

Provision of emergency maxillofacial service during the COVID-19 pandemic : a collaborative five centre UK study

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Abstract

The global pandemic of Coronavirus disease (COVID-19) represents one of the greatest challenges to healthcare systems, and has forced medical specialties to rapidly adapt their approaches to patient care. Oral and Maxillofacial Surgery is considered particularly at risk of disease transmission due to aerosol generation during surgical interventions, patient proximity and operating environment. On day 2 (26th March, 2020) of when severe restrictions in population movement were instigated in the United Kingdom, we began a study to prospectively monitor the presentation and management of maxillofacial emergencies at five hospital trusts. Data was collected onto an online live database fed through a smartphone application. Of the total 529 patients over six weeks, 395 attended for face-to-face consultations and 134 patients received remote consultations via telephone or video link. There were 255 trauma related cases, 221 infection and 48 cases of postoperative complications. Most trauma cases were minor soft tissue injury related to slip, trip or fall at home. There were 44 cases of facial fractures with a tendency for conservative treatment. 19 cases were related to domestic violence or self-harm. Of the 216 dental related emergencies, 68% could have been managed in the primary care setting. A quarter of all emergency patients were satisfactorily managed by remote consultations. There was a significant change in the provision of emergency maxillofacial service during the pandemic lockdown. We discuss the study findings as well as the potential implications in relation to planning for possible further COVID-19 spikes and future pandemics.

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Keywords: COVID-19 pandemic; Maxillofacial emergency; Service provision

Introduction

An outbreak of the novel Coronavirus disease (COVID-19) originated in Wuhan, China and rapidly spread to multi-

ple countries worldwide,^{1,2} the United Kingdom being one of them. It has been shown to spread via person-to-person transmission^{3,4} as well as being present on aero-digestive mucosal surfaces and in saliva; and may cause severe respiratory complications.^{5,6} Oral and Maxillofacial Surgery (OMFS) as a specialty is considered particularly at risk of disease transmission due to aerosol generation during surgical interventions, patient proximity and operating environment.^{7,8}

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In line with the World Health Organization (WHO) declaration of a Global Pandemic and the evidence of rapid community spread of COVID-19 infection in the population, the UK government instituted strict measures on the 24th of March 2020. These lockdown measures included physical distancing, working from home, closure of non-essential services and closure of schools.⁹ On day 2 of the lockdown, we began a study to monitor the provision of OMFS emergency service at multiple National Health Service (NHS) hospital trusts.

The aims and objectives of this study was to analyse the pattern of presentation and management of maxillofacial emergencies during the lockdown. We discuss potential implications of the study findings in relation to planning for current and possible further spikes of COVID-19, and future pandemics.

Methods

This is a multi-centre study involving maxillofacial units based at five NHS hospital trusts: University Hospital Southampton, St. Richard's Hospital (Chichester), Salisbury Hospital, Poole Hospital and Queen Alexandra Hospital (Portsmouth). Together, these hospitals serve a population of 3.93 million people, representing approximately 6% of the UK population.¹⁰

We included all patients who were managed by OMFS departments on an emergency basis during the lockdown period. We prospectively collected data over a period of 6 weeks to the date when the UK government announced retraction of some of the strict restrictions imposed.

The data was collected using an online system through a custom built web-based application and stored onto a central database, making data capture and collection as convenient as possible. Several automated algorithms collated and processed the data, presenting the results on a real time 'Live Whiteboard'. This was readily accessible to all collaborative members of the team so that any learning issues for the department could be picked up quickly and change of practice implemented as necessary in managing their emergency patients flow during the fast moving situation of the pandemic.

Results

There were a total of 529 patients, of which 395 attended for face-to-face and 134 patients received remote consultations via a telephone or video link. The detailed data on a range of parameters examined are listed in Table 1 and Table 2.

There were 255 trauma related cases, 221 infection and 48 cases of postoperative complications. Of those who physically attended the hospital, the majority were treated as outpatients (80.5%, n=318), and 201 received treatment under local anaesthesia. Of those who had surgery under

Table 1
Patient data related to face-to-face consultations.

Variables	Total number of patients: 395 Number of patients (%)	
Age	Median Age : 42 Range : 1-95	
Gender		
Male	206	(52.2)
Female	189	(47.8)
Source of referral		
A&E	287	(72.7)
Dentist	34	(8.6)
GP	21	(5.3)
Other	53	(13.4)
Care setting		
Inpatient	77	(19.5)
Outpatient	318	(80.5)
Treatment modality		
Local Anaesthetic	201	(51.0)
General Anaesthetic	35	(9.0)
Non-Surgical Management / No Treatment	158	(40.0)
Grade of treating / consulting clinician		
Consultant	49	(12.4)
Middle Grade	113	(28.6)
Core/ Foundation Year trainee	233	(59.0)
If taken to theatre: time waiting (n = 35)		
0-1 Hours	15	(42.9)
1-2Hours	7	(20.0)
2-5 Hours	6	(17.1)
5-10 Hours	1	(2.9)
10+ Hours		
Patient's COVID-19 status		
Unknown	373	(94.4)
Positive (tested)	0	(0)
Suspected Positive	6	(1.5)
Negative (tested)	16	(4.1)
Appropriate for remote consultation		
Yes	67	(17.0)
No	328	(83.0)

general anaesthesia (n = 35), the median duration from admission to operating theatre was 3 hours. 60.6% of patients who sustained injuries did so within their house, and most were related to slips, trips and falls (See Fig. 1 and 2). The proportion of injury sustained outside of home was seen to rise towards the end of the lockdown coinciding with an increasing number of cases. There were 17 cases related to domestic violence and 2 of self-harm. None of the patients seen face-to-face were tested positive for COVID-19 at the time of their presentation and treatment, although 6 were initially treated as suspected for the disease. Two patients who were tested positive for COVID-19 received advice remotely and discharged.

Among those who had face-to-face consultations, the clinicians felt 17% (n = 67) could have been managed by remote consultation instead. Of those who had remote consultations, the clinicians felt the majority (97%, n = 130) were appro-

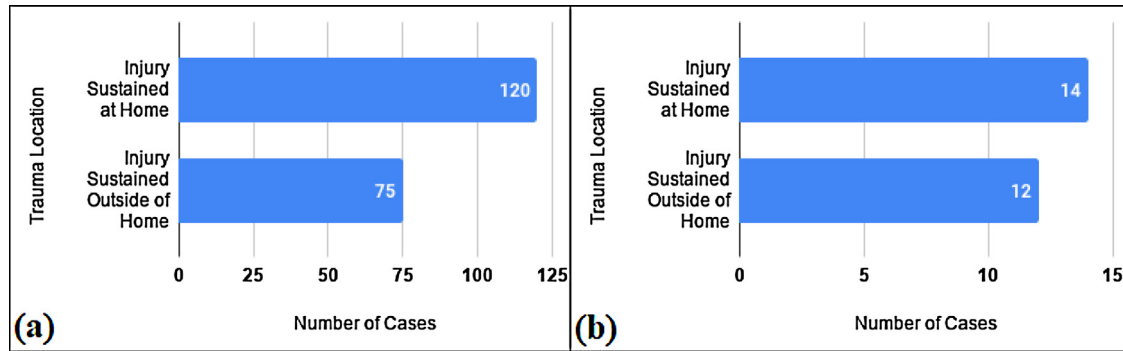


Fig. 1. Location of patient when trauma sustained (a) Face-to-Face consultation (b) Remote consultation.

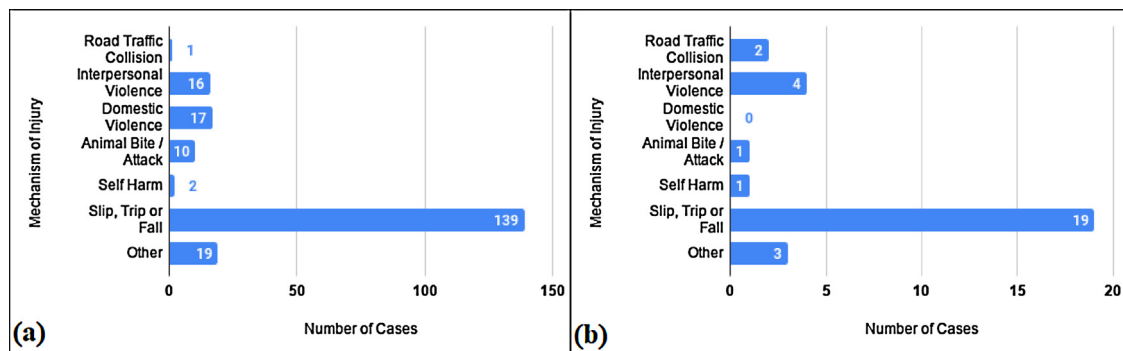


Fig. 2. Mechanism of injury (a) Face-to-Face consultation (b) Remote consultation.

privately suitable for remote management. In this group, most were given advice and discharged on the initial remote consultation or further remote consultation organised. 14.2% (n = 19) were organised to have a face-to-face review on the same or next day. Dental emergencies constituted 40.8% (n = 216) of the total patients seen, a large proportion of them (68%, n = 146) could have been managed in primary care.

Discussion

The utilisation of an online platform readily accessible to all centres led to an excellent uptake of data entry resulting in a large number of subjects for analysis. This study gives a valuable insight into the maxillofacial emergency workload during the time of the initial peak of COVID-19 in the UK.

Maxillofacial emergencies comprise a significant portion of activity for both A&E departments and the specialty itself.^{11,12} One of the most striking findings was that the overall number of cases diminished significantly during the lockdown period. Data available from one centre alone over the same period a year previously revealed 488 cases referred by A&E. This is likely to be due to reluctance of people attending hospitals due to COVID-19, and reduction in the incidence of trauma as most people stayed at home. The proportion of injuries sustained at home was significantly higher than injuries sustained outside of home. However, the gap

began to reduce towards the end of the lockdown as the overall number of cases also rose. The sharp reduction in the number of cases triggered rota changes in some centres, allocating reduced number of doctors in on-call duties, freeing up members of the team to either remain at home or be redeployed to other duties.

The majority of trauma encountered was minor, and resulted from an increase in home related slips, trips and falls. The number of facial fractures reduced significantly with only 9 mandibular fractures and 15 midface fracture cases seen among five centres. The incidence of major trauma was reduced while the proportion of minor soft tissue injury increased. This is in keeping with the general population staying home, reduction in road traffic use, and the closure of bars and pubs resulting in reduced interpersonal violence.

Nevertheless, we noted a few instances of severe facial trauma including domestic violence and suicide attempt. The huge upheaval of self isolating at home and the vast reduction in social activities has been suggested as a detrimental factor in individuals' mental health.¹³ Being in close proximity with others, including family members, through prolonged periods of time with external stress factors can result in heightened tensions, feelings of isolation, loneliness and worsening of existing mental health conditions.¹⁴ Domestic violence victims are, in the vast majority, targeted by family members such as a spouse or member of their immediate household.¹⁵ There were several mainstream media reports of government

Table 2
Patient data related to remote consultations

Variables	Total number of patients: 134 Number of patients (%)	
Age	Median age : 48 Range : 1-95	
Gender		
Male	73	(54.5)
Female	61	(45.5)
Source of referral		
A&E	45	(33.6)
Dentist	21	(15.7)
GP	23	(17.1)
Other	45	(33.6)
Grade of treating / consulting clinician		
Consultant	19	(14.2)
Middle Grade	4	(3.0)
Core/ Foundation Year trainee	111	(82.8)
Consultation outcome		
Advice given and discharged	45	(33.5)
Further remote consultation organised	27	(20.1)
Follow up organised – Face-to-face: Same day	8	(6.0)
Follow up organised – Face-to-face: Next day	11	(8.2)
Follow up organised – Face-to-face: 2 days or more	28	(21.0)
Advised to see primary care practitioner	6	(4.5)
Referred to another specialty	3	(2.2)
Other	6	(4.5)
Patient's COVID-19 status		
Unknown	131	(97.8)
Positive (tested)	2	(1.5)
Suspected Positive	1	(0.7)
Negative (tested)	0	(0)
Appropriate for remote consultation		
Yes	130	(97.0)
No	4	(3.0)

isolation measures fuelling occurrences of domestic violence and mental health illnesses. It was not possible to compare directly the figures of domestic violence and self harm seen in our study to previous figures, however it may be fair to suggest that we may have seen a higher proportion of such cases during the study period. The cases we encountered included a gunshot suicide attempt and assaults by partners, all of which resulted in severe injuries. There is a need for the government to invest in the support systems for the victims of domestic violence and those with mental health issues during the pandemic.

We encountered an increased incidence of dog bites resulting in facial lacerations. This is likely to be a result of people staying in close and prolonged contact with their pets. The

most significant departure from the norm was the almost total absence of road traffic related trauma (See Fig. 2).

OMFS as a specialty is considered to be at particularly high risk due to the generation of aerosols during surgical interventions related to the use of powered surgical instruments⁸ such as bone drills, hand-pieces and reciprocating saws. These can generate aerosol particles up to 50 micrometers in size, hence presenting an infective risk if loaded with pathogens.^{8,16} These aerosols containing viable pathogens can spread for up to 1.5 metres from the operative field.¹⁷ This highlights the importance of appropriate Personal Protective Equipment (PPE) for clinicians in preventing the transmission of the virus.

British Association of Oral & Maxillofacial Surgeons (BAOMS) produced national guidelines at the beginning of the pandemic, and their recommendations were widely publicised through their membership.⁷ We found a relatively good use of PPE, appropriate for the clinical activity undertaken across the region. All clinicians who undertook surgical intervention within the oral cavity utilised the appropriate PPE including FFP3 masks. There was a varying use of PPE for examination only and extraoral surgery, however there was no evidence to suggest inadequate protection (See Fig. 3). It was interesting to note that, among those who physically attended for consultation, not a single patient was known COVID-19 positive at the time of their presentation, and remained disease free during their inpatient stay. The vast majority of the patients had an unknown COVID-19 status, however were treated as if they were asymptomatic carriers of the infection (See Tables 1 and 2).

There was a variation in the treatment of facial fractures, and conservative management strategies were employed more commonly, particularly in the early part of the lockdown. The ballistic injury patient could have been a candidate for early free flap reconstruction for a maxillary defect, however was managed initially with an obturator. A domestic violence case of severe panfacial fractures was treated with open reduction and internal fixation (ORIF) of parasymphiseal mandible fracture, however the midface fractures were managed conservatively. Such cases would have required extended operating times with the use of PPE, and there may have been reluctance in undertaking surgical intervention with high risk of aerosol generation. When ORIF were undertaken, some clinicians implemented steps to try and minimise the aerosol generated by keeping the drill underwater when entering screw holes or using lubricant such as Instillagel or Aquagel instead of water irrigation.

As clinicians adjust to the new normal of routinely wearing PPE, we expect that the treatment of facial fractures during the pandemic will return to established treatment strategies with an increase in the proportion of ORIF. We recommend that any fractures that can wait for over a week are treated as elective cases. For midface and orbital fracture patients, who can safely wait for their surgery for up to 2 weeks, are advised to self-isolate at home for at least a week and have a COVID-19 PCR test carried out within 48 hours of surgery.

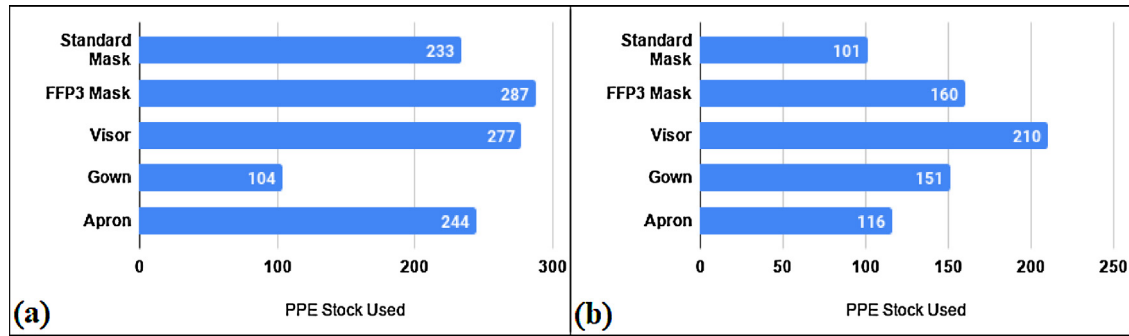


Fig. 3. Use of Protective Patient Equipment (PPE) (a) For patient examination (b) For surgical procedure (when needed).

This is in line with the guidelines published by NHS England for elective procedures.¹⁸

There were a significant number of dental emergency referrals, of which over two-thirds could have been managed by a General Dental Practitioner (GDP) in the primary care setting. Due to the guidance issued by NHS England's Chief Dental Officer and the General Dental Council (GDC), the GDPs were initially advised against seeing and treating patients.¹⁹ Furthermore, the 'Urgent Dental Hubs' designed to treat acute dental problems were delayed and unpredictable in their capacity to provide a service, due to the complexities in organisation and a lack of provision of PPE for the primary care sector. The maxillofacial units and hospital trusts need to urgently liaise with the relevant stakeholders to ensure dentists are adequately prepared to treat their patients prior to any possible further resurgence of peaks of COVID-19.

There was a drive to limit direct patient contact, and all centres implemented remote consultations utilising telemedicine systems. While the telephone consultations were widely used, there were only four video calls made which occurred in one centre only. The video consultation allowed for visual examinations of patients to a degree, for example skin lacerations. Of those patients who attended the hospitals, the assessing clinicians felt that nearly one-fifth could have been managed purely by remote consultation. Only 3% of patients who had remote consultation were deemed inadequate for consultation by this method. These figures confirm the great value of remote consultations even in the management of emergencies.

The level of digital support varied widely with some trusts not having access to video equipment or sufficiently robust internet connections. Up to 74% of patients surveyed in a study demonstrated a preference for remote consultations, particularly considering the cost and time savings made by avoiding travel to appointments.²⁰ The successful rapid deployment of these systems during lockdown has highlighted the capabilities of the systems available, and hospitals should consider continuing their use even after the pandemic period has passed. There is an urgent need to invest further in these systems which will better prepare the hospitals to cope with possible further peaks in the future.

Conclusion

The significant change in the provision of maxillofacial emergency service during the lockdown demonstrated the need for the specialty to prepare its resources and workforce accordingly for possible further peaks of the COVID-19 and future pandemics. Having a robust remote patient management system, and pre-planned pathway for managing dental emergencies would alleviate undue pressure on the service which needs to be established in partnership with various stakeholders involved in providing dental services. The significant reduction in the emergency workload may allow for members of the team to be redeployed to other duties in the hospital. There may be a scope for merging emergency service with other units to allow for cross-cover if one particular hospital were to be overwhelmed by COVID-19 patients and unable to safely run a service. There is a need for government investment in the systems to prevent and support the victims of domestic violence and those with mental health issues during the pandemic.

Ethics statement/ Confirmation of patients' permission

Institutional approval was obtained for the study. Patient consent is not required.

Conflict of interest

We have no conflicts of interest.

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