# The introduction of Cone Beam Computed Tomography (CBCT) in a District general hospital

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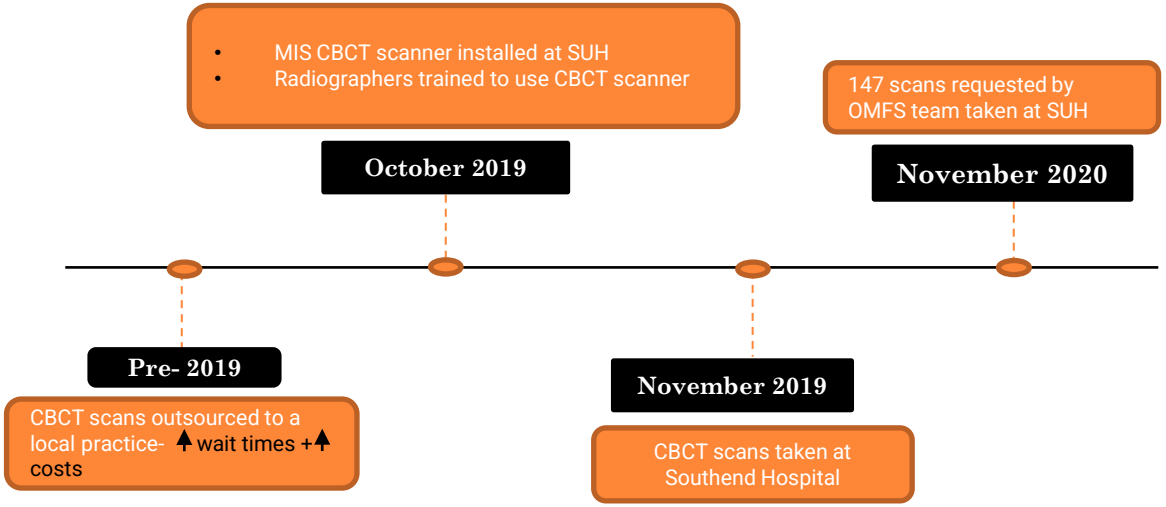
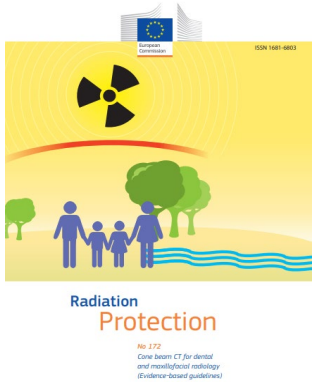
# Introduction of CBCT at Southend Hospital




## Aims & Objectives




- To assess whether the **clinical indications and justifications** provided for requesting CBCT scans comply with the SEDENTEXCT guidelines.
- To assess the **quality of the CBCT images** taken by determining if they are of diagnostic value.
- To assess the diagnostic value of CBCT scans requested by the OMFS team at Southend Hospital and whether **this impacted the treatment plan** or management of the patient.

# METHODOLOGY

- Retrospective data collected
- 147 patients scanned between November 2019 and November 2020
- Information collected from ICE and clinical notes.
- Data collection- carried out by a Dental Core Trainee and a Specialty Doctor.

**TABLE 1- Justification Criteria Set By SEDENTEXCT Guidelines**

| | 1)The developing dentition | 2)Restoring the dentition | 3)Surgical applications | 4)Implants | 5)Bony Pathosis |
|---|---|---|---|---|---|
| A | Unerupted tooth localisation | Detection of infra-bony defects and furcation lesions | Where radiograph suggests a direct inter-relationship between a M3M + ID canal and surgical removal is planned | Cross-sectional imaging prior to implant placement | For evaluation of bony invasion of the jaws by oral carcinoma – where initial imaging for diagnosis and staging is inadequate |
| B | Cleft palate | PA pathology where plain film doesn't match clinical signs | Pre-surgical assessment of an unerupted tooth | | Orthognathic surgery planning |
| C | For treatment planning of complex cases of skeletal abnormality | Multi-rooted root canal anatomy, atypical pulp anatomy and perforations | | | For maxillofacial fracture assessment where radiation dose from CBCT is lower than MRI/MSCT |
| D | External resorption in relation to unerupted tooth | Surgical endodontic procedures- proximity to anatomical structures | | | For examination of TMJ where radiation dose from CBCT is lower than MRI/MSCT |
| E | | Presence of inflammatory root resorption or internal resorption | | | For assessment of cysts |
| F | | Assessment of dental trauma (suspected root fractures) | | | |

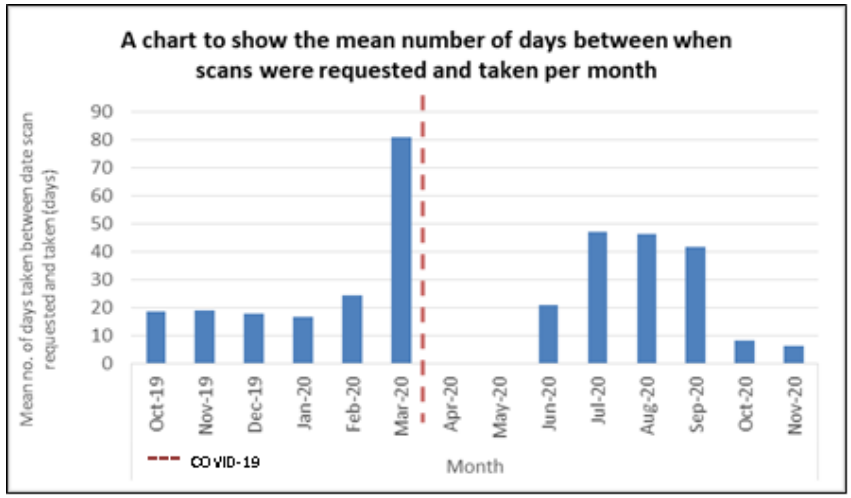
**TABLE 2- Subjective Image Quality Rating Scale And Targets for CBCT Scans**

| Quality Rating | Basis | Target |
|---|---|---|
| Diagnostically acceptable | No errors or minimal errors in either patient preparation, exposure, positioning or image reconstruction and of sufficient image quality to answer the clinical indication | Not less than 95% |
| Diagnostically unacceptable | Errors in patient preparation, exposure, positioning or image reconstruction which render the image diagnostically unacceptable | No greater than 5% |

**TABLE 3- Types Of Faults That May Be Seen in CBCT Scans**

| Fault category | Recorded fault category | Observed fault | Cause |
|---|---|---|---|
| Patient Preparation | A1 | Streak artefacts | Failure to take out removable metallic objects before scanning |
| | A2 | Imaging stent not in the correct anatomical position | Inadequate care in placing the stent or an ill-fitting stent |
| | A3 | Blurring of image | Patient movement |
| Patient Positioning | B1 | All, or part of, the area of interest excluded from the scan volume | Failure to position the scan volume over the area of interest during preparation |
| | B2 | | Patient movement between initial positioning and exposure |
| | B3 | | Field of View too small for the diagnostic task |
| Exposure | C | Increased 'graininess' and reduced sharpness of the image | Exposure factors too low (kV, mA, reduced no of images) |

# RESULTS

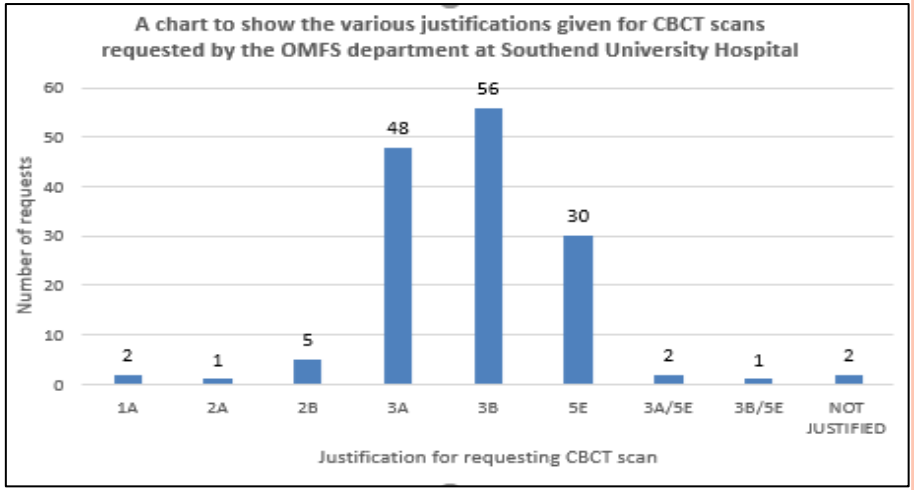


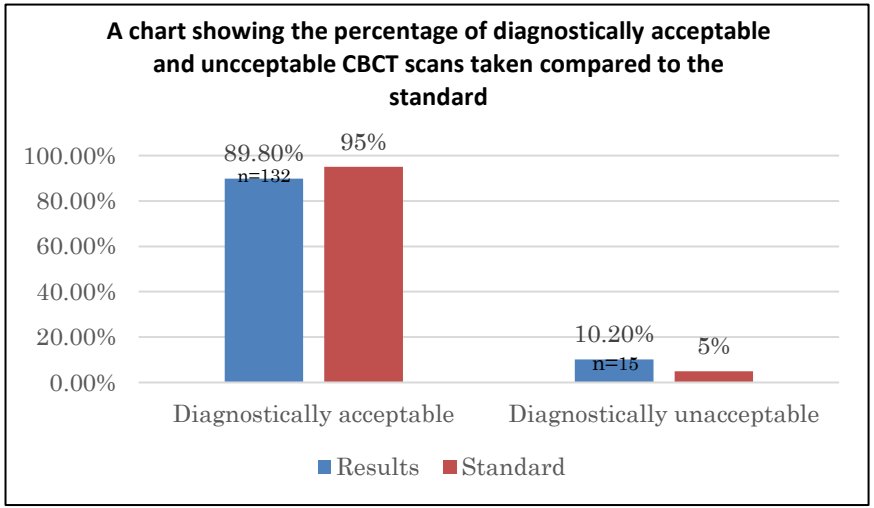

## REQUEST AND ACQUISITION TIME

- Age range: 9 and 81
- Mean age: 24 years
- On average, scans were completed between **6.25 and 47.1 days**
- **March 2020- 81.2 days** between scan request and acquisition

## CBCT JUSTIFICATION

- **98.6%** - Justified
- **1.4%** - Not justified

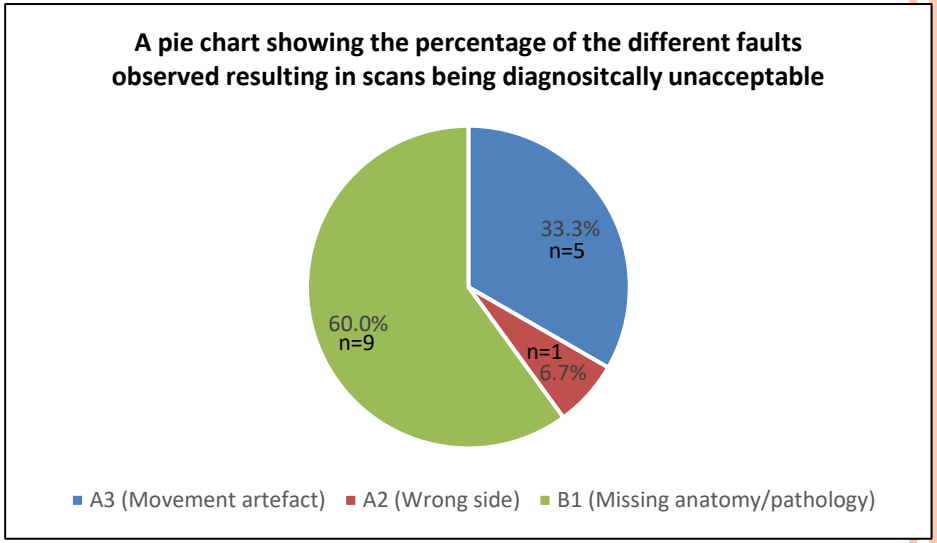


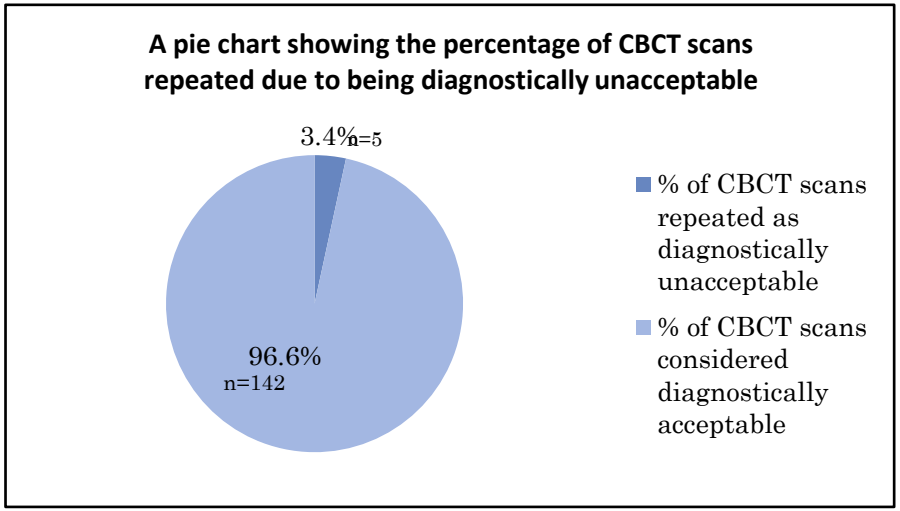



- **89.8%** of scans were **diagnostically acceptable** (standard- 95%)
- **10.2%** of scans were **diagnostically unacceptable** (standard- 5%)

**Faults observed** in diagnostically unacceptable scans:

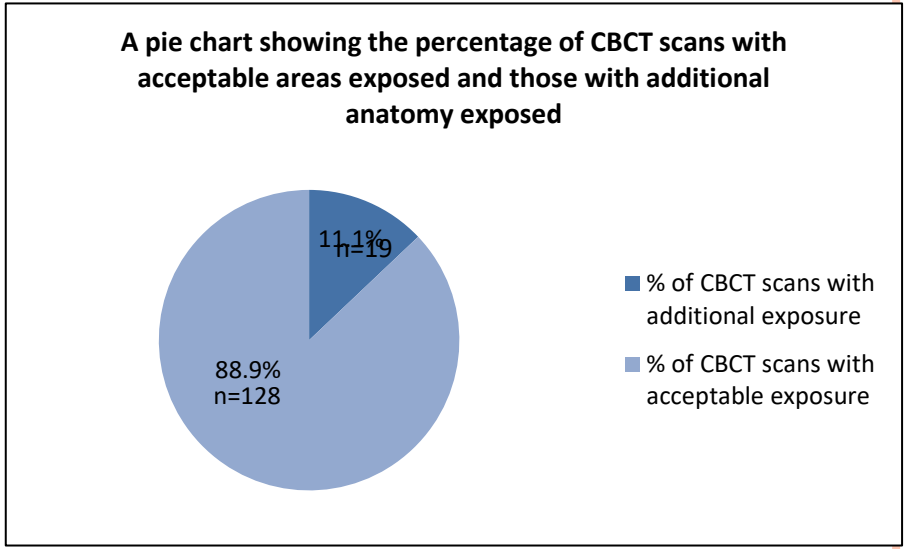
- Missing anatomy **(60%)**
- Movement artefact **(33.3%)**
- Wrong side imaging **(6.7%)**



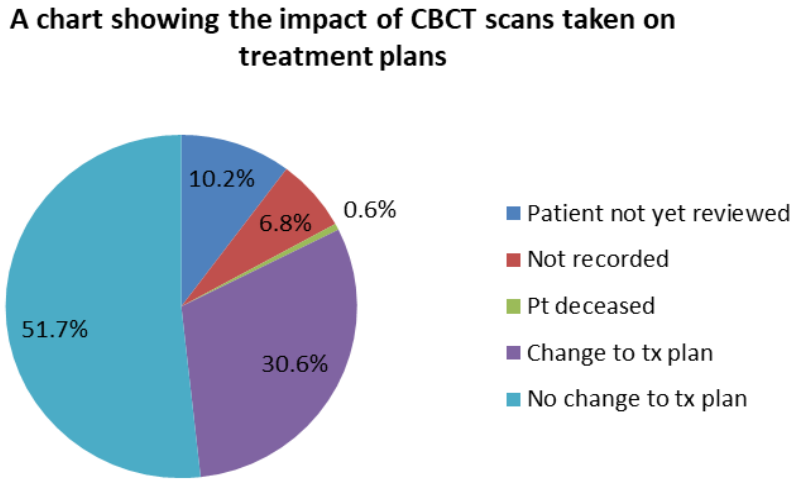


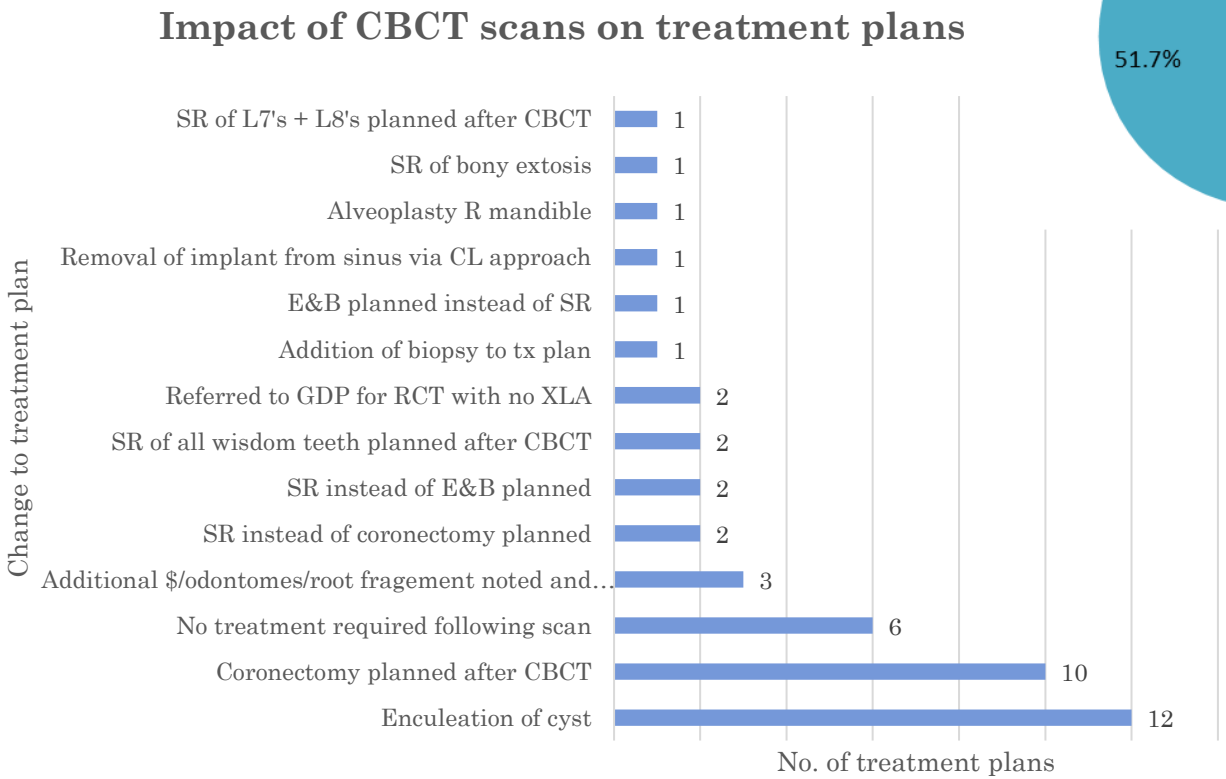

- **3.4% of scans repeated**
- The reasons they were repeated included **excessive movement artefact**, **imaging of the wrong side** and **missing anatomy**

- **11.1%** of scans consisted of exposure to additional anatomy



# IMPACT OF CBCT SCANS ON TREATMENT PLANS




- **30.6% of treatment plans altered**

| Recommendation for improvement | Actions Required: |
| --- | --- |
| Teaching to OMFS clinicians | **Present audit results** to OMFS team |
| Reminder of justification criteria for colleagues in the OMFS team at Southend Hospital | Place a **laminated poster of justification criteria** in each clinic room |
| Reminder to tick correct box when requesting CBCT and provide sufficient clinical details | Create a **standardised clinical template** and place in each clinic room |
| Teaching to radiology team at SUH | **Present audit results** to the Radiology team at SUH |

# Conclusion

- There is **98.6% compliance** with the justification criteria.
- There is a high percentage (**10.2%**) of scans being classified as **diagnostically unacceptable**. This is over double that of the standard set.
- The most common fault observed in the scans considered diagnostically unacceptable was **missing anatomy** followed by **movement artefact**.
- **11.4%** consisted of **exposure to additional anatomy**.


**References**

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