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Applicability of standards based medical physics checks in field based dental conebeam CT (CBCT) assessment

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Introduction: The number of conebeam ct (CBCT) scanners in dental practices has increased significantly in Ireland. A number of guidance documents exist on testing CBCTs including RP 162, the Sedenxt guidelines and the recent publication from EFOMP. The purpose of this paper is to assess the experience of applying these standards to field based dental CBCT.

Materials and Methods: 20 CBCT assessments were reviewed from a number of different manufacturers and models over a 10 year period : Planmeca (n = 4), Sirona Galileos (n = 1), Sirona Orthophos GX (n = 2), Gendex ICAT (n = 1), Carestream (n = 10), Kavo , (n = 1), MyRay (n = 1). Each unit was checked by an experienced medical physicist/RPA . In more recent year's image quality phantoms e.g Quart, Manufacturers, and custom made 3d printed phantoms were used where available.

Results/discussion: The time required to complete testing often exceeds that for whole body ct scanners. Some findings included high dose default settings, incorrect functioning due to network errors, poor electrical or mechanical performance and poor image resolution. Output and field size measurements in cone beam were challenging due to differing beam delivery methods and low doses for exposing gafchromic film. This can lead to opg mode use to characterise beams and DAP accuracy. Useful DICOM images for analysis were difficult to extract from a number of systems.

Conclusion: The testing required for dental CBCT in the field requires significant personnel and equipment resources . The lessons learned from dental conebeam are also applicable to interventional and radiotherapy based CBCT systems.

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Optimising radiology design for an MRI in theatre without compromising patient safety in a new paediatric hospital utilising a local healthcare technology assessment (LHTA) tool

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Local healthcare technology assessment (LHTA) is a multidisciplinary systematic process that identifies the benefits associated with the adoption and application of healthcare technology to meet the clinical needs for a healthcare facility. The aim of this study was to explore the option of locating an intraoperative MRI scanner in our future 22 theatre Department. Following a series of engagements with relevant stakeholders, including patients, carers, surgeons, radiologists, radiographers and anaesthetists, the needs and requirements for the patient journey were evaluated. This was achieved using a LHTA tool to incorporating a workflow analysis informed by these engagements. As such, the process was holistic in its approach while maintaining a patient centred focus. The tool allowed additional value to be demonstrated with the reconfiguring of the four safety zones and access points so that the scanner could be accessed and operated safely both intra-operatively and independently from theatre as required. This allows the scanner to be used to its full capacity scanning both theatre and ambulatory patients. The final outcome is an exemplar design of an MRI in a theatre department integrating the patients' priority needs, safety and clinical efficiency. It gives access to imaging at the right time and place, resulting in the best potential outcomes for all.

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