



UK NEQAS for General Haematology

Blood Component Quality Monitoring Pilot Scheme

1403CM Summary Report October 2014

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For information on data analysis and performance assessments see the UK NEQAS (H) Participants Manual (www.uknegash.org)

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This report gives the summary analysis of the Blood Component Quality Monitoring exercise 1403CM, distributed 7th October 2014.

Background

This pilot scheme was developed for the monitoring of laboratories associated with the production of blood components for therapeutic use. The scheme is designed to assess performance at the analyte levels monitored in the preparation of blood components, in particular at raised Hb, Hct and platelet count.

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Survey Contents

Participants are supplied with red cell specimens for Hb and Hct and platelet specimens for platelet counts.

Participant Laboratories

Specimens were distributed to a total of 21 laboratories. Eight of these were non-UK laboratories within the EU. A number of participants have more than one analyser and analyse specimens in more than one mode, giving a total of 35 possible data returns. Each analyser is identified by its unique participant reference number (PRN), either as used in the UK NEQAS Full Blood Count scheme or allocated for this Pilot scheme only. Table 1 shows the analysers registered and the analysis mode if applicable.

UK NEQAS (H) receives a set of specimens as a participant in the Pilot Scheme and tests these specimens using ICSH reference method for haemoglobin, the microhaematocrit method for Hct

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telet count in addition to analysis using the in-house
The results from the UK NEQAS haematology analyser
20028.

Table 1: Registered participant analysers

PRN	Mnemonic	Instrument
02185		Sysmex XS1000i
20028		Sysmex XE2100
20083	Automatic	Coulter LH780
20083A	Manual	Coulter LH780
20083B	Manual	Coulter LH780
20083C	Automatic	Coulter LH780
20235	Manual	Coulter LH780
20235A	Automatic	Coulter LH780
20235B	Manual	Coulter LH780
20235C	Automatic	Coulter LH780
20261		Sysmex XT2000i
20261A		Sysmex XT1800i
20483		ABX Pentra XL80
20518		Coulter LH750
20648	Manual	Coulter LH780
20648A	Automatic	Coulter LH780
20685	Automatic	Coulter LH750
20685A	Manual	Coulter LH750
20685B	Automatic	Coulter LH780
20685C	Manual	Coulter LH780
20687		Cell-Dyn Sapphire
20687A		Cell-Dyn Sapphire
20694		Siemens ADVIA 2120
20906B		Sysmex XP-300
21006B		Sysmex XP-300
21524		Coulter LH500
21871		Sysmex XT2000i
21871A		Sysmex XE2100
21872	Automatic	Sysmex XT2000i
21872A	Automatic	Sysmex XT1800i
21872B	Automatic	Siemens ADVIA 2120
21873		Pentra 80XL
25545		ABX Pentra 80
30883		Sysmex XT1800i
30883A		Coulter LH780

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Schedule

The programme for the distribution is shown below, with preparation day designated as day 0:

Date	Day	Action
Friday 03/10/14	-3	Blood components collected
Monday 06/10/14	0	Survey material prepared
Tuesday 07/10/14	1	Specimens dispensed, packed and distributed by first class post or courier for non-UK participants
Friday 10/10/14	4	Specimens tested
Tuesday 14/10/14	8	Survey closed for return of results

Survey Material

1. Red Cell specimens : Hb & Hct (1403CM1 & 1403CM2)

Fresh (72 hours old), plasma reduced whole blood in CPD or SAG-M was provided by NHS Blood and Transplant and used without further additives. Where necessary, the red cell concentrates were centrifuged and plasma reduced further, to raise the level of haemoglobin.

2. Platelet specimens (1403CM3 & 1403CM4)

Fresh (72 hours old), platelet pools were provided by NHS Blood and Transplant. Each pool was treated with 10% K₃-EDTA in Alsever's solution, then centrifuged and the supernatant decanted and retained. The platelets were partially fixed by the same method used for UK NEQAS (H) FBC survey material and the platelet count was adjusted using the retained supernatant.

Stability and homogeneity

Specimens were tested during preparation, to assess the initial Hb and Hct levels and platelet counts, using a Sysmex XE2100 analyser in the UK NEQAS (H) laboratory. A set of specimens was posted back to UK NEQAS (H) for analysis on the designated testing day (PRN 20028).

Return of results

20/21 laboratories (95%) returned Hb, Hct and platelet results on specimens supplied.

Data Analysis

The median, interquartile range (IQR), estimated standard deviation (Est.SD) and coefficient of variation (CV %) were calculated for each specimen. These values are shown in table 2. All instruments were analysed in the same group, regardless of instrument make. The raw anonymised data returned for each specimen are shown in Appendix 1 (Hb results), Appendix 2 (Hct results) and Appendix 3 (platelet results) and Appendix 4 (statistics).

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Parameter	Specimen	Median	No. of returns	IQR	Est. SD	CV%	Range	
							Min.	Max.
Hb (g/L)	1403CM1	224	29	219-228	6.7	3.0	214	274
	1403CM2	216	30	211-220	6.5	3.0	209	243
Hct (L/L)	1403CM1	0.711	29	0.704-0.734	0.022	3.2	0.684	0.775
	1403CM2	0.678	30	0.671-0.697	0.019	2.8	0.646	0.787
Platelets ($\times 10^9/L$)	1403CM3	2713	30	2548-2801	187	6.9	2250	3282
	1403CM4	2222	30	2112-2262	111	5.0	1823	2676

Performance assessment

The acceptable performance range for each parameter was established as the median value $\pm 2\%$ for Hb, $\pm 4\%$ for Hct and $\pm 10\%$ for platelets. Any result outside these limits was considered an outlier for that specimen. These outlier limits are in accordance with the limits suggested by Dr S.M. Lewis (Dacie and Lewis Practical Haematology 9th edition), as being clinically significant and are as agreed for the initial pilot exercises.

Table 3 shows the results obtained by reference and alternative methods.

Table 3. ICSH & other alternative method data for 1403CM

Parameter	Specimen	Method	Result
Hb (g/L)	1403CM1	ICSH	Technical Problems
	1403CM2	ICSH	Technical Problems
Hct (L/L)	1403CM1	Microhaematocrit Centrifuge	0.726
	1403CM2	Microhaematocrit Centrifuge	0.699
Platelets ($\times 10^9/L$)	1403CM3	Flow Cytometry	3115
	1403CM4	Flow Cytometry	2372

Table 4 shows the performance range and the number of outliers for each specimen; this information is supplied for guidance only and there is no formal scoring system for the pilot scheme. Until more data has been gathered and performance patterns become clearer, none of the results warrant action.

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Parameter	Specimen	Median	Performance range (median $\pm$ 2% for Hb, $\pm$ 4% for Hct, $\pm$ 10% for platelets)	No. of Returns	No. Outliers	
					Low	High
Hb (g/L)	1403CM1	224	220-228	29	8	6
	1403CM2	216	212-220	30	8	2
Hct (L/L)	1403CM1	0.711	0.683-0.739	29	0	4
	1403CM2	0.678	0.651-0.705	30	2	5
Platelets ($\times 10^9$ /L)	1403CM3	2713	2442-2984	30	3	3
	1403CM4	2222	2000-2444	30	3	2

Reference

S. M. Lewis 2001 Quality Assurance. In: Dacie and Lewis Practical Haematology 9th edition, SM Lewis, BJ Bain and I Bates (eds), Churchill Livingstone.

Next steps

The planned model for performance assessment will be circulated to participants and feedback from participants will be welcomed.

Unit for reporting Hb

In line with the recommendations of Pathology Harmony, UK NEQAS (H) has adopted g/L as the unit for reporting Haemoglobin (Hb).

The conversion from g/dL to g/L is;

- $\text{g/L} = \text{g/dL} \times 10$
- $12.0 \text{ g/dL} = 120 \text{ g/L}$

If you have any queries about this change, contact either Barbara De la Salle or Paul McTaggart on 01923 217878.

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Appendix1: All Hb Results Returned

PRN	Mnemonic	Instrument	1403CM1	1403CM2	1403CM1-Median	1403CM2-Median
02185		Sysmex XS1000i	228	218	4	2
20028		Sysmex XE2100	230	222	6	6
20083	Automatic	Coulter LH780	220	213	-4	-3
20235	Manual	Coulter LH780	224	216	0	0
20235A	Automatic	Coulter LH780	218	211	-6	-5
20235B	Manual	Coulter LH780	224	216	0	0
20235C	Automatic	Coulter LH780	219	212	-5	-4
20261		Sysmex XT2000i	219	211	-5	-5
20261A		Sysmex XT1800i	228	211	4	-5
20483		ABX Pentra XL80	226	220	2	4
20518		Coulter LH750	223	216	-1	0
20648	Manual	Coulter LH780	220	214	-4	-2
20648A	Automatic	Coulter LH780	219	213	-5	-3
20685	Automatic	Coulter LH750	218	210	-6	-6
20687		Cell-Dyn Sapphire	227	220	3	4
20687A		Cell-Dyn Sapphire	217	220	-7	4
20694		Siemens ADVIA 2120	220	212	-4	-4
20708		Sysmex XT4000i	229	220	5	4
20906B		Sysmex XP-300	218	210	-6	-6
21524		Coulter LH500	214	209	-10	-7
21871		Sysmex XT2000i	226	216	2	0
21871A		Sysmex XE2100	230	214	6	-2
21872	Automatic	Sysmex XT2000i	274	243	50	27
21872A	Automatic	Sysmex XT1800i	224	211	0	-5
21872B	Automatic	Siemens ADVIA 2120	227	222	3	6
21873		Pentra XL80	228	220	4	4
25545		ABX Pentra 80	234	221	10	5
29120A		Cell-Dyn Ruby	230	221	6	5
29120B		Cell-Dyn Ruby	228	218	4	2
42370		Siemens ADVIA 2120		210	-224	-6

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Appendix 2: All Hct Results Returned

PRN	Mnemonic	Instrument	1403CM1	1403CM2	1403CM1- Median	1403CM2 - Median
02185		Sysmex XS1000i	0.727	0.696	0.02	0.02
20028		Sysmex XE2100	0.758	0.697	0.05	0.02
20083	Automatic	Coulter LH780	0.717	0.677	0.01	0.00
20235	Manual	Coulter LH780	0.703	0.676	-0.01	0.00
20235A	Automatic	Coulter LH780	0.689	0.664	-0.02	-0.01
20235B	Manual	Coulter LH780	0.703	0.676	-0.01	0.00
20235C	Automatic	Coulter LH780	0.696	0.665	-0.01	-0.01
20261		Sysmex XT2000i	0.706	0.678	0.00	0.00
20261A		Sysmex XT1800i	0.744	0.692	0.04	0.01
20483		ABX Pentra XL80	0.708	0.647	0.00	-0.03
20518		Coulter LH750	0.704	0.678	0.00	0.00
20648	Manual	Coulter LH780	0.704	0.671	0.00	-0.01
20648A	Automatic	Coulter LH780	0.698	0.669	-0.01	-0.01
20685	Automatic	Coulter LH750	0.706	0.672	0.00	-0.01
20687		Cell-Dyn Sapphire	0.774	0.733	0.07	0.05
20687A		Cell-Dyn Sapphire	0.775	0.730	0.07	0.05
20694		Siemens ADVIA 2120	0.770	0.738	0.06	0.06
20708		Sysmex XT4000i	0.707	0.684	0.00	0.01
20906B		Sysmex XP-300	0.708	0.674	0.00	0.00
21524		Coulter LH500	0.694	0.646	-0.01	-0.03
21871		Sysmex XT2000i	0.729	0.703	0.02	0.02
21871A		Sysmex XE2100	0.733	0.683	0.03	0.01
21872	Automatic	Sysmex XT2000i	0.722	0.683	0.01	0.01
21872A	Automatic	Sysmex XT1800i	0.734	0.704	0.03	0.03
21872B	Automatic	Siemens ADVIA 2120	0.755	0.731	0.05	0.05
21873		Pentra XL80	0.684	0.650	-0.02	-0.03
25545		ABX Pentra 80	0.714	0.668	0.01	-0.01
29120B		Cell-Dyn Ruby	0.734	0.679	0.03	0.00
42370		Siemens ADVIA 2120		0.787	-0.71	0.11

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Appendix 3: All Platelet Results Returned

PRN	Mnemonic	Instrument	1403CM3	1403CM4	1403CM3- median	1403CM4- median
02185		Sysmex XS1000i	2852	2361	113	131
20028		Sysmex XE2100	2306	2064	-433	-166
20083	Automatic	Coulter LH780	2708	2183	-31	-47
20235	Manual	Coulter LH780	2748	2230	9	0
20235A	Automatic	Coulter LH780	2790	2226	51	-4
20235B	Manual	Coulter LH780	2748	2230	9	0
20235C	Automatic	Coulter LH780	2739	2280	0	50
20261		Sysmex XT2000i	2686	2143	-53	-87
20261A		Sysmex XT1800i	2658	2126	-81	-104
20483		ABX Pentra XL80	2616	2240	-123	10
20518		Coulter LH750	2804	2294	65	64
20648	Manual	Coulter LH780	2759	2261	20	31
20648A	Automatic	Coulter LH780	2747	2275	8	45
20685	Automatic	Coulter LH750	2821	2309	82	79
20687		Cell-Dyn Sapphire	3282	2676	543	446
20687A		Cell-Dyn Sapphire	3172	2593	433	363
20694		Siemens ADVIA 2120	2529	2023	-210	-207
20708		Sysmex XT4000i	2675	2262	-64	32
20906B		Sysmex XP-300	3236	2136	497	-94
21524		Coulter LH500	2718	2218	-21	-12
21871		Sysmex XT2000i	2707	2230	-32	0
21871A		Sysmex XE2100	2350	2074	-389	-156
21872	Automatic	Sysmex XT2000i	2829	2111	90	-119
21872A	Automatic	Sysmex XT1800i	2762	2173	23	-57
21872B	Automatic	Siemens ADVIA 2120	2437	1963	-302	-267
21873		Pentra XL80	2605	2258	-134	28
25545		ABX Pentra 80	2475	2113	-264	-117
29120A		Cell-Dyn Ruby	2302	1943	-437	-287
29120B		Cell-Dyn Ruby	2250	1823	-489	-407
42370		Siemens ADVIA 2120	2528	2110	-211	-120

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Appendix 4: Statistics

HB ANALYSIS	1403CM1	1403CM2
Min	214	209
Q1	219	211
Median	224	216
Q3	228	220
Max	274	243
Est SD	6.7	6.5
2 SD	13.3	13.0
CV	3.0	3.0
Median +2SD	237	229
Median - 2SD	211	203
Allowable %	2	2
Median - 2%	220	212
Median + 2%	228	220
CCV	4.48	4.32
No.OUTLIERS	1403CM1	1403CM2
Below allowable %	8	8
Above allowable %	6	2
Outside +/- 2 est SD	1	1

Hct ANALYSIS	1403CM1	1403CM2
Min	0.684	0.646
Q1	0.704	0.671
Median	0.711	0.678
Q3	0.734	0.697
Max	0.775	0.787
Est SD	0.022	0.019
2 SD	0.045	0.039
CV	3.2	2.8
Median +2SD	0.756	0.717
Median - 2SD	0.666	0.639
Allowable %	4.0	4.0
Median - 4%	0.683	0.651
Median + 4%	0.739	0.705
CCV	0.028	0.027

No.OUTLIERS	1403CM1	1403CM2
Below allowable %	0	2
Above allowable %	4	5
Outside +/- 2 est SD	4	5

Plts ANALYSIS	1403CM3	1403CM4
Min	2250	1823
Q1	2548	2112
Median	2713	2222
Q3	2801	2262
Max	3282	2676
Est SD	187	111
2 SD	374	223
CV	6.9	5.0
Median +2SD	3087	2445
Median - 2SD	2339	1999
Allowable %	10.0	10.0
Median - 10%	2442	2000
Median + 10%	2984	2444
CCV	271.3	222.2
No. OUTLIERS	1403CM3	1403CM4
Below allowable %	3	3
Above allowable %	3	2
Outside +/- 2 est SD	6	5

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