Brief Report

External quality assurance in thrombosis and hemostasis: an update

John D. Olson[1], Richard A. Marlar[2], Ian Jennings[3], William L. Nichols[4]

[1]Department of Pathology and Laboratory Medicine, University of Texas Health Science Center at San Antonio, San Antonio, TX, USA; [2]Department of Pathology, University of New Mexico, Albuquerque, New Mexico, USA; [3]United Kingdom National External Quality Assurance - Blood Coagulation (UK NEQAS-BC), Sheffield, UK; [4]Special Coagulation Laboratory (Hematopathology), Mayo Clinic, Rochester, MN, USA

Correspondence to: John D. Olson, MD, PhD. Professor Emeritus, Department of Pathology and Laboratory Medicine, UT Health San Antonio, 7703 Floyd Curl Dr, San Antonio, TX 78229-3900, USA. Email: olsonj@uthscsa.edu.

Abstract: In 2005, several external quality assurance (EQA) providers met and formed the External Quality Assurance in Thrombosis and Hemostasis (EQATH) group, although a formal Charter was not enacted until 2016. The goals of EQATH are to: identify the organizations involved with EQA in thrombosis and hemostasis; determine the functions and scope of these EQA programs; share information with the goal of improving the quality of existing programs and to seek methods that may standardize some activities; develop EQA samples that can be shared among EQA programs to determine the variation that may exist is various regions of the world; inform laboratories participating in EQA programs of the identified problems in laboratory testing; work with existing ISTH Scientific Subcommittees and Working Groups, providing information regarding clinical laboratory needs for standards and to help with the validation and value setting of standards; work with other organizations in developing recommendations and guidelines for EQA program activities; collaborate with other organizations and societies with interests in the quality of diagnostic coagulation testing. Since its beginning, the EQATH group has met regularly, completed two international projects, collaborated in the completion of four others and developed a guidance document for developing an EQA program in thrombosis and hemostasis. The group is now engaged in two additional projects that are underway.

Keywords: External quality assurance (EQA); proficiency testing (PT); External Quality Assurance in Thrombosis and Hemostasis (EQATH)

Received: 19 August 2019; Accepted: 12 September 2019; Published: 08 October 2019.
doi: 10.21037/aob.2019.09.01
View this article at: http://dx.doi.org/10.21037/aob.2019.09.01

Introduction

In the clinical laboratory, an effective quality program must encompass all aspects of laboratory operations. Of the many aspects of the quality program, internal quality control (IQC) and external quality assessment [EQA; also known as proficiency testing (PT)] are directed specifically at the management of test results. In general, IQC is designed to reduce the imprecision of the test results while EQA assures the accuracy. There are many EQA programs internationally that provide testing for the broad spectrum of testing in clinical laboratory. There is variability among the functions of EQA programs regarding the menu of analytes offered, the frequency of challenges for each analyte, the method of evaluation, satisfaction of government/accreditation requirements and other aspects. Collaboration among programs internationally remains limited at this time. Original efforts to this end began in the early 1990s with the founding of External Quality Assurance in Laboratory Medicine in Europe (EQALM) (1) providing a forum for cooperation and exchange of knowledge among EQA providers, primarily but not exclusively in Europe.

The External Quality Assurance in Thrombosis and Hemostasis group (EQATH) was formed in 2005, with the

goal of supporting collaboration among EQA programs in the field of thrombosis and hemostasis laboratory testing. In this manuscript, we update on the activities, development and progress of the EQATH group.

Organization history of EQATH

An initial organizational meeting was held at the International Society on Thrombosis and Haemostasis (ISTH) meeting, held in Sydney, Australia in July of 2005. A total of 17 individuals representing five EQA programs, the ISTH, and the Clinical Laboratory Standards Institute (CLSI) were present. Through word of mouth and internet search, 15 EQA programs were identified and invited to participate in this international EQA collaborative effort, of which 13 expressed interest. At the initial meeting, three officers were elected (John D. Olson, Chair; F. Eric Preston, Vice-Chair; William L Nichols, Secretary). They served continuously in their rolls until the development of the EQATH charter a decade later in 2016. The organization has gathered annually for a general meeting of the membership during meetings of the ISTH. Details regarding the formation of EQATH have been previously reported (2) and are also detailed on the organization's website (http://www.eqath.org).

Membership of EQATH

The member organizations of EQATH are shown in *Table 1*. Each of the member organizations of EQATH completed a detailed survey regarding their operations. The data reported was comprehensive, including items such as personnel, number of modules in hemostasis testing, test menus, sources of challenge samples, and number of participants, among many others. The statistical method (parametric or non-parametric) for data analysis was also provided. The variability of the scope and processes among the programs was remarkable and has also been reported in detail previously (2). At the time of this writing, EQATH has not required payment of any dues. Instead, support of the organization by the members has been in the form of each organization internal resources devoted to the gathering and analysis of data for projects of EQATH.

Charter, officers, and executive committee

In 2016, the EQATH group approved a charter for the organization defining its mission and objectives, reaffirmed establishing officers (Chair, Vice-Chair, Secretary-Treasurer) and forming an executive committee made up of the officers and two at-large, elected members [http://www.eqath.org]. Officers and at-large members serve two-year terms with elections staggered to provide for continuity in the leadership.

Meetings of EQATH

Since its inaugural meeting in 2005 during the ISTH Congress in Sydney, EQATH has held annual general meetings in concert with ISTH meetings. The ISTH has supported EQATH by providing a meeting venue via ISTH-SSC (Scientific Standardization Committee) funding. Attendance at EQATH general meetings has ranged (in representation) from 10 individuals representing 4 EQA organizations to 19 individuals representing 10 EQA organizations.

The newly formed EQATH executive committee held its first meeting in 2017 at the annual ISTH-SSC meeting held in Berlin, Germany, and has held face-to-face meetings each year since in conjunction with the general EQATH meeting. In addition, the executive committee has held quarterly meetings electronically using video conferencing.

Development of the EQATH website

In 2016, development of the EQATH website began and www.eqath.org was launched on 6th January 2017 [http://www.eqath.org]. The website provides information on history of the organization, links to the participating programs, information on the executive committee and its members, information on upcoming events, bibliography of completed projects and the minutes of the general as well as the executive committee meetings.

Projects of EQATH

Past projects

Program variability

Fifteen initial member organizations submitted the completed original membership survey. Since that time, one program has ceased functioning and one new program has joined, leaving the current membership at the same number. Current membership is summarized in *Table 1*. Survey information available (eleven at the time) was collated and the data regarding the variability of EQA practice

Table 1 Programs participating in EQATH

Program	Location	Clientele
RCPA-QAP	Australia	National, international
IQMH	Canada	Regional, national
ProBioQual	France	National, international
INSTAND e.V.	Germany	National, international
ISHTM-CMC	India	National, international
FSCA	Italy	National
CISMEL	Italy	National
ECAT	Netherlands	International
LEECH	Spain	Regional, national
NEQAS-BC	Thailand	Regional, national
NEQAS-BC	United Kingdom	National, international
CAP	United States	National, international
NASCOLA	United States	National, international
WHO	United Kingdom	International
WFH EQA	United Kingdom	International

RCPA-QAP, Royal College of Pathologists of Australasia-Quality Assurance Program; IQMH, Institute for Quality Management in Healthcare, Toronto, Ontario, Canada; ProBioQual, Association ProBioQual; INSTAND, Gesellschaft zur Fo¨rderung der Qualita¨tssicherung in medizinischen Laboratorien e.V.; ISHTM-CMC, Indian Society of Haematology and Transfusion Medicine-Christian Medical College External Quality Assurance Scheme; CISMEL, Italian Committee for the Standardization of Laboratory Tests–Committee on Hemostasis; FSCA, Italian Federation of Anticoagulation Clinics; ECAT, ECAT Foundation; LEECH, Laboratorio de Evaluacion Externa de la Calidad en Hematologia; NEQAS-BC, Thailand National External Quality Assurance Scheme (Blood Coagulation); NEQAS-BC, United Kingdom National External Quality Assurance Scheme for Blood Coagulation; CAP, College of American Pathologists; NASCOLA, North American Specialized Coagulation Laboratory Association; WHO, World Health Organization; WFH, World Federation of Haemophilia.

was then published (2). The programs ranged in size from 58 to 1,700 participating laboratories. The presentation of testing covered in the individual program (modules) also varied from a single module with many analytes to as many as 13 modules with few analytes in each. Five of the EQA programs reported the results to the laboratory for self-evaluation while participating laboratories were graded (pass/fail or out-with-consensus) by six of the EQA programs. Seven of the eleven programs had deemed status from an accrediting or licensing agency, requiring successful participation to satisfy accreditation requirements for the participating laboratory.

Dataset analysis

Eleven EQA organizations in EQATH using eight different statistical methods participated in a more recent study of a dataset evaluation in order to determine the variability in outcomes for a participating laboratory, by providing analysis using the same data set of laboratory results from a previously completed exercise (3). Data for a normal and reduced factor VIII (FVIII) and a normal and prolonged activated partial thromboplastin time (aPTT) from 218 laboratories were sent to the EQA providers. Each analyzed the data set using their specific method of evaluation for aPTT and FVIII, determining the performance for each laboratory record in the data-set. Providers also summarized their statistical approach to grading laboratory performance and assigning target values. The data from each laboratory record in the data set was evaluated (pass/fail) by all EQA providers for each of the four analytes. There was a lack of agreement of grading among EQA programs. Discordance in the grading was 20.2% and 17.4% of normal and reduced FVIII results, respectively; and 17.9% and 11% of normal and prolonged aPTT results, respectively. No

two methods of evaluation graded all participants the same for any analytic challenge. All EQA programs in the study employed statistical methods compliant with the International Standardization Organization (ISO), ISO 13528, yet the evaluation of laboratory results for all four analytes showed remarkable grading discordance.

Guidelines

In many countries, EQA programs are very limited or may not exist at all. Programs covering more than just the basic coagulation testing are few in number. In an effort to encourage and assist the development of programs at the local/national levels, the EQATH group has developed a set of guidelines directed toward the recommended structure and operation of an EQA program. Elements covered in the Guidance document include: (I) setting up the EQA program—this portion is for the initial establishment as well as the start of the cyclic (yearly) process; (II) preparation of samples—selection of plasma, testing, aliquoting and packaging; (III) specimen distribution—transport and laboratory preparation of specimens; (IV) data collection—data from each laboratory that must be collected; (V) initial analysis of data—evaluation of data to ensure that the sample integrity is of good quality; (VI) data analysis—the results are analyzed and decisions made as to acceptability or failure of results; (VII) final report—report is generated and provided to participants with any accompanying sanctions (as necessary); (VIII) follow up—support, education, sanctions if applicable. A summary of the Guidance Document is presented in this issue of AOB and the full text of the document can be viewed on the EQATH website [http://www.eqath.org].

Other projects

Although not projects directly initiated by the EQATH group, other publications/studies have been undertaken through collaboration of EQATH members. In three recent manuscripts, Favaloro *et al.* address harmonization of clinical laboratory testing in hemostasis as well as harmonization of testing among EQA programs (4-6). In addition, a detailed study involving several EQA programs, members of EQATH, and sharing specimens reported on variations among laboratory methods that assessed von Willebrand factor activity in detecting samples with reduced molecular weight von Willebrand factor multimers (7). This particular study represented an extended EQA collaborative endeavor that updated on a more limited study published in 2012 (8).

Current projects

EQA platelet function

The EQATH group has embarked on two new studies. The first will examine EQA of platelet function testing. There have been recent studies/guidelines published regarding best practice in platelet testing in the clinical laboratory (9,10) but the EQA of this particular laboratory activity has not been addressed. It is well recognized that there is great diversity in laboratory approaches to testing of platelet function for diagnosis/exclusion of primary hemostasis defects (10-17). The EQATH group plan to examine current member practices to determine the methods being performed and then to make recommendations regarding the platelet function EQA performance.

Esoteric analyte EQA

The second ongoing project plans to examine EQA performance for esoteric tests. All EQA programs have difficulty providing challenges for esoteric (or rarely performed) analytes. At times, it can be difficult to obtain specimens with varying levels of the analyte of interest and, perhaps a greater issue is that of too few laboratories performing assays for the analyte to make up peer groups that can be satisfactorily analyzed. Thus, the value of the EQA for the participant is limited. The new project proposes to share a set of specimens challenging an esoteric analyte among multiple EQA programs. Each program would use the challenges in its own program as usual, but then would share the data from their participants with all other EQA programs using the same set of specimens. The pooled data can then be more appropriately analyzed by each program using their own evaluation method but with increased numbers in the peer groups. The study will also provide the opportunity the reevaluate the variable approaches to EQA evaluation among the programs.

Summary and conclusions

In the 15 years since its inception, the EQATH group has met regularly, shared information among members and embarked on collaborative studies that have contributed to the improvement and understanding of EQA activities in the field of thrombosis and hemostasis. Plans for new studies are underway and efforts are ongoing to expand participation.

Acknowledgments

The authors acknowledge the support of the members of the EQATH group.
Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the editorial office, *Annals of Blood* for the series "External Quality Assurance". The article has undergone external peer review.

Conflicts of Interest: The authors have completed the ICMJE uniform disclosure form (available at: http://dx.doi.org/10.21037/aob.2019.09.01). The series "External Quality Assurance" was commissioned by the editorial office without any funding or sponsorship. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References

1. Stavelin A, Albe X, Meijer P, et al. An overview of the European Organization for External Quality Assurance Providers in Laboratory Medicine (EQALM). Biochem Med (Zagreb) 2017;27:30-6.
2. Olson JD, Preston EF. Nichols WL. External Quality Assurance in Thrombosis and Hemostasis: An International Perspective. Semin Thromb Hemost 2007;33:220-5.
3. Olson JD, Jennings I, Meijer P, et al. Lack of grading agreement among international hemostasis external quality assessment programs. Blood Coagul Fibrinolysis 2018;29:111-9.
4. Favaloro EJ, Lippi G. On the complexity of hemostasis and the need for harmonization of test practice. Clin Chem Lab Med 2018;56:1568-74
5. Favaloro EJ, Gosselin R, Olson J, et al. Recent initiatives in harmonization of hemostasis practice. Clin Chem Lab Med 2018;56:1608-19.
6. Favaloro EJ, Jennings I, Olson J, et al. Towards harmonization of the external quality assessment/proficiency testing in hemostasis. Clin Chem Lab Med 2018;57:115-26.
7. Favaloro EJ, Bonar R, Hollestelle MJ, et al. Differential sensitivity of von Willebrand factor activity assays to reduced VWF molecular weight forms: A large international cross-laboratory study. Thromb Res 2018;166:96-105.
8. Favaloro EJ, Bonar R, Chapman K, et al. Differential sensitivity of von Willebrand factor 'activity' assays to large and small VWF molecular weight forms: a cross-laboratory study comparing ristocetin cofactor, collagen binding and monoclonal antibody based assays. J Thromb Haemost 2012;10:1043-54
9. Hayward CP, Moffat KA, Raby A, et al. Development of North American consensus guidelines for medical laboratories that perform and interpret platelet function testing using light transmission aggregometry. Am J Clin Pathol 2010;134:955-63.
10. Cattaneo M, Hayward CP, Moffat KA, et al. Results of a worldwide survey on the assessment of platelet function by light transmission aggregometry: a report from the platelet physiology subcommittee of the SSC of the ISTH. J Thromb Haemost 2009;7:1029.
11. Moffat KA, Ledford-Kraemer MR, Nichols WL, et al. Variability in clinical laboratory practice in testing for disorders of platelet function. Thromb Haemost 2005:93:549-53.
12. Favaloro EJ, Bonar R, Duncan E, et al. The utility of the PFA-100® as a screening test of platelet function: An audit of haemostasis laboratories in Australia and New Zealand. Blood Coagulation Fibrinolysis 2007;18:441-8.
13. Jennings I, Woods TA, Kitchen S, et al. Platelet function testing: practice among UK National External Quality Assessment Scheme for Blood Coagulation participants, 2006. J Clin Pathol 2008;61:950-4.
14. Duncan EM, Bonar R, Rodgers SE, et al. Methodology and Outcomes of Platelet Aggregation Testing in Australia, New Zealand and the Asia-Pacific Region: Results of

a Survey from the Royal College of Pathologists of Australasia Haematology Quality Assurance Program. Int J Lab Hematol 2009;31:398-406.
15. Favaloro EJ, Mohammed S. Platelet function testing: auditing local practice and broader implications. Clin Lab Sci 2010;23:21-31.
16. Gresele P, Harrison P, Bury L, et al. Diagnosis of suspected inherited platelet function disorders: results of a worldwide survey. J Thromb Haemost 2014;12:1562-9.
17. Jennings I, Perry D, Watson H, et al. Haemostasis and Thrombosis Task Force of the British Society for Haematology & UK NEQAS for Blood Coagulation. Quality assurance and tests of platelet function. Br J Haematol 2018;181:560-1.

doi: 10.21037/aob.2019.09.01
Cite this article as: Olson JD, Marlar RA, Jennings I, Nichols WL. External quality assurance in thrombosis and hemostasis: an update. Ann Blood 2019;4:23.

