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Ramamurthy, Poornima, Sharma, Dileep, and Thomson, Peter (2022) *Oral cancer in Australia: regional and remote perspectives*. Faculty Dental Journal, 13 (1) pp. 41-45.

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<https://doi.org/10.1308/rcsfjdj.2022.9>

Oral Cancer in Australia – Regional and Remote Perspectives

by

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Keywords: Oral Cancer, Australia, Regional and Remote Health

Abstract

Oral squamous cell carcinoma (OSCC) is a lethal and deforming disease of rising global significance. Detailed information on contemporary incidence, patient awareness and preventive strategies within Australia remains somewhat lacking, however. Geographic profiling has shown a high burden of disease in regional and remote areas compared with metropolitan districts with Indigenous Australians, in particular, exhibiting high OSCC incidence, reduced access to specialist treatment and, ultimately, poor clinical outcomes. Strategies to deliver enhanced preventive techniques, improve diagnostic accuracy and encourage targeted interventional management for 'high-risk' populations in regional and remote communities are recommended.

Introduction

It is a sobering reality for clinicians in the 21st Century that cancer remains one of the principal causes of premature mortality in our populations. Oral squamous cell carcinoma (OSCC), the most frequent malignancy to arise from the mucosal lining of the oral cavity, is a lethal and deforming disease in contemporary clinical practice exhibiting rising incidence and a significant global burden; over 300,000 new cases are diagnosed each year, worldwide. Even although early signs of OSCC are readily detectable by oral examination, 5-year survival rates have remained around 50% for many years due to patients presenting late with advanced stage disease¹.

Oral carcinogenesis is driven by the accumulation of complex, multi-focal genetic mutations primarily initiated by prolonged exposure to exogenous carcinogens such as tobacco and alcohol, although the role of human papillomavirus (HPV) infection in tonsillar and oro-pharyngeal cancer and the significance of cultural and geographic influences on disease progression, particularly low socio-economic status, impaired nutrition and regional/rural isolation, are all increasingly recognised as important, contributory factors^{1,2}.

Improved understanding of the natural history of OSCC, together with population-based studies to better define socio-demographic profile, deprivation data and risk factor behaviour in 'high-risk' individuals are essential prerequisites to the delivery of effective oral health surveillance, screening, targeted prevention, early disease detection and minimally invasive interventional treatment protocols^{1,3}.

In a series of recent studies within the population of Hong Kong, it proved feasible to characterise both the demographic and geographic profile of specific, sub-populations within a society deemed to be most at risk of OSCC development⁴⁻⁶. The ability to subsequently marshal appropriately designed preventive and early interventional strategies offers real opportunities to influence the future pattern of OSCC disease burden within a particular population. In particular, and as summarized in Table 1, primary prevention aims to eliminate the principal risk factors of disease, secondary preventive techniques aid detection of disease and deliver minimally invasive treatment at the earliest possible OSCC stage (ideally to non-invasive precursor lesions), and tertiary prevention post-diagnosis helps identify and treat recurrent or further disease development^{1,7,8}.

In this paper, we review the current burden of cancer, and in particular that of OSCC, within Australia and consider how more effective prevention and appropriately targeted intervention may be delivered to the Australian population most in need of such care in the years ahead.

Cancer Statistics in Australia

The population of Australia during 2021 was calculated to be approximately 25,700,000. As in many developed countries, cancer is a major cause of severe illness that delivers substantial social and economic hardship on affected individuals and their families. Even although cancer survival rates have increased and cancer mortality rates continue to fall, cancer accounts for approximately 3 in every 10 deaths in Australia, with 2 out of every 5 people expected to be diagnosed with a malignancy by the age of 85. Registration of newly diagnosed cancers is required by law for each state and territory, and data is provided to the Australian Institute for Health and Welfare (AIHW) annually to produce the Australian Cancer Database (ACD). Curiously, despite recognizing that basal and squamous cell carcinomas of the skin are the most frequently diagnosed cancers in Australia and virtually endemic in some sectors of the population, they are not notifiable in all jurisdictions and are thus not included in the ACD⁹.

Statistical review, carried out during the 5-year period 2012 to 2016, revealed that 130,000 new cancer cases were diagnosed each year (affecting 616 individuals per 100,000 population), with breast, prostate, melanoma, colorectal and lung tumours the 5 most common malignancies. More recent data accrued during 2021 predicts that over 150,000 new cases will be diagnosed by year-end, whilst mortality counts from a number cancers have doubled from just under 25,000 in 1982 to 49,221 in 2021; an alarming statistic indeed¹⁰⁻¹².

Presently, only 3 national population-based screening programmes, BreastScreen Australia, the National Cervical Screening Programme and the National Bowel Cancer Screening Programme, are delivered to try to improve early detection of cancer and/or pre-cancerous conditions by targeting specific 'high-risk' populations and age groups⁹.

Oral Cancer in Australia

Detailed information on oral cancer in Australia is surprisingly limited in contemporary literature. OSCC data are, unfortunately, often included within the generic descriptor 'head and neck cancers' in databases. Calculated at 21.6 per 100,000 population for the 2012/16 period, they do, however, collectively comprise one of the ten most common cancers for both men and women in Australia⁹. Such generic data can be misleading, of course, due to combined analysis of tumours of disparate aetiology and behaviour including lip, oral cavity, tonsil and oropharynx, nasopharyngeal, laryngeal and salivary gland cancers. Recent studies have reported substantive falls in lower lip cancer, probably due to enhanced awareness of the carcinogenic effect of ultraviolet irradiation, whilst oropharyngeal tumours appear to have risen significantly due to increased exposure to HPV infection^{13,14}.

Table 2 attempts to summarize the contemporary presentation of OSCC in more detail, utilising the latest available data relating to lip, oral cavity and oropharyngeal cancers presented in AIHW's 2019

cancer report. It is notable that lip and tongue tumours are most common, accounting for nearly 60% of cases. Although relative survival data are also presented (the probability of being alive 5-years post-diagnosis compared to the general population), detailed interpretation is limited by the lack of tumour staging data. Interestingly, information regarding tumour stage at diagnosis were not collected on a national basis in Australia until 2011, and then only for the 5 most common cancers listed above.

A more thorough and comprehensive analysis of contemporary OSCC data in Australia, especially in relation to stratification of population and individual patient risk, appears overdue as does the development and delivery of targeted oral and/or head and neck cancer screening programmes.

Rural, Regional and Remote Perspectives

As the World's sixth largest country, with an area exceeding seven-and-a half-million square kilometres and comprising 6 states and 2 territories, it is unsurprising that significant geographic variations in cancer incidence and survival are recognised within Australia. Nearly 70% of Australians live within the Greater Capital City areas, particularly Sydney, Melbourne and Brisbane, with the population heavily concentrated in the South-East coastal region of the country; other areas are thus literally regarded as 'sparsely populated'. The Australian Statistical Geographical Classification (ASGC) of Remoteness define such areas further as: Inner Regional, Outer Regional, Remote or Very Remote¹⁵.

It has been recognised for many years by James Cook University's College of Medicine & Dentistry that populations in regional and remote areas have much poorer health than those residing in metropolitan districts and, indeed, integral to the University's mission is the ability to deliver equitable access to high-quality healthcare for rural communities¹⁵.

Recent cancer data have emphasized significant disparities between regional/remote and inner city areas. Whilst the state of Queensland exhibited the highest age-standardised incidence rates and the Northern Territory the highest mortality rates for all cancers, both indices were considerably lower in the highly urbanised Australian Capital Territory. Very Remote areas have also shown higher mortality rates for liver and lung cancer compared with major cities, and those living in the most socioeconomically disadvantaged areas exhibit the highest incidence rates for cervical, colorectal and head and neck cancer⁹.

Figure 1, which is derived from the Australian Cancer Atlas, is a geographic representation of new head and neck cancer cases presenting between the years 2007 and 2016; approximately 4,250 tumours were diagnosed each year. A colour scale emphasizes high (red) or low (blue) cancer incidence, contrasted with average values (pale yellow) for Australia. It is visually striking how much more head and neck cancer presents in less affluent and more remote Northern and Western regions of the country¹⁰.

Cancer in the Indigenous Population

All of the above observations are even more pertinent for Aboriginal and Torres Strait Islander people living in rural and remote regions who not only suffer socio-economic disadvantage, but also have lower life expectancy than non-Indigenous Australians and are twice as likely to rate their general health as 'poor'. In Australia, indigenous status is predominantly determined by self-reporting and it is estimated that Indigenous Australians represent around 3% of the total population. Australian cancer registries collect information on indigenous status from hospital and death record notifications. Cancer incidence, mortality and burden are all significantly higher in Indigenous Australians, who tend to present late in clinical practice with advanced-stage disease. In 2014, cancer was the cause of one in every five deaths of Aboriginal and Torres Strait Islander people, with lung cancer the most common diagnosis and a mortality rate 1.8 times higher than Non-Indigenous Australians^{3,9,15}.

The incidence of head and neck cancer is known to be significantly higher in Aboriginal and Torres Strait Islander people, for both men and women, compared with Non-Indigenous populations. In addition to social deprivation and low income, a substantially higher proportion of Indigenous people smoke tobacco and regularly consume alcohol, principal risk factors for upper aerodigestive tract cancer³.

In a review of 67 Indigenous and 62 Non-Indigenous Australians with head and neck cancer, who exhibited similar socio-economic status and disease staging, Moore et al confirmed that Indigenous patients were far less likely to undergo any treatment at all and, when treated, frequently received less comprehensive care, rarely receiving adjuvant radiotherapy for example, and unsurprisingly exhibiting much poorer survival. Whilst the potential influence of comorbidities, particularly cardiorespiratory disease or diabetes, on Indigenous patient outcomes remained unexplored in the study, it is nonetheless very alarming to discover such apparent disparities in the delivery of cancer therapy¹⁶.

Whilst the inference from the study suggests that treatment uptake in this population needs to be dramatically improved, further research is required to understand the cultural background to the issue and to delineate the specific barriers that prevent Indigenous patients receiving appropriate healthcare. Patient-related and health service factors may all contribute to impaired access to specialist medical care, and these are listed in Table 3; the precise balance between individual factors, however, remains to be seen and may well vary between different populations. Effective strategies to overcome such barriers are essential to improve treatment outcomes in the future.

Strategies in Oral Cancer Prevention and Intervention

Despite the recognition of geographic variation in head and neck cancers within Australia, there remain significant gaps in our contemporary knowledge of more specific oral cancer incidence data, and little at all regarding patient awareness of risk factors, or their understanding of the salient signs and symptoms of disease, especially the many faceted presentations that comprise potentially malignant disorders (PMD) and the pernicious features of early-onset cancers^{1,17}.

Bayesian disease mapping, a statistical approach to quantify spatial and temporal risk utilising cancer registry data, has proved successful in identifying and characterizing 'high-risk' geographical areas for both oral cancer incidence and mortality within communities in Hong Kong, and offers real potential to help distinguish the sub-populations most at risk within regional and remote Australia⁶.

Similarly, active engagement with local stake holders and community leaders to assess the baseline knowledge of oral cancer and the treatment expectations of the targeted population, especially relevant for Aboriginal and Torres Strait Islander people, are essential prerequisites for efficacious health promotion, delivery of meaningful secondary prevention programmes and, ultimately, the execution of successful interventional treatments¹⁸.

Table 4 summarizes six, stepwise approaches to improving the early diagnosis and management of OSCC within a defined population. It is hoped that the years ahead will see increasing and effective application of these techniques to improve the delivery of specialist cancer care to 'high-risk' patients within the regional and remote communities in Australia.

Conclusions

The global burden of cancer continues to rise. Oral cancer, a lethal but largely preventable disease linked to known risk factor behaviour, may be readily diagnosed in clinical practice at both precursor PMD and early invasive stages by conventional oral examination techniques, rendering it amenable to curative, minimally invasive intervention. In order to optimize the efficacy of this approach, improved preventive strategies must be increasingly and specifically targeted at identifiable 'high-risk' population sub-groups⁸.

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TABLES

Table 1: Preventive Strategies in Managing Oral Cancer^{7,8}

Preventive Strategy	Supporting Knowledge	Target Population	Clinical Intervention
Primary	Socio-Demographic Patient Profiling Stratification of Risk	General	Patient Education Identify & Eliminate Risk Factor Behaviour
Secondary	Multi-Step Carcinogenesis Field Change Effects in the Upper Aerodigestive Tract Natural History of Oral Potentially Malignant Disorders	‘High-Risk’	Targeted Screening Field Mapping Biopsy Assessment Interventional Laser Surgery
Tertiary	Clinical Outcomes Treated Patient Cohort Data	Previously Diagnosed / Treated Patients	Active Patient Surveillance Repeat / Further Intervention

Table 2: Oral Cancer Incidence, Mortality and 5-Year Survival Data in Australia⁹

Cancer (ICD-10* Code)	Incidence (No.) 2015	Mortality (No.) 2016	5-Year Relative Survival (%) 2011-2015
Lip (C00)	935	7	93.3
Tongue (C01-C02)	865	212	67.1
Mouth (C03-C06)	598	135	60.1
Oropharynx (C09-C10)	678	180	68.6

* ICD-10 is the International Statistical Classification of Diseases and Related Health Problems, 10th Revision.

Table 3: Potential Barriers to Accessing Health Care Services

Patient Issues: Language Difficulties

Cultural Background

Employment & Income

Family & Housing

Availability of Transport

Possession of Health Insurance

Health Service Delivery: Proximity to Population Served

Access to & Availability of Specialist Services

Cultural Appropriateness

Affordability

Table 4: Approaches to Improving Oral Cancer Diagnosis & Management

1. Detailed Socio-Demographic Profiling of the 'High-Risk' Population
2. Improved Population Awareness of Oral Cancer & Risk Factor Behaviour
3. Delivery of Tailored Educational Programmes
4. Targeted Screening of 'High-Risk' Individuals
5. Enhanced Diagnosis of Oral Potentially Malignant Disorders & Early Invasive Cancer
6. Delivery of Targeted, Minimally Invasive Interventional Treatment

FIGURES

**Figure 1: Geographic Pattern of Head and Neck Cancer Cases in Australia
(2007-2016)¹⁰**



