Blood Film Morphology & Performance Assessment

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Morphology Performance Assessment

Proposal: **To introduce Performance Assessment for the Morphology survey (BF)**

The model being tested uses two indicators:

1) **Consensus score** - statistical analysis of comments returned

2) **Expert flags** - essential comments selected by expert panel

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Morphology Performance Assessment

Drivers for change:

- Long history of discussion of benefit of performance monitoring for morphology. A non-participation score is reported but otherwise essentially an educational scheme
- Recent UKAS visit to UK NEQAS Haematology Watford under **ISO 17043** prompted review of the Morphology schemes
- Brings the Morphology schemes in line with other UK NEQAS Haematology EQA schemes
- Requirements of **ISO 15189**

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ISO 15189

5.6.3 Interlaboratory comparisons

5.6.3.1 Participation

- The laboratory shall participate in an interlaboratory comparison programme(s) (such as an external quality assessment programme or proficiency testing programme) appropriate to the examination and interpretations of examination results

- Interlaboratory comparison programme(s) chosen by the laboratory shall, as far as possible, provide clinically relevant challenges that mimic patient samples and have the effect of checking the entire examination process, including pre-examination procedures, and post-examination procedures, where possible

UK NEQAS Haematology – Blood Films for Morphology Scheme

Current Scheme:

Eight blood film distributions annually of two slides, including four manual differential surveys – to approx. 530 participant laboratories in the UK and abroad. Reports include an educational summary and information on the numbers of morphology comment codes returned by participating laboratories, ranked by frequency

Performance assessment comprises:

- Non-participation score

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Consensus score / Comment code score:

- For any survey a consensus score can be derived from the number of participants returning a particular comment
- The more returns for a particular comment, the higher the score

Morphology Performance Assessment

Consensus score / Comment code score:

- For the purpose of performance scoring, <u>the determination of a diagnosis will not be required</u>
- Comments and suggestions of a diagnosis/differential diagnosis will continue to be encouraged as part of the educational element of the scheme

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Comment Code Score

1) Collect numbers of comment codes for a case

Comment	Code	Number of comments
Nucleated RBCs	022	621
Thrombocytopenia	302	543
Lymphocytosis	227	445
Monocytosis	203	309
Smear/smudge cells	218	264
Blast cells	212	171
Myelocytes	215	75
Cleft nuclei	221	68
	Totals:	2496

Comment Code Score

2) Derive % points

Comment	Code	Number of comments	%
Nucleated RBCs	022	621	25
Thrombocytopenia	302	543	22
Lymphocytosis	227	445	18
Monocytosis	203	309	12
Smear/smudge cells	218	264	11
Blast cells	212	171	7
Myelocytes	215	75	3
Cleft nuclei	221	68	2
	Totals:	2496	100

Comment Code Score

3) Assign a score from % points

Example for a single participant return:

Comment	Code	Score
Nucleated RBCs	022	25
Monocytosis	203	12
Smear/smudge cells	218	11
Blast cells	212	7
Macrocytic platelets	303	0
	***Total score:**	**55**

*Out of maximum possible 84 points for this case

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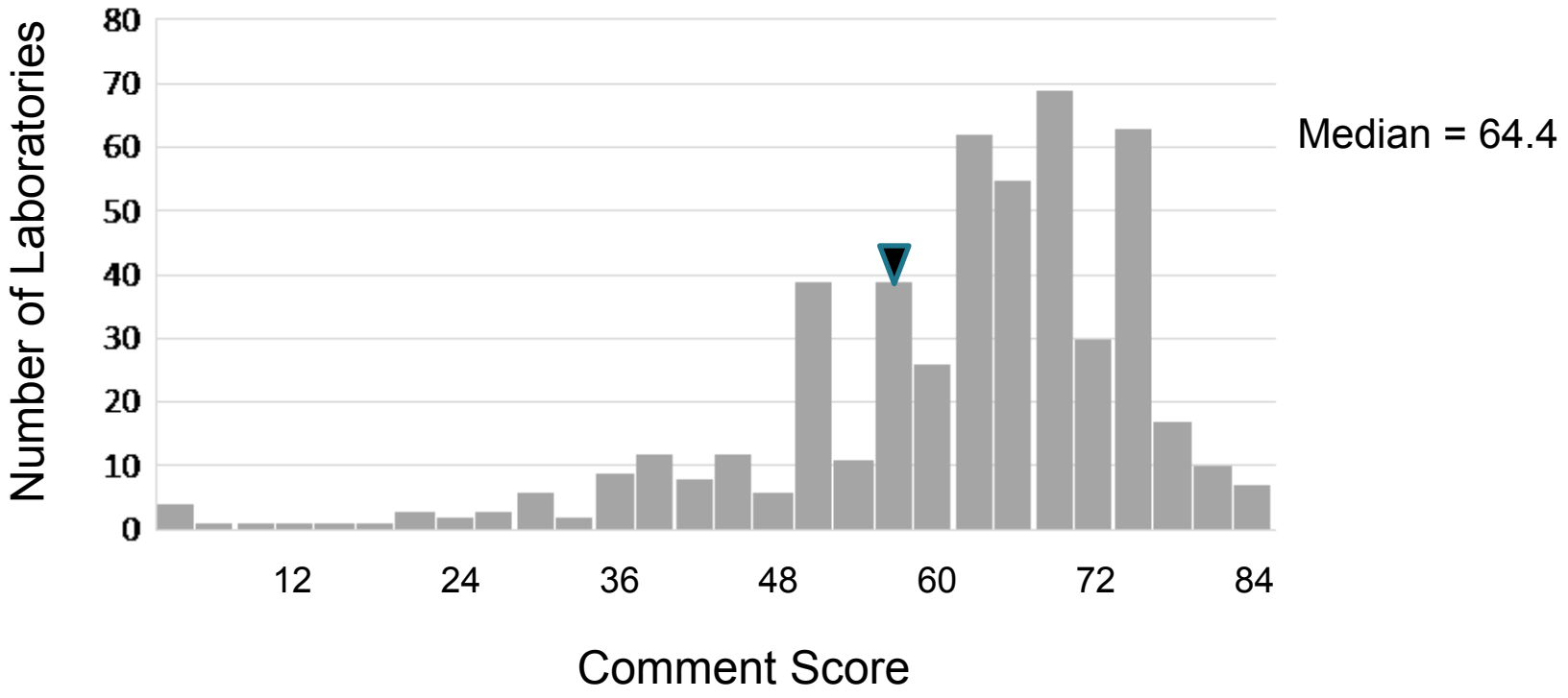
Comment Code Score

Example: Comment Scores vs. Number of Laboratories



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Deviation Index

The Deviation Index (DI) for a participant's score can be derived using the same formulae* as for existing schemes:

$$Deviation\ Index = \frac{Laboratory\ Score - Consensus\ Target\ (Median\ Score)}{Estimated\ Standard\ Deviation}$$

Where:

$$Estimated\ Standard\ Deviation = \frac{Interquartile\ Range}{1.349}$$

- The DI is recorded as a positive value
- For scores higher than the median, the DI is set to zero

*Participants manual 2016

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Deviation Index

From the earlier example for a score of 55 and median of 64.4

Deviation Index = 0.84

DI	Interpretation
0 – 0.5	Excellent
0.5 – 1.0	Good
1.0 – 2.0	Satisfactory – borderline
2.0 – 3.0	Unsatisfactory
>3.0	Serious problem requiring investigation

Performance Score

Performance monitoring can be achieved using the same procedure as other Haematology EQA schemes; the current DIs and the DIs from two previous surveys are summed and multiplied by a factor to give a running total for each participant

Example: DIs were obtained in three consecutive morphology (BF) surveys as below

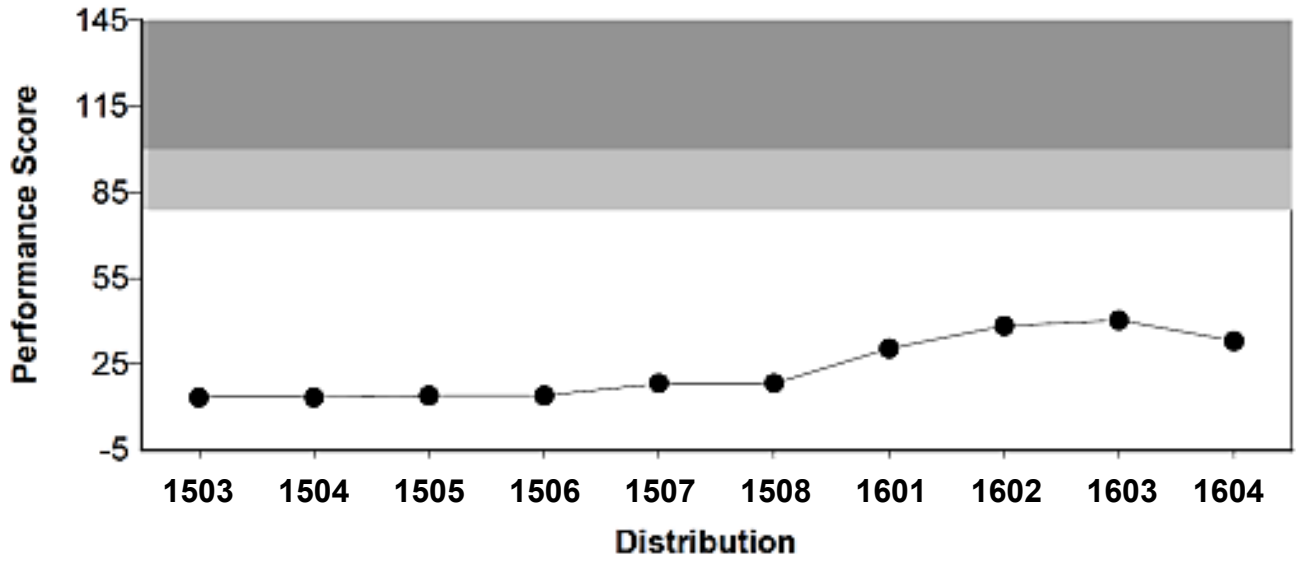
Survey	Specimen BF1	Specimen BF2
1	0.64	1.85
2	0	1.13
3	1.89	0.64

DI values >3.5 rounded down to 3.5, values totalled and multiplied by 6

Performance Score

Example:
Performance score = (0.64+1.85+0+1.13+1.89+0.64) x 6 = **37**

ie Satisfactory Performance



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Expert Flags

As a safety net against the possibility of an important comment not being selected by the majority in the consensus score, for easier interpretation of the scores and in order to add further value to the educational component, an expert flag is to be assigned

1) Determine comments for flags

- The expert reviewer will select up to two comments or flags for each survey, which are considered either clinically ‘vital’ (the highest priority) or ‘important’ (slightly lower priority)

- The expert flags will be matched to the laboratory’s comments and reported with the score and DI

Expert Flags

2) Assign comment flags

'A' - 'vital' comment
'a' - 'important' comment
'X' - expert comment not noted

Example: Expert reviewer assigns:
Blast Cells - **A** (vital)
Nucleated Red Cells - **a** (important)

Laboratory (i) identifies Blast Cells and Nucleated Red Cells **= 'A/a'**

Laboratory (ii) identifies Nucleated Red Cells only **= 'X/a'**

Performance Assessment

Example (i)

Comment score = 55
DI = 0.84
Performance score = 37
Expert flag = A/a

Comment	Code	Score
Nucleated RBCs	022	25
Monocytosis	203	12
Smear/smudge cells	218	11
Blast cells	212	7
Macrocytic platelets	303	0

Example (ii)

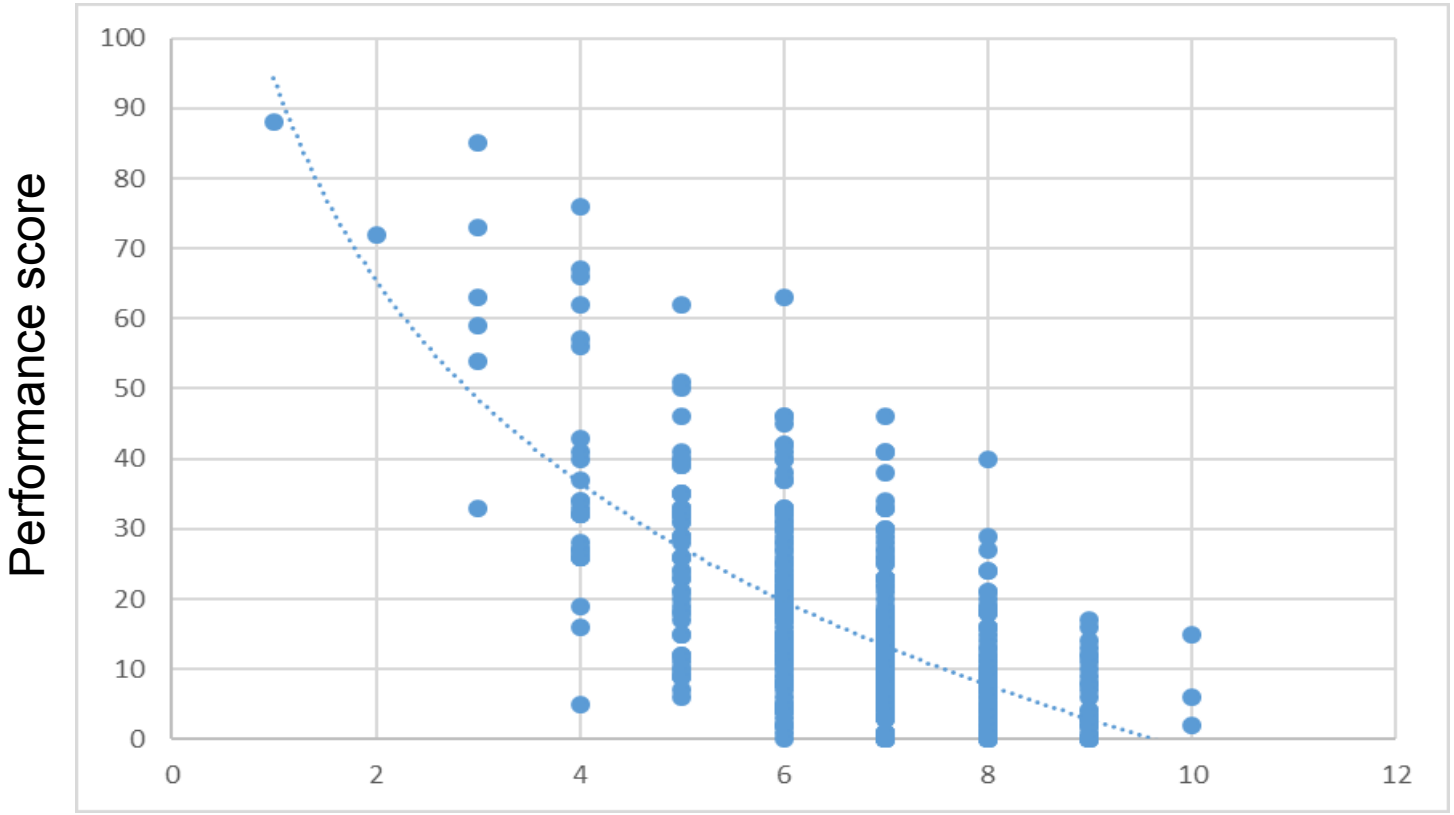
Comment score = 62
DI = 0.17
Performance score = 37
Expert flag = X/a

Comment	Code	Score
Nucleated RBCs	022	25
Thrombocytopenia	302	22
Monocytosis	203	12
Myelocytes	215	3
Rouleaux	017	0

Expert assessment:
A - Blast cells
a - Nucleated red cells

Performance Assessment Model

Expert Flags vs. Performance Score (from 1601BF)



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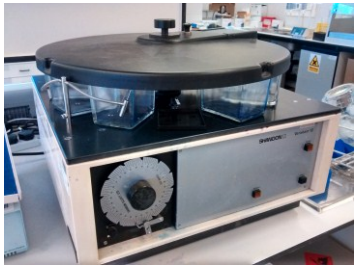
Performance Monitoring and Persistent Unsatisfactory Performance

- Feedback will be given on each case in terms of performance against consensus and expert opinion, for internal review by the laboratory
- Performance monitoring by UK NEQAS will be difficult, for example consideration for the complexity and clinical significance of the cases will be required. An annual review is proposed, highlighting areas for improvement as appropriate
- The focus will continue to be on improvement through support, training and education rather than reliance on a system of penalties

Morphology Performance Assessment

What next?

- The blood film morphology surveys are being shadow scored at present - continue shadow scoring
- Presentation to Morphology Special Advisory Group Meeting Jan 2017
- Volunteers for next stage of shadow scoring



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Possible future developments

- Morphology surveys and allowance for different participant skill levels?
- Film comment priority - more clinical information required?
- Option for ‘opt-out’ for certain participant groups?
- WBC manual differential for performance scoring
- Cytochemistry (Haemosiderin & Sudan Black) scoring
- Digital images and EQA

Coming soon

- Manual differential reports on-line and updated results interface

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