing and antibody screening of patients with a previous group, using automation, manual techniques and overall.

Table 8 – Technology used for primary group and screen (G+S) - manual, automated and overall

Technology	Number G+S automated	Number G+S manual	Total number (%)
Bio-Rad	109	13	122 (48.0%)
Ortho	79	3	82 (32.3%)
Immucor	25	0	25 (9.8%)
Grifols	15	0	15 (6.0%)
LISS tube	0	1	1 (0.4%)
Tube group/Bio-Rad screen	0	9	9 (3.5%)
All techniques	**228**	**26**	**254 (100%)**

Inclusion of a reverse group

- 60/247 (24.3%) omit the reverse group for patients with more than one historical group
  - 2/60 (3.3%) use manual techniques
  - 4/60 (6.7%) do include a reverse group if there is only one historical group record.
  - 1/60 (1.7%), using manual Bio-Rad, also omits the reverse group on patients with no historical group.

D typing

- 18/247 (7.3%) laboratories incorporate an anti-CDE reagent into routine testing for all patients
- 25/247 (10.1%) routinely confirm D negatives using an IAT anti-D reagent:
  - 22 for all patients
  - 3 only for patients with no previous group.

IAT technology used for serological crossmatching

Table 9 shows the number and percentage using each IAT technology for serological crossmatching.

Table 9 – Technology used for the IAT crossmatch (manual and automated methods and overall)

Technology	Number automated	Number manual	Total number (%)
Bio-Rad	37[1]	121	158 (62.2%)
Ortho	33	42	75 (29.5%)
Immucor (Capture)	2	0	2 (0.8%)
Grifols	7	9	16 (6.3%)
Tube	0	3	3 (1.2%)
All techniques	**79**	**175**	**254 (100%)**

[1] includes two using Immucor automation for G+S.

Method for establishing final compatibility

- 153/253 (60.5%) use electronic issue (EI)
- 91/253 (36.0%) use an IAT crossmatch (with or without an immediate spin)
- 9/252 (3.6%) use an immediate spin crossmatch alone.

Use of enzyme techniques

- 14/248 (5.6%) routinely perform an antibody screen with enzyme treated cells
- 226/247 (91.5%) have access to an enzyme panel for antibody identification
- 102/246 (41.5%) use an enzyme IAT as part of the antibody identification process, if indicated.

Table 10 shows when the enzyme panel is used

Table 10 – use of enzyme panel

When enzyme panel is used	Number (%)
For every sample with a positive antibody screen	145 (64.1%)
For all samples where the patient's antibody screen is positive for the first time (+/- if specificity is not clear)	25 (11.1%)
Only if the specificity is not clear (or another specificity cannot be excluded) by IAT	54 (23.9%)
Other situation	2 (0.9%)
Total	**226 (100%)**

Secure bedside electronic patient identification systems

A secure bedside electronic patient identification system was defined in the questionnaire as having barcoded wristbands with handheld barcode scanners and printers to allow secure bedside labelling of samples. Table 11 shows the details of the 46/252 (8.8%) who stated that they have such a system in place.

Table 11 – electronic patient identification systems in use

System in use	Number
Haemonetics BloodTrack	25
Fordman Systems BARS	9
MSoft Bloodhound	7
Other	5

- 35/46 used the patient identification system in all areas.
- 11/46 used the system in selected areas only, including two where it did not extend to satellite / community hospitals.
- A further three hospitals had patient identification systems in place that partially covered the process, and three more were part way through implementing blood tracking systems.

Second sample – 'group check' policy

Requirement for ABO group check on second sample in routine situations

Table 12 shows the number and percentage of laboratories with a policy for the ABO group to be checked on a second sample (one could be historical), before group specific blood is issued in a routine situation. This is shown both overall and by laboratories that use EI.

Table 12 – Requirement for a 'group check' on a second sample

Policy for ABO group check performed on second sample?	Number (%)	
	Using EI	All laboratories
Yes, for all patients	118 (77.1%)	167 (66.3%)
Yes, for all patients except where the first sample is group O	0 (0.0%)	1 (0.4%)
Yes, but only for electronic issue (EI)	4 (2.6%)	4 (1.2%)
No, but plan to implement a policy	22 (14.4%)	59 (23.4%)
No, have made a decision not to implement a policy	9 (5.9%)	21 (8.3%)
Total	**153 (100%)**	**252 (100%)**

- Of the 21 laboratories making a decision not to implement a two sample policy
  - 10 use secure bedside electronic patient ID systems in all clinical areas
  - 11 do not have secure bedside electronic patient ID systems (5 in England and 6 in ROI)

- 118/153 (77.1%) laboratories using EI require a group check on a second sample for all patients compared to 50/100 (50.0%) using a serological crossmatch.

Testing of second sample

The level of testing performed on the second sample is detailed in Table 13.

Table 13 – Combinations of tests performed on the second sample

Combination of tests on the second sample	Number (%)
Full ABO/D group and antibody screen	129 (79.1%)
Forward ABO/D group	33 (20.2%)
Forward ABO group	1(0.6%)
Total	**163 (100%)**

Policy for provision of red cells if a second sample is not available and blood is required urgently

163 laboratories with a group check policy for all patients (as opposed to just for those undergoing EI), answered this question. Assuming that testing has been completed on the first sample to BCSH specifications for group compatible blood, 121/163 (74.2%) would give group O and 40/163 (24.5%) would give group specific blood. Two laboratories (1.2%) stated that they do not have a policy for this situation.

Workload associated with group check sample

Table 14 shows the approximate number of occasions per 24 hour period, where the 155 laboratories requiring a group check on all patients and answering this question, have to contact clinical areas to request a second sample.

Table 14 - Number of additional samples per 24 hour period

Number of requests	Number (%)
None or 1	23 (14.8%)
2-5	47 (30.3%)
5-10	39 (25.2%)
11-15	13 (8.4%)
>15	33 (21.3%)
Total	**155 (100%)**

Where respondents were able to equate this to a % of workload:

- <1%: n=18
- 1-3%: n=36
- 4-6%: n=29
- 7-10%: n=22
- 11-15%: n=17
- >15%: n=37

Data was further analysed to compare the number of additional samples and percentage workload quoted, with the annual workload stated earlier in the questionnaire; in 32/153 (20.9%) cases the data did not match, as demonstrated in the two examples below.

1. 6-10 additional samples tested per day, with a stated annual workload of 50000, equating to >15% of workload
2. 6-10 additional samples tested per day, with a stated annual workload of 10000, equating to >1-3% of workload

Perceived impact of group check policy

Participants were asked to judge the impact of the group check policy on overall workload (testing, communications etc.), use of O D negative red cells and delays in provision of red cells.

Figure 2 shows the impact on workload as judged by 121 laboratories where the workload figures recorded did match with the annual workload figures. Table 15 shows the impact as judged by all 161 laboratories who answered the question.

Figure 2 – assessment of impact on workload (n=121)

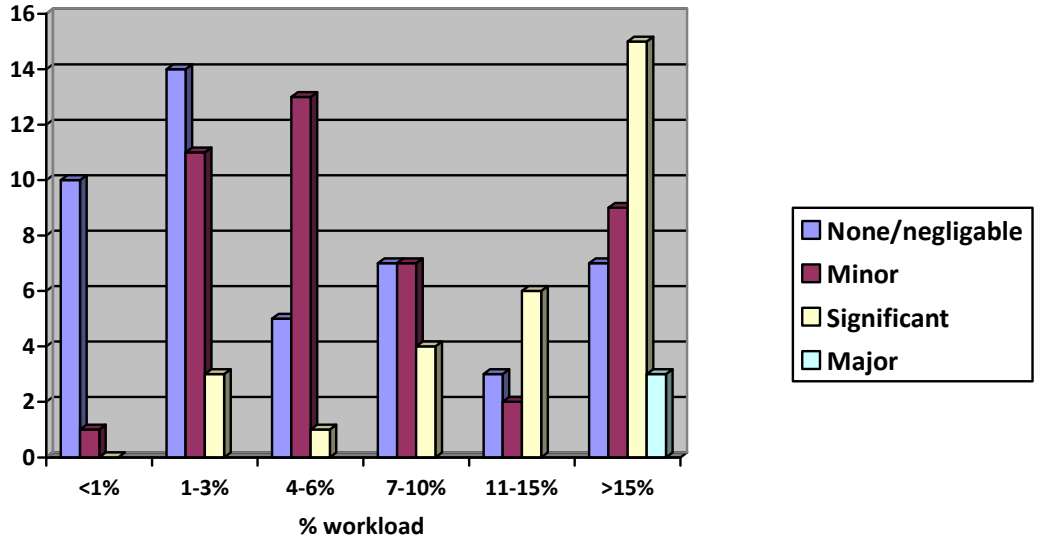


Table 15 – Reported impact on workload, use of O D Negative red cells and delays to transfusion

Impact	Number (%)		
	On workload	On use of O D Negative	On delay to transfusion
Major	4 (2.5%)	2 (1.3%)	1 (0.6%)
Significant	39 (24.2%)	9 (5.6%)	11 (6.8%)
Minor	68 (42.2%)	43 (26.7%)	42 (26.1%)
Negligible	36 (22.4%)	72 (44.7%)	62 (38.5%)
None	14 (8.7%)	35 (21.7%)	45 (28.0%)
Total	**161 (100%)**	**161 (100%)**	**161 (100%)**

Exemptions from the second sample policy

Table 16 shows details of exemptions to the policy in the 167 laboratories requiring a group check on all patients. The majority of laboratories have no exemption and others exclude more than one department.

Table 16 – Departments exempt from the second sample policy

Exemptions to second sample policy	Number (%)
None	117 (70.1%)
All paediatrics	6 (3.6%)
Neonates only	34 (20.4%)
Trauma	9 (5.4%)
Other [1]	4 (2.4%)

[1] One newborns (1st 12 hours of life); one paediatrics where a 2nd sample is not possible; one related to the urgency of the request; one in any situation by agreement with patient and clinician and one not stated.

Variation in practice by country

Table 17 shows the number of laboratories by country that use EI and automation, and the number that either currently test a second sample before issuing group specific blood, or are in the process of implementing a policy to do so.

Table 17 – Use of automation, EI and policy for group check on second sample by country

Country	Number (% within country)		
	Using automation	Using electronic issue	With second sample policy in place
England (n=171)	158 (92.4%)	125 (73.1%)	133 (76.0%)
Scotland (n=24)	23 (95.8%)	12 (50.0%)	9 (37.5%)
Wales (n=10)	8 (80.0%)	9 (90.0)	10 (100.0%)
Northern Ireland (n=6)	6 (85.7%)	1 (14.2%)	2 (33.3%)
Republic of Ireland (n=41)	31 (75.6%)	6 (14.6%)	13 (31.7%)
Other (n=2) [1]	2 (100%)	0 (0%)	1 (50%)
Total 254	**229**	**150**	**167**

[1] Crown dependencies

Feedback and Customer Satisfaction Questionnaire

Comments were received from 27 participants. Eight of these gave positive feedback about the Scheme. The other 19 (and one who also gave positive feedback) made suggestions for improvement as outlined in table 18; these will be discussed internally and with the Steering Committee and placed on the quality improvement plan where deemed feasible and appropriate. In response to a direct question, 126 said they would like a formal customer satisfaction questionnaire and 121 said they would not (7 did not answer this questions). Given that more were in favour than against, the Scheme will distribute a formal survey during 2017.

Table 18 – Suggestions for improvement

Area for improvement	Number
Clarity of questions in this Annual Practice Questionnaire	4
Website and data entry issues	10
Extension to the closing date	3
Provision of a CPD certificate for undertaking the EQA	1
Provision of a whole blood sample in place of the separate plasma samples	1
Widen scope of EQA to include haemolysin testing and titrations	1

Discussion

Most of the data reported has not changed significantly from that collected and reported in 2015. However, it is noted that:

- 67% of laboratories (cf.55% in 2015) request two samples taken at separate times for a group check (one group could be historical), before group specific blood is issued in a routine situation, and a further 24% are in the process of implementing this policy (cf. 20% in 2015).
- There are still a higher proportion of those using EI requesting a second sample than those crossmatching serologically (78% cf. 51%.
- The numbers using automation and EI, and requiring a second sample, varies significantly by country.

EQA órequestsôare booked into the LIMS in 73% laboratories (72% in 2015), allowing the EQA samples to follow the same process as clinical samples, thus making the EQA results more relevant to clinical practice. Some laboratories cited sample format (i.e. not whole blood) as a reason for not booking EQA samples to the LIMS, and whilst it is appreciated that the sample format is not ideal, this does not seem to be a barrier to LIMS entry in the majority of laboratories. In some cases there are additional obstacles to overcome, e.g. where there is a shared database and / or problems with building up historical records for EQA ópatientsô It might be possible to overcome these issues with additional planning in allocating names and numbers to the EQA samples for entry to the LIMS. However, in 28 laboratories ócustom and practiceôwas cited as a reason not to book in EQA samples, with this being the only reason for 11 (4% of all respondents, cf 6% in 2015).

The conditions of EQA Scheme participation[1] issued by the Royal College of Pathology Joint Working Group (JWG) for Quality Assessment in Pathology, state that ôEQA samples must be treated in exactly the same way as clinical samples. If this is not possible because of the use of non-routine material for the EQA (such as photographs) they should still be given as near to routine treatment as possibleô

The questionnaire data will continue to be collected and analysed on an annual basis.

References

[1]JWG conditions of EQA Scheme participation: https://www.ukneqash.org/external_links