# Picture Archiving and Communication Systems (PACS) and guidelines on diagnostic display devices [QSI Ref: XR-303]

**Descriptor:**

Digital display monitors are the standard method for viewing radiological investigations. It is therefore of great importance that standards exist to ensure these devices meet quality benchmarks throughout their working lifespans.

**Background:**

Primary diagnostic work is usually carried out by a radiologist or other specialist trained health professional in order to generate a formal and legally binding medical report.

Clinical review work is carried out by a vast range of health professionals who wish to view and interpret images in order to influence clinical management but who do not typically generate a formal radiology report.

Mobile review of radiology images is becoming more common and presents a number of challenges in terms of the sheer range of devices available, the varied component displays used and the difficult nature of controlling the reading environment.

The choice of displays suitable for a specific workplace will depend on a number of additional influencing factors such as cost, supplier, departmental preferences and the intended workplace setting.

## The Cycle

**The standard:**

Primary Diagnostic Workstations should be equipped with a reliable display with at least 3 Megapixels in resolution, a luminance range of at least 1-350cd/m2 which is regularly hardware calibrated such that it remains within 10% of the DICOM GSDF.

Clinical Review Displays should be at least 2 megapixel resolution with a luminance range 0.8-250cd/m2 and should be calibrated at least once a year to remain within 20% of the DICOM GSDF. Either hardware or perceptual calibration (using the TG18 test pattern) may be used.

Mobile Device Displays should mainly be used in the absence of a primary diagnostic display. They should conform to the same standards as clinical review displays.

When colour displays are used in radiology, they should still meet the grayscale calibration requirements for the given setting. The consistent use of the sRGB colour space is recommended to achieve uniformity across workplaces. The viewing environment should be strictly controlled in the primary diagnostic setting. For clinical review, the environment should be controlled as best achievable.

All medical displays should be subject to a regular and ongoing quality assurance (QA) programme to ensure consistently accurate representation of medical images across an institution.

**Target:**

100% Primary Diagnostic Workstations: quarterly calibration

100% Clinical Review Workstations: annual calibration

100% Mobile Device Displays: annual calibration

100% Medical displays should be subject to regular ongoing QA programme

## Assess local practice

**Indicators:**

Calibration and QA monitoring records

**Data items to be collected:**

Number and type of workstations

Number of primary diagnostic workstations calibrated quarterly or more frequently

Number of clinical review workstations calibrated annually

Number of mobile device displays calibrated annually

Documented medical display device QA Programme

**Suggested number:**

10 of each type of workstation

Single QA programme covering all medical display devices

**Suggestions for change if target not met:**

Documented QA programme covering all medical devices if none existing

Compliance with monitoring requirements

**Resources:**

Department/trust QA standard for medical display devices

Documentary evidence of device monitoring checks

**References:**

1. Image Quality and Monitor Calibration Video Tutorial. <https://youtu.be/YRBmNNCO1KI?list=UUxhigk23GaZyj88OxJt8Psw>(accessed 12/1/2017)
2. Samei E et al. Assessment of display performance for medical imaging systems: executive summary of AAPM TG18 report. Med Phys. 2005 Apr;32(4):1205-25.
3. IEC 61966-2-1 <https://webstore.iec.ch/publication/6169>
4. Salazar AJ et al. DICOM gray-scale standard display function: clinical diagnostic accuracy of chest radiography in medical-grade gray-scale and consumer-grade color displays. AJR 2014 Jun;202(6):1272-80

**Submitted by:**

Caroline Rubin

**Co-authors:**

Dr Dan Fascia and Dr Dave Harvey

**Published Date:**

Friday 11 January 2019

**Last Reviewed:**

Thursday 10 January 2019