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**KEY WORDS**

Antarctic, dental morbidity, dental emergencies, evidence-based teaching programme

**LEARNING OBJECTIVES**

- To develop an understanding of dental morbidity in extreme conditions
- To identify common dental emergencies and their management
- To understand medicolegal implications of non-dentists managing dental emergencies
- To understand utilisation of best evidence to update a training programme

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**DENTISTRY WHERE THERE IS NO DENTIST: A RETROSPECTIVE ANALYSIS OF URGENT DENTAL CARE REPORTED THROUGH THE BRITISH ANTARCTIC SURVEY MEDICAL UNIT (BASMU), 2015 – 2020****ABSTRACT**

**Aim:** To evaluate the nature of dental related morbidity in British Antarctic Survey (BAS) deployed personnel, and to compare the findings to those in other deployed population groups. Additional aims include outlining the evidence-based approach to further developing a training programme for non-dentists, to manage dental emergencies.

**Methods:** A retrospective analysis of dental morbidity between 2015 – 2020 reported through the British Antarctic Survey Medical Unit (BASMU) database of dental reported morbidity recorded by deployed medical officers.

**Results:**

Analysis and comparison of dental morbidity in deployed personnel to austere environments revealed similarity, in that relatively minor conditions led to the most significant number of presentations for personnel seeking dental advice when deployed.

**Conclusions:**

Dental morbidity for deployed personnel in austere conditions can present with a range of **symptoms** from relatively minor to severe. Use of best evidence to configure training packages to likely presentations, may limit likelihood of necessitating evacuation from remote locations, or limit morbidity when evacuation is not feasible.

**Introduction**

For 60 years, the British Antarctic Survey (BAS) has been responsible for most of the UK’s scientific research in Antarctica. BAS has its roots in Operation Tabarin, a secret World War II mission with a dual scientific role.<sup>1</sup> Today BAS is a research-driven organisation responsible for world-class polar research and operations. BAS provides and operates world-leading research infrastructure that enables scientists from the UK, and colleagues from many nations, to work safely and effectively in the polar regions.<sup>1</sup>

The British Antarctic Survey Medical Unit (BASMU) is based at University Hospitals Plymouth (UHP) and is contracted to BAS to provide healthcare for those serving in the Antarctic. There are three parts to this function:

- Preparation and screening
- Routine healthcare during deployment
- Managing emergencies including dental emergencies

Due to the geographical location and nature of the environment, Antarctic medicine is unique and challenging (**Figures 1 and 2 provide a snapshot of the setup and the environment**). BASMU works closely with BAS to reduce the risk of illness or injury in deployed personnel; however, despite the best planning possible, people still suffer from illness and injury including dental related morbidity. In most bases or on research ships BASMU provides access to routine and emergency medical care via their deployed medical teams, **but** unfortunately access to dental care is much more restricted. Most of the workload of BASMU doctors is of a routine or minor nature as would be expected in any population, however the extreme environmental conditions, **such as** extreme cold, altitude or trauma, may contribute to medical presentations specific to those environmental conditions. Workload analysis reveals dental related morbidity is, by proportion of workload, a relatively common problem that **must** be managed.<sup>2</sup>

<NOTE TO TYPESETTER: PLEASE INSERT FIGURES 1 & 2>

Peninsula Dental School at the University of Plymouth, with support from its clinical arm Peninsula Dental Social Enterprise Community Interest Company (CIC), has provided education and training for BASMU doctors prior to deployment to the Antarctic. The aim of this training is to equip BASMU doctors with the skills necessary to manage common dental problems and emergencies when access to a dental facility is not possible or delayed. These skills are particularly important during winter

months when evacuation to a dental facility is sometimes not possible and, when it is possible, it may take several weeks to arrange with close consideration needed of the risks/benefits in relation to evacuation which has significant logistical and cost implications.

The Dentists Act 1984<sup>3</sup> restricts the practice of dentistry to registered dental professionals and those in training. This means that, unless dually qualified and appropriately registered with the General Dental Council (GDC), doctors should not treat dental conditions. However, in circumstances where there is limited availability of suitable alternatives, i.e. in BAS locations, the ethical responsibility of a doctor to offer help in an emergency must be considered. Where patients require urgent treatment, such as for pain or sepsis, medical interventions may be justifiable even if the underlying cause might be a dental problem. In doing so, they must be aware of the limits of their competence and consider the availability of other options for care.

From a medico-legal perspective and to avoid a claim for negligence or a finding of impaired fitness to practise by the General Medical Council (GMC), it is generally necessary to demonstrate that any medical intervention undertaken is in keeping with a responsible body of medical or dental opinion. At any one time there may be more than one responsible body, and provided they comply with one such body, even if it is in the minority, they should not be justifiably criticised. The GMC would also expect the same level of record-keeping and the same precautions to safeguard patient confidentiality, wherever treatment takes place.

The Scottish Dental Clinical Effectiveness Programme (SDCEP) have produced a guide for all health care professionals on the appropriate management of acute dental problems<sup>4</sup> and this provides a useful reference for non-dentists in managing dental emergencies. Similarly, there is also guidance from the National Institute for Health and Care Excellence (NICE) on the medical treatment of dental abscesses.<sup>5</sup>

Where medicines are to be provided specifically for the treatment of dental emergencies, medical doctors should be aware of the relevant regulations relating to the procurement, transport and storage of these drugs and any import/export issues that might arise, including restrictions imposed by airline and other transport authorities. The GMC and GDC would also expect that doctors be competent in the dispensing and administering of these medicines, as well as being familiar with the identification and timely treatment of any complications that arise.

Lastly, it is a GMC requirement that all registrants have adequate indemnity in place for the activities they plan to undertake. It is also advisable that all medical professionals undertaking this type of work seek to find out what additional registrations and regulations may be applicable in the territories **in which** they intend to practise.

While taking into consideration the medico-legal ramifications of medical doctors treating dental emergencies, the aim of this paper is to conduct a retrospective analysis of dental morbidity experienced by BAS deployed personnel reported by BASMU doctors between 2015 – 2020 and to compare the findings to those in other population groups. This will allow the medical doctors to be prepared as far as possible to deal with common dental presentations, to limit morbidity and the need for evacuation which in some circumstances may not be feasible, depending on climatic conditions.

## **Materials and methods**

Consultations provided for dental care were analysed using the BASMU database of dental reported morbidity recorded by deployed medical officers. BASMU has maintained a database of all patient episodes in the period of 2015 – 2020 according to date of visit, description of the presenting dental complaint, and actions taken by medical personnel to address the problem. No person-identifiable data were collected. Completion of the NHS Health Research Authority decision tool determined that ethical approval for the analysis was not required.

Data were analysed using Excel 2016 (Microsoft Corporation) and descriptive statistics used to provide an overall summary. Any incomplete or duplicate data was removed from the final analysis. Where there was further clarification needed on data entries, BASMU were consulted. Data were arranged into year groups and by category of dental morbidity using descriptors provided in a previous study in deployed military personnel.<sup>6</sup>

## Results

The most common causes of Dental morbidity over this five-year period are shown in Figure 3.

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This corresponds with data provided by Combes et al. in Operation Herrick, the British military commitment in Afghanistan,<sup>6,7</sup> where fractured/lost restorations and pulpitis were among the most common presenting complaints in military populations.

## Discussion

There **were** limitations to the data, however analysis provided the team at Peninsula Dental Social Enterprise and Plymouth University **with insight** to update the course provided for the BASMU doctors, to ensure that medical personnel were as well equipped as they could be to manage dental emergencies (Figure 4).

<NOTE TO TYPESETTER: PLEASE INSERT FIGURE 4>

Using the data described, the teaching programme focused on what doctors could realistically achieve given the type of dental emergencies they were most likely to encounter. Data analysis **suggested that** the most likely presentations **would include** periapical abscesses, sensitivity, fractured or lost restorations, fractured cusps, and pericoronitis. The data from Combes et al.<sup>8</sup> highlighted the importance of pre-screening and prevention of pericoronitis in deployed personnel, given the challenges that impacted wisdom teeth can present even with dedicated dental teams in theatre, and this was emphasised to deploying personnel.

With regards to periapical abscesses and associated swelling, the doctors were made aware of likely presentations and made familiar with the common dental adages' "if there's pus about, let it out" and similarly "never let the sun go down on pus". The doctors who are almost exclusively on emergency medicine rotas working in busy emergency departments (EDs), were very familiar with dealing with abscesses and minor surgical interventions related to managing acute infections. Teaching focused on giving the doctors an understanding of dental anatomy and tracking of infection so that this could be managed when deployed. For those patients who could not be managed through incision and drainage and/or antibiotics, basic exodontia skills were taught, with the medical students practicing skills on the phantom heads and then progressing onto pig heads (Figure 5). Great emphasis was placed on the significant challenges of exodontia in austere conditions and the

need for remote consultation with a GDC Dental Registrant (Specialist Oral Surgeon) before such treatment should be considered in extremis, and where a successful outcome may be achievable, i.e. mobility of teeth. Minor oral surgery and intra-oral suturing were also covered.

<NOTE TO TYPESETTER: PLEASE INSERT FIGURE 5>

For fractured restorations and teeth, the doctors were made aware of a range of materials and instruments which would be available so these presenting complaints could be managed when deployed. Mixing of materials was practised and a handbook prepared by the nursing team to ensure the doctors could utilise materials to optimise outcomes for patients.

With some BAS personnel deploying for a year or more, as with any deployment, diet can change leading to increased caries risk, so the dental nursing team led a prevention workshop which was very well received by the doctors. Oral hygiene instruction, diet advice, and the use of high fluoride toothpaste and varnishes were all covered so they could provide evidence-based prevention advice as necessary. Materials were provided so that the doctors could run similar dental prevention workshops when deployed in the Antarctic, especially during the mid-winter oral health checks.

Doctors were advised on a range of likely oral medicine presentations ranging from necrotising periodontal diseases to squamous cell carcinoma, and how best to differentiate and manage such conditions should they present. Managing dental trauma was covered following protocols, such as that recommended by Dental Trauma UK,<sup>9</sup> and it was felt that this would not only be of benefit when deployed to the Antarctic but useful for the doctors who had been presented with such situations in UK EDs.

For more extensive trauma, a Consultant Maxillofacial Surgeon provided teaching on immediate management of facial trauma, presentations necessitating evacuation and, where this was not feasible immediately, life-saving interventions specific to the circumstances the doctors will face in these austere conditions.

Feedback from the course (see Table 1) was universally positive with doctors commenting on the transferable nature of the skills to UK emergency medicine while highlighting that they would have liked more coverage of dental emergencies at medical school.

<NOTE TO TYPESETTER: PLEASE INSERT TABLE 1>

**TABLE 1: FEEDBACK FROM BASMU MEDICS**

“Best course I have done.”

“So nice to have a mix of dentists and nurses ... everyone was fantastic.”

“It was all exceptionally well run and very relevant. The whole teaching team were fab.”

“Really great course, in particular all very relevant to what we need to know.”

“Excellent Faculty, well structured, and really well taught.”

“Fantastic four days, thank you very much!”

## Conclusions

The analysis of data highlighted that dental morbidity experienced by BAS deployed personnel was broadly similar to that experienced in other population groups, such as military personnel deployed on operations and patients attending Urgent Dental Care Centres during the COVID pandemic.<sup>10,11</sup> These scenarios share similarities due to limited access to routine dental care.

The data will be used to continually improve the education and training provided to BASMU doctors in managing dental emergencies as well as pre-deployment dental assessment procedures, reporting frameworks, and the specification of ongoing remote dental advice and support to BASMU while personnel are deployed without access to a dental facility.

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