Equipment Quality Assurance (QA): A Quick Guide

In the UK, the Quality Assurance of radiological equipment is governed by the Ionising Radiation (Medical Exposure) Regulations 2017[1] (IR(ME)R, 2018 in Northern Ireland[2]) –hereafter referred to as IR(ME)R.

Equipment and the employer's responsibilities:

IR(ME)R details the duties of the employer in relation to any equipment that delivers ionising radiation to an individual undergoing an exposure, as well as any ancillary devices that can directly control or influence the exposure. This ancillary equipment may include, for example: CT contrast injector pump; equipment used for gated examinations; gamma cameras; gamma probes; radionuclide dose calibrators. Equipment used for clinical evaluation (e.g. reporting monitors) are not included as ancillary equipment, but should be included in the QA programme to ensure consistency of set up and image quality.

Equipment **Quality Assurance (QA)** refers to the planned system required to ensure that equipment performs satisfactorily and in compliance with the regulations. This includes the actions necessary to ensure that the QA system is working as it should, such as audit. **Quality Control (QC)** is part of QA and refers to operations carried out to improve equipment quality such as testing, monitoring, evaluation and maintenance of equipment. [3]

Basic Principles:

Employers must establish a quality assurance (QA) programme to ensure compliance of the regulations. The QA programme must include:

- Adequate equipment testing before it is first put into clinical use (QC)
- Adequate equipment testing at appropriate intervals and after any major maintenance (QC)
- Appropriate measurements at suitable intervals to assess representative doses to persons undergoing medical exposures (QC) [4]

Documented Equipment QC Programme:

The employer should consult the appointed Medical Physics Expert (MPE) about the QC programme. The QC document should[5]:

- specify when to test and the frequency of testing;
- contain a written protocol detailing how to perform and record the testing;
- contain appropriate action level(s)/tolerances for each test result;
- identify the remedial actions required in the event that action levels/tolerances are exceeded;
- make clear who has responsibility for carrying out the testing and acting on adverse findings;
- include all ancillary equipment which can directly influence the exposure;
- detail equipment handover for maintenance and testing e.g. AXREM form[6]
- review/audit results over time to assess performance and remove equipment no longer in use;

QC Training and Entitlement

Under IR(ME)R, it is for the employer to decide who undertakes the testing – this can be the employer's own staff or contractors. With their familiarity with the equipment and their knowledge of the department in which they work, Radiographers and Assistant Practitioners are well placed to undertake routine QC.

Anyone performing QC of radiological equipment is regarded as an IR(ME)R operator and must be entitled by the employer and have undergone suitable training in accordance with IR(ME)R Schedule 3.

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References and further reading

1. The Ionising Radiation (Medical Exposure) Regulations (IR(ME)R) 2017 http://www.legislation.gov.uk/uksi/2017/1322/regulation/10/made
2. The Ionising Radiation (Medical Exposure) Regulations (Northern Ireland) (IR(ME)R) 2018 http://www.legislation.gov.uk/nisr/2018/17/contents/made
3. IR(ME)R Implications for Clinical Practice in Diagnostic Imaging, Interventional Radiology and Diagnostic Nuclear Medicine, BIR, RCR, IPEM, SCoR, PHE, June 2020.
4. The Radiographic Assistant Practitioner's role in Quality Control of Radiological Equipment, SCoR, December 2019 https://www.sor.org/getmedia/fc23ab5e-8b1f-43b3-bf64-4e70d66b5d6e/final_the_radiographic_assistant_practitioners_role_in_quality_control_of_radiological_equipment_rev_2
5. Institute of Physics and Engineering in Medicine Recommended Standards for the Routine Performance Testing of Diagnostic X-Ray Systems. IPEM Report No 91, York: IPEM, 2005
6. AXREM. Radiation Controlled Area and Equipment Handover Form. Available from: https://www.axrem.org.uk/resource/ensuring-compliance-with-radiation-safety-regulations/

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