

QA OF CR AND DR SYSTEMS

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Computed and Digital Radiography (CR and DR) are replacing traditional film screen radiography as hospitals move towards digital imaging and PACS. Recently published IPEM guidelines, and protocols developed by KCARE set out Quality Assurance (QA) and acceptance testing methods. In this paper we compare the performance of a range CR and DR systems. Seven different manufacturers are included. Particular attention is paid to performance of the systems under Automatic Exposure Control (AEC). The patient is simulated using a range of thicknesses of tissue equivalent material. Image quality assessment was based on detector assessment protocols and includes pixel value measures as well as subjective assessment using standard Leeds Test Objects.

The protocols for detector assessment cover a broad range of tests and in general detectors (whether DR or CR) performed satisfactorily. The chief limitation in performing these tests was that not all systems provided ready access to pixel values. Subjective tests include the use of the Leeds TO20. As part of this work we provide suggested reference values for calculating the TO20 Image Quality Factor (IQF). One consequence of moving from film screen to digital technologies is that the dynamic range of digital detectors is much wider and increased exposures are no longer evident from changes in image quality. As such AEC is a key parameter for CR and DR. Entrance doses, using a standard patient mimicking set up, were measured as a basic means of comparing system performance. In order to determine AEC performance under varying conditions, exit doses were also measured. Systems were found to perform similarly using the manufacturers' assessment protocol (i.e. with 21 mmAL phantom), but considerable variance was observed when tissue-mimicking material was used. Signal to Noise Ratios (SNR) were calculated on a number of systems where pixel values were available. IQF and SNR were affected by selection of clinical program. Dose was affected where the clinical program added a 'density' modifying factor. Comparisons between different technologies and collation of data will help refine acceptance thresholds and contribute to optimising dose and image quality.

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