

COVID-19 pandemic: the first wave – an audit and guidance for paediatric dentistry

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Key points

Provides an insight into the paediatric dental emergencies that are likely to present in the current pandemic of COVID-19.

Provides evidence-based guidance for urgent dental care centres (UDCs) to follow when triaging patients.

Discusses transferable standard operating procedures being implemented in secondary care.

Abstract

With the use of newly issued guidelines, King's College Hospital has developed new standard operating procedures specifically for the COVID-19 pandemic. Given the unprecedented nature of the current global pandemic, this paper highlights how paediatric dental emergencies can be managed safely and efficiently, as well as new measures which can help reduce transmission of the virus. Furthermore, an audit of the current paediatric dental emergencies attending the hospital is presented. Seventy-six percent of patients attending met the agreed local criteria for urgent treatment, with the most common presentation being irreversible pulpitis. This highlights the types of cases that practitioners enrolled in urgent dental care centres (UDCs) can expect to encounter and how to effectively manage this challenging group of patients.

Introduction

The impact of the coronavirus (COVID-19) disease caused by the single-stranded RNA virus, SARS-CoV-2, has had a profound impact on daily lives, with over one-third of the global population in 'lockdown' as the world battles to contain the pandemic. As of 22 April 2020, over 2.5 million people are reported to have been affected worldwide with over 170,000 reported deaths.¹ The actual infected and death rates are believed to be much higher.²

Given the novel nature of this disease, guidance is constantly being updated. It is believed that the COVID-19 virus is at least two times more infective than common influenza, affecting between two to three individuals per one infected person in the population.³

The nature of spread is believed to be through droplet contamination or infected surfaces, with the virus being introduced into

the body via mucosal surfaces such as the eyes, nose and mouth. Many patients will remain asymptomatic despite having contracted the disease, meaning it is essential to implement social distancing and effective hand hygiene as per government protocol.⁴

The impact of COVID-19 on dentistry has been profound due to the way in which the virus is spread through aerosol. Consequently, those in the dental profession are at high risk of contracting and spreading the virus to the general population through aerosol generating procedures (AGPs).

Aerosol and droplets frequently mix with saliva and blood in everyday dental treatment, increasing the likelihood of airborne spread and transmission of viruses such as COVID-19.⁵

AGPs include the use of:

- High-speed handpieces
- Slow handpieces
- 3-in-1
- Ultrasonic scalers
- High-volume suction/aspirator.⁶

On 25 March 2020, government directives advised primary care dental practices to indefinitely cease all non-urgent dental treatment. Patients currently remain in a state of flux as primary care practices have

been advised to provide telephone triage and, wherever possible, to adhere to the 'three As' approach of giving advice, treating with analgesia and prescribing antimicrobials where appropriate.⁷ Patients who are deemed to require urgent care after telephone triage have been advised to attend local urgent dental care centres (UDCs). UDCs are being established, but there have been reports that some centres are struggling with a lack of personal protective equipment (PPE) as the country struggles with a nationwide shortage.⁸

What compromises urgent care?

The following compromise urgent care:

- Life-threatening facial swellings
- Traumatic dental injuries: complicated crown fractures, avulsion of a permanent incisor tooth and severe luxation injuries
- Soft tissue infections
- Post-operative bleeding which cannot be managed with local measures
- Severe dental/facial pain which cannot be controlled with self-help advice and analgesics
- Suspected oral cancer
- Conditions likely to exacerbate systemic medical conditions.⁹

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Refereed Paper.

Accepted 12 May 2020

<https://doi.org/10.1038/s41415-020-1702-8>

King’s College Hospital standard operating procedures

King’s College Hospital (KCH) is one secondary care urgent care provider in London treating paediatric patients. This has led to an increased volume of calls through the recently implemented phone triaging service, taking on average 200 calls a day as patients are unable to find primary care alternatives.

The hospital has implemented a consultant-led telephone triage system where a thorough history is undertaken for all patients. A series of flow charts have been formulated for management of acute conditions, providing a clear decision-making tool on care provision. Most patients require self-help advice or remote prescription of antibiotics.

In cases where diagnosis is unclear, a generic secure e-mail has been created to allow parents to securely send clinical photographs. This has aided diagnosis and clinical decision-making. If it is determined that urgent operative treatment is necessary, then the child will be required to attend with only one parent for treatment without siblings (unless exceptional circumstances apply, such as translation issues). Through telephone triaging, patients and their household members are screened for symptoms of COVID-19.

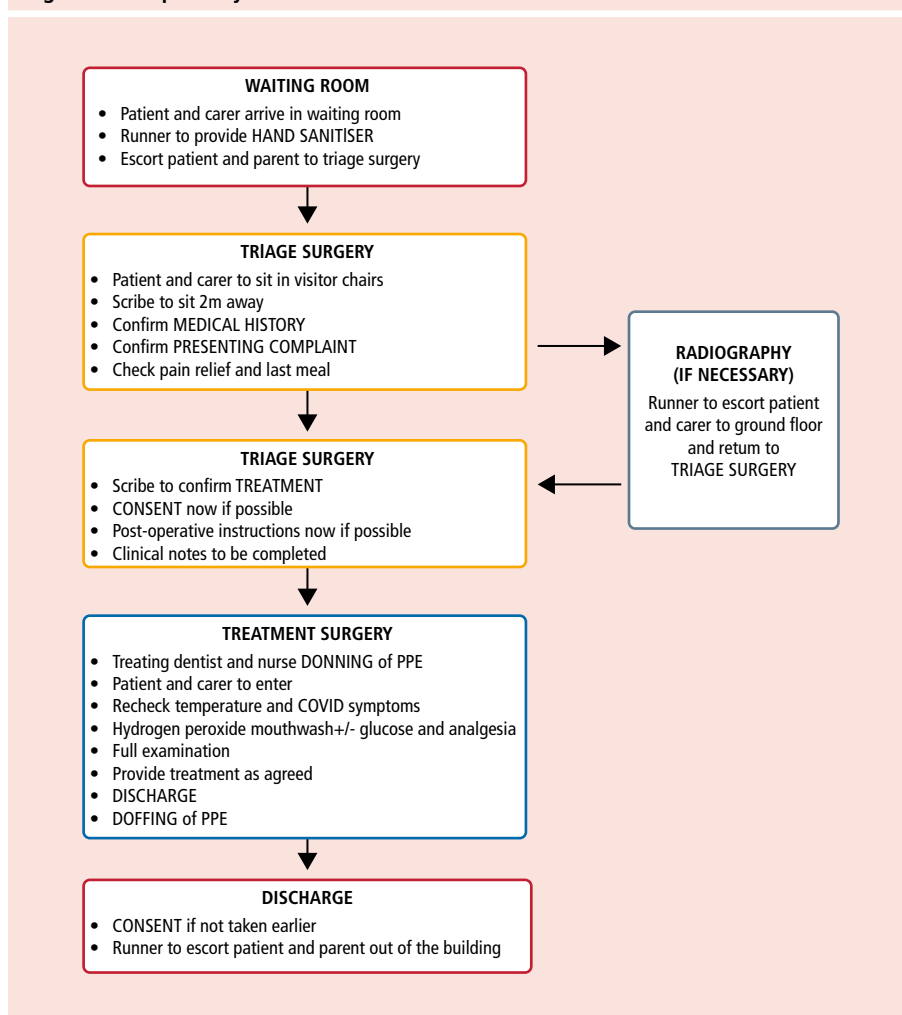
Children represent a unique challenge, as along with the established difficulties in undertaking invasive treatment, they are thought to display only mild COVID-19 symptoms (if any), increasing the chance of being unidentified carriers.^{10,11} More recently, the Paediatric Intensive Care Society have highlighted an increased number of children presenting with a multi-inflammatory state requiring intensive care.¹² This has been shown to have a possible link to COVID-19 and highlights the wide range of symptoms children can present with.

With this in mind, the care pathway (Fig. 1) has been designed to treat every child as a potential COVID-19-positive patient. Therefore, the clinician and nurse providing treatment wear full enhanced PPE.

A team of four staff operate to provide treatment; two dentists, one nurse and a runner, with the aim to reduce patient contact and transmission as much as possible, improve efficiency, minimise the risk of AGPs and obtain maximum use of PPE.

Upon arrival at the hospital, patients are met by the runner. The patient and parent’s temperatures are recorded and they are

Fig. 1 Patient pathway



provided with hand sanitiser. They are then escorted to the Paediatric Dental Department where the first dentist, in universal PPE and two metres away (in accordance with social distancing), takes a full history in the designated triage room. Subsequently, radiographs are taken if deemed clinically necessary. Prescription of radiographic views which reduce the likelihood of triggering a cough or gag-reflex should be undertaken.^{13,14} Therefore, for trauma, standard occlusal views are preferred to periapical films, and for caries diagnosis, extraoral films such as lateral oblique views or a dental panoramic tomogram (DPT) are preferred.

Following diagnosis, treatment planning, consent and delivery of post-operative instructions, the patient and carer are escorted to a second surgery for treatment, where full enhanced PPE will be donned by both the treating dentist (dentist 2) and the nurse. This includes waterproof gowns, FFP3 masks and full-face visors. In order to minimise the use of FFP3 masks, the second dentist and dental

nurse will remain in FFP3 masks for the full emergency session (up to four hours). Prior to any clinical examination, the patient is required to rinse with 1% hydrogen peroxide for 30 seconds. Mouthwash can be used as prescribed, providing the patient can comply with rinsing and not swallowing. This has been shown to reduce potential viral load in saliva.^{5,15} Parents are advised to sit or stand two metres away from the operating clinician, wherever possible, with clear markings placed on the floor for guidance.¹⁶ Following the administration of the rinse, any additional pre-operative analgesia and/or glucose required will be given.

If the patient requires an AGP, rubber dam is used wherever possible, along with high-speed suction in order to limit aerosol risk.¹⁷ With regards to treatment provided, we are carrying out more extractions, especially for primary teeth. In the permanent dentition, we are undertaking extirpations and temporary restorations to minimise AGPs.

Upon completion of treatment, the patient and parent will be escorted from the building.

Recommendation from Public Health England advises vacating the surgery for 20 minutes after AGPs before re-entering to disinfect the room. However this is dependent upon the air pressure. This is believed to reduce the air contamination to less than 1%. The Department of Paediatric Dentistry are following this protocol, along with universal standard precautions for all patients treated.¹⁸ Where a known COVID-19-positive patient has had a dental procedure, the surgery will be deep-cleaned by the hospital estates team before further use.

Inhalation sedation

Given the challenges of working with a paediatric population, including anxiety and a lack of compliance, it is not unrealistic that additional pharmacological behavioural management techniques will be required. Due to limitations associated with access to general anaesthetic operating theatres in the current climate, inhalation sedation (IHS) can be offered as an alternative if non-pharmacological behavioural management techniques (NPBMTs) alone are insufficient.¹⁹ The risk of transmission of COVID-19 associated with IHS has been reported as being low.^{20,21,22} IHS is being used for those patients who cannot cope with NPBMTs and require additional support. Disposable nasal hoods and tubing are being used for all patients to minimise the risk of viral transmission in the decontamination process, with treatment being carried out as efficiently as possible to minimise any risk of aerosol production.

Trauma

With respect to the current climate, a new standard operating procedure has been developed for the management of paediatric dental trauma in conjunction with the restorative team and national guidance. The aims of the standard operating procedure are to decrease the risk of transmission to both patients and staff and to provide effective and efficient treatment (Figures 2 and 3).

Only complicated crown fractures, severe luxation injuries (significant mobility and occlusal interferences) and avulsion of permanent incisors with optimal extra-alveolar dry time should be seen urgently for treatment (Figures 2, 3 and 4).²¹ Splinting will be completed as required. Given the rapidly changing climate, parents should be informed

Fig. 2 Primary tooth trauma standard operating procedure

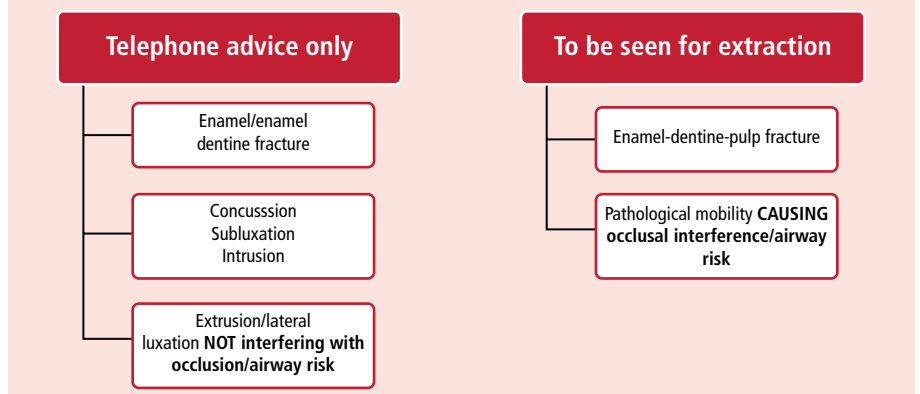


Fig. 3 Permanent tooth trauma standard operating procedure

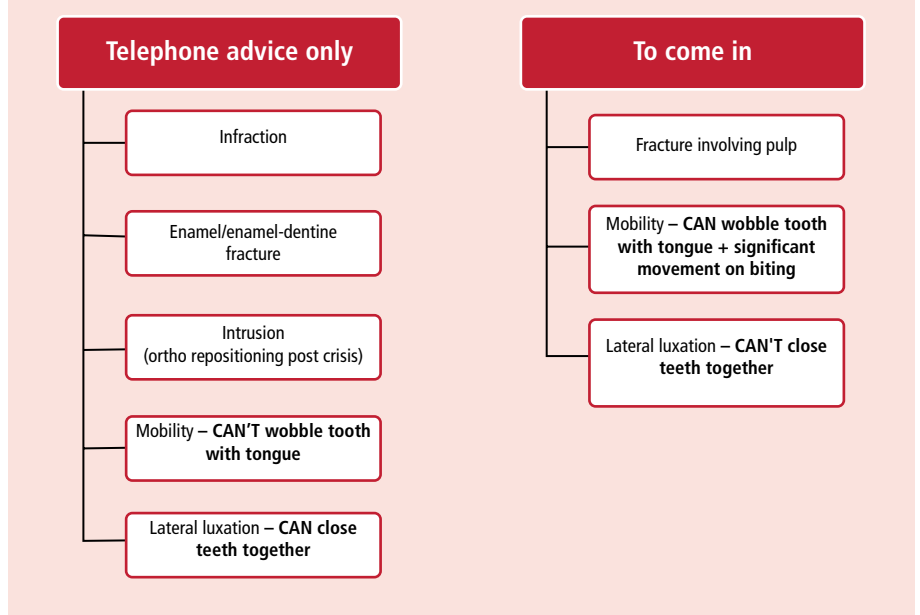


Fig. 4 Permanent tooth avulsion standard operating procedure



Table 1 Diagnoses of patients presenting acutely to the clinic

Diagnosis	Number
Irreversible pulpitis	10
Abscess	4
Buccal swelling	4
Luxation (permanent)	3
Complicated crown fracture (permanent)	3
Complicated crown fracture (primary)	3
Luxation (primary)	2
Reversible pulpitis	2
Uncomplicated crown fracture (permanent)	1
Gingival degloving	1
Retained root of primary tooth	1

that these may not be able to be removed within the ideal time. Telephone advice is given for all uncomplicated crown fractures, luxation injuries without occlusal interference and intrusion injuries, with the aim to treat post-pandemic with orthodontics.

Regarding avulsion (Fig. 4), for permanent incisors in pre-pubertal children with extended dry time (over 30 minutes) or storage in milk (or any other suitable storage medium) for over 60 minutes, telephone advice is given. This is due to the high risk of infra-occlusion in the future and poor long-term prognosis.^{23,24} This is a difficult clinical decision which is made by the triaging dentist. For teeth in post-pubertal children with less than 30 minutes of dry time, or less than 60 minutes in milk, patients are signposted to their nearest UDC for replantation and splinting, providing the patient has no medical contraindication. Where possible, at the same time as replantation and splinting, these teeth are being extirpated in order to prevent the need for re-attendance within two weeks and to mitigate the risk of infection. In all avulsion cases, it is prudent to warn the parents of the risk of pain and infection and the guarded long-term prognosis, with further warnings that, as the situation is constantly changing, splint removal and endodontic treatment may not be possible within the optimal timeframe.²¹

Following the implementation of the COVID-19 care pathway, a prospective audit was undertaken to establish whether appropriate cases were accepted for treatment. By ensuring only essential patients are seen, it

reduces the risk to patients and their families and, wherever possible, maintains vital enhanced PPE.

Local standards

Telephone triage diagnosis will correspond to clinical diagnosis for every patient.

One hundred percent of patients should fit emergency clinic criteria on presentation.

All patients attending should successfully receive operative care.

Method

Audit was registered with the trust governance team.

Sample

All children that attended for urgent operative dental treatment over a three-week period (30 March 2020 – 20 April 2020).

A data collection *pro forma* was piloted and modified accordingly. The following were recorded: triage, clinical diagnosis and treatment undertaken. This was correlated with emergency clinic acceptance criteria for urgent treatment. Data were recorded and analysed on Microsoft Excel.

Results

A total of 34 patients were seen. Of these, 82% (28/34) successfully had operative treatment. One patient was non-compliant for treatment.

Seventy-six percent of patients (26/34) met the set criteria for urgent treatment.

Twenty-four percent (8/34) did not meet the criteria, of which six patients could have benefited from visual triaging facilities being available. Of these patients, three were historic trauma, three could have been managed with further analgesic advice, one was an enamel/dentine fracture and the final patient had already received emergency treatment from their general dental practitioner.

Telephone triage and clinical diagnosis matched for 91% of patients (31/34).

The majority of patients (ten) presented with irreversible pulpitis symptoms, not helped by self-help advice or analgesia. A further eight presented with abscesses/swellings, of which two required urgent oral and maxillofacial admission and management. Most of these patients had already received management with the correct dose and appropriate antibiotics. Three patients had luxation injuries to their permanent dentition. The full range is shown in Table 1.

In terms of treatment, 19 patients had extractions completed successfully, a further three had splints placed and three had pulp caps. Only one patient required IHS; the remaining were treated successfully with local anaesthetic.

Discussion

This audit highlighted the difficulty of determining, in children with trauma, whether urgent treatment was necessary or if analgesia and self-help advice would have been acceptable. Six children could have been diagnosed more accurately with the aid of a virtual video clinic. In accordance with this finding, the current pathway of care has been modified to include the option of a virtual video clinic to further aid diagnosis.¹⁰ The aim of this is to reduce the number of patients attending the hospital unnecessarily (thereby increasing their risk of contracting COVID-19), providing reassurance to patients and parents, and to provide clinician-guided self-help measures. Future iterations of this audit will record how many courses of antibiotics patients have required in order to ascertain those with an urgent need to be seen.

It may also be possible to use this as a means of assisting parents, through clinician-guided instructions, to replant avulsed permanent incisors before hospital attendance. This could significantly improve the prognosis of teeth in the long term.

Our dynamic and forward-thinking team have been efficiently implementing changes

to allow staff to work together safely and to improve patient care. At present, bi-weekly meetings are being held virtually, with the aim of reviewing our clinical practice and re-evaluating the service in line with the rapidly emerging evidence. The audit presented is one key example of this.

Long-term considerations

The current pandemic has the potential to change the dental landscape for the foreseeable future.²⁵ Consideration needs to be given to potential vaccine development, the likelihood of a 'second peak' and the ever-changing evidence-based guidelines which highlight the impact COVID-19 is having upon both dental practitioners and patients. Long-term practice may be changed indefinitely. If pre-operative mouth rinses continue to prove effective, these could become a part of routine procedure, in the same way in which universal standard precautions have developed in response to blood-borne pathogens.²⁶

Conclusion

In these unprecedented times, we have highlighted possible strategies and patient pathways for management of acute pain and dento-alveolar trauma in the paediatric patient. As UDCs begin to open and treat patients, we hope to have highlighted the types of patients likely to be seen and that the use of our protocols may be beneficial when treating patients.

Conflict of interest

All authors declare they have no conflict of interest.

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