

Equipment Quality Control for Film-screen Radiography

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Imaging Physics

CancerCare Manitoba

Purpose

An equipment quality control (QC) program establishes baseline performance levels, tracks system performance over time and reveals performance trends. This document outlines the tests that are typically part of a QC program for film-screen radiography equipment. Contact Imaging Physics for assistance in setting up a program.

What are the benefits of a QC program?

- Performance degradation can be identified leading to preventative action.
- Patients benefit when equipment performance is maintained at acceptable levels.
- A QC program is an important element in achieving accreditation.

What are the components of a QC program?

The QC program is set up by the facility under the guidance of a medical physicist certified by the Canadian College of Physicists in Medicine. The program consists of acceptance testing, on-going quality control, and periodic review of QC data and outcomes. Typically, the routine QC activities are carried out by a technologist while in-depth checks are performed by, or under the guidance of, a medical physicist. A typical QC program includes the following:

Acceptance Testing

Acceptance testing must be performed by or under the oversight of a medical physicist when a system is installed, relocated (where relevant) or undergoes significant upgrades or maintenance. Acceptance testing verifies vendor specifications and establishes performance baselines. It is the facility's responsibility to make arrangements for acceptance testing by a medical physicist.

Daily

1. Inspect system operation and verify operational status. Follow manufacturer's recommendations for equipment warm up. Check meters and audible and visual indicators for proper function. Inspect equipment for mechanical soundness and smooth motion, including collimator blade motion and tracking.
2. Clean darkroom.
3. Check processor operation. Perform sensitometric strip processing.

Weekly

1. Visually inspect equipment for cleanliness.
2. Inspect view boxes for cleanliness and proper illumination.

Monthly

1. Clean the cassettes and screens according to the manufacturer's recommendations.
2. Check darkroom temperature and humidity.
3. Visually inspect the darkroom for external light leakage into the room.
4. Check film processor operation, including accuracy of temperature display and replenishment rate. Change processing solutions, clean tanks and perform the fixer retention test.
5. Perform retake and reject analysis. A reasonable target reject rate for general radiography is 8%, with thresholds for investigation set at 10% and 5%. A low reject rate can mean that recording or analysing rejects is not being done correctly. For paediatrics, the reject rate should be around 5%, with thresholds for investigation at 7% and 3%¹. If these requirements are not met, causes should be identified and documented, along with any corrective action taken, if applicable. In consultation with medical physics, the target reject rates can be modified to fit clinical practice. For sites that do less than 250 patients per month, the reject analysis can be done quarterly².

Quarterly

1. Check door interlocks if applicable.

Annually

1. Annual testing by or under the oversight of a medical physicist to evaluate performance against vendor specifications and baseline levels established at acceptance.
2. Annual equipment QC review by a medical physicist.

With regard to the suggested test frequencies, daily refers to each day the equipment is used.

QC data should be recorded in a manner that allows monitoring of trends in performance levels. It is recommended that QC data trends be reviewed at least semi-annually.

Where to go for help?

Imaging Physics at CancerCare Manitoba provides physics testing for diagnostic imaging systems, and can assist diagnostic imaging departments in setting up QC programs, training staff to perform QC tests and identifying appropriate QC tools. You can contact Imaging Physics at

Imaging.Physics@cancercare.mb.ca or by calling 204-787-4145.

The radiography specialists are Dr. Idris Elbakri (204-787-2856) and Dr. Harry Ingleby (204-787-2126).

¹ Ongoing quality control in digital radiography: Report of AAPM Imaging Physics Committee Task Group 151. American Association of Physicists in Medicine Report No. 151. 2015.

² Quality control in diagnostic radiology: Report of Task Group #12 Diagnostic X-ray Imaging Committee. American Association of Physicists in Medicine Report No. 74. 2002.

Annual Medical Physics Review - Film Radiography

This is a sample form of the annual QC review to be conducted by a medical physicist. This form is required by MANQAP to demonstrate ongoing compliance with the QC requirements.

Facility		Department	
System make/model		System Location	
Date of review		Contact Person	
Overall QC Program Assessment	<input type="checkbox"/> ACCEPTABLE <input type="checkbox"/> ACCEPTABLE but requires remediation <input type="checkbox"/> NOT Acceptable. Immediate action required	Time period of data reviewed (mm/yy to mm/yy)	

QC Test	Status	Comments
Daily Radiography System Inspection		
Daily Dark Room Cleaning		
Daily Processor Sensitometry		
Weekly Visual Inspection and Cleanliness		
Weekly View Box Inspection		
Monthly Cassette Cleaning		
Monthly Darkroom Temperature and Humidity Check		
Monthly Dark Room Light leakage Check		
Monthly Check of Processor Temperature Display, Replenishment Rates, Changing Solutions, Cleaning Tanks		
Monthly Fixer Retention Test		
Monthly Retake and Reject Analysis		
Quarterly Door Interlocks Check		
Annual Physics Testing (or acceptance if Equipment is new or relocated)		

**Overall QC Program Assessment:
Recommendation:**

Review conducted by

Signature

Date