Australian Dental Journal
The official journal of the Australian Dental Association
AUSTRALIAN DENTAL ASSOCIATION INC.
Australian Dental Journal 2016; 61: 29–34
doi: 10.1111/adj.12314

Referral patterns for oral squamous cell carcinoma in Australia: 20 years progress

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ABSTRACT

Background: The aim of this study was to identify changes in referral patterns and delays in diagnosis and treatment of oral squamous cell carcinoma (OSCC), managed at a tertiary institution in Victoria, Australia.
Methods: The hospital records of all patients with newly diagnosed OSCC, managed by The Royal Melbourne Hospital (RMH) Head and Neck Tumour Stream between January 2008 and December 2010, were retrospectively reviewed.
Results: Of the 101 patients, 52% first sought help from general medical practitioners (GMP) while 43% initially attended a general dental practitioner (GDP). The most common site of OSCC was oral tongue (42%). The most common presentation was ulceration (31%). Seventy per cent of patients presented with T1 (39%) or T2 (31%) tumours. The diagnostic delay ranged from 0 to 8 years with an average of 4.5 months. Patient delay ranged from 0 to 1.4 years with an average of 1.8 months. Professional delay ranged from 0 to 8 years with an average of 2 months.
Conclusions: Delays in patients seeking advice have decreased compared to previous studies, while delays in professionals making a diagnosis have not improved considerably. There has been a significant shift towards initial presentation to GMP rather than GDP. Further decrease in delays is possible by improving both population awareness and clinician education.

Keywords: Delay, diagnosis, oral cancer, referral patterns, squamous cell carcinoma.

Abbreviations and acronyms: GDP = general dental practitioner; GMP = general medical practitioner; OHNS = otorhinolaryngology, head and neck surgery; OMS = oral and maxillofacial surgery; OSCC = oral squamous cell carcinoma; RMH = Royal Melbourne Hospital.

(Accepted for publication 22 March 2015.)

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is the most prevalent malignancy of the head and neck region.[1] The oral cavity is readily accessible for examination and biopsy yet a large proportion of patients present with advanced disease, requiring more extensive treatment and resulting in greater morbidity. Detecting oral cancer at an early stage can reduce morbidity and mortality rates and improve long-term survival and quality of life.[2,3] Delayed diagnosis can result from both patient and professional factors, and such factors have been well described in the literature with several studies showing the greatest delay is that of patients seeking medical attention.[4–6]

Very few studies have examined referral patterns in Australia[4,7] and only one has assessed diagnostic delays for an Australian population.[4] The purpose of this study was to review the referral patterns for patients with OSCC managed by the RMH Head and Neck Tumour Stream. Changes in referral patterns and delays were evaluated with reference to the earlier Australian study and comparisons were made with international studies.

MATERIALS AND METHODS

This study was approved by the Royal Melbourne Hospital (RMH) Human Research Ethics Committee. The records of all patients treated at RMH for a first-time histological diagnosis of OSCC made between 1 January 2008 and 31 December 2010 were reviewed retrospectively. Clinical data (patient demographics, tumour characteristics, dates of symptom onset, presentation to health professionals and treatment, as well as health status at 2 years follow-up) were obtained from hospital records and cancer databases. The TNM Classification of Malignant Tumours and staging[8] was used to define the extent of disease at the time of diagnosis. The data were recorded in an

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Excel datasheet (Microsoft Corp., Seattle, WA, USA) and Prism 6 (Graphpad Software, Inc.) and analysed using unpaired two-sided *t*-tests. P values < 0.01 were considered to be significant.

RESULTS

A total of 101 patients (63 males, 38 females) presented to RMH with a first-time diagnosis of OSCC during the study period. The average age at time of diagnosis was 63 years (range 31–91). Thirty-seven per cent of patients were actively smoking at the time of diagnosis and 60% had a history of regular alcohol consumption. Tumour characteristics including site, laterality and AJCC stage at presentation are shown in Table 1. The most common sites were oral tongue (42%), floor of mouth (19%) and mandibular alveolus (12%).

The most common presenting sign was ulceration (31%), followed by a lump or swelling (26%; Table 1). In 17% of cases, there was a perceived dental problem such as ill-fitting dentures or a non-healing extraction socket. Only 4% of cases were asymptomatic and as such, considered incidental findings.

The duration between symptom onset and diagnosis (diagnostic delay) ranged from zero (for incidental findings) to 8 years with an average of 5.5 months (median 2.5 months; Table 2). There was one outlier at 8 years from the time of onset of symptoms, although it is unlikely that OSCC was present when the symptoms first arose. This patient had multiple psychosocial issues resulting in failures to attend appointments and loss to follow-up. Consequently, there was an exceptionally large diagnostic delay. Excluding this outlier, the average diagnostic delay was 4.5 months. Once a diagnosis of OSCC was made, the median time to definitive treatment (treatment delay) was 1 month (range 0–9 weeks). Overall, the total delay (combining diagnostic and treatment delay) ranged from 3 weeks to just over 8 years, with a median duration of 3.7 months (Table 2).

In 36% of cases a histological diagnosis was made prior to referral to a definitive specialist. For these patients, the average diagnostic delay was 3.2 months (median 2.5 months) and the average treatment delay was 4.8 weeks (Table 3). The remaining cases were referred to a definitive specialist without a histological diagnosis. For these patients, the average diagnostic delay was 6.6 months (median 3 months) and average treatment delay was 3.7 weeks. Analysis with and without the outlier showed no statistically significant difference (p > 0.01) in diagnostic, treatment or total delay between these two groups.

Table 1. Characteristics of 101 patients with OSCC

Characteristic	% of cases
Gender	
Male	62
Female	38
Tumour site	
Oral tongue (dorsal or ventral surfaces)	42
Floor of mouth	19
Mandibular alveolus	12
Retromolar trigone	10
Buccal mucosa	9
Maxillary alveolus	5
Hard palate	4
Laterality	
Right-sided	52
Left-sided	41
Midline	7
TNM combined stage at presentation	
Stage I	36
Stage II	24
Stage III	13
Stage IV	28
Chief presenting complaint	
Ulceration	31
Lump/swelling/growth	26
Perceived dental problem (ill fitting prosthesis, non-healing extraction socket, toothache)	17
Non-specific pain or discomfort	11
Mucosal changes/discolouration	9
Asymptomatic/incidental finding	4
Altered taste	3

Table 2. Diagnostic and treatment delays for 101 patients with OSCC

	Diagnostic delay	Treatment delay	Total delay
All cases (n = 101)			
Range	0–8 years	0–9 weeks	3 weeks – 8.1 years
Mean	5.5 months†	1 month	6.5 months
Median	2.5 months	1 month	3.7 months

†4.5 months excluding outlier.

Table 3. Comparison of diagnostic and treatment delays for specialist referrals made with and without histological diagnosis

	Diagnostic delay	Treatment delay	Total delay
Specialist referral with Dx (n = 36)			
Range	0–1.4 years	2–8 weeks	5 weeks – 1.5 years
Mean	3.2 months	4.8 weeks	4.3 months
Median	2.5 months	4.5 weeks	3.8 months
Specialist referral without Dx (n = 65)			
Range	0–8 years	0–9 weeks	3 weeks – 8.1 years
Mean	6.6 months†	3.7 weeks	7.5 months§
Median	3 months	4 weeks	3.7 months

†5.3 months excluding outlier.
§6.1 months excluding outlier.

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Table 4. Comparison of initial management patterns and diagnostic delays by GDP and GMP

	% of cases		
	GDP (n = 42)	GMP (n =53)	Combined (n = 95)
Initial management – referral			
Referral to OMS	33	26	33
Referral to another dental specialist (oral medicine, periodontist, etc.)	17	11	14
Referral to another medical specialist	0	11	6
Referral to GDP	-	6	3
Initial management – intervention			
Prescription of antibiotics	17	25	20
Ulcer management (denture adjustment, filing of tooth, etc.)	15	13	13
Extraction	12	-	5
Reassurance/monitoring	5	4	4
Biopsy	0	4	2
Dry socket/non-healing socket management	2	0	1
Number of consultations prior to diagnosis			
Range	2–5	1–6	1–6
Mean	2.9	2.7	2.8
Median	3	2	3
Diagnostic delay			
Range	0–3 years	0–8 years	-
Mean	5.8 months	5.3 months†	-
Median	3 months	2.4 months	-

†3.5 months excluding outlier.

Fifty-three patients (52%) first sought help from a general medical practitioner (GMP) while 42% attended a general dental practitioner (GDP) first. Three per cent initially presented to another dental specialist and 2% to another medical specialist. Table 4 lists the initial management by GDPs and GMPs. Collectively, 53% of cases were promptly referred to a specialist, with both GDPs and GMPs promptly referring approximately equal numbers (50% and 48%, respectively). The most common intervention for both groups was prescription of antibiotics (20%), followed by some form of ulcer management (13%). In 4% of cases, GMPs performed a biopsy. No biopsies were performed by GDPs. For both groups, the number of consultations required prior to a definitive diagnosis ranged from 1 to 6 with an average of 2.8 visits. For patients who first sought GMPs, 47% of cases required more than two consultations before a diagnosis was made compared to 61% of cases for GDPs. For patients who first sought a GDP, the average diagnostic delay was 5.8 months (range 0–3 years) compared with 5.3 months (range 0–8 years) for GMPs. There was no significant difference ($p > 0.01$) in the diagnostic delay between these two groups (Table 4).

Diagnostic delay was also stratified according to the AJCC combined stage at presentation and compared with 2-year survival data (Table 5). There was no significant difference in diagnostic delay observed between any of the stages ($p > 0.01$). Stage I disease showed the highest 2-year survival rate (97%) while Stage III disease showed the lowest 2-year survival rate (77%). When examined by tumour size, the majority of patients presented with T1 (39%) or T2 tumours (31%), while 24% of patients presented with T4 tumours.

Only 70 of the 101 cases (69%) had sufficiently accurate records to subdivide diagnostic delay into patient delay and professional delay. This subgroup had a similar mean and variance to the whole group.

Table 5. Diagnostic delays and survival rates stratified by combined stage of tumour

	Stage I (n = 36)	Stage II (n = 24)	Stage III (n = 13)	Stage IV (n = 28)
Diagnostic delay				
Range	2 weeks – 2 years	2 weeks – 8 years	0–3 years	0–3 years
Mean	4.7 months	6.7 months†	5.8 months	5 months
Median	3.1 months	1.9 months	3.2 months	2.4 months
2-year survival (%)	97	83	77	79

†2.9 months excluding outlier.

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Table 6. Subset analysis of patient and professional delay (n = 70)

	Patient delay	Professional delay	Total diagnostic delay
Dimitroulis *et al.*[4] (n = 51)			
Range	6 days – 8 years	2 days – 3.2 years	-
Mean	4.5 months	2 months	-
Median	-	-	-
This study (n = 70)			
Range	0–1.4 years	0–8 years	0–8 years
Mean	1.8 months	3.3 months†	5.1 months§
Median	1 month	0.5 months	2.5 months

†2 months excluding outlier.
§3.8 months excluding outlier.

Patient delay (time from symptom onset to initial presentation to a health professional) for this subgroup ranged from 0 to 1.4 years with an average of 1.8 months (Table 6). Professional delay (time from initial presentation to a histological diagnosis) for this subgroup ranged from 0 to 8 years with an average of 3.3 months. Again, excluding the outlier at 8 years, the average professional delay was approximately 2 months.

DISCUSSION

A recent meta-analysis of the impact of diagnostic delay on survival of head and neck cancer found that diagnostic delay was moderately related to patient mortality.[9] Despite this, there is still no consensus on what constitutes an acceptable 'delay'. Analysis of the literature is hampered by the use of differing criteria to define delays and the difference of subdivisions into patient, professional, referral and scheduling delays. In this study we analysed both diagnostic and treatment delays. We restricted analysis of diagnostic delay to that due to the patient and that due to the professional to allow comparison with previous studies.

Diagnostic and treatment delays – have we made progress?

Most tertiary institutions have established pathways to deal with patients who present with clinically suspicious or histologically confirmed oral cancer. All such referrals to our institution are triaged and subsequently seen within 1 week of referral. Each patient is then reviewed and discussed at the next multidisciplinary meeting, which is held weekly. In this study, 99 patients (98%) required surgery and the median time from meeting to surgery was 2 weeks (mean 2.5 weeks, range 0–8.7 weeks). The remaining two patients had very advanced stage disease and received palliative chemoradiotherapy. The overall treatment delay (interval from diagnosis to definitive treatment, whether it be surgery or chemoradiotherapy) for the whole group was on average 1 month. Unfortunately, there are no data from previous Australian studies for comparison. Taking into account the time required for patient education and counselling as well as anaesthetic assessment and preoperative work-up, this is likely approaching the lower limit of achievable treatment delay.

Therefore, the greatest delay continues to occur at the diagnostic stage. Comparison with Dimitroulis *et al.*[4] (who used the same definitions as our study) shows the mean patient delay has improved from 4.5 months to 1.8 months. At an international level, the median patient delay of 1 month in this study also compares favourably with other studies in the UK[5,10,11] (2.3 to 3 months), Japan[12] (1.6 months) and the Netherlands[13] (1.2 months). While other international studies do exist, the definitions used and intervals measured were too dissimilar to ours to make a meaningful comparison.

We found that the proportion of patients who delayed their first visit to a health professional by more than 3 months has also improved over the last 20 years (19% compared with 37.5%). This would suggest that patient awareness has improved. Unfortunately, however, the mean professional delay has not significantly changed over this time. The proportion of patients who had a histological diagnosis made within 2 weeks of initial presentation is also similar (51% in the present study compared with 57% by Dimitroulis *et al.*[4]).

It must be acknowledged that one limitation of the study is that data on all the health professionals that patients consulted could not be captured. There is anecdotal evidence that some of the patients had second or third opinions before seeing the professional who referred to our institution. As a result, the patient delays reported here are likely overestimates and professional delays are likely underestimates.

Timing of biopsy – before or after referral to a specialist?

Approximately one-third of patients in this study had a histologically confirmed diagnosis prior to seeing a specialist. Of these cases, very few GMPs (4%) and no GDPs performed a biopsy as part of their initial management, instead referring to another dental or medical specialist to carry this out. The other two-thirds of patients were referred prior to an established diagnosis being made and it was not always clear from referral documentation if the referring professional was suspicious of OSCC.

One of the most important determinants in making a histological diagnosis is obtaining an appropriate and adequate sample. It can sometimes be difficult

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obtaining a representative sample and false negatives can contribute to delays or inappropriate treatment. Furthermore, radiological staging can be adversely affected by prior biopsy.[13,14] There was no significant difference in diagnostic, treatment or combined delay between those patients who were biopsied prior to referral to a specialist and those who were biopsied after being seen by a specialist, suggesting the timing of the biopsy was not a significant contributor to treatment delay. Imaging and biopsy may best be coordinated at a tertiary centre where the definitive treatment is to take place. It is pertinent that a suspicion of OSCC is communicated in the referral so it can be appropriately triaged.

Trends in referral patterns – GDP versus GMP

In Australia, patients face the least out-of-pocket expenses if seen in the community by GMPs. GDP visits do not attract a Medicare rebate and very few (if any) medical specialists will see patients without a referral from a GMP. Patients are also not entitled to a Medicare rebate for a specialist consult and treatment without a GMP referral. It is likely that these factors have contributed to a significant shift towards an initial presentation to GMPs over the last 20 years (52% versus 24%). This highlights the growing importance of GMPs in the initial evaluation of oral cancer patients in our population. Similar findings have been reported in the UK[5,10] (65% and 52%, respectively).

The urgency with which a referral is triaged depends heavily on both the clinical and administrative information provided by the referring doctor. We found the quality of referral letters and record keeping was quite poor with only 69% of all cases having complete data. Date of initial presentation to a health professional by a patient was the most difficult data to collect, followed by the differential diagnosis. Community dental and medical practice records were not available for review and referral letters from these health professionals did not always contain this information.

How do delays relate to the stage at presentation and survival rates?

The proportion of patients presenting with advanced (Stage 4) disease has decreased compared to 20 years ago (28% versus 45%). In this study, 70% of patients presented with either T1 or T2 tumours, compared with 49% observed by Dimitroulis *et al.*[4] This indicates a shift towards earlier presentation by patients (and is corroborated by the reduction in patient delay). No significant differences in diagnostic delays between the different tumour stages were identified in this study. However, a number of other studies have shown larger size tumours (T3–T4) were associated with less professional and overall diagnostic delays compared with T1–T2 tumours.[12,15–17]

We found that early disease (Stage I and II) had better 2-year survival rates (97% and 83% respectively) compared to more advanced disease (Stage III and IV; 77% and 79% respectively). While it might seem intuitive that patients who present with more advanced disease have a worse prognosis, there remains disagreement in the literature as to whether this is the case.[16,18,19] Nevertheless, the extent of resection, and hence the surgical morbidity, is greater for those patients with more advanced disease.

Oral cancer education in medicine and dentistry

Screening patients for oral cancer should form part of routine practice for GDPs and continuing professional development for both GMPs and GDPs. The central role of GDPs in oral health education and maintenance is obvious. Despite a significant portion of the dental curriculum dedicated to oral medicine and oral pathology, a large number of cases continue to be inappropriately managed. Approximately half the cases of OSCC that presented to the GDPs had treatment that could be considered inappropriate (compared with 42% for GMPs). While it is easy to criticize these decisions in retrospect, it is a timely reminder of the complexities involved in diagnosing OSCC and the potential consequences of a delayed or missed diagnosis. Management of OSCC and other head and neck cancers should also form an integral part of the undergraduate medical curriculum.[20] A UK study which investigated oral cancer awareness in undergraduate medical and dental students revealed that significantly more final year dental students had an opportunity to examine patients with oral lesions compared to their medical colleagues (88% versus 61%).[21] A study investigating oral cancer education for medical students across the UK found that clinical changes associated with oral cancer was relatively poorly taught.[20] Ulceration and lymphadenopathy were taught by 60% of medical schools, leukoplakia was taught by 55% and erythroplakia and erythroleukoplakia were taught by 45%. Only 40% of medical schools included oral health, oral cancer and oropharyngeal history taking in student assessments. Another study from Western Australia surveying recent medical graduates revealed that only a fifth of the interns had examined a primary tumour of the mouth, compared to the national average (19% compared with 39%).[21] Our finding of the tongue being the most common site of oral cancer is consistent with previous studies[22,23] and reiterates the readily accessible

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nature of these lesions to visual inspection by the willing clinician.

Public awareness in Australia

The reduction in patient delays identified in this study could be attributed to increasing awareness as well as improved access to health care professionals. Further reductions could be achieved though effective public health campaigns focusing on risk, habits, early detection and symptoms of oral cancer.

The UK implemented The National Oral Cancer Awareness Week (NOCAW) in 1995 to increase awareness of oral cancer amongst both health professionals and the public. However, studies in the UK following its introduction have unfortunately not shown a significant improvement in patient delay.[5] This raises concerns about the effectiveness of current strategies there. More recently, the UK has launched Mouth Cancer Action Month. However, it is yet to be shown whether this has been more successful than NOCAW. Such large-scale multimedia campaigns for oral cancer have yet to be implemented in Australia.

REFERENCES

1. Marur S, Forastiere AA. Head and neck cancer: changing epidemiology, diagnosis, and treatment. Mayo Clin Proc 2008;83:489–501.
2. Robinson PN, Mickelson AR. Early diagnosis of oral cavity cancers. Otolaryngol Clin North Am 2006;39:295–306.
3. Peacock ZS, Pogrel MA, Schmidt BL. Exploring the reasons for delay in treatment of oral cancer. J Am Dent Assoc 2008;139:1346–1352.
4. Dimitroulis G, Reade P, Wiesenfeld D. Referral patterns of patients with oral squamous cell carcinoma, Australia. Eur J Cancer B Oral Oncol 1992;28B:23–27.
5. McLeod NM, Saeed NR, Ali EA. Oral cancer: delays in referral and diagnosis persist. Br Dent J 2005;198:681–684.
6. Walter F, Webster A, Scott S, Emery J. The Andersen Model of Total Patient Delay: a systematic review of its application in cancer diagnosis. J Health Serv Res Policy 2012;17:110–118.
7. Chandu A, Smith AC. Patterns of referral of patients undergoing surgical management for oral cancer. Aust Dent J 2002;47:309–313.
8. Edge S, Byrd DR, Compton CC, Fritz AG, Greene FL, Trotti A, eds. AJCC Cancer Staging Manual: 7th edn. New York: Springer-Verlag, 2010.
9. Seoane J, Takkouche B, Varela-Centelles P, Tomás I, Seoane-Romero JM. Impact of delay in diagnosis on survival to head and neck carcinomas: a systematic review with meta-analysis. Clin Otolaryngol 2012;37:99–106.
10. Schnetler JF. Oral cancer diagnosis and delays in referral. Br J Oral Maxillofac Surg 1992;30:210–213.
11. Scott SE, Grunfeld EA, McGurk M. The idiosyncratic relationship between diagnostic delay and stage of oral squamous cell carcinoma. Oral Oncol 2005;41:396–403.
12. Onizawa K, Nishihara K, Yamagata K, Yusa H, Yanagawa T, Yoshida H. Factors associated with diagnostic delay of oral squamous cell carcinoma. Oral Oncol 2003;39:781–788.
13. Jovanovic A, Kostense PJ, Schulten EA, Snow GB, van der Waal I. Delay in diagnosis of oral squamous cell carcinoma: a report from The Netherlands. Eur J Cancer B Oral Oncol 1992;28B:37–38.
14. Yesuratnam A, Wiesenfeld D, Tsui A, *et al.* Preoperative evaluation of oral tongue squamous cell carcinoma with intraoral ultrasound and magnetic resonance imaging–comparison with histopathological tumour thickness and accuracy in guiding patient management. Int J Oral Maxillofac Surg 2014;43:787–794.
15. Brouha XD, Tromp DM, Koole R, Hordijk GJ, Winnubst JA, de Leeuw JR. Professional delay in head and neck cancer patients: analysis of the diagnostic pathway. Oral Oncol 2007;43:551–556.
16. Seoane J, Pita-Fernandez S, Gomez I, *et al.* Proliferative activity and diagnostic delay in oral cancer. Head Neck 2010;32:1377–1384.
17. Kerdpon D, Sriplung H. Factors related to advanced stage oral squamous cell carcinoma in southern Thailand. Oral Oncol 2001;37:216–221.
18. Massano J, Regateiro FS, Januario G, *et al.* Oral squamous cell carcinoma: review of prognostic and predictive factors. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;102:67–76.
19. Gómez I, Seoane J, Varela-Centelles P, Diz P, Takkouche B. Is diagnostic delay related to advanced-stage oral cancer? A meta-analysis. Eur J Oral Sci 2009;117:541–546.
20. Carter LM, Parsonage-Grant S, Marshall A, Achal KS, Kanatas A. Oral cancer teaching of medical students in the UK: time for a new approach? J Cancer Educ 2011;26:308–314.
21. Carter LM, Ogden GR. Oral cancer awareness of undergraduate medical and dental students. BMC Med Educ 2007;7:44.
22. Holmes JD, Martin RA, Gutta R. Characteristics of head and neck cancer patients referred to an oral and maxillofacial surgeon in the United States for management. J Oral Maxillofac Surg 2010;68:555–561.
23. Gao W, Guo CB. Factors related to delay in diagnosis of oral squamous cell carcinoma. J Oral Maxillofac Surg 2009;67:1015–1020.

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