Standard Operating Procedure for Endodontic Emergency Care in Restorative Dentistry during the COVID-19 Outbreak

1. Scope

This document is for the Duncan Street Dental Centre (DSDC) clinical staff to provide emergency care (Non-AGP) in endodontics during the COVID 19 disease outbreak subsequent to "advice, analgesia and antimicrobials" and 48-72 hour review (1, 2)

1.2 Key Principles

The authors acknowledge the challenges of routine dentistry brought about by COVID – 19, including access to diagnostics, routine equipment, and the cumbersome nature of PPE for AGPs. Therefore the priorities for provision of Restorative Dentistry within the service are:

- Provide safe and effective patient care
- Optimise the time and number of exposure prone contacts for staff, patient and community safety (3)
- Protect the capacity of OMFS and other NHS services from dento-alveolar infections(4)

The following is a pragmatic approach in conjunction with a risk assessment (appendix 1) to meet these key principles.

1.3 Inclusion

- Management of teeth associated with persistent pain/discomfort not controlled by analgesics
- Primary endodontic treatment of incisor, canine, premolar and first molar teeth associated with pulpal and periradicular disease
- Incision and draining of infection-related swelling
- Management of avulsion injury
- Management of dento-alveolar fracture
- Management of severe displacement injuries affecting function
- Management of complicated crown fractures of teeth

1.4 Exclusion

- Treatment of teeth that require an AGP to provide appropriate dental management (such as a tooth with a large restoration and with reversible pulpitis)
- Treatment of teeth with a questionable short-medium prognosis (see features outlined below)
- Unpredictable treatment that risks additional short – medium term intervention
- Primary endodontic treatment of second and third molar teeth
- Endodontic retreatment
- Treatment of teeth associated with a draining sinus
- Non-urgent dental trauma: concussion, subluxation, uncomplicated crown fractures not affecting function

Additional features that would suggest a questionable short - medium prognosis (5):

- Poor oral health

- Endodontic: Major difficulties with access
- Prosthodontic: Insufficient tooth structure/inadequate ferrule to allow a well-adapted restoration, deep subgingival margins, cracks/vertical root fractures. Already wearing a removable prosthesis
- Periodontal: advanced (≥50%) bone loss, mobility (Grade I, II or III), furcation involvement
- Occlusal: Missing adjacent teeth/non-functional tooth not in occlusion

1.5 Special considerations:

Risk assessment should be undertaken jointly by Oral Surgery and Restorative Dentistry Specialists:

- If the tooth in question is a bridge abutment, consideration should be given to surgical extraction of root, sectioning the bridge, or extraction of multiple abutment teeth.

- If extraction is contra-indicated as a result of a complex medical history (e.g. bleeding disorders, risk of osteoradionecrosis or medication related osteonecrosis of the jaw).

2. Treatment

Emergency Endodontic treatment details can be found in section 4.
Every effort should be made to ensure that the dental nurse does not need to leave the room for additional equipment. A second nurse (runner) should be available as support.
Particular attention should be given to ensure dental handpieces are functioning.

2.1 PPE

For non COVID patients NHSL board policy PPE should be followed. Please see links below for further information.

http://intranet.lothian.scot.nhs.uk/Directory/CriticalCare/Critical%20Care%20COVID19/Sterile%20Procedure%20Donning%20and%20Doffing.pdf

http://intranet.lothian.scot.nhs.uk/Directory/CriticalCare/Critical%20Care%20COVID19/Sterile%20Procedure%20Donning%20and%20Doffing.pdf

2.2 Documentation

Due to the cross-infection risk with paper based notes, radiographs and clinical notes should be accessed/recorded electronically through PACS/Trakcare and R4 Clinical Portal respectively. The authors accept no written consent can be recorded, but the journey of the consent process should still be recorded as normal in the electronic record.
Appendix 1 and 3 are examples of the risk assessment and triage template that may make up a patients entry in clinical portal.
The authors acknowledge that due to additional cross infection precautions, viewing the computer screen is not ideal and the clinical notes will be written contemporaneously where possible.

2.3 Radiology

The authors and RPS agree in line with our key principles an adequate level of clinical information will be gathered during triage to justify a radiographic investigation without necessarily a clinical examination. Intraoral radiographs are not classed as an AGP. [16]
There is no access to an OPG machine at DSDC and should one be required, referral to CDC will be required.

3. Review

As the COVID - 19 pandemic evolves, this guidance will be amended by the authors taking into consideration operational capacity and demand, and local and national guidance. Amendments are can be found in appendix 5.

4. Endodontics

Within the scope of this document the aim of endodontic treatment is to resolve acute symptoms of pulpal and periradicular disease. This will primarily involve:

1. Management of teeth with irreversible pulpitis which is non-responsive to analgesics
2. Management of localised dental infection to avoid systemic spread
3. Management of teeth with reversible pulpitis in which the cavity can be prepared to receive a restoration **without the generation of an AGP** i.e. using a slow speed handpiece **without coolant**

4.1 Diagnosis of pulpal problems

Triage of patients to the appropriate service is key. Establishing an accurate pulpal and periapical diagnosis can often be difficult due to crossover in the stages of the disease as it progresses. The differentiation between reversible and irreversible pulpitis can be especially problematic.

In general, pain associated with both reversible and irreversible pulpitis may be poorly localised, with the severity of the latter being greater often leading to affected sleep. The other key differences relate to the intense response to thermal stimuli and the inability to control symptoms associated with irreversible pulpitis.

Condition	Pain	Tender to percussion	Soft tissue palpation	Cold test	Radiographic changes	Treatment
Normal pulp	**None**	**-ve**	**-ve**	**+ve**	**None**	**None**
Reversible pulpitis	**On application of stimulus** **Not spontaneous**	**-ve or possibly mild**	**-ve**	**+ve lingering for seconds**	**None**	**Remove cause e.g. temporary replacement of restoration**
Symptomatic irreversible pulpitis	**Intense on application of stimulus** **Lingering (30secs)** **Spontaneous** **Referred elsewhere** **May be affected by postural change**	**+ve (sometimes)**	**-ve**	**+++ ve lingering for up to 30 secs or more**	**None**	**Pulpotomy as per guidelines below**

It is imperative during the triage process that the following is established prior to the patient attending at Duncan Street Dental Centre (DSDC):

1. A provisional diagnosis (based on the patient's report) is reached
2. That the procedure required to be completed will not be an AGP i.e. endodontic access or cavity preparation to manage a reversible pulpitis that can be completed with a slow speed handpiece only

During the triage process or the initial clinical examination, if it becomes apparent that this is not the case and the patient requires treatment that involves an AGP, contact should be made with CDC to discuss the case and arrange treatment at Chalmers as appropriate.

4.2 List of essential endodontic equipment

Radiograph of affected tooth
Local anaesthetic & safety syringe
High volume aspiration and surgical suction tip
Disposable scalpel (number 11)
Syringe and yellow irrigation tip
Endo instrument kit (small)
Front surface mirror
DG16 probe
Flat plastic instrument
Tweezers

High speed/slow speed handpieces
Endodontic access kit (burs)
Rubber dam kit
Winged clamp (rubber dam and winged clamp set up ready to put on with frame)
Povidone iodine 7.5% Skin prep/rubber dam disinfection
Povidone iodine 0.2% OR 1% hydrogen peroxide pre-operative mouthwash
Barrier material (Oraseal caulking)
Shaper Ni-Ti rotary file
Irrigation: NaOCl 5.25 % (x2 preloaded syringes)
Non-setting calcium hydroxide Ledermix/Odontopaste
Sterile cotton pellets
Light cured glass ionomer cement

4.3 Pulp Extirpation

Using a speed increasing (red ring) handpiece without water, this is not an aerosol generating procedure (AGP), appropriate PPE should be worn. Water coolant may NOT be used. If access through metal, metal-ceramic or ceramic indirect restorations is required, please consider referral to CDC..

- Adequate anaesthetic to be administered
- Pre-operative preparation of patient's skin around face and nose with 7.5% povidone iodine (10) (if available and provided no medical contraindication)
- If there is significant intra oral soft tissue swelling consider incision and drainage and/or extraction (14)
- Single tooth rubber dam isolation with winged clamp to be applied
- If required (due to caries or lost restoration), consider isolation of tooth immediately adjacent to candidate tooth using split dam technique and floss into contact
- If multiple tooth isolation required, consider either Haller 2a clamp for quadrant isolation or alternatively 2 separate clamps, one placed on tooth most distal to site of working and one mesial e.g. K clamp on tooth 47 and 2a clamp on tooth 44 to work in lower right quadrant. Floss dam between individual contacts to avoid leakage of saliva at lingual aspect of mandibular areas especially
- Disinfection of rubber dam with 7.5% povidone iodine (10) (if available and provided no medical contraindication) or swab soaked in 2.5% sodium hypochlorite for one minute

- Additional Oraseal to be placed circumferentially around CEJ once dam in place to ensure seal
- Speed increasing electric handpiece (25, 26) can be used without water (27) for access. This needs to be used intermittently and with limited pressure to avoid overheating the periodontal ligament
- Access is best achieved through direct restorative material and metal-based indirect restorations using a tungsten carbide bur (24)
- Access is best achieved through ceramic restorations using a fine diamond bur (28)
- The cavity may be cleaned with a gentle stream of water from a syringe to remove debris and aid visibility
- High volume aspiration at all times during access
- Remove visible inflamed tissue from pulp chamber if present using a bur in slow speed handpiece or allow chamber to soak in sodium hypochlorite. Do not instrument canals (15, 16, 17, 18, 22).
- Copious irrigation with sodium hypochlorite
- Dry pulp chamber using cotton pellets
- Dress with non-setting calcium hydroxide paste from syringe or Ledermix/Odontopaste (placed with cotton pellet),
- Place cotton wool pellet and well adapted glass-ionomer restoration. Adapt prior to set using a flat plastic instrument and gloved finger coated with Vaseline in order to minimise need for occlusal adjustment once set (19)
- Carefully remove rubber dam
- Provide post-operative instructions and advice to see own general dental practitioner when re open to complete treatment

4.4 Treatment of teeth with a diagnosis of reversible/partial irreversible pulpitis (based on guidelines from European Society of Endodontology) (33)

This operating procedure applies only to the management of patients presenting with symptoms of pulpitis in whom a cavity can be prepared without generating an aerosol i.e. only using a slow speed handpiece. This will most likely be limited to teeth with open carious cavities in close proximity to the pulp or those with minimal remaining restorative material.

- Adequate anaesthetic to be administered
- Pre-operative preparation of patient's skin around face and nose with 7.5% povidone iodine (10) (if available and provided no medical contraindication)
- Pre-operative mouthwash with 1% hydrogen peroxide for 1 min or 0.2% povidone iodine for 30 seconds (11-13)
- Single tooth rubber dam isolation with winged clamp to be applied
- If required (due to caries or lost restoration), consider isolation of tooth immediately adjacent to candidate tooth using split dam technique and floss into contact
- If multiple tooth isolation required, consider either Haller 2a clamp for quadrant isolation or alternatively 2 separate clamps, one placed on tooth most distal to site of working and one mesial e.g. K clamp on tooth 47 and 2a clamp on tooth 44 to work in lower right quadrant. Floss dam between individual contacts to avoid leakage of saliva at lingual aspect of mandibular areas especially

- Disinfection of rubber dam with 7.5% povidone iodine (10) (if available and provided no medical contraindication) or swab soaked in 2.5% sodium hypochlorite for one minute
- Additional Oraseal to be placed circumferentially around CEJ once dam in place to ensure seal
- High volume aspiration at all times during cavity preparation
- In carious teeth, carefully excavate any soft dentine from the periphery of the cavity using a rose-head bur in a slow speed handpiece or a hand excavator
- In cases where residual restorative material remains e.g. fractured restoration), attempt removal using a hand instrument or if tooth non-carious, leave in situ
- Where required, soft dentine may be left in the central, deepest aspect of the cavity to avoid pulpal exposure (30)
- Clean debris from cavity using cotton pellet soaked in saline
- Alternatively, the cavity may be cleaned with a gentle stream of water from a syringe to remove debris and aid visibility
- Dry cavity gently using cotton pellets
- Place non-setting calcium hydroxide paste or Ledermix/Odontopaste on floor of cavity in central, deepest aspect (29, 30)
- Place well adapted glass-ionomer cement (GIC) (Fuji) or Zinc oxide and eugenol based (IRM/Kalzinol) temporary restoration. Adapt GIC prior to set using a flat plastic instrument and gloved finger coated with Vaseline in order to minimise need for occlusal adjustment once set (19)
- Where a frank pulpal exposure occurs, clean the cavity using a cotton pellet soaked in sodium hypochlorite or chlorhexidine (32)
- Haemostasis should be achieved within a maximum time of 5 minutes (33). Do not continually compress the area with wet cotton pellets
- If haemostasis cannot be achieved, complete a partial or total pulpotomy. This may involve removal of pulp tissue to the level of the root canal orifices in cases which bleeding is hard to control
- Clean cavity using cotton pellet soaked in saline
- Dry cavity gently using cotton pellets
- Dress with non-setting calcium hydroxide paste from syringe, Biodentine or Ledermix/Odontopaste (placed with cotton pellet).
- Place well adapted GIC (Fuji) or Zinc oxide and eugenol based (IRM/Kalzinol) temporary restoration. Adapt GIC prior to set using a flat plastic instrument and gloved finger coated with Vaseline in order to minimise need for occlusal adjustment once set
- Carefully remove rubber dam
- Provide post-operative instructions and advice to see own general dental practitioner when re open to complete treatment

4.5 Additional notes

If symptoms do not resolve or indeed return, extraction should be the treatment of choice.

5.0 Dental Trauma

Within the scope of this document the aim of dental trauma treatment is to maintain a comfortable and functional dentition. If there is doubt or a high chance of short – medium term complications there should be a low threshold for alternative treatment based on our key principles.

5.1 List of essential trauma equipment

Radiograph of affected teeth
Local anaesthetic & safety syringe
Disposable scalpel (number 11)
Povidone iodine 7.5% skin prep
High volume aspiration and surgical suction tip
Cons kit
Cotton wool rolls
Gauze
L-pop
Upper and lower universal forceps
Composite
Flowable composite
5.0 vicryl rapide suture
Needle holders
Tissue forceps
Irrigation syringes (pre-loaded with saline)
Light cure
Titanium Trauma Splint
Wire cutters
If avulsion, the endo kit described above will also be needed

5.2 Procedure Repositioning Teeth

This is a non-aerosol generating procedure, appropriate PPE should be worn.

- Pre-operative preparation of patient's skin around face and nose with 7.5% povidone iodine (10) (if available provided no medical contraindication)
- Pre-operative mouthwash with 1% hydrogen peroxide for 1 min or 0.2% povidone iodine for 30 seconds (11-13)
- Adequate anaesthetic to be administered
- Digital repositioning of displaced teeth where possible
- If avulsed tooth extirpation out-with mouth (holding root with saline dampened gauze)
- If visible debris on root, rinse under cold running water for 10 seconds (20)
- Irrigation of socket to remove clot and re-implantation of avulsed tooth

- Check occlusion
- Apply provisional splint to incisal edges and light cure where possible
- Treatment of enamel with L-pop & light cure
- Addition of composite wire splint to support tooth position
- Check occlusion
- >60 mins EADT avulsion script Doxycycline/Amoxycillin as per Prescribing advice
- Provide post-operative instructions including specific injury and complications leaflets. Advice to see own general dental practitioner when re open to complete treatment and follow up

5.3 Additional notes

If symptoms do not resolve or indeed return, extraction should be the treatment of choice.

Splinting times differ per injury type. It is suggested prolonged splinting times may be associated with an increased risk of ankylosis for avulsed teeth, however review of the evidence has suggested that fixation period may not be a significant variable in relation to healing outcome(6, 7) .Therefore, to minimise pressure on NHS resources, patient contact and unnecessary travel the splint will not be reviewed and should be removed by the patient's own dentist when they reopen. Other risks include caries and periodontal issues. To minimise risk of these complications developing patients must be instructed to return to normal tooth brushing as soon as possible with F- toothpaste and to minimise sugar exposures.

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Appendix 4 Intra oral Radiograph sensor cleaning

Cleaning of Sensor after Intra Oral Examination

- Ensure before examination is performed everything needed to clean the sensor is available and to hand (Detergent wipe for cleaning and paper towel or tissue to dry). Ensure the Vistascan is turned on before starting.
- The sensor is covered with a black plastic barrier envelope.
- Make sure the barrier envelope is completely sealed before use.
- After imaging the patient remove the sensor from instrument.
- Clean the plastic cover with a detergent wipe (Clinell) and dry. Inspect the plastic cover for perforations from teeth. If the plastic has been perforated in a suspected/positive COVID19 patient, dispose of sensor in clinical waste and start again.
- Pass the cleaned sensor in plastic cover to the nurse / clinician outside of the room.
- Sensor can then be cleaned and dried again. Ensure this is completely dry as if any detergent is on the sensor this will affect image quality.
- Barrier envelope is ripped at the appropriate end and sensor inserted into Vistascan for processing.
- Beam aiming device should be cleaned with detergent wipe and placed in appropriate place for being sent to CCSD.

Note: If you are undertaking an occlusal radiographs for dental trauma, please contact the dental radiology department (ext 89646) prior to starting imaging for advice.

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