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Running Title:

Significant increase in hospital admissions for the management of severe dental infection in England 2000-2020.

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### **Highlights**

- Dental infection is most commonly caused by the preventable condition dental caries (decay) and usually responds well to early surgical intervention such as incision and drainage, extraction of the tooth or initiation of root treatment.
- Severe dental infection however is a serious and potentially life threatening condition which can necessitate hospitalization for surgical intervention, airway support and medical management.

- Routinely captured hospital episode statistics can be used to monitor trends over time.
- Over the last twenty years the number of admissions to Englands hospitals to deal with severe dental infection has increased more than 3.5 fold from 842 admissions per annum to 3018 admissions per annum.
- In 2019-2020 the number of bed days associated with the management of severe dental infection was 5,629.
- Policymakers and commissioners should investigate this worrying phenomenon to identify the cause and to prevent these potentially avoidable admissions.

### **Keywords**

Humans; Dental Care; Dental Caries; Dental Pulp Diseases; Hospitalization; Abscess; Cellulitis; Sepsis; Tooth Extraction; Drainage; Focal Infection

Dear Editor,

Severe odontogenic infection is the most serious consequence of dental disease<sup>1</sup>. Maxillo-facial cellulitis is most commonly a result of dental caries where the carious lesion extends into the tooth pulp causing irreversible pulpal inflammation leading to pupal necrosis and subsequent peri-apical abscess. Spread of the infection beyond the immediate periapical area is influenced by both local anatomic considerations such as location of tooth apex to mucosal surfaces, tissue planes, muscle attachments and systemic factors<sup>2,3</sup> such as, poorly controlled diabetes mellitus. Spread of infection along tissue planes often leads to pain, swelling, trismus, dysphagia and loss of airway, together with signs and symptoms of sepsis syndrome. Severe odontogenic infection is an emergency that must be promptly treated by a combined surgical (incision and drainage, tooth extraction, airway protection) as well as medical management for infection (IV antibiotics) and symptoms of sepsis as required. The large majority of localised dental abscesses respond to early local surgical intervention such as, tooth extraction or root canal therapy. In 2008 Thomas et al<sup>4</sup> reported a case series of life threatening dental infections and described a doubling in such admissions over the period 1998-2006, this report updates and extends the data on hospital admission in England for the period 2000-2020.

Following the method reported by Thomas et al<sup>4</sup> we accessed routinely captured data on all admissions to NHS hospitals in England between 2000 and 2020. The Hospital Admitted Patient Care Activity (formerly known as Hospital Episode Statistics) data includes information on all patients treated in NHS hospitals regardless of funding source, residential

status or treatment centre location. The Hospital Admitted Care Activity records store information on the main operation and currently up to 24 procedures in total for each hospital episode coded using the *Office of Population Censuses and Surveys: Classification of Surgical Operations and Procedures, 4th Revision (OPCS4)*. According to convention the main operation is normally the most resource intensive procedure or intervention performed during the treatment episode. This report focused only on cases where the management of the dental abscess was the main intervention. We downloaded freely available aggregated data from the NHS Digital website<sup>5</sup>. Trends are reported for episodes where the main operation code was “drainage of abscess of alveolus of tooth” (OPCS4.2 code F16.1). Information was available for each year from 2000-2020 (1 April to 31 March). We calculated the absolute number of admissions and the rate of admission per hundred thousand head of population in order to account for population change over the study period. Over the last 20 years 36,197 people have been admitted to England’s hospitals for the surgical drainage of dental abscesses (Table 1). The number of people admitted for incision and drainage of the alveolus has risen steadily over the last two decades from 842 in 2000-2001 to 3,018 in 2019-2020 (Figure 1). The raw number of cases is more than three and a half times (3.58) higher in 2019-2020 compared with 2000-2001. The rate per 100,000 head of population has also increased steadily from 1.71/100,000 to 5.36/100,000 over the same time period. The rate was 3.13 times higher in 2020 compared with 2000. In the year 2000-2001 1,887 bed days were taken up with the management of dental abscesses, by 2019-2020 this figure had risen to 5,629.

Although odontogenic infection is one of the most common causes of infection in the maxillofacial area it is however a largely preventable condition. The majority of cases are caused by dental caries which occurs due to excessive sugar consumption and inadequate dental hygiene. Despite its preventable nature dental caries rates in the United Kingdom at the last national survey remain high at 31% and dental infection has been shown to be present in 2% of the population<sup>6</sup>. Dental caries and its complications remains a disease linked to health inequalities with the burden of disease falling on the most deprived populations. Moles<sup>7</sup> subsequently analysed the data initially reported by Thomas et al<sup>4</sup> and showed that there was a widening social gradient meaning that patients from lower socioeconomic groups were also far more likely to experience the most serious of sequelae. The majority (86.3%) of these admissions were classified as emergencies and again the most affluent patients were least likely to be admitted as an emergency. In response Freeman<sup>8</sup> expressed hope that reforms begun in 2006 would lead to “accessible NHS dentistry for all”. While it is not

possible to attribute causality we note that numbers have continued to rise in the twelve years since these concerns were first raised and show no sign of levelling off or improving. The increase may be due to poor access to dental care in deprived areas, an inability to pay for dental treatment leading to neglect until serious complications arose or other systemic changes in the provision of dental care in England. The identification of this surprising and sustained increase in admissions to hospital for the management of severe odontogenic infections should cause policy makers and commissioners to investigate this phenomenon further, identify risk factors and improve dental health especially in socio-economic groups at higher risk of hospital admission for this potentially life threatening infection.

#### **Ethics approval and consent to participate**

Not applicable.

#### **Consent for publication**

Not applicable.

#### **Availability of data and material**

Not applicable.

#### **Authors contributions**

All authors have contributed to the manuscript.

#### **Patient and public involvement**

None, paper is of interest to patients and public. An observational study.

#### **Transparency declaration**

The author affirms the manuscript is an honest accurate and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

#### **Declaration of Competing Interests**

None.

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Table 1. Number and Rate/100,000 pops of Hospital admissions for drainage of dental abscess  
2000-2020

Year	N	Rate /100,000
2000-01	842	1.71
2001-02	884	1.79
2002-03	963	1.94
2003-04	1,060	2.12
2004-05	1,219	2.43
2005-06	1,431	2.83
2006-07	1,522	2.99
2007-08	1,625	3.16
2008-09	1,799	3.47
2009-10	1,749	3.35
2010-11	1,774	3.37
2011-12	2,086	3.93
2012-13	2,127	3.98
2013-14	2,174	4.04
2014-15	2,281	4.20
2015-16	2,270	4.14
2016-17	2,244	4.06
2017-18	2,558	4.60
2018-19	2,571	4.59
2019-20	3,018	5.36

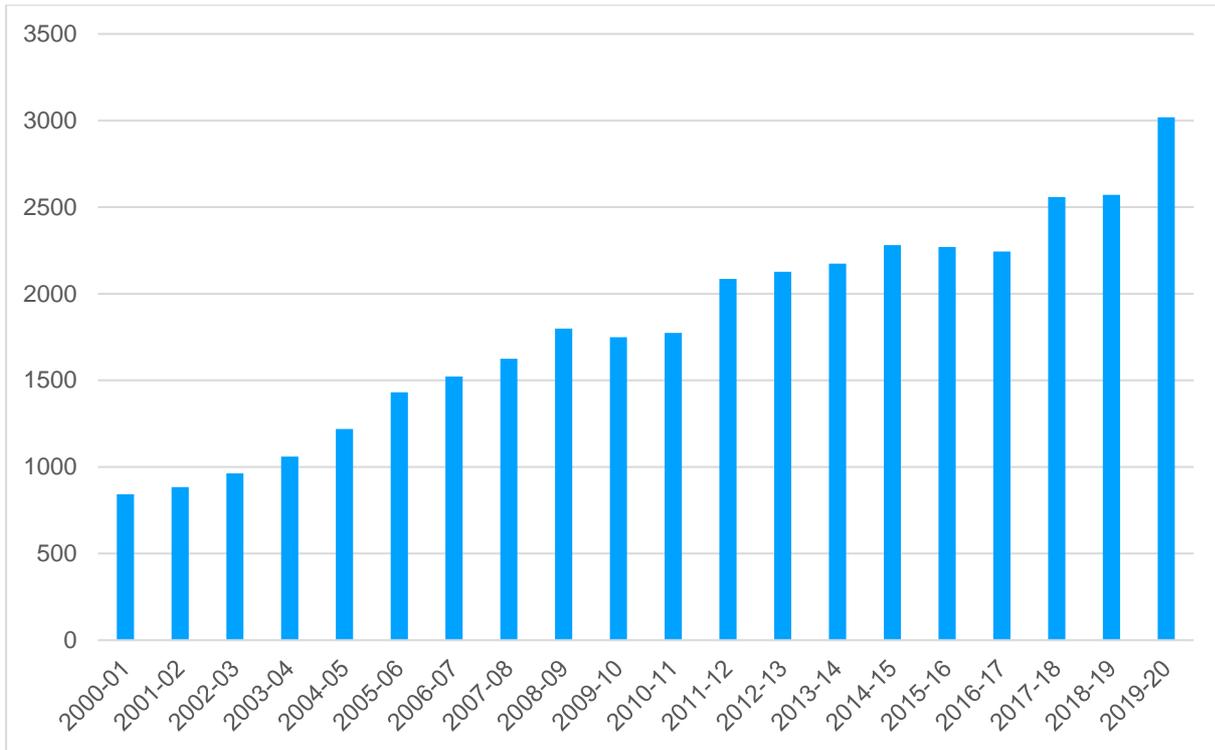


Figure 1 Rising number of hospital admissions for drainage of dental abscesses in England 2000-2020

