Clinical Justification and Imaging Protocols in Cone Beam CT

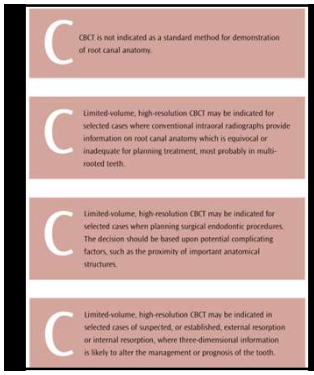
Niall O'Neill
Consultant in Dental and Maxillofacial Radiology
Leeds Dental Institute

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Learning Objectives

- be aware of guidelines that can aid in identifying when cone beam CT is indicated
- recognise referrer's role with regards to providing sufficient clinical information to enable justification of cone beam CT
- understand influence of protocol on diagnostic yield of cone beam CT

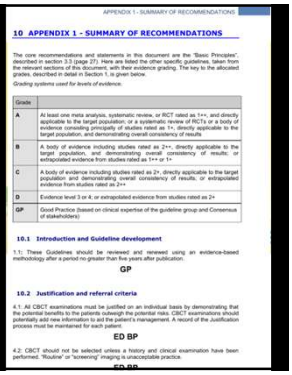
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Selection Criteria for Dental Radiography – College of General Dentistry

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Cone beam CT for dental and maxillofacial radiology - Publications Office of the EU



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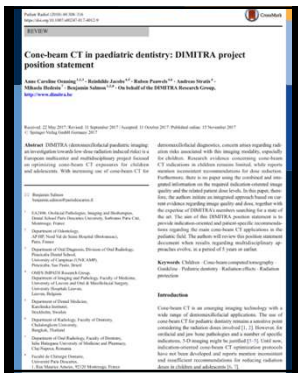
European Society of Endodontology: Position Statements - Löst - 2014 - International Endodontic Journal - Wiley Online Library

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E.A.O. guidelines for the use of diagnostic imaging in implant dentistry 2011. A consensus workshop organized by the European Association for Osseointegration at the Medical University of Warsaw - Harris - 2012 - Clinical Oral Implants Research - Wiley Online Library

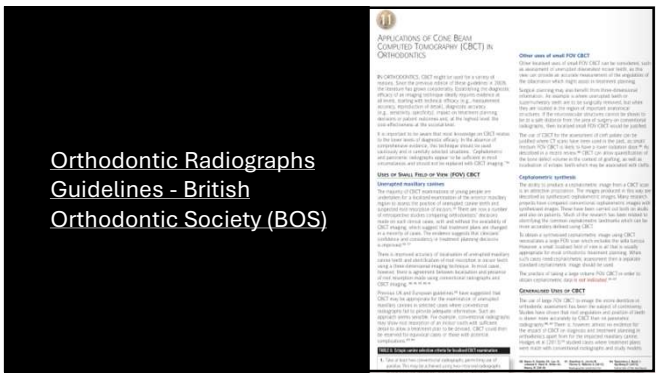


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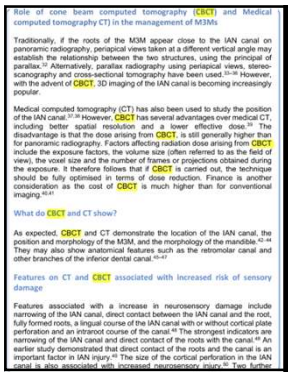
Cone-beam CT in paediatric dentistry: DIMITRA project position statement | Pediatric Radiology | Springer Nature Link

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Orthodontic Radiographs Guidelines - British Orthodontic Society (BOS)

8



Clinical guidelines — Royal College of Surgeons

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Referrer

- registered medical practitioner, dental practitioner or other registered healthcare professional
- entitled to refer individuals to IRMER practitioner

responsibilities under IR(ME)R:

- ensuring **sufficient clinical information** to enable IR(ME)R practitioner to determine whether exposure can be justified

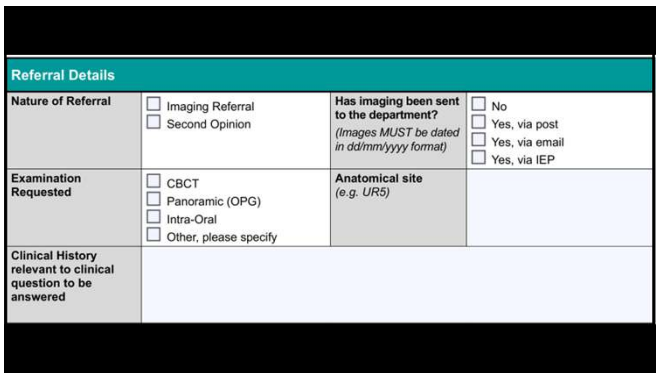
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Patient Details			
		NHS No	
Surname		Forename	
Title		Date of Birth	
Contact number		Sex	
Patient Address			

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Referrer Details			
Practice Name, Address, Hospital Trust & Department			
Referring Clinician			
GDC / GMC Registration Number		Referrer Signature	
Referral Date			

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Referral Details			
Nature of Referral	☐ Imaging Referral ☐ Second Opinion	**Has imaging been sent to the department?** *(Images MUST be dated in dd/mm/yyyy format)*	☐ No ☐ Yes, via post ☐ Yes, via email ☐ Yes, via IEP
Examination Requested	☐ CBCT ☐ Panoramic (OPG) ☐ Intra-Oral ☐ Other, please specify	**Anatomical site** *(e.g. UR5)*	
Clinical History relevant to clinical question to be answered			

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What to include in CBCT referrals

- Be unambiguous about the region of interest
- Provide a summary of all relevant findings on clinical examination / conventional imaging
- Describe how further imaging i.e. cone beam CT is likely to influence patient management

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Vetting

- process of reviewing and triaging an imaging request
- checking an imaging request form for completeness - all required fields provided e.g. patient identifiers, referrer identifiers
- helps decide whether a request is accepted, rejected or put on hold for more details

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IR(ME)R Practitioner

- registered healthcare professional entitled to **take responsibility** for an individual medical exposure

responsibilities under IR(ME)R:

- **justification** of individual exposures

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Justification

- ethical, legal and clinical process of weighing potential benefit vs radiation risk on case-by-case basis
- not performing imaging when not clinically indicated = single greatest impact in dose reduction
- is it the right time to take the cone beam CT scan?
- is cone beam CT the right imaging modality?
- cone beam CT / conventional CT scan already available elsewhere?
- patient selection / compliance? will patient be able to remain stationary for scan? (age, capacity, medical reasons for someone unable to remain stationary for scan)

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Authorisation

- documented confirmation that justification has taken place and exposure may be performed
- authorisation process may be carried out by an operator (radiographer) who strictly follows authorisation guidelines issued by practitioner
- practitioner who issues authorisation guidelines continues to take responsibility for justification of each individual exposure authorised by operators following these guidelines
- where details within referral fall outside scope of authorisation guidelines, authorisation must be performed by practitioner

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Protocolling

- specific parameters of cone beam CT scan based on clinical indications:
  - field of view / scan volume – diameter x height
  - resolution – low / standard / high
  - exposure settings – kV / mA
  - scan speed – fast / standard
  - arc of rotation – 180 / 270 / 360^{0}

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Vetting and Protocolling Exercise

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CBCT Referral 1

- Six-month history pain, swelling and foul taste localised to area behind LR7. OPG demonstrated lower right 4th molar in a kissing configuration with LR8. LR8 appears close to right inferior alveolar canal with narrowing and deviation. CBCT to facilitate surgical planning

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CBCT Referral 2

- Entirety of maxilla, mandible and facial bones CBCT for orthognathic surgery planning with 3D model. Teeth in occlusion

22

CBCT Referral 3

- Recurrent infection both mandibular wisdom teeth. LL8 and LR8 roots closely associated with IDCs with narrowing and deviation on DPT. CBCT to assess relationship between roots and IDC. Planning extraction or coronectomy depending on CBCT findings

23

CBCT Referral 4

- Longstanding bony swelling adjacent right mandibular premolars. Asymptomatic and unchanged over past 20 years. Cone beam CT to further characterise

24

CBCT Referral 5

- History of UR1 concussion. Now pain and swelling above UR1. Canal poorly demonstrated on periapical radiograph. Suspect pulpal sclerosis. Need to confirm if canal patent and morphology for RCT

25

CBCT Referral 6

- CBCT mandible please

26

CBCT Referral 7

- Patient had RCT of LR4 in February 2026. Had hypochlorite injury and ulcer which has now healed however continues to experience pain in right mandible. Lump palpable adjacent LR4 ? osteomyelitis

27

CBCT Referral 9

- Mountain biking in woods. Went over handlebars. UL1 avulsed and recovered from scene. Thinks UL2 intruded but not visible on periapical. ? ultra intruded

28

CBCT Referral 10

- CBCT UL6 region to assess bone quality/volume prior to implant placement in the UL6 region. May require sinus lift

29

Referral 11

- Oro-antral communication following extraction of UR6. Palatal root unaccounted for ? root displaced into right maxillary antrum ? size of bony defect

30

Referral 12

- Large radiolucency centred within left mandible but appears to cross midline on OPG – margins unclear. Need to confirm extent of lesion and relationship with IDC prior to biopsy

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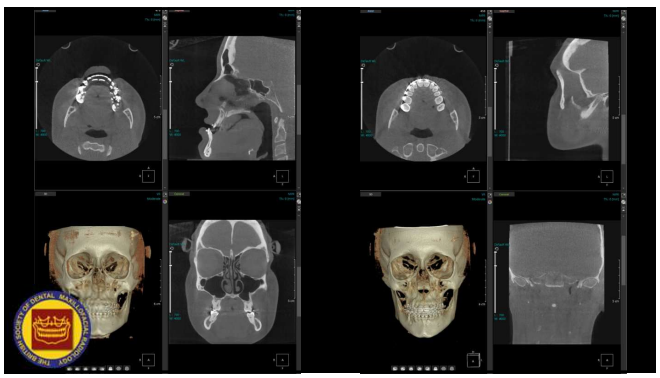


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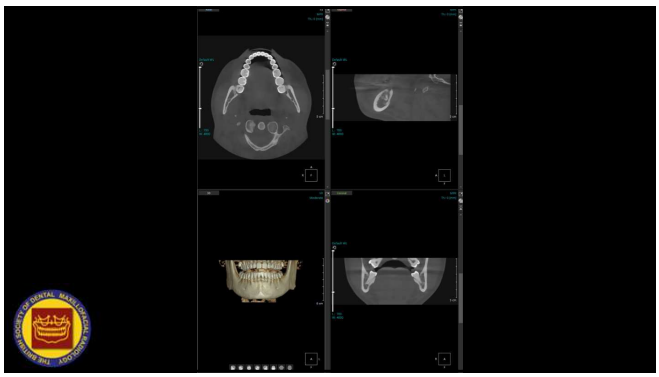


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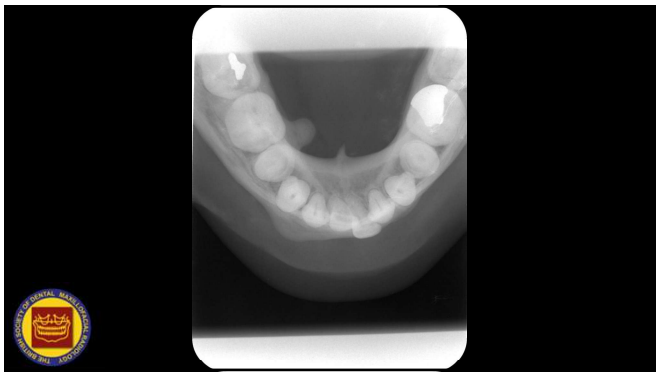


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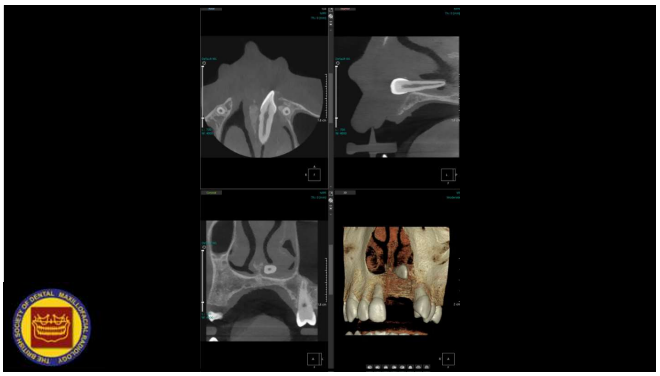


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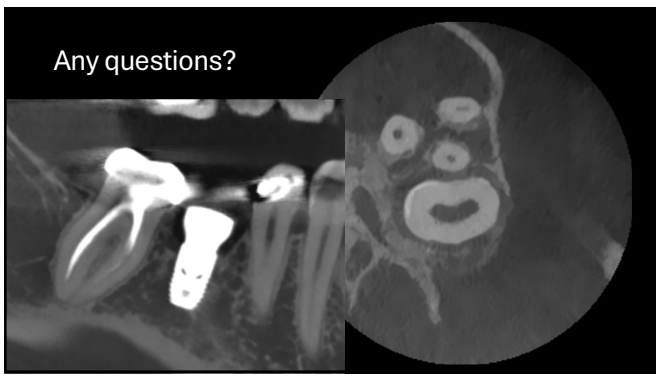
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Any questions?



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