WHO Manual
Organizing a National External Quality Assessment Programme for Health Laboratories and other Testing Sites

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The WHO EQA manual

- Available in English

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The WHO manual

- Describes strategic managerial, financial, technical and scientific aspects to be considered when establishing a national EQA programme.

- The scope: All WHO Member States, with a focus on developing countries.

- The intended audience includes Ministries of health, programme managers, laboratory managers, testing personnel and other implementing partners and EQA providers.
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- Glossary (Definitions)

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Data from EQA Participation

- Provide objective evidence of the testing service’s competencies to customers, accrediting bodies and regulatory agencies
- Allow comparison of performance and results among different sites, instruments and reagents
- Identify areas of improvement and training needs
- Does not adequately assess: Pre-analytic (sample collection and transport) and Post analytic (results evaluation and dissemination)
Introduction


- **Proficiency testing:** Evaluation of participant performance against pre-established criteria by means of interlaboratory comparisons (ISO/IEC 17043:2010)
  - NOTE 1: For the purposes of this International Standard, the term proficiency testing is taken in its widest sense
  - NOTE 2: Some providers of proficiency testing in the medical area use the term “external quality assessment”.

- **Proficiency test item:** specimen, product, artefact, reference material, piece of equipment, measurement standard or data set provided to one or more participants, or submitted by participants, in a proficiency testing round (ISO/IEC 17043:2010)

- **Inter-laboratory comparison:** organization, performance and evaluation of measurements or tests on the same or similar items by two or more laboratories in accordance with predetermined conditions (ISO/IEC 17043:2010).
Introduction ctn

- **Quality management system**: a set of policies, processes and procedures required for planning and execution (production/development/service) in the core business area of an organization (i.e. areas that can impact the organization's ability to meet customer requirements) (ISO 9001:2015)

- Three main components of quality management system include: internal quality (process) control, proficiency testing (PT), and quality improvement

- An EQA programme may be organized on a sub-national, national, regional or international basis; each has its **advantages and disadvantages**
Considerations for establishing national EQA Programme

- **Advantages**
  - Improve PT samples availability, integrity, appropriateness
  - More affordable in the long run
  - Enable provision of better support to failing labs
  - In-country capacity building: sample preparation, data analysis
  - Provide opportunity to increase scope and coverage

- **Challenges**
  - Initial high cost
  - Preparation of challenging PT samples (CD4)
  - Small number of labs
Path of EQA workflow

EQA cycle

- Challenge Selection
- Creation or Acquisition
- Quality Control and Validation
- Sample Send-out
- Laboratory Processing
- Results Receipt
- Results Analysis
- Client Reports

Pre-Analytic

Post-Analytic
Chapter 1&2: Establishing National EQA programme

- The organization of an EQA programme is a **technical process** that will be accomplished only after **the final stage of organization** has been reached.

- There are two non-mutually exclusive strategies that can be used to establish a national EQA programme: Non-governmental organizations: competitive
  - National agency (a government ministry, professional or academic institution)

- Final goal of an EQA organizing centre: to be accredited to the international standard for providers of EQA programmes (ISO/IEC 17043:2010)

- Encourage public and private laboratories to participate but, wherever possible, participation **should be mandatory**.
Chapter 2
Situational analysis is critical

Conduct a risk-based situational analysis of laboratories and other testing services as the basis for planning and implementing an effective strategy for EQA to include:

- **Number, type and location** of laboratories or testing centres
- Existing **infrastructure** in the laboratories or point-of-care (POC) testing sites
- **Type of laboratory analyses** carried out in the various disciplines
- Existence of **implementation of laboratory quality management** measures
- Availability of support for **supervisory and mentoring** networks;
- Inventory, state of performance and maintenance of **laboratory equipment**;
- **Calibrators, proficiency test items** and their supply;
- Number of **technical and medical professionals**
- Existing **infrastructure for transport** of proficiency test items;
- **Financial** aspects for provision of the testing service;
- **Supply chain management** system;
- National **regulatory and licensing** requirements
- **Existing disease-specific EQA programmes** etc
Chapter 3-6
Steps in establishing national EQA

● Obtain Government commitment:
  – appropriate legislation or regulation(s),
  – encourages provision of appropriate EQA services taking into account the national priorities

● Identify organizing centre(s) with required competencies to run an EQA programme, supported by relevant experts depending on the type of analytes included in the programme, as described in ISO/IEC 17043:2010
  – Personnel including technical advisory committee
  – room facilities, equipment, etc
Chapter 3-6
Steps in establishing national EQA ctn

- Prepare a Plan and organize PT rounds with approximate timelines for all stages (planning, implementation (range -18 months to +2 months))

- Ensure adequate and appropriate packaging and shipment arrangements (international standards)

- Prepare essential EQA documents

- Ensure capacity to do data entry and evaluation (Statisticians, software etc)
Structure of an EQA programme organizing centre

- EQA programme coordinator
- Technical advisory committee
- Administration & logistics
- Specimen preparation, internal quality control, packing, distribution and mailing
- Data collection and evaluation
## Timelines for planning and implementation of a PT round

<table>
<thead>
<tr>
<th>Stage</th>
<th>Check date*</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planning</strong></td>
<td>–18 months</td>
<td>Identification of laboratory disciplines and sub-disciplines</td>
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<td></td>
<td>–16 months</td>
<td>Decision on frequency of PT rounds in a particular discipline</td>
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<td>–14 months</td>
<td>Determination of dates of mailing of proficiency test items</td>
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<td>–12 months</td>
<td>Preparation or ordering of proficiency test items (for non-perishable stable items)</td>
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<td></td>
<td>–12 months</td>
<td>Ordering of packing materials</td>
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<tr>
<td></td>
<td>–3 months</td>
<td>Confirmation of delivery of proficiency test items and packing materials</td>
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<tr>
<td><strong>Implementation</strong></td>
<td>–1 month</td>
<td>Control of the availability of proficiency test items</td>
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<tr>
<td></td>
<td>–1 month</td>
<td>General review of preparatory work for the PT round</td>
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<tr>
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<td>–3 weeks</td>
<td>Validation of target values and viability of microbiological specimens; preparation of questionnaire and marking key</td>
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<tr>
<td></td>
<td>–2 weeks</td>
<td>Printing of addresses, forms, etc.</td>
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<td></td>
<td>–1 week</td>
<td>In-house processing; aliquot dispensing and aliquot testing</td>
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<td></td>
<td>–1 day</td>
<td>Packaging of proficiency test items</td>
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<td></td>
<td>Dispensing and packing of perishable EQA materials e.g. fixed blood specimens</td>
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<tr>
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<td>In-house validation of panels before despatch</td>
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<tr>
<td>Day 0</td>
<td></td>
<td>Delivery for mailing</td>
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<tr>
<td>+1 week</td>
<td></td>
<td>In-house validation of despatched proficiency test items</td>
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<tr>
<td>+2 weeks</td>
<td></td>
<td>Closing date – this will vary according to the type of test (some are performed daily, some weekly, etc.), and to specimen transit and data return times</td>
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<tr>
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<td>Data entry completion (for manual data entry, two entries are advised)</td>
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<tr>
<td></td>
<td></td>
<td>Data analysis and validation</td>
</tr>
<tr>
<td>+3 weeks</td>
<td></td>
<td>Printing of PT round reports and generation of corrective action templates</td>
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<tr>
<td>&gt;3 weeks</td>
<td></td>
<td>Assessment of remarks, questions and comments</td>
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<td>Update of the programme's historical records</td>
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<td>Storage of leftover proficiency test items, where stability of analyte permits</td>
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Requirements for Packaging and Transportation of EQA material

- Regulated under the United Nations regulations for the transport of dangerous goods
  - Infectious substances are Class/Division 6.2

- Packaging type will depend on its classification under the regulations, on whether the specimen is classified as
  - Category A: (Infectious substances which are known to contain, or are reasonably expected to contain, pathogens),
  - Category B: Diagnostic specimens, assigned to UN 3373, are human or animal materials that are being transported only for the purpose of diagnosis or investigation or Exempt.
Requirements for Packaging and Transportation of EQA material ctn

- Determine the appropriate type of packing and transport.
  - Category A infectious substances UN 2814 or UN 2900 packaging should follow packing instructions P620. Biological substances,
  - Category B, UN 3373, packaging should follow packing instructions P650.

- Both Category A and Category B items require a **triple package** but each has different safety testing requirements.

- Exempt specimen packaging also requires triple packaging but with less stringent safety testing. An example of the triple package
Triple package for transporting biological substances, category B
Steps in establishing national EQA ctn

- Ensure capacity to prepare **proficiency testing round reports**

- Establish a **well-organized record system** including for PT round records, data analysis and participants performance

**Make cost estimation**:  
- EQA programme requires specific investments and financial obligations to ensure a sustainable service  
  - an allocated budget from government authorities  
  - twinning with other EQA organizers  
  - fees from participants, commercial suppliers  
  - academic centres, long-term benefactors including trusts  
  - support from development partners as a short-term measure  
- Cover the whole process (personnel, reagents, equipment, packaging, transport, analysis, training etc)
Calculation of expenses should include, but not be limited to:

- Rent of premises.
- General costs (water, communication, electricity, insurance).
- Salaries for personnel or man-hours required.
- Information technology infrastructure and maintenance.
- Costs for maintenance and repair of laboratory equipment.
- Proficiency test items, which can be purchased or produced locally
  - costs of the proficiency test items (serum, plasma, urine, whole blood, etc.).
  - investments for local production
  - evaluation of proficiency test items (i.e. test kits, reagents, calibrators, consumables, etc.)
  - assessment of stability and homogeneity of the proficiency test items.

- Packaging
  - packaging of proficiency test items
  - envelopes and labels for mailing.
- Administration of PT rounds
  - registration of participants
  - invoicing of participants (if applicable).
- Printing of forms, reports and catalogue.
- Mailing and/or courier costs
  - of proficiency test items
  - of reports.
- Evaluation of PT rounds
  - reimbursement of costs for experts (as appropriate)
  - costs for use of informatics (as appropriate)
  - costs for organizing meetings of experts and workshops for participants (once or twice a year).
- Training/corrective actions for participants.
- Miscellaneous costs
  - programme development costs
  - programme financial management
  - programme quality management system
  - staff training and development.
Chapter 7&8
Proficiency test items

Requirements of proficiency test items

- as similar as possible to patient specimens;
- homogenous, as indicated by homogeneity testing;
- stable at least for the PT round turnaround time;
- safe;
- negative for infectious agents unless specifically required for the PT round;
- where applicable, ready for use with a pierceable septum;
- sterile, except for specific instances such as microbiological PT rounds;
- acceptable matrix, homogeneity and stability properties

Establish to mechanism to
- collect and characterize the PT item
- Comparison of EQA materials from available sources

Ensure stability during transportation
Chapter 8
Preparation of specific EQA test items

- Cover broad consideration when preparing specific EQA items
  - Haematology
  - Bacteriology
  - Parasitology
  - Clinical chemistry
  - Serology
  - Nucleic acid testing
  - Tissue based pathology
  - CD4 testing
Chapter 9
Evaluation of EQA results

- Before evaluating the participants results Ensure:
  - the PT challenge participants have received is consistent with the planned value (controlled sample);
  - Participants have received the same challenge material (homogeneity);
  - if there is a predetermined correct target value, laboratory results have provided evidence that the challenge is fair and reasonable to the extent that all laboratories can be expected to achieve a valid result (equity);
Chapter 9
Evaluation of EQA results ctn

Before evaluating the participants results ensure:

- where collective laboratory results form the basis of a consensus value, laboratory results will be compared and analyzed in a fair and equitable manner (comparability);

- the probability or risk of specimen degradation has been studied and, to the extent possible, contained (stability).

- For review of proficiency testing of quantitative values, measurements in a laboratory should not be considered as perfect; some variation may be introduced into the testing process (measurement uncertainty)
Chapter 10
Proficiency testing round report

- PT round report should be sent to all participants for them to compare their laboratory’s performance with that of peer laboratories conducting similar analysis.

- The laboratory or testing site manager shall share the EQA report with everyone in the laboratory or testing site and develop appropriate corrective action.

- EQA programme should include a procedure for monitoring performance over time.
Chapter 11-12
Monitoring and evaluation

- EQA should be an educational tool
- EQA programme maintains a process of quality improvement
- Monitors its performance against performance indicators.
- Evaluation should be undertaken at least once a year and an annual report produced
Acknowledgement

WHO EQA Technical Working Group

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Quality assurance

The maintenance of a quality management system is crucial to a laboratory for providing the correct test results every time.

Quality assurance

Important elements of a quality management system include:

- Documentation
- Standard Operating Procedures (SOPs)
- Quality Control samples
- External Quality Assessment Scheme

Quality control

Are procedures used in each assay to assure a test run is valid and results are reliable:

- Kit Controls
- Quality Control Samples

External quality assessment schemes (EQAS)

Aims to analyse the accuracy of the entire testing process from receipt of sample and testing of sample to reporting of results (also known as proficiency testing)

- WHO manual for organizing a national external quality assessment programme for health laboratories and other testing sites
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