Blood Gas and Co-oximetry Scheme Guide
Contents

1 Scheme Details and repertoire ……………………3
   1.1 Blood Gas ………………………………...3
   1.2 Co-oximetry ……………………………..3

2 Statistical analysis ………………………………4
   2.1 Reference Values ………………………….4
   2.2 Performance Criteria ……………………...4
   2.3 Data analysis and interpretation………………6

3 Instructions for Use……………………………6

4 Method evaluation ………………………………6
   4.1 Matrix effects……………………………..7
   4.2 Instructions for use- Tonometrol……………7

5 References ………………………………………7
1. Scheme details and repertoire

1.1 Blood Gas

Details:
For Blood Gases, the material is supplied in 2.5 ml sealed glass ampoules. Tonometered protein based aqueous material is used. A batch lasts approximately 12 months and consists of six levels covering the pathological range. Three of the six samples are randomly distributed each month.

Number of samples sent with each distribution: 3
Frequency of distributions: every month
Material: protein based aqueous

<table>
<thead>
<tr>
<th>Analytes</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.0 - 7.8</td>
</tr>
<tr>
<td>H⁺</td>
<td>20 - 100 nmol/L</td>
</tr>
<tr>
<td>pCO₂</td>
<td>2-12 kPa</td>
</tr>
<tr>
<td>pO₂</td>
<td>4 - 40 kPa</td>
</tr>
<tr>
<td>Na⁺</td>
<td>112 - 164 mmol/L</td>
</tr>
<tr>
<td>K⁺</td>
<td>1.7 - 7.9 mmol/L</td>
</tr>
<tr>
<td>Ca²⁺</td>
<td>0.5 - 1.9 mmol/L</td>
</tr>
<tr>
<td>Cl⁻</td>
<td>72 - 121 mmol/L</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.4 – 1.8 mmol/L</td>
</tr>
<tr>
<td>Glucose</td>
<td>2.6 - 19.2 mmol/L</td>
</tr>
<tr>
<td>Lactate</td>
<td>0.4 – 6.0 mmol/L</td>
</tr>
<tr>
<td>Urea</td>
<td>1.0 – 35 mmol/L</td>
</tr>
<tr>
<td>Creatinine</td>
<td>5.0 – 700 µmol/L</td>
</tr>
<tr>
<td>Haematocrit</td>
<td>0 – 70 %PCV</td>
</tr>
</tbody>
</table>

1.2 Co-oximetry

Details:
For Co-oximetry, the material is supplied as 1 ml lyophilised vials with an integrated 1ml water reservoir. The material is prepared from lyophilised stroma-free bovine haemoglobin solutions with no dyes or additives. A batch lasts approximately 12 months and consists of 6 levels covering the pathological range. Three of the six samples are randomly distributed each month.

Number of samples sent with each distribution: 3
Frequency of distributions: every month
Material: Bovine haemolysate

<table>
<thead>
<tr>
<th>Analytes</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Haemoglobin</td>
<td>80 - 200 g/L</td>
</tr>
<tr>
<td>Carboxyhaemoglobin</td>
<td>1.7 - 17 %</td>
</tr>
<tr>
<td>Methaemoglobin</td>
<td>4 - 37 %</td>
</tr>
<tr>
<td>Oxyhaemoglobin</td>
<td>40 - 90 %</td>
</tr>
</tbody>
</table>
2. Statistical analysis

2.1 Reference values
For Blood gases the trimmed method mean (instrument) is used as the target value. Participant’s results are compared with their instrument mean. For co-oximetry the Total Hb is measured with the CNMetHb reference method. The instrument mean is used as the target value for the derivatives. Data using continuous spectra absorbance is also available for these analytes.

2.2 Performance Criteria
Standard deviation limits used in the report are based on precision profiles calculated over several batches and are fixed for a given level of analyte. They are reviewed yearly and reflect the state of the art of the methods used.

Filename: SP-QL1-GASGUIDE1014  Approved by: M.A.Thomas  Version 2.2  Revision Date: 03/11/14  Page 4 of 7
2.3 Data analysis and interpretation

Please refer to the accompanying Participants Manual for full details on statistical analysis and interpretation of results.

**pH assessment.**

As pH is a logarithmic function of H⁺ ion concentration, WEQAS assess pH performance by converting results to H⁺ ion concentration. SDI scores and linear regression analysis are therefore calculated from the H⁺ ion concentration. The table of results for pH is for information only.

3. Instructions for use

Please refer to the accompanying documents for full Instructions for Use for both Blood Gas and Co-oximetry vials.


In addition to the monthly aqueous Scheme, WEQAS undertakes an additional annual assessment of instrument accuracy using freshly tonometered bovine blood. WEQAS has identified a range of analysers with improved analytical performance (bias) when using freshly tonometered bovine blood (Tonometrol) compared with aqueous material.

Results of the last Study undertaken is available on: http://www.weqas.com/resources

Please type ‘Tonometrol’ into the keywords field (no area or category needs to be entered), and click ‘search’.

The matrix effects of aqueous samples were clearly identified in these studies. There are therefore obvious advantages in using the freshly tonometered material:

It exhibits similar properties to fresh patient samples in that it contains protein and haemoglobin, giving identical Hb saturation curve for O₂ and Total O₂ content. The material is very easy to use with no reconstitution requirements.
4.1 Matrix effect of aqueous material

Where a potential matrix effect has been identified with the aqueous material, participants should compare their results with the instrument group. Each type of instrument is now uniquely identified in the WEQAS database. Instrument performance data is available for all instruments as part of the monthly report. However the calculation of the SDI score will require a minimum number of 8 participants. The overall mean will be used for scoring if the number is less than 8.

WEQAS will continue to distribute the freshly tonometered haemolysate material on a yearly basis to monitor overall performance and bias.

4.2 Instructions for use - Tonometrol

Due to the limited stability of the fresh haemolysate, participants should analyse the sample within 48 hours of dispatch (preferably the same day as they received it). If immediate analysis is not possible please refrigerate the sample on arrival, bringing the sample to room temperature immediately prior to analysis (i.e. treat in a similar way to fresh whole blood samples transported on ice to the laboratory). The sample should then be mixed gently before analysis.

5. References

1. Thomas MA, Davies KW. The Wales External Quality Assessment Scheme: blood gas trials Proc ACB National meeting, 1995