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Maxillofacial trauma and the GDP – specialty recognition and patterns of referral

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ABSTRACT

Objective: To investigate New Zealand GDPs' awareness of maxillofacial trauma and to identify their associated referral patterns. **Design:** Cross-sectional survey of a random sample of GDPs. **Method:** A nationwide postal questionnaire survey was sent to GDPs on the New Zealand Dental Register, maintained by the Dental Council of New Zealand. The questionnaire requested socio-demographic details, together with information on the availability of specialist services and their need for continuing professional development in oral and maxillofacial surgery (OMS). The questionnaire also asked the GDPs to indicate which specialty (plastic surgery, ear nose and throat (ENT) surgery, OMS and Other) they expected to manage—and to which specialty they would refer—seven types of maxillofacial injury.

Results: Some 377 GDPs responded (76.6%). The majority of GDPs expected OMS to manage maxillofacial trauma, except for facial lacerations and isolated nasal fractures which were expected to be managed by plastic surgery (83.0%) and ENT surgery (79.7%), respectively. Most GDPs (48.0% to 87.9%) referred maxillofacial trauma to OMS, except for isolated nasal fractures, for which there were similar proportions referred to ENT surgery and OMS (45.8% and 41.4%, respectively). Differences in awareness of and referral patterns for maxillofacial trauma were identified by dentist characteristics. Most GDPs (96.0%) felt there was a need for continuing professional development in OMS, and most (84.1%) preferred this to be in the form of lectures and seminars.

Conclusion: The first-ever study of GDP referral patterns for maxillofacial trauma in New Zealand has revealed that most GDPs in New Zealand referred maxillofacial trauma appropriately to OMS.

INTRODUCTION

The management of maxillofacial injuries is a complex and specialised field of surgery. Oral and maxillofacial trauma includes injuries to the hard and soft tissues of the mouth, face and jaws and in severe facial trauma is often concurrent with other injuries, particularly head trauma, orthopaedic trauma and thoracic trauma (Follmar et al, 2007). In New Zealand, the incidence of maxillofacial fractures has increased; mandibular fractures are the most common maxillofacial fractures, followed by zygomatic complex and dentoalveolar fractures (Buchanan et al, 2005; Lee, 2009). The most common cause of maxillofacial fractures is interpersonal violence (Sinclair, 1979; Hammond et al, 1991; Kieser et al, 2002; Buchanan et al, 2005; Lee, 2009), and alcohol is implicated in half of facial fracture presentations (Lee and Snape, 2008).

Oral and maxillofacial surgeons have unique expertise in the management of maxillofacial trauma due to their background in both dentistry and medicine leading to advanced specialist training in OMS. According to the International Association of Oral and Maxillofacial Surgeons, OMS is “the surgical specialty that includes the diagnosis, surgical and related treatments of a wide spectrum of diseases, injuries, defects and aesthetic aspects of the mouth, teeth, jaws, face, head and neck”. Plastic and ENT surgery also manage maxillofacial trauma, however, and an overlap of the three surgical specialties exists, leading to some debate as to which specialty is most suited to providing the optimal overall management of maxillofacial trauma. Occasionally, this overlap potentially turns into somewhat of a “turf battle” in teaching hospitals as the respective specialist units compete for valuable clinical experience in maxillofacial trauma management (Bell, 2007).

Most major maxillofacial trauma patients are transferred to a hospital in the first instance, with readily available access to OMS, plastic surgery and ENT specialist services in all of the larger regional centres. However, the GDP may be the first point of contact for the maxillofacial trauma patient, particularly in rural or remote locations. The aim of this study was to determine New Zealand GDPs' awareness of maxillofacial trauma and to identify their associated referral patterns.

METHOD

A nationwide postal survey of 700 New Zealand GDPs was conducted in 2008. Ethical approval was granted by the University of Otago Ethics Committee. The sample was selected randomly from the 2007 New Zealand Dental Register, maintained by the Dental Council of New Zealand. Specialists and those who did not hold annual practising certificates were excluded from the sampling frame. The survey questionnaire was posted with a covering letter explaining the study's purpose, and a free return envelope was included for returning completed forms. One month later, a second wave of forms was sent to the dentists who had not yet responded. This was accompanied by an amended covering letter. A prize draw was offered as a participation incentive.

Along with data on respondents' socio-demographic characteristics, the questionnaire sought respondents' details of the following: previous employment as a dental house surgeon; previous military experience; specialist services available in their local practice area; and regional specialist services available nearest to their practice area. Respondents were also asked to indicate, from a list of seven clinical situations, the specialty they would expect to manage them and the specialty they would refer them to. The four specialties were: Plastic surgery; ENT surgery; OMS and Other. Information was also gathered on respondents' understanding of OMS as a specialty of dentistry, medicine,

both, or unsure; need for continuing education; and preferred means of disseminating the continuing education.

For reporting purposes, respondents were grouped by: gender; year of graduation (Pre-1980, 1980-1989 and 1990+); practice type (private and private/public); country of graduation (New Zealand and overseas); experience as a dental house surgeon; and previous military experience.

The survey responses were entered into an electronic database, and then analysed using the Statistical Package for the Social Sciences (SPSS). Associations between categorical variables were tested for statistical significance using the Chi-square test, with the alpha level set at 0.05.

RESULTS

Of the original random sample of 700 GDPs, 243 were outside the sampling frame, either because they were retired or deceased, or because their questionnaires had been returned due to incorrect address details. The 327 questionnaires returned from the remaining 457 general dental practitioners represented a response rate of 71.6%. The socio-demographic characteristics of the participants are summarised in Table 1. A higher proportion of males than females and more of the oldest graduating cohort (followed by the 1980-1989 graduating cohort) had previous military experience.

Table 1. Previous house surgeon experience and military experience, by dentist characteristics (brackets contain percentages)

	Experience as a house surgeon	Previous military experience	All combined
Sex			
Female	35 (43.8)	1 (1.3) ^a	80 (24.5)
Male	80 (32.4)	38 (15.4)	247 (75.5)
Graduating cohort			
Pre-1980	45 (38.1)	19 (16.1) ^a	118 (36.1)
1980-1989	28 (26.4)	17 (16.0)	106 (32.4)
1990+	42 (40.8)	3 (2.9)	103 (31.5)
Practice type			
Private	94 (36.4)	31 (12.0)	258 (78.9)
Private/public	21 (30.4)	8 (11.6)	69 (21.1)
BDS source			
Overseas	16 (29.1)	9 (16.4)	55 (16.8)
New Zealand	99 (36.4)	30 (11.0)	272 (83.2)
All combined	115 (35.2)	39 (11.9)	327 (100.0)
Missing responses	0	0	0

^aP<0.05

Data on whether GDPs considered OMS to be a specialty of dentistry, medicine or both are presented in Table 2. Overall, most respondents (81.9%) considered it to be a dual specialty. A higher proportion of the oldest graduating cohort and NZ-qualified GDPs considered OMS to be a specialty of dentistry alone.

Regarding the availability of local specialist services in GDPs' practice areas, emergency medicine (77.2%), general surgery (74.4%), OMS (72.8%) and ENT surgery (69.4%) were significantly more available than plastic surgery (56.3%). Only 13.4% of GDPs had none of these specialist services in their local practice area.

In regards to the availability of regional specialist services in GDPs' practice areas, emergency medicine (90.5%) was

Table 2. Number of GDPs who consider OMS a specialty of dentistry, medicine or both, by dentist characteristics (brackets contain percentages)

	Dentistry alone	Medicine alone	Dentistry and medicine
Sex			
Female	11 (13.8)	1 (1.3)	68 (85.0)
Male	42 (17.1)	5 (2.0)	199 (80.9)
Graduating cohort			
Pre-1980	26 (22.0) ^a	0 (0.0)	92 (78.0)
1980-1989	15 (14.3)	0 (0.0)	90 (85.7)
1990+	12 (11.7)	6 (5.8)	85 (82.5)
Practice type			
Private	42 (16.3)	5 (1.9)	210 (81.7)
Private/public	11 (15.9)	1 (1.4)	57 (82.6)
BDS source			
Overseas	5 (9.1) ^a	3 (5.5)	47 (85.5)
New Zealand	48 (17.7)	3 (1.1)	220 (81.2)
Experience as dental house surgeon			
No	29 (13.7)	5 (2.4)	177 (83.9)
Yes	24 (20.9)	1 (0.9)	90 (78.3)
Previous military experience			
No	43 (15.0)	6 (2.1)	238 (82.9)
Yes	10 (25.6)	0 (0.0)	29 (74.4)
All combined	53 (16.3)	6 (1.8)	267 (81.9)
Missing responses	1	1	1

^aP<0.05

significantly more available than all other specialist services. OMS (81.3%), anaesthesia (75.2%), intensive care unit (ICU) (74.9%) and ENT surgery (73.1%) specialist services were significantly more available than plastic surgery (60.2%), with no statistical difference noted in the availability of OMS, anaesthesia, ICU and ENT surgery specialist services.

Data on who GDPs expected to manage maxillofacial trauma and GDPs' referral patterns of maxillofacial trauma are presented in Table 3. Apart from facial lacerations and isolated nasal fractures, the majority of GDPs (76.6% to 99.0%) expected OMS to manage maxillofacial trauma and apart from isolated nasal fractures, the majority of GDPs (48.0% to 87.9%) referred maxillofacial trauma to OMS. Plastic surgery was expected to manage facial lacerations and ENT surgery was expected to manage isolated nasal fractures by the majority of GDPs (83.0% and 79.7%, respectively). However, because of their practice circumstances, most GDPs (48.0%) referred facial lacerations to OMS and there was no statistically significant difference in the proportions of GDPs that referred isolated nasal fractures to ENT surgery and OMS (45.8% and 41.4%, respectively). OMS was also expected to manage pan-facial fractures and penetrating injuries of the face by a higher proportion of GDPs in both private/public practice than in private practice alone (95.4% vs. 82.1% and 85.9% vs. 74.1%, respectively, P<0.05), whilst a higher proportion of GDPs without experience as dental house surgeons than with it (46.8% vs. 32.1%, P<0.05) referred isolated nasal fractures to OMS.

ENT surgery was expected to manage pan-facial (25.0% vs. 13.2%), orbital (17.8% vs. 9.0%) and midface/zygoma fractures (18.9% vs. 6.4%) and was referred midface/

Table 3. Management of maxillofacial trauma by specialty – GDP expectations and referrals (brackets contain percentages)^a

In theory, who would you expect to manage:	Plastic surgery	ENT surgery	OMS	Other	Missing responses
Facial lacerations	258 (83.0)	18 (5.8)	123 (39.5)	38 (12.2)	16
Isolated nasal fractures	34 (11.1)	244 (79.7)	102 (33.3)	14 (4.6)	21
Mandibular fractures	7 (2.3)	5 (1.6)	306 (99.0)	10 (3.2)	18
Midface/zygoma fractures	30 (9.7)	29 (9.4)	299 (97.1)	12 (3.9)	19
Orbital fractures	65 (21.2)	34 (11.1)	252 (82.1)	38 (12.4)	20
Pan-facial fractures	74 (24.7)	48 (16.0)	255 (85.0)	29 (9.7)	27
Penetrating facial injuries	148 (48.8)	59 (19.5)	232 (76.6)	33 (10.9)	24
In reality, to whom do you refer:	Plastic surgery	ENT surgery	OMS	Other	Missing responses
Facial lacerations	121 (39.8)	5 (1.6)	146 (48.0)	74 (24.3)	23
Isolated nasal fractures	17 (5.7)	136 (45.8)	123 (41.4)	53 (17.8)	30
Mandibular fractures	1 (0.3)	2 (0.7)	268 (87.9)	45 (14.8)	22
Midface/zygoma fractures	7 (2.3)	14 (4.6)	259 (85.5)	47 (15.5)	24
Orbital fractures	31 (10.3)	17 (5.7)	222 (74.0)	70 (23.3)	27
Pan-facial fractures	31 (10.5)	22 (7.5)	223 (75.9)	65 (22.1)	33
Penetrating facial injuries	61 (20.5)	22 (7.4)	202 (68.0)	73 (24.6)	30

^aPercentages do not add up to 100 because multiple responses were permitted

zygoma fractures (10.8% vs. 2.6%), by a higher proportion of females than males (P<0.05). Midface/zygoma fractures were also referred to ENT surgery by a higher proportion of GDPs in private practice than in private/public practice (5.9% vs. 0.0%, P<0.05). ENT surgery was expected to manage penetrating injuries of the face by: more GDPs in both private/public practice than in private practice alone (28.1% vs. 17.2%, P<0.05); more of the 1980-1989 graduating cohort, followed by the youngest graduating cohort (27.3% and 19.4%, respectively, P<0.05); and more GDPs qualified in NZ (22.1% vs. 6.0%, P<0.05).

Plastic surgery was expected to manage isolated nasal fractures (16.2% vs. 8.2%), midface/zygoma fractures (14.5% vs. 7.1%), orbital fractures (27.9% vs. 17.3%) and penetrating injuries of the face (56.9% vs. 44.3%) by a higher proportion of GDPs with experience as dental house surgeons than those without it (P<0.05). More NZ-qualified GDPs expected fractures of the orbit (23.7% vs. 8.0%), pan-facial fractures (27.5% vs. 10.2%) and penetrating injuries of the face (52.2% vs. 32.0%) to be managed by plastic surgery and more GDPs in private practice than in private/public practice referred facial lacerations (43.7% vs. 25.8%) and penetrating injuries of the face (24.6% vs. 6.2%) to plastic surgeons (P<0.05).

Almost all GDPs (96.0%) thought there was a need for continuing professional development in the initial management of maxillofacial trauma and in OMS in general. Data on how GDPs wanted to receive continuing education are presented in Table 4. Most GDPs wanted to receive continuing education in the form of lectures and seminars (84.1%), followed by workshops (60.6%), journal

review articles (39.4%) and other means (8.3%). Continuing education in the form of journal review articles were preferred by a higher proportion of the youngest graduating cohort, followed by the 1980-1989 cohort (50.5% and 36.6% respectively, P<0.05) and GDPs with dental house surgeon experience compared with those GDPs who had no hospital based experience as a dental house surgeon (47.3% and 35.1% respectively, P<0.05). GDPs without dental house surgeon experience preferred continuing education in the form of workshops instead (66.3% vs. 50.0%, P<0.05).

DISCUSSION

This study set out to investigate New Zealand GDPs' awareness of maxillofacial trauma and to identify their associated referral patterns. It found that most GDPs in New Zealand referred maxillofacial trauma appropriately to OMS, and may reflect findings from similar studies where GDPs did not fully appreciate the diversity of maxillofacial injuries that are within the scope of OMS in those countries (Ameerally et al, 1994; Hunter et al, 1996). Furthermore, referral of patients may be influenced by local agreements among GDPs and specialists or even among specialists themselves. Dentist-specific characteristics such as previous house surgeon experience, locality and graduating cohort appeared to influence (1) expectations as to which specialty managed maxillofacial trauma and (2) the associated referral patterns.

Before discussing the findings, it is appropriate to examine the study's weaknesses and strengths. The ability to make generalisations from the findings is a key consideration. At 24.5% (95% CI 19.8, 29.2) and 16.8% (95% CI 12.7, 20.9)

Table 4. GDP preferences for continuing education in OMS (brackets contain percentages)

	Journal review articles	Workshops	Lectures/Seminars	Other
Sex				
Female	32 (40.5)	50 (63.3)	62 (78.5)	8 (10.1)
Male	92 (39.0)	141 (59.7)	203 (86.0)	18 (7.6)
Graduating cohort				
Pre-1980	36 (31.9) ^a	67 (59.3)	97 (85.8)	11 (9.7)
1980-1989	37 (36.6)	57 (56.4)	87 (86.1)	8 (7.9)
1990+	51 (50.5)	67 (66.3)	81 (80.2)	7 (6.9)
Practice type				
Private	95 (38.5)	153 (61.9)	208 (84.2)	23 (9.3)
Private/public	29 (42.6)	38 (55.9)	57 (83.8)	3 (4.4)
BDS source				
Overseas	24 (43.6)	32 (58.2)	46 (83.6)	5 (9.1)
New Zealand	100 (38.5)	159 (61.2)	219 (84.2)	21 (8.1)
Experience as dental house surgeon				
No	72 (35.1) ^a	136 (66.3) ^a	171 (83.4)	15 (7.3)
Yes	52 (47.3)	55 (50.0)	94 (85.5)	11 (10.0)
Previous military experience				
No	107 (38.6)	171 (61.7)	234 (84.5)	20 (7.2)
Yes	17 (44.7)	20 (52.6)	31 (81.6)	6 (15.8)
All combined	124 (39.4)	191 (60.6)	265 (84.1)	26 (8.3)
Missing responses	12	12	12	12

^aP<0.05

respectively, female and overseas-qualified respondents were under-represented in the responding sample, as Dental Council of New Zealand data show that those proportions in the active workforce at the time of the survey were 29.9% and 24.1% respectively. Thus, the findings should be generalised with caution. Another limitation was that, in the questionnaire, the option 'Other' was implied to mean any medical service other than plastic surgery, ENT surgery or OMS. However, this was not disclosed in the questionnaire and the survey was not designed for respondents to specify what they meant by 'Other'. It is possible that the respondents that specified 'Other' referred maxillofacial trauma to a hospital emergency department or to an oculo-plastic surgeon in the case of orbital trauma. A strength of the study is that it is the first such investigation in New Zealand, and that the findings should therefore be of considerable interest, not only to the profession, but also to policymakers.

Maxillofacial trauma is a complex and specialised field of surgery that requires expertise in the anatomic structures of the head, neck and maxillofacial region. The management of maxillofacial trauma is fundamental in the scope of OMS however this area is not the exclusive domain of the specialty. Plastic surgeons (and to a lesser extent in New Zealand, ENT surgeons) also commonly manage maxillofacial trauma which creates much debate as to which of these specialties provide the optimal management of maxillofacial trauma. The availability of OMS services was considerably greater than that of plastic surgery services, both locally and regionally. Despite this, most GDPs expected plastic surgery to manage facial lacerations, while only four out of ten GDPs expected OMS to manage facial lacerations. A study conducted in the United Kingdom found that 64% of GDPs expected OMS and 30% of GDPs expected plastic surgery to treat a cut on the face (Ameerally et al, 1994). The converse was true in the United States, where 82% of GDPs expected plastic surgery and only 6% expected OMS to treat cuts on

the face (Hunter et al, 1996). More recently, GDPs believed cuts on the face were in the domain of OMS (Ifeacho et al, 2005). In our study, a higher proportion of GDPs referred facial lacerations to OMS rather than plastic surgery, but this difference was not statistically significant. A significantly higher proportion of GDPs in private practice referred facial lacerations to plastic surgery, and this may be due to factors such as limited awareness of the full scope of OMS, practice location, availability of various specialist services and (perhaps as a reflection of current media stereotyping) the numerous reality-television shows featuring cosmetic makeovers performed by plastic surgeons.

The availability of OMS and ENT surgery specialist services was similar, both locally and regionally, yet, most GDPs expected ENT surgery to manage isolated nasal fractures, while only one-third of GDPs expected OMS to manage isolated nasal fractures. Part of this may be due to the name of the specialty: it would be rather obvious that Ear, Nose and Throat surgeons would deal with nasal fractures. On the other hand, Rocha et al (2008) showed that almost half of GDPs expected OMS to treat nasal fractures, whereas one-third of GDPs expected ENT surgeons and one-sixth of GDPs expected plastic surgeons to treat nasal fractures. They proposed that the nasal area is an anatomical site for which all three specialties are responsible, but our findings did not support this: a higher proportion of GDPs referred isolated nasal fractures to ENT surgery (although this was not significantly different to the proportion of GDPs who referred isolated nasal fractures to OMS).

Most GDPs expected OMS to manage mandible, midface/zygoma, pan-facial and orbital fractures and penetrating injuries of the face, and referred these maxillofacial injuries appropriately to OMS. Nearly all of the GDPs in this study expected OMS to manage mandible and midface/zygoma fractures and these findings were consistent with similar studies (Ameerally et al, 1994; Hunter et al, 1996;

Ifeacho et al, 2005; Rastogi et al, 2008; Rocha et al, 2008). A higher proportion of females expected ENT surgery to manage midface/zygoma, orbital and pan-facial fractures, the significance of which is unknown and may be a chance finding. A higher proportion of NZ-qualified GDPs expected plastic surgeons to manage orbital and pan-facial fractures, and a higher proportion of the same group expected plastic and ENT surgeons to manage penetrating injuries of the face. Similarly, a higher proportion of GDPs in private practice referred facial lacerations and penetrating injuries of the face to plastic surgery and midface/zygoma fractures to ENT surgery. This may be partly a practice location effect, whereby the GDP may be in an area where the local specialist dealing with facial injuries is either a plastic surgeon or an ENT surgeon (either in the same town or even in the same medical/dental building). Another possibility may be that some GDPs view oral and maxillofacial surgeons in private practice as dealing only with traditional oral surgery procedures and not the face.

A higher proportion of GDPs with dental house surgeon experience expected plastic surgery to manage isolated nasal fractures, midface/zygoma fractures, orbital fractures and penetrating injuries of the face. In New Zealand, the majority of dental house surgeons are junior dentists with limited training in the management of maxillofacial trauma, and limited awareness of the scope of OMS. They may be unduly influenced or pressured from other medical specialties for these referrals, and this may set a pattern for their future referrals. At teaching hospitals in the United States, all facial injuries other than isolated mandible fractures (pan-facial injuries, complex lacerations, and midface fractures) are referred in equal numbers to OMS, ENT or plastic surgery (Le et al, 2003). However, it is important to note that, in New Zealand, Australia and the United Kingdom, the main two specialties routinely managing maxillofacial trauma are OMS and plastic surgery. It is imperative, therefore, that dental house surgeons and emergency and trauma services are fully informed about the scope of OMS in order for maxillofacial trauma patients to receive the optimal management, irrespective of partisan rivalry between the surgical specialties.

The GDP may be the first point of contact for the maxillofacial trauma patient, especially in rural or remote locations. Consequently, it is reassuring for the patient and for the oral and maxillofacial specialty that most GDPs are referring maxillofacial injuries to OMS. There is, however, a need to reiterate that the management of facial lacerations and isolated nasal fractures is well within the scope of OMS although local agreements or policies among clinicians may influence the referral of these injuries. Ameerally et al (1994) stated that, if patients are to receive the optimal treatment for maxillofacial problems, GDPs need to have a better understanding of what the OMS specialty has to offer. They suggested a much simpler name, such as 'Facial and Oral Surgery', and the need to educate and nurture local GDPs. Our findings indicated a need for oral and maxillofacial surgeons to provide continuing education for GDPs—who indicated a preference for lectures/seminars, followed by workshops—which may, in turn, improve awareness of the full scope of OMS, maintain a collegial relationship, and continue to ensure that maxillofacial trauma patients are referred to the appropriate specialty, with the underlying principle being managing the patient for the best possible outcome. Although the majority of GDPs regard OMS as a specialty of both dentistry and medicine, older graduates still

view OMS as a pure dental specialty, which reflects a time when OMS training did not involve a medical degree.

This study raises the possibility of similar research projects to be conducted in the future, such as GDP referral patterns for oral and maxillofacial pathology and for reconstructive and cosmetic procedures. Such information can provide greater insight into the needs of general practitioners and what specialty groups can provide in terms of continuing education and clinical support.

CONCLUSION

This first-ever study of GDP referral patterns for maxillofacial trauma in New Zealand has found that most GDPs in New Zealand refer maxillofacial trauma to OMS, but that most GDPs still expect plastic surgeons to manage facial lacerations and ENT surgeons to manage isolated nasal fractures. Most New Zealand GDPs are aware of the availability of OMS specialist services in their local practice area and have expressed a need for lectures/seminars and workshops in OMS. This presents an opportunity for the OMS specialty group to promote awareness of the full scope of OMS practice and provide continuing education that would be well received by GDP colleagues.

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