Quality control in dental practice

Peter Kivovics
DMD, BDS, MDSc, PhD,
Chief Dental Officer for Hungary
## Quality Assurance vs. Quality Control

<table>
<thead>
<tr>
<th>Quality Assurance</th>
<th>Quality Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>An overall management plan to guarantee the integrity of data (The “system”)</td>
<td>A series of analytical measurements used to assess the quality of the analytical data (The “tools”)</td>
</tr>
</tbody>
</table>
Definitions (1)

- **Quality Control** - QC refers to the measures that must be included during each assay run to verify that the test is working properly.

- **Quality Assurance** - QA is defined as the overall program that ensures that the final results reported by the laboratory are correct.

- “The aim of quality control is simply to ensure that the results generated by the test are correct. However, quality assurance is concerned with much more: that the right test is carried out on the right specimen, and that the right result and right interpretation is delivered to the right person at the right time”
Definitions (2)

• **Quality Assessment** - quality assessment (also known as proficiency testing) is a means to determine the quality of the results generated by the laboratory. Quality assessment is a challenge to the effectiveness of the QA and QC programs.

• Quality Assessment may be external or internal, examples of external programs include NEQAS, HKMTA, and Q-probes.
Variables that affect the quality of results

- The educational background and training of the laboratory personnel
- The condition of the specimens
- The controls used in the test runs
- Reagents
- Equipment
- The interpretation of the results
- The transcription of results
- The reporting of results
Errors in measurement

- **True value** - this is an ideal concept which cannot be achieved.
- **Accepted true value** - the value approximating the true value, the difference between the two values is negligible.
- **Error** - the discrepancy between the result of a measurement and the true (or accepted true value).
Sources of error

• Input data required
• Inherent characteristics of the quantity being measured
• Instruments used - accuracy, repeatability.
• Observer fallibility - reading errors, blunders, equipment selection, analysis and computation errors.
• Environment - any external influences affecting the measurement.
• Theory assumed - validity of mathematical methods and approximations.
Random Error

- An error which varies in an unpredictable manner, in magnitude and sign, when a large number of measurements of the same quantity are made under effectively identical conditions.

- Random errors create a characteristic spread of results for any test method and cannot be accounted for by applying corrections. Random errors are difficult to eliminate but repetition reduces the influences of random errors.

- Examples of random errors include errors in pipetting and changes in incubation period. Random errors can be minimized by training, supervision and adherence to standard operating procedures.
True Value vs. Measured Value

**True Value**
The known, accepted value of a quantifiable property

**Measured Value**
The result of an individual’s measurement of a quantifiable property
Accuracy vs. Precision

Accuracy: How well a measurement agrees with an accepted value

Precision: How well a series of measurements agree with each other
Accuracy vs. Precision

Precise, not Accurate

Neither Precise nor Accurate

Accurate, not Precise
Systematic vs. Random Errors

Systematic Error
Avoidable error due to controllable variables in a measurement.

Random Errors
Unavoidable errors that are always present in any measurement. Impossible to eliminate.
Random Errors
Systematic Error

- An error which, in the course of a number of measurements of the same value of a given quantity, remains constant when measurements are made under the same conditions, or varies according to a definite law when conditions change.

- Systematic errors create a characteristic bias in the test results and can be accounted for by applying a correction.

- Systematic errors may be induced by factors such as variations in incubation temperature, blockage of plate washer, change in the reagent batch or modifications in testing method.
Systematic Errors

True Value

x x x x x x x x
National Center for Healthcare Audit and Improvement
Our inspection programmes

What do we inspect?

What services do we inspect?

We enforce RMER in England through a programme of assessment and inspection of NHS and independent healthcare providers who perform medical exposures.

Our methodology is targeted, risk-based and responsive and inspections cover the range of medical exposures. These include:

- Radiology
- Radiotherapy
- Cardiology
- Nuclear medicine
- Mammography
- Dentistry
- Chiropractic

In developing our templates for inspection or assessment we work with our partner regulators from the devolved administrations, the Department of Health (DH) and the Health Protection Agency (HPA).

Our inspectors have powers which are derived from section 20 of the Health and Safety at Work Act 1974 (H&SWA). These powers allow us to gain reasonable access to premises, interview duty-holders and collect evidence.

Proactive inspections

A proactive compliance inspection is one we carry out to assess whether the use of medical exposures by
The Council of European Chief Dental Officers

promotes dental public health throughout Europe

The Council of European Chief Dental Officers (CECDO) was inaugurated in July 1992 and was registered as an association under Dutch law with the Kamer van Koophandel (Chamber of Commerce) Den Haag in 1995.

Our Aims

The Council aims to provide a forum for the exchange of views on dental matters which affect European Union (EU) and European Economic Area (EEA) member countries. It exists to offer advice to National Governments, to the Commission and others on matters affecting European dentistry through the creation and maintenance of a contact organization for European Chief Dental Officers (CECDO).