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Acute oral and maxillofacial admissions to Tauranga Public Hospital: 2005-2019

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Abstract

Background: Specialist acute oral and maxillofacial surgery (OMFS) is a critical part of public sector healthcare services, yet accessing OMFS specialist care is of great concern, especially in smaller urban and rural centres in New Zealand. This study was undertaken to provide an overview of acute admissions to the oral and maxillofacial surgery service at Tauranga Public hospital over a 15-year period, from January 2005 to December 2019.

Methods: Principal diagnostic category codes and demographic data on all acute admissions were obtained from the Bay of Plenty District Health Board. Those were categorised as either trauma (soft tissue and hard tissue), infections (dental-related and other facial), treatment complications or miscellaneous (including sinus pathologies, malignancies, otolaryngology and other medical management).

Results: There were 787 patients included in the study (age range 1 to 95 years), just over three in five of whom were male. Most admissions arose from either trauma or infection. In a background of an OMFS workforce crisis and rising population over that period, trauma rates fell while infection rates rose. This represents an escalation of unmet dental disease treatment needs; hospital admissions for odontogenic infections disproportionately affected Māori and those in the 20-39 age group.

Conclusions: The high rates of serious dental infections in key vulnerable groups likely reflect their inability to access primary dental care.

Introduction

The provision of specialist acute oral and maxillofacial surgery (OMFS) in New Zealand is a critical part of public sector healthcare services, yet accessing OMFS specialist care is of great concern, especially in smaller urban and rural centres. A recent workforce study revealed that numbers in this service are declining and public hospitals are finding it increasingly difficult to attract newly qualified surgeons to help provide it.[1] Tauranga Public Hospital (TPH) in the Bay of Plenty (New Zealand) is one of the few regional hospitals that provides specialist OMFS services. However, a recent review of the delivery of publicly-funded oral health services in the Bay of Plenty identified that it is of critical concern and not prepared to meet the region's future oral health needs.[2]

The same two surgeons made up the workforce of the OMFS unit at TPH over the study period. There are no dedicated junior clinical staff but general resident medical officers assist with OMFS ward duties. Outpatient clinics have had to be held in the private rooms of the surgeons because there was no dedicated dental facility for this service. This lack of adequate facilities and resources at TPH means that the service provided falls short of that provided in almost all other district health boards in New Zealand.[2]

The Bay of Plenty is the fifth largest region by population (and one of the fastest growing) in New Zealand.[3] Currently having larger than (national) average older people and Māori populations, well over half of the region's population can be categorised as deprived, with this disproportionately impacting Māori and Pacific people.[4] Where NZ case series analyses have demonstrated how older people and Māori can be over-represented in acute maxillofacial care, albeit for different reasons,[5-6] there has been no systematic investigation of these issues in the Bay of Plenty, with its unique demographic profile.

Accordingly, this consecutive case series analysis describes the demographic and aetiological characteristics of acute cases requiring inpatient management at TPH over a 15-year period. By using TPH as the lens, this study aimed to highlight the major oral health issues in New Zealand and the impact of the current OMFS workforce crisis on health among those seeking to utilise those services.

Methods

Data were collected on consecutive patients requiring acute admission under the oral and maxillofacial service at TPH from January 2005 to December 2019. Information on age, sex and ethnicity, and presentation aetiology was obtained from the Bay of Plenty District Health Board–Health Network. A report was obtained using Principal Diagnostic I10 Category Codes, for all relevant oral and maxillofacial procedures.[7]

As well as Tauranga city and its immediate environs, the service area for TPH also included Waihi Beach, East Cape, and Ruatahuna. The main other population centres are Opotiki, Kawerau, Whakatāne, Katikati and Waihi Beach.[4] Rotorua was excluded because its acute OMFS cases are sent to Waikato Public Hospital, in Hamilton. Patients who were admitted under another surgical specialty but were treated as inpatients by the OMS service were not captured in this study. Patients managed as outpatients were also not included. Those who had presented more than once during the observation period were treated as discrete cases.

Non-Māori (NZ European, Pacific Island, Indian, Asian and Other ethnicities) were combined to make a single ethnic category.

Acute admissions were categorised according to the major types: trauma (soft tissue and hard tissue), infections (dental-related and other facial), treatment complications and miscellaneous. Miscellaneous treatment covered sinus pathologies, malignancies, otolaryngology and other medical management.

Statistical analysis was undertaken using Stata. Following the computation of descriptive statistics, comparisons were made using cross-tabulations and chi-square tests, with statistical significance set at $P<0.05$. All data used in this study had been de-identified and obtained from public records for audit purposes; as such, ethics approval was not required.

Results

There were 787 patients, ranging in age from 1 to 95 years. Just over three in five cases were male, and that proportion was relatively steady throughout the observation period (Table 1). Despite increases in the number of cases for the 40-59 and 60+ age groups, no clear trend was observed over that time; the majority

Table 1: Number of acute maxillofacial admissions treated for the periods 2005–07, 2008–10, 2011–13, 2014–16 and 2017-2019 by demographic characteristics and treating surgeon (brackets contain column percentages unless otherwise indicated)

	2005–2007	2008–2010	2011–2013	2014-2016	2017-2019	Total
Sex						
Male	60 (61.2)	107 (64.5)	101 (54.0)	120 (66.3)	86 (55.5)	474 (60.2)
Female	38 (38.8)	59 (35.5)	86 (46.0)	61 (33.7)	69 (44.5)	313 (39.8)
Age group (years)						
0–19	31 (31.6)	41 (24.7)	36 (19.3)	43 (23.8)	31 (20.0)	182 (23.1)
20–39	43 (43.9)	75 (45.2)	84 (44.9)	64 (35.4)	67 (43.2)	333 (42.3)
40–59	19 (19.4)	32 (19.3)	38 (20.3)	45 (24.9)	41 (26.5)	175 (22.2)
60+	5 (5.1)	18 (10.8)	29 (15.5)	29 (16.0)	16 (10.3)	97 (12.3)
Ethnicity						
Non-Māori	64 (65.3)	120 (72.3)	120 (64.2)	125 (69.1)	88 (56.8)	517 (65.7)
Māori	34 (34.7)	46 (27.7)	67 (35.8)	56 (30.9)	67 (43.2)[a]	270 (34.3)
Surgeon						
Surgeon A	50 (51.0)	122 (73.5)	141 (75.4)	142 (78.5)	114 (73.6)	569 (72.3)
Surgeon B	48 (49.0)	44 (26.5)	46 (24.6)	39 (21.6)	41 (26.5)	218 (27.7)
All combined	98 (12.5)	166 (21.1)	187 (23.8)	181 (23.0)	155 (19.7)	787(100.0)

[a] $P<0.05$

Table 2: Number of acute maxillofacial admissions for the periods 2005–07, 2008–10, 2011–13, 2014–16 and 2017-2019 by presentation aetiology (brackets contain column percentages unless otherwise indicated)

	2005–2007	2008–2010	2011–2013	2014-2016	2017-2019	Total
Presentation aetiology						
Trauma						
Fractures						
Midface	6 (6.1)	16 (9.6)	10 (5.3)	15 (8.3)	5 (3.2)[a]	52 (6.6)
Mandible	19 (19.4)	34 (20.5)	33 (17.7)	20 (11.1)	20 (12.9)	126 (16.0)
Dental	3 (3.1)	3 (1.8)	8 (4.2)	6 (3.3)	4 (2.6)	24 (3.1)
Other fractures	1 (1.0)	3 (1.8)	1 (0.5)	4 (2.2)	1 (0.7)	10 (1.3)
Soft tissue	5 (5.1)	14 (8.4)	10 (5.3)	15 (8.3)	6 (3.9)	50 (6.4)
Other trauma	1 (1.0)	2 (1.2)	2 (1.1)	2 (1.1)	0 (0.0)	7 (0.9)
Infections						
Dental infections	40 (40.8)	53 (31.9)	73 (39.0)	60 (33.2)	67 (43.2)[a]	293 (37.2)
Other facial infections	1 (1.0)	11 (6.6)	16 (8.6)	20 (11.1)	15 (9.7)	63 (8.0)
Treatment complications	9 (9.2)	10 (6.0)	9 (4.8)	11 (6.1)	12 (7.7)	51 (6.5)
Miscellaneous	14 (14.3)	22 (13.3)	27 (14.4)	32 (17.7)	26 (16.8)	121 (15.4)

[a] $P<0.05$

Other Fractures – Include Nasal and Orbits

Table 3: Acute maxillofacial admission aetiology by sex, ethnicity and age group characteristics (brackets contain column percentage, unless otherwise indicated)

	Any infection	Any fracture	Soft tissue injuries	Miscellaneous	Treatment complications
Sex					
Male	183 (51.4)[a]	172 (81.1)[a]	30 (60.0)	64 (54.2)	25 (49.0)
Female	173 (48.6)	40 (18.9)	20 (40.0)	54 (45.8)	26 (51.0)
Ethnicity					
Non-Māori	208 (58.4)[a]	143 (67.5)	38 (76.0)	39 (76.5)	89 (75.4)
Māori	148 (41.6)	69 (32.6)	12 (24.0)	12 (23.5)	29 (24.6)
Age group (years)					
0–19	60 (16.9)[a]	95 (44.8)[a]	27 (54.0)[a]	28 (23.7)[a]	4 (7.8)[a]
20–39	166 (46.6)	76 (35.9)	6 (12.0)	38 (32.2)	23 (45.1)
40–59	102 (28.7)	23 (10.1)	9 (18.0)	26 (22.0)	12 (23.5)
60+	28 (7.9)	18 (8.5)	8 (16.0)	26 (22.0)	12 (23.5)
All combined	356 (45.2)	212 (26.9)	50 (6.4)	118 (15.0)	51 (6.5)

[a] $P<0.05$

of cases were aged 20-39 years. Almost one third of the total cases were Māori, although that proportion had risen to two in five in 2017-19. The total number of acute admissions increased by 70% and 90% in 2008-10 and 2011-13 respectively, from the initial 2005-07 period; however, there was a 15% reduction in acute admissions from 2014-16 to 2017-19.

Data for presentation aetiology are presented by period in Table 2. Across the observation period, there was an increase in the proportion of admissions due to infections, while those due to trauma fell steadily. Dental infections made up the great majority of infection-related presentations. The miscellaneous treatment category comprised three in twenty of the acute oral and maxillofacial admissions, whereas treatment complications were less frequent.

While there was little difference in the proportion of male and females admitted with infections or treatment-complication-related admissions, there was a marked sex difference with fractures (Table 3). The most frequent reason for Māori to be admitted to the services was infections, and Māori made up a substantial proportion of all infection-related acute admissions. Those aged 0-19 years comprised a large proportion of the fracture and soft tissue injuries presenting, whereas there where higher proportions of infections, miscellaneous admissions and treatment complications in the 20-39 age group.

Discussion

This case series analysis described demographic and aetiological trends in acute maxillofacial presentations requiring acute inpatient management in a New Zealand provincial hospital over a 15-year period. Our principal findings appear to be consistent with observations from other OMFS centres in the country.[5,6,8] An increasing proportion of the acute admissions were due to infections, mostly odontogenic in origin, while those from serious facial trauma fell steadily. Māori continue to be disproportionally represented with respect to acute OMFS admissions, a pattern seen throughout New Zealand.[5] Māori accounted for a substantial proportion of all infection-related acute admissions.

There are some methodological issues to be taken into account before considering the study findings. These were data from only one provincial area, restricted to the aforementioned limits within that region. Rotorua, the second largest city within the Bay of Plenty region, was excluded because its OMFS cases are managed by Waikato hospital. The study data cannot be considered to represent all Bay of Plenty region acute OMFS admissions. Acute presentations managed as outpatients (such as minimally displaced fractures or odontogenic infections requiring routine exodontia) were also excluded, and this also limits the comparability of the findings to those from other locations. It is not uncommon for patients suffering multiple trauma to be admitted under another surgical speciality, e.g. orthopaedic surgery. This study did not capture treatment provided to patients admitted under another service. Conversely, strengths of the study include (a) the length of the observation period, and (b) OMFS services being provided by just two on-call consultants for the entire observation period; this is unique for a case series analysis of this type and allows for more consistent admission and treatment patterns. This study presents a rare look into a centre outside of the main tertiary OMFS centres within New Zealand.

Over the reported 15-year period, the catchment population for this service grew substantially. The population for the Bay of Plenty health district at the beginning of the observation period was estimated to be 200,000. By the end of the reported period, it was estimated to be 265,000, a 32.5% growth.[3] The study data should therefore be interpreted in light of that population growth. Despite the rapid growth, the region remains underserved with respect to OMFS services. Within the city of Tauranga (the largest in this catchment), 18% of the population is Māori, higher than the national average of 16.5%, and 19.7% of

the population is 65 years or older, higher than the national average of 15.2%.[8] This demographic profile is concerning because both Māori and older adults utilise a disproportionate amount of acute OMFS service for both conservative and operative needs.[5-6] The continued decline in numbers of the public OMFS workforce will exacerbate existing barriers to access, with the greatest impact on these vulnerable groups who need it the most.

The OMFS workforce is ageing, there are fewer newly trained surgeons entering public practice, and there is less job satisfaction for those who remain.[1] This is of a concern for the burden of care that remains. Many of the major tertiary centres are already struggling to meet the needs of their own communities before accepting patients from outside their catchment.[2] Regional services such as TPH are able to provide local treatment for their patients, thereby reducing unnecessary referrals to tertiary centres such as that in the Waikato. The total of 787 admissions over the 15-year period represents one admission for an acute OMFS presentation each week. That such admissions are able to be dealt with locally is likely to improve patient outcomes because it takes place in a familiar setting, close to whānau, and with treatment by known members of the community, while also avoiding the costs of hospital transfers and treatment delays.

There were noteworthy trends in admission aetiology which accurately reflect those seen throughout New Zealand. Acute admissions from trauma, namely serious trauma, continue to fall despite the increasing population.[5,6,8] This suggests that important public health gains in trauma prevention continue to be made across the motu. A combination of factors such as improved road and vehicle safety, the continued social marginalisation of interpersonal violence and excessive alcohol use, and better prevention of sporting injuries have likely contributed to these changes. A well-documented observation from other studies in New Zealand is that fall-related facial fractures are rising among the older adult population.[5,6,8] This should be of great concern for the OMFS speciality and needs to be considered in workforce planning, especially for centres such as Tauranga with increasingly ageing populations. Fall-related facial fractures commonly result in minimally displaced fractures which can be managed conservatively in an outpatient setting.[5] Our exclusion of outpatient managed care means that it is likely that our fall in trauma rates more accurately reflects a decline in serious facial trauma requiring acute admission.

In contrast to the apparent gains in serious facial trauma prevention, admissions for serious odontogenic infections increased. These are usually the result of an acute exacerbation of untreated dental disease. Many odontogenic infections requiring admission are life-threatening and associated with considerable suffering. Moreover, the associated surgery can be disfiguring, with the need to place external neck drains. High rates of untreated dental disease in New Zealand have long been noted in Māori and those of low socioeconomic position.[10] In contrast to trauma, there was no apparent sex difference in infections. Dental care is free for all people aged under 18 years of age in New Zealand. The 0-19 year age group in this study accounted for 16.9% of the admissions for the entire period. In the group aged 20-39 years, the proportion of infection-related admissions was almost three times that, at 46.6%. The rise in admissions for acute dental infections matches the rise in unemployment linked to the global financial crisis at this time. Financial barriers affect access to primary dental care, and this increases the likelihood of someone presenting with a serious odontogenic infection and requiring acute admission. The cost of managing severe odontogenic infections is substantial, and greater demand for this advanced care by OMFS services will further burden a public healthcare sector which is already struggling to cope.[11] Better oral health knowledge, behaviours, and better health support networks—and, of course, having fewer teeth at risk—may have contributed to the lower rate of infection-related admissions observed in the abundant 60+ age group.[12] Strategies to promote oral health and access to primary dental care among local health providers, focusing on prevention, are likely to ease the burden of acute admissions and pressure on the declining OMFS services, but it will be neither easy nor quick.

Further studies are necessary to investigate the impact that provincial OMFS services have on reducing the burden at main centres. Although continued efforts to raise oral health awareness, and prevent oral disease and trauma should be encouraged, this study raises concerns about the access and delivery of OMFS services in the rapidly-growing Bay of Plenty region.

Conclusion

This study describes the trends in hospital admissions for an acute OMFS service which largely remained unchanged over a 15-year period. The two main issues facing this service, representative of New Zealand, were facial trauma and odontogenic infections. Despite an increasing population, admissions for facial trauma declined over this period, demonstrating that public health measures for trauma prevention are working in this region. Severe odontogenic infections increased over the study period and disproportionally affected Māori. In the 20-39 year age group immediately following the cessation of free dental care the acute admission rates for serious dental infections almost tripled. It appears that the escalation of unmet dental disease could greatly reduce if vulnerable groups were given better access to primary dental care. Persistent untreated primary dental disease and the declining nationwide workforce to manage the serious escalations of this disease present challenges for health and workforce planners.

Conflict of Interest

The authors declare no conflicts of interest.

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