BACKGROUND
The World Federation of Hemophilia (WFH) improves and sustains care for people with inherited bleeding disorders around the world. The WFH has been supporting people with inherited bleeding disorders and treatment for over 50 years.

The WFH International External Quality Assessment Scheme (IEQAS) was launched in 2004 to monitor and improve laboratory performance in hemophilia treatment centres (HTCs) worldwide. Laboratories can participate in this scheme to assess their quality assurance systems and the reliability of their test results.

IEQAS improves and standardizes laboratory diagnosis by auditing the effectiveness of the internal quality assurance systems in place and giving a measure of the laboratory’s competence.

The scheme is operated by the United Kingdom’s National External Quality Assessment Scheme (UK NEQAS) for Blood Coagulation, based in Sheffield, and has been inspected by the United Kingdom Accreditation Service Ltd (UKAS) and has been granted full accreditation to ISO 17043 for all listed tests.

The mandate of the WFH IEQAS is to provide an external quality assessment (EQA) for tests of blood coagulation and also to promote high standards of performance and practice. EQA, together with internal quality control (IQC) procedures, are vital components of overall laboratory quality assurance. In addition, the WFH IEQAS provides repeat testing and advisory services to sponsored participants, as well as the organization of educational activities, including a participants meeting during the biennial WFH World Congress.

The WFH receives advice from a Steering Committee, which is comprised of an independent chair appointed by the WFH, at present Dr. Sukesh Nair, the Scheme program director, senior IEQAS program staff in the Sheffield Teaching Hospitals (host institution), and several WFH staff and volunteers. The IEQAS Committee is responsible for overseeing the International External Quality Assessment Scheme (IEQAS) program and reports to the WFH Programs Committee. The IEQAS Committee oversees all operational aspects of the program, reviews participation in the scheme, analyses results and monitors global laboratory performance and steers advisory and educational support for centres registered on the scheme.

REGISTRATION
A review process ensures that WFH evaluates IEQAS applications. Laboratories are chosen based on their involvement in the diagnosis of hemophilia and other bleeding disorders. There is usually one main reference laboratory that is enrolled in IEQAS from each country. In larger countries, several laboratories may enrol in the scheme. The WFH offers sponsorship to a selection of laboratories in the developing world and information on this can be obtained from the WFH (ieqas@wfh.org). The WFH is prepared to sponsor the enrolment fee of certain centres in emerging countries which are involved in key WFH programs; thus, Centre twins, IHTCs, GAP, Cornerstone, and country program centres are eligible for a subsidy if requested.

Enrolment runs from February to the following February, and centres cannot join mid-year. IEQAS confirmation forms must be received at the WFH Headquarters by January in order to be reviewed and included in the scheme for a year. Centres new to the scheme must submit a completed laboratory questionnaire and participation form.
PARTICIPATION

Samples for blood coagulation tests are distributed to more than 100 participating laboratories around the world. The WFH IEQAS ensures the protection of participants’ confidential information but does share information with the WFH for laboratories that are sponsored.

The nominated participant, which is typically the person with overall responsibility for the laboratory, is requested to register for all tests included in the WFH IEQAS, which their laboratory offers as a service. The www.ukneqasbc.org website can be used for online result submission and to view survey reports. Participants are provided with a password in order to access the result entry pages of the website.

As of 2017, there are 129 centres from 79 countries registered with the program, though not all centres are registered for all tests.

PERSONNEL

Members of the IEQAS team include:

Dr. S Kitchen         Program Director (steve.kitchen@sth.nhs.uk)
Mr. T.A.L Woods       Program Manager
Dr. I Jennings        Scientific Program Manager
Mrs. D P Kitchen      Biomedical Scientist
Mrs. S L Lamb         PA to Scheme Director
Ms. T De Anda         WFH IEQAS Program Officer

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TESTS COVERED BY THE WFH IEQAS PROGRAM:

The WFH IEQAS surveys are distributed three times per year, typically in March, July, and November.

All surveys usually include:
  Prothrombin Time (PT)
  Activated Partial Thromboplastin Time (APTT)
  FVIII assay
  FIX assay

Two of the three surveys include:
  von Willebrand factor antigen assay
  VWF:Ristocetin cofactor/VWF activity assays

The remaining survey will include
  Two other factor assays as appropriate, along with fibrinogen.
EQA for genetic testing, in relation to inheritable bleeding disorders, is available through an international EQA program. For details, contact neqas@coageqa.org.uk.

SUPPLEMENTARY EXERCISES
Supplementary exercises are carried out to address topical issues in hemostasis testing. Recent exercises have included a diagnostic challenge to investigate prolonged APTTs and a FXIII exercise. Reports are circulated to participating centres and data are presented back to participants at the biennial participants meeting.

REPORTS
Individual reports for each survey are sent approximately two weeks after the closing date for the respective survey. Reports are made available as online PDF documents.

PERFORMANCE ANALYSIS
Performance is determined by the comparison of individual laboratory results with the target value for each test. Target values and median used for this test are typically determined prior to the survey when the same samples were tested by participants in the UK NEQAS Blood Coagulation Programme. The UK NEQAS BC Programme has over 1000 participants, which means that the peer groups are large and the data are therefore robust enough for assessment of individual centre results. In general, the median results obtained by the WFH IEQAS participants are very similar to the median determined from the UK NEQAS BC group. As the number of participants in the WFH IEQAS program is relatively small, analysis of the minor reagent groups is only made meaningful by the use of the UK NEQAS BC values to define the target ranges. Use of the median avoids the effect of outlying results which can significantly impact on mean values in some cases. Where consistent reagent or method-related differences have been identified, participants’ results are assessed against their ‘peer-groups’ within UK NEQAS BC Programme. However, this only occurs if the number in that group is sufficient to be statistically valid.

For PT and APTT
For PT and APTT the percentage deviation of each individual laboratory’s results from the reagent and overall medians are calculated, with the following criteria for performance applied:

Performance is considered “within consensus” if the deviation is <15% from:
- the reagent median if the number of users of that reagent is equal to or greater than 10 or
- the overall median if the number of users of the reagent is less than 10.

Results >15% deviation from the median are considered “outwith consensus.”

Factor Assays
For Fibrinogen assay, Clauss method results are assessed against the overall Clauss method median, with results >15% from this median considered outwith consensus. Multifibrin U users are assessed separately.
For other factor assays, WFH IEQAS distributes samples with factor concentrations covering the wide range encountered in clinical practice. A ranked grading analysis to evaluate performance was devised by Professor S. Thomson, Department of Public Health and Primary Care, University of Cambridge and is used in the UK NEQAS BC Programme as well as WFH IEQAS.

The overall consensus median is taken as the central reference point or “target value”. Individual results are ranked into five unequal quantiles above and below the median, each quantile being designated by a letter depending on ranked distance from the median:

**Group A:** The nearest 25% of results above (A) and below (a) the median (i.e. 50% of results);  
**Group B:** The next 10% of results above (B) and below (b) the median (i.e. 20% of results);  
**Group C:** The next 5% of results above (C) and below (c) the median (i.e. 10% of results);  
**Group D:** The next 5% of results above (D) and below (d) the median (i.e. 10% of results);  
**Group E:** The 5% of results furthest from the median, above (E) and below (e) (i.e. 10% of results).

Grades below the median are shown in lower case, and above the median in upper case, to aid in assessment of bias.

Performance is based on grades obtained in two consecutive exercises for any particular test. *Performance "outwith consensus"* is defined as a combination of a C (or ‘c’) grade together with an E (or ‘e’) grade, or any combination of D (or ‘d’) and E (or ‘e’) grades (e.g. cE, ec, Dd, de, ED and EE in consecutive distributions of that particular assay).

**Persistent "outwith consensus" performance** is defined as two consecutive "outwith consensus" performances. This will arise from three consecutive performances with the following combinations of grades (upper case only shown):

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DDD, DED, ECE, EEC, DDE, DEE, EDD, EED, CEE, EDE, EEE
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A *non-return* for a registered test will be graded as ‘F’ and taken as equivalent to an E grading. Thus, designations which include ‘F’ grades are based on performance over two or three exercises, respectively.

In some cases, significant differences have been noted between different methodologies. Where this occurs on a consistent basis, separate analysis of the groups is carried out, using
medians specific to each method group. However, the system is only effective if the number of participants is greater than 20; consequently, grading analysis is not applied to groups of results from fewer than 20 centres.

At present, the following groups are analysed separately (groupings are regularly reviewed):

- Factor VIII:C
- One stage and chromogenic
- VWF Ristocetin Cofactor/VWF activity assay
- ELISA, Aggregometry, individual Latex assays

If results of screening tests are outwith consensus on three consecutive occasions (including failure to return results), or results from factor assays are persistently outwith consensus, a letter of concern with an offer of assistance is sent by the Scheme Director to the head of the sponsored laboratory. For WFH sponsored centres, these concerns can also be communicated with the chairs of the WFH Laboratory Sciences and IEQAS committees.

**NON-RETURN OF RESULTS**

The aim of the program is to help centres which need support and guidance; therefore, there should be a sense of responsibility for sponsored laboratories to maintain good communication with the WFH. A follow-up letter is sent after 2 consecutive samples that have no results returned. After a third non-returned set of results, the sponsored centre maybe suspended from the IEQAS program unless they provide valid explanations for their non-response.

**COMPLAINTS**

Any complaint about the WFH IEQAS program will be treated as serious, and will be dealt with as soon as possible by the director or manager.

Address for complaints:

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WFH IEQAS Program Director  
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Tel: +44 (0)114 267 3300  Fax: +44 (0)114 267 3309  E-mail: neqas@coageqa.org.uk

Or to  
WFH IEQAS Program officer  
1425 René- Lévesque Blvd. West, Suite 1010, Montréal, Québec, Canada H3G 1T7  
Tel: +1(514) 875-7944  Email: ieqas@wfh.org

**EDUCATIONAL ACTIVITIES**

In addition to an advisory role for individual laboratories WFH IEQAS/ UK NEQAS BC also publishes and presents data through a variety of leading journals and meetings.

An IEQAS participants meeting is held biennially as part of the WFH World Congress.
The WFH Laboratory Manual (2nd ed) is free to download online, and is available in English, French, Spanish, Arabic, Russian, and Chinese: http://elearning.wfh.org/resource/diagnosis-of-hemophilia-and-other-bleeding-disorders-a-laboratory-manual/

**PUBLICATIONS**

DJ Perry, T Cummings, A Goodeve, M Hill, I Jennings, S Kitchen, I Walker
The UK National External Quality Assessment Scheme for Heritable Bleeding Disorders. Seminars in Thrombosis and Hemostasis. 2014;40:261-8

Jennings I, Kitchen DP, Kitchen S., Woods TA, Walker ID

Bolton-Maggs PH, Favoloro EJ, Hillarp A, Jennings I, Kohler HP
Difficulties and Pitfalls in the Laboratory Diagnosis of Bleeding Disorders. Haemophilia 2012 Jul; 18 Suppl 4:66 – 72


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