EXTERNAL QUALITY CONTROL PROGRAM: EXPERIENCE IN THE DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY, MUHIMBILI UNIVERSITY COLLEGE OF HEALTH SCIENCES, DAR ES SALAAM, TANZANIA

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Summary

Objective: To share experiences and lessons learned from 2002 National External Quality Assessment Schemes for Leukocyte Immunophenotyping (UK NEQAS) and College of American Pathologists (CAP) proficiency testing (PT) panels received and tested as part of External Quality Control Program

Setting: Department of Microbiology and Immunology, Muhimbili University College of Health Sciences, Dar es Salaam.

Methods: All PT panel records from January – December 2002 were reviewed and summarized to show the type of panel and date received, date results sent after analysis and our performances.

Results: Six and fourteen panels were received from UKNEQAS and CAP, respectively. The mean time interval between receipt of panels and reporting back of the results was 9.4 days (range 2-17). UKNEQAS performance was good in 5/6 panels (83.3%) analyzed. Among CAP panels, satisfactory (100%) performances included two viral markers, two *C. trachomatis* antigen detection and two comprehensive hematology with automated differentials whereas unsatisfactory (79%, 66%, 71%) performances were all 3 general chemistry with an overall score of (6/9) 66.7%.

Conclusion: To implement an effective and efficient quality assurance in an established laboratory requires committed long-term efforts that are potentially constrained with multiple obstacles. Continuing education and training of laboratory personnel is an integral part of quality control/quality assurance program.

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Introduction

Quality control (QC) is a set of laboratory procedures designed to ensure that test methods are working according to acceptable guidelines.[1] QC is an admirable activity for ideally it ensures the accuracy and reliability of test results. Quality assurance (QA) is a comprehensive set of policies, procedures, and practices implemented to ensure the reliability and accuracy of laboratory testing methods.[1] In recent years, a new term quality system (QS) is used and it refers to organizational structure, resources, processes and procedures needed to implement quality management in the laboratory.

QC in the microbiology laboratory includes internal and external quality control programs. External quality control program is also known as proficiency testing (PT). Internal QC includes measurement affecting the performance of the whole work of the laboratory at pre-analytical, analytical & post analytical stages and general QC measures related to lab and hospital personnel, to the place and lab instruments; their performance and maintenance. It also includes measures related to test request, sampling and sample transportation, relevance of samples, inoculation of the sample into the appropriate media, identification of growing pathogen by staining, biochemical, serological and antibiotic sensitivity tests.

In an external quality assessment program, a group of laboratories analyze the same specimens usually the same control materials, exact same lot numbers and submit their results to a central facility where the data are generated to compare the performance of an individual laboratory to the peer group and sometimes to target values established by reference methods or reference laboratories.[(2)]

The Department of Microbiology and Immunology, Muhimbili University College of Health Sciences is enrolled in a number of external quality control programmes in line with good laboratory practice to ensure reliable and accurate laboratory results. These include United Kingdom National External Quality Assessment Schemes for Leukocyte Immunophenotyping (UK NEQAS), College of American Pathologists (CAP), CDC HIV testing, Quality Assessment and Standardization for Immunological (QASI) Measures Relevant to HIV/AIDS, World Health Organization/National Institute for Communicable Diseases (WHO/NICD), UK NEQAS for AAFB microscopy and UK NEQAS for mycobacterium culture. These programmes are supported through various collaborative research projects - MUCHS/Harvard, CDC, WHO and MUCHS/Dartmouth.

This paper describes the experiences and lessons learned from 2002 UK NEQAS and CAP PT panels in the Department of Microbiology and Immunology, Muhimbili University College of Health Sciences, Dar es Salaam, Tanzania.

Materials and methods

All PT panel records from January – December 2002 were reviewed and summarized to show the type of panel and date received, date results sent after analysis and our performances.

Results

Six and fourteen PT panels were received from UKNEQAS and CAP, respectively, and all were analyzed. The mean time interval between receipt of panels and reporting back of the results was 9.4 days (range 2-17). UKNEQAS performance was good in 5 out of all 6 panels (83.3%) analyzed (Table 1). Among CAP panels, satisfactory (100%) performances included 2 viral markers, 2 *C. trachomatis* antigen detection and 2 comprehensive hematology with automated differentials whereas unsatisfactory (79%, 66%, 71%) performances were all 3 general chemistry panels (Table 2). Five were either hematology or chemistry/lipid/enzyme calibration verification/linearity panels and such panels are not usually scored. The overall CAP score was (6/9) 66.7%.

Table 1. 2002 UKNEQAS PT Panels Analyzed at the Department of Microbiology and Immunology, Muhimbili University College of Health Sciences

S/N	Panel	Date Received	Results Faxed	Performance
1.	Samples no. 122, 123 and 124	31/01/02	05/02/02	No. 122 - Inadequate No. 123 – Adequate No. 124 – Adequate
2.	Samples no. 125, 126 and 127	28/03/02	08/04/02	Good
3.	Samples no. 128 and 129	29/05/02	10/06/02	Good
4.	Samples no. 130 and 131	24/07/02	01/08/02	Good
5.	Samples no. 132 and 133	04/09/02	10/09/02	Good
6.	Samples no. 134 and 135	08/11/02	12/11/02	Good

UKNEQAS, United Kingdom National External Quality Assessment Schemes for Leukocyte Immunophenotyping; PT, Proficiency Testing.

Table 2. 2002 CAP PT Panels Analyzed at the Department of Microbiology and Immunology, Muhimbili University College of Health Sciences

S/N	Panel	Date Received	Results Faxed	Report/Current Event Performance Interpretation	Cumulative Performance Interpretation
1.	General chemistry (C-A)	01/03/02	08/03/02	Received/Unsatisfactory (79%)	Successful
2.	Automated hematology calibration verification/ linearity (LN9-A)	23/04/02	30/04/02	Not received	-
3.	*C. trachomatis* antigen detection (HC3-B)	13/05/02	30/05/02	Received/Satisfactory	Successful
4.	Comprehensive hematology with automated differentials (FH2-B)	24/05/02	04/06/02	Received/Satisfactory	Successful
5.	Viral markers series 1 (VM-B)	29/05/02	13/06/02	Received/Satisfactory	Successful
6.	Chemistry/lipid/enzyme calibration verification/ linearity (LN2-A)	10/06/02	18/06/02	Received/NA	NA
7.	General chemistry (C-B)	13/06/02	26/06/02	Received/ Unsatisfactory (66%)	Unsuccessful
8.	Chemistry glucose replacement calibration verification/linearity (LNR-A)	23/08/02	04/09/02	Received/NA	NA
9.	*C. trachomatis* antigen detection (HC3-C)	12/09/02	20/09/02	Received/Satisfactory	Successful
10.	Viral markers series 1 (VM-C)	16/09/02	24/09/02	Received/Satisfactory	Successful
11.	Comprehensive hematology with automated differentials (FH2-C)	08/10/02	21/10/02	Received/Satisfactory	Successful
12.	General chemistry (C-C)	16/10/02	25/10/02	Received/Unsatisfactory (71%)	Unsuccessful
13.	Automated hematology calibration verification/ linearity (LN9-B)	23/10/02	25/10/02	Received/NA	NA
14.	Chemistry/lipid/enzyme calibration verification/ linearity (LN2-B)	10/12/02	23/12/02	Received/NA	NA

CAP, College of American Pathologists; PT, Proficiency Testing; Satisfactory=100%; NA, not applicable

Discussion

Many research scientists definitely want to do quality science, but are afraid or do not want to do QA because they are intimidated by the QA process or they do not appreciate the benefits of QA.[3] PT panels are an important part of the QA/QC documentation that must be performed regularly, since taken together such QA/QC systems are a key element for ensuring the integrity of laboratory results. An effective QA/QC program can identify problems, initiate course of action and monitor resolutions. QA/QC programs lead to efficiency by eliminating rework. It also leads to recognition and accreditation.

Time elapsed between receipts of panel and reporting back the results appears to be relatively short and is within the acceptable period. It is required that the result report should be returned to CAP and UKNEQAS within 10 and 18 working days, respectively.

Despite some technical faults of the machines at times, frequent power cuts, running short of reagents and difficulties in getting quick results from the one time analysis, all panels were analyzed.

The initial inadequate performance to UKNEQAS could be attributed to the technical faults of the machine after which the results improved dramatically. The satisfactory performances in viral markers, *C. trachomatis* antigen detection and comprehensive hematology with automated differentials panels could be explained by the fact that all these panels were analyzed in the Department of Microbiology and Immunology. The unsatisfactory and unsuccessful performances in general chemistry panels could be explained by the frequent breakdown of the analyzers, wear and tear of the machine and thus inaccurate results. The panels were analyzed in the chemistry analyzer (Cubas Mira plus) in Specialized Pediatric Laboratory as part of good interlaboratory relationship that exists between our two laboratories.

To implement an effective and efficient quality assurance program in an established laboratory requires committed long-term efforts that are potentially constrained with multiple obstacles. Continuing education and training of laboratory personnel is an integral part of QC/QA program in laboratories so as to be able to pursue accreditation with regional as well as international organizations.

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References

1. **O'Brien JA. Common problems in clinical laboratory management. New York. McGraw-Hill Companies, Inc., 2000; 191-208.**
2. **Westgard JO. Basic QC practices. 2nd ed. Gray Fox Trail, Madison. Wesrgard QC, Inc., 2002; 125.**
3. **Hughes TJ. Quality science and quality assurance: observations of an environmental scientist. Qual Assur 1999; 7(4): 225-235.**