# Oral cancer awareness in patients attending university dental clinics: A scoping review of Australian studies

Running Title: Oral Cancer awareness in university patients

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## Abstract

This scoping review was conducted to evaluate the important role Australian university-based dental teaching clinics and dental students may have in promoting oral cancer awareness in their patients. Four Online database (PubMed, OVID, Scopus and Emcare) were searched for studies that assessed oral cancer awareness amongst patients attending Australian university-associated (teaching) clinics. A total of five articles were retrieved for full-text analysis. All studies showed significant variation in patient awareness and understanding regarding the principal risk factors associated with oral cancer development. Smoking was predominantly identified as a significant risk factor, but alcohol consumption was less frequently recognised as relevant. Non-healing ulceration was most commonly identified as a symptom of concern, whilst red and/or white mucosal patches were infrequently recognised as potentially-malignant conditions. Our review confirms that a significant lack of patient awareness regarding oral cancer risk and the signs /symptoms of early malignancy or potentially malignant disease exist in patients attending dental teaching

clinics. Important opportunities exist to involve dental students proactively in raising oral cancer awareness, delivering smoking cessation interventions and safe alcohol consumption advice to their patients. Incorporation of established health educational models may deliver effective support for such student-delivered patient education.

Keywords: Oral Cancer, awareness, knowledge, attitude, health education



## Introduction

Oral cancer, in particular oral squamous cell carcinoma (OSCC), is the 14th most common malignancy worldwide in terms of incidence and mortality.[1] It is a lethal and deforming disease associated with a range of risk factor behaviours such as tobacco smoking and alcohol consumption, and compounded by low socio-economic status, poor nutrition, and regional isolation.[2] In Australia, an estimated 49,900 people died from cancer in 2019 with mortality rates 1.4 times higher for males and 1.8 times higher for females living in regional and remote locations, compared with metropolitan areas.[3, 4] Furthermore, the Australian National Cancer Control Indicators confirm that average OSCC five-year survival rates for Indigenous Australians are 23% lower than for non-Indigenous Australians (36.7% and 59.8%, respectively).[5] Despite significant improvements in treatment, five-year survival rates

have remained relatively stable (with only a slight reduction from 62% to 71%) between 1987–1991 and 2012–2016.[3] Furthermore, a recent retrospective study confirmed that the overall five-year survival rate for oral cancer patients (66.1%) and disease-specific survival rates (79.7%) have shown minimal changes.[6] Early detection and interventional treatment are key to improving outcomes and, therefore, increasing patient awareness, targeted screening of 'high-risk' populations and early diagnosis are all critical to reduce morbidity and mortality in the Australian population.

Recent trends point towards a marginal decline in the incidence of new OSCC cases in Australia and this may be related to increasing awareness of the detrimental effects of smoking and alcohol misuse. However, it is also worth noting that Human Papilloma virus (HPV) related cancers, particularly tonsillar and oropharyngeal, show a rising incidence, currently in the order of up to 10% each year across the world, including Australia.[7-9] This may be attributed to the changes in sexual habits within the population.[9] There is increasing evidence that HPV can significantly enhance the risk of oral cancer in combination with other risk factors such as alcohol and smoking.[10, 11] In a 10 year prospective cohort study assessed the overall long-term survival for HPV-positive oropharyngeal cancers was substantially improved compared to HPV-negative disease in the long term even when smoking status was matched.[12] This may explain the higher reported overall survival for HPV-associated oropharyngeal cancers, regardless of stage, estimated to be approximately 80% at 5 years.[13] Interestingly, HPV-positive oral cancers has been reported to typically occur in younger age group not using tobacco or alcohol, as compared to HPV-negative oral cancers that occur in older patients that smoke and consume alcohol regularly.[10, 14]

Another factor implicated as a contributory factor in oral cancers includes long term use of alcohol-containing mouth rinse due to increase in salivary acetaldehyde.[15] Although various other possible mechanisms attributed to alcoholic mouth use has been extensively researched, at least two recent systematic review and meta analysis concluded that there is significant lack of evidence to directly implicate alcoholic mouth rinses in oral cancer pathogenesis.[16, 17] As noted in our recently published scoping review, it is worth acknowledging that oral cancer in non-smoking, non-alcohol drinking patients is in fact a distinct entity unrelated to HPV infection.[18]

Various studies have been conducted globally to assess the awareness of both patients and oral health professionals (OHPs) regarding OSCC and PMD. In a recent Australian study involving dentists, dental specialists, hygienists, dental and oral health therapists it was noted that, although 95% supported regular OSCC screening, only 51% actually performed screening in practice.[19] In addition, less than 40% of OHPs in Japan perform screening due to apparent low levels of knowledge, lack of training and insufficient confidence.[20] These findings all suggest that further work is required to enhance delivery of effective OSCC screening and to improve patient awareness. An interesting approach was reported in a recent randomised controlled trial conducted within remote aboriginal communities in Taiwan whereby community members were trained as lay health advisors to deliver OSCC screening and promote mouth self-examination.[21] The classic Health Belief Model, developed to rationalize our understanding of health related behaviours, is based upon the concept that personal awareness of susceptibility will drive behavioural change to avoid or prevent illness.[22, 23] With improved understanding and better definition of clinically recognisable precursor cancer lesions, there are significant population health benefits to raising awareness of both OSCC and oral potentially malignant disorders (PMD) through a variety of approaches.[24]

University-associated dental teaching hospitals and out-patient clinics are uniquely placed to provide holistic oral health care to a wide-range of patients owing to their location, extended clinical settings and provision of comprehensive and highly specialist dental care.[25, 26] Indeed, in many regional centres, university clinics may be the only option to obtain timely and affordable treatment due to significant oversubscription of the public healthcare system in Australia.[27, 28] Within these teaching clinics, students provide, under the supervision of experienced clinical educators, definitive dental treatment to patients following precise and accurate oral diagnosis.[29] Furthermore, dental students acquire extensive abilities to interact with their patients, providing holistic care to patients from diverse backgrounds in a culturally appropriate manner.[30] These factors place university dental clinics in a highly strategic position to implement health promotional strategies to enhance health awareness within a local community. The aim of this paper is to undertake a scoping review of current knowledge regarding patients' perceptions and awareness of OSCC in the university dental teaching environment in Australia.

# Methods

The framework for scoping review described below was adapted from the methodology described by Arksey and O'Malley [31] and Sucharew et al [32] that ensured comprehensive and reproducible, structured literature searches for relevant information, with minimal potential for bias. The scoping review and the search strategy was driven by the following broad question.

What role does Australian university-based teaching clinics play in promoting and assessing oral cancer awareness in patients?

## Inclusion criteria

Any type of studies (observational, cross-sectional, case-control, cohort or interventional studies) which assessed the oral cancer awareness of patients or population, without any age or gender restrictions, published in English language and conducted in Australian university-associated (teaching) clinics were included in this review.

## Exclusion criteria

Any studies conducted in private clinics or public hospitals alone or focusing on health professionals' awareness and attitudes, systematic or literature reviews, case reports or case series, letters to editors, conference abstracts, theses or dissertations and studies focusing on patient management after treatment of oral cancer were excluded from this review.

## Search strategy

The formulation of search strategy was finalised after a discussion with a research librarian to identify relevant keywords for electronic search. Databases PubMed, Medline (Ovid), Scopus and Emcare were searched using relevant keywords. The search strategy and the search strings are listed in Supplementary Table 1.

### Study selection

Two reviewers (PR and DS) independently screened all the titles and abstracts and excluded studies that were not relevant, based on the predetermined inclusion and exclusion criteria. Any disagreement between the two reviewers in selection process was resolved by consulting a third reviewer (PT). Endnote (v20.1 Clarivate, Philadelphia, PA) bibliographic software was used to import, screen and manage the references.

## Results

Initial electronic search across the four databases identified a total of 104 articles. After removal of duplicates, 77 were screened for inclusion after reviewing titles and abstracts. The reviewers agreed to consider 12 for full text review and final inclusion, based on predefined inclusion and exclusion criteria was limited to five papers. Preferred Reporting Items for Systematic reviews and Meta-analysis (PRISMA) flow chart was utilised (Figure 1) to illustrate the literature search and selection process followed in this scoping review.[33] Basic characteristics and main findings of the five articles included in the scoping review are presented in Table 1.

## Discussion

This scoping review focused upon studies conducted within Australian University- teaching clinics, which inevitably limits the number of papers eligible for inclusion. Self-administered questionnaires were employed in three[34-36] studies, one utilised face-to-face interview[28] and another combined both -semi-structured interviews and self-administered questionnaires.[37] Sample size ranged from 100 to 1498, although the large 1498 patient study utilised data from multiple sites including public dental clinics, indigenous health clinics and a community pharmacy associated with two coordinating university-clinics.[37]

Data collected in these studies included: (i) Socio-demographic profile (ii) Knowledge of risk factors and perceived risk of developing cancer, and (iii) Awareness of signs and symptoms of PMD and OSCC. [28, 37]

It is apparent that awareness of OSCC risk varies substantially between different study populations, ranging from under 40% to up to 90%.[37-39] Notably, Park et al [28] reported that although awareness regarding lung cancer reached 100%, only 72% of their study participants had ever heard of OSCC; a similar result (74%) was recently confirmed in a study by Zachar et al.[36] Furthermore, only 20% of patients report awareness of the existence of PMD, which is particularly concerning considering the efficacy of interventional PMD management techniques in reducing malignant transformation risk.[40] The observations were confirmed in a study in Far North Queensland where 300 participants showed far better OSCC awareness (55.6%) compared to PMD (27%).[34]

## Socio-demographic profile

Knowledge of OSCC and an appreciation of risk are directly influenced by socio-demographic factors.[41, 42] These include familiarity with the English language, attainment of University education, and regular employment status.[28] Logistic regression confirmed that a high level of educational attainment was actually an independent predictor of OSCC awareness.

Whilst neither age nor gender influenced overall awareness, highest OSCC awareness (61%) and an appreciation of the early warning signs of OSCC were reported in younger age participants, especially those between 20-39 years.[34] The large, 1498 participant dataset also noted that younger people and those with higher annual incomes (defined as greater than $80,000 per annum) showed significantly higher awareness, as confirmed by bivariate analysis.[37] In addition, non-indigenous Australians showed higher awareness than Indigenous Australians or overseas-born participants.[37]

The source of information around OSCC varied significantly with mass media being the biggest source (67%).[34] This differed from our previous findings wherein most common source of information was internet platforms (54%) followed by mass media (49%) in Hong Kong.[43] Interestingly, in a recent Australian study, participants noted that their information source for oral cancer was more often (35%) a cigarette package and this can be attributed to the recent changes in packaging requirements to enhance awareness around ill-effects of smoking.[36] This trend is in agreement with the findings reported in a recent systematic review that graphic health warnings, depicting lung cancer and oral diseases were particularly effective deterrent for smokers, in comparison to text-only warnings.[44]

Furthermore, plain packaging was noted to reduce the desirability of cigarette packaging particularly when darker colours were used.

Dental practitioner was identified as a source of information by significantly lower proportion of participants across various studies ranging from 28% to a mere 3%.[34, 36]

## Knowledge of risk factors and perceived risk of developing OSCC

Tobacco use, particularly cigarette smoking, and excessive alcohol consumption are widely acknowledged as risk factors for upper aerodigestive tract cancers. Nearly 98% of participants acknowledged the increased risk of OSCC with the use of either tobacco or alcohol consumption.[35] Interestingly, however, only 16% of participants identified both smoking and alcohol as a risk for OSCC development in a study in Western Australia as compared to one in Queensland (88%).[28, 35] Such alarming lack of awareness may have significant effects on OSCC prevalence, since the concurrent use of tobacco and alcohol has long been recognised as a marker of increased OSCC risk.[45]

It has previously been shown that immigrants from South Asian countries living in developed countries such as the USA, UK, Italy and New Zealand may possess limited knowledge of OSCC and demonstrate unfavourable smoking habits and risk factor behaviours, emphasizing the importance of cultural influences in population-attributable risk.[46] As a specific example, the effects of actinic radiation on the lip and areca nut chewing (with or without tobacco) were particularly reported as high risk factors in the Far North Queensland population, perhaps reflecting lifestyle choices unique to the population in this geographical location.[34]

Overall, 38% of participants considered themselves to be at risk of developing OSCC during their lifetime, and this perception was 6-times higher in current smokers than non-smokers.[28] In the Zachar et al study, however, only 18% of the participants considered themselves to be at risk of OSCC, although current smokers and ex-smokers were more likely to acknowledge their risk.[36] In general, risk factors that were identified accurately included smoking (96%), poor oral hygiene (77%), a family history of mouth cancer and alcohol use (57%); these were more frequently recognised by participants younger than 30

years.[36] However, other relevant factors such as Human Papilloma virus infection, increased age, and stress were not properly identified as OSCC risk factors.[36]

### Signs and symptoms of OSCC

Awareness of the subtle and pernicious clinical presentations inherent in both OSCC and PMD development are vital for early detection and delivery of optimal, low-morbidity treatments. Careful inspection of the oral mucosa by trained clinicians remains the most efficacious approach. Sadly, however, patients usually present late with advanced stage disease. Partly due to the asymptomatic nature of early mucosal changes, including leukoplakia, erythroleukoplakia, erosive or early ulcerative lesions, and compounded by ignorance of the existence of OSCC, patients often simply ignore symptoms during the onset of carcinogenesis. Later, loosening of teeth, pain and bleeding may be regarded as routine 'dental' conditions until progression to the more sinister features of impaired tongue mobility, dysphagia and cervical lymphadenopathy.[47]

In the studies reviewed, non-healing ulceration was considered the most recognizable presentation suggestive of OSCC, with up to 90% of participants in agreement.[28, 36] Other commonly suggested signs or symptoms included bleeding gums, unexplained growths, a lump in the neck, red and white mucosal patches and painless ulcers.[28, 34-36] One study reported that conditions such as dental caries, hairy black tongue and recurrent dental abscesses were all likely to represent OSCC, emphasizing the need for improved patient education.[28] Overall, less than a half of participants identified a white or red patch, or painless ulceration as possible signs of OSCC; interestingly, erythroplakia was believed to be of more significance for participants with an education level of Year 12 and beyond, compared with those lacking higher education.[36]

## Conclusions

Currently, there is limited contribution from university-based teaching clinics in promoting oral cancer awareness as evidenced by limited papers published in this field. Furthermore, this scoping review has confirmed a significant lack of knowledge and awareness among patients attending university dental teaching clinics. Younger, non-indigenous Australians of higher socio-economic status appear to possess better understanding of both the risk

factors and pertinent signs and symptoms associated with OSCC development. A particularly concerning observation was that many patients did not perceive dentists or oral health professionals as their principal source of information or advice regarding PMD and OSCC. With the large number of patients regularly attending university teaching clinics, there are, however, significant opportunities for active incorporation of health educational models to support dental students in educating their patients effectively regarding OSCC risk and identification of PMD.

## Figure Legends

Figure 1: PRISMA Flow Diagram illustrating literature search process

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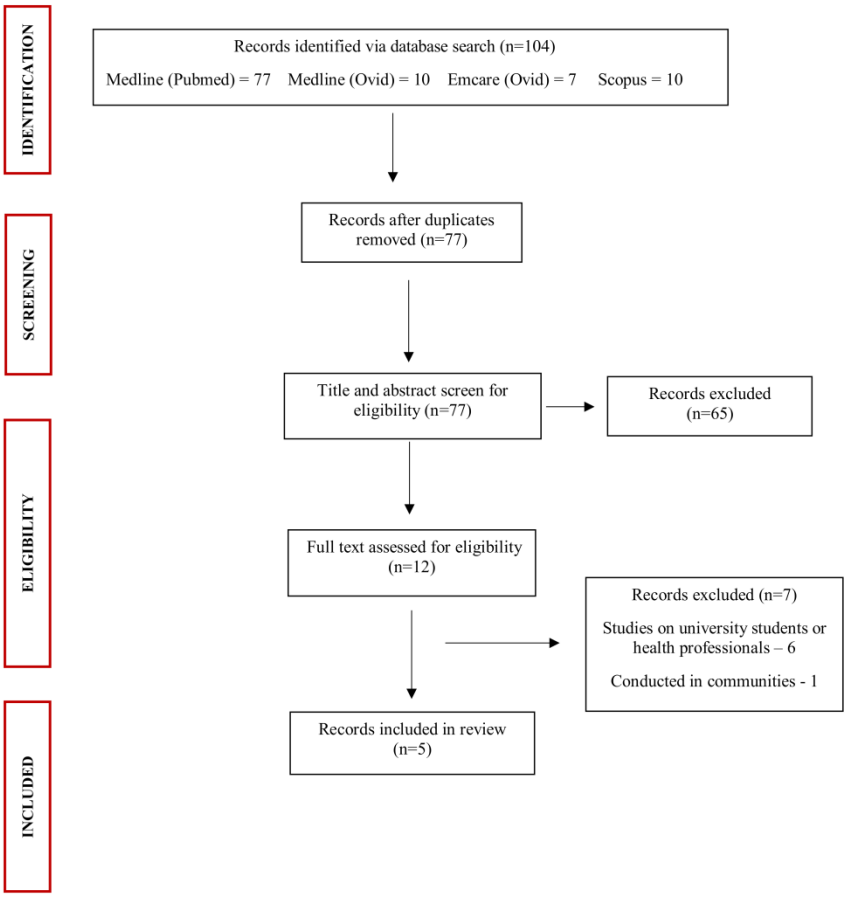
**Table 1: Overview of studies included in the scoping review**

| Citation | Participants | Sites of Data collection/ University | Data collection methodology | Socio-demographic factors linked to increased awareness | Risk factors identified by participants (%) | Signs and symptoms identified by participants as concerning (%) |
|---|---|---|---|---|---|---|
| Park et al[28] (2011) | 100 | One University of Western Australia dental clinic in regional center of Western Australia | Face-to-Face interview (21 questions) | Language spoken at home (3 times)<br>University education<br>Employment (5 times) | Tobacco Smoking 42%<br>Excessive alcohol 5 %<br>Smoking + alcohol 16% | Non-healing ulcer 23%<br>Bleeding gums 17%<br>Growth in mouth 13%<br>Lump in the neck 13% |
| Formosa et al[34] (2016) | 300 | One James Cook university dental clinic in regional Queensland | Self-administered questionnaire | University education (OSCC awareness better than PMODs)<br>Experience as patient in university clinic (OSCC awareness) | Tobacco Smoking 92%<br>Chewing tobacco 84%<br>Actinic radiation 71%<br>Chewing tobacco + areca nut 68%<br>Excessive alcohol 52%<br>Chewing areca nut 51% | Non-healing ulcer 49%<br>Lump in the neck 30%<br>White patch 22%<br>Red patch 19% |
| Bakr et al[35] (2016) | 150 | One Griffith University dental clinic in regional centre of Queensland | Self-administered questionnaire (10 questions) | Age (>40 yrs) | Tobacco Smoking 98%<br>Excessive alcohol 58%<br>Smoking + alcohol 88%<br>Age >40 yrs 62% | Non-healing ulcer 68%<br>White/red patch 64% |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Dost et al[37] (2016) | 1498 | Two University of Queensland dental clinics in Urban Queensland* | Semi-structured interview followed by oral mucosal screening and self-administered questionnaire | Age (≤ 45years)<br>Non-indigenous Australian<br>Annual income >$80K<br>High fruit intake<br>High vegetable intake<br>Adequate dentition | Tobacco Smoking<br>Poor oral hygiene<br>Family history<br>Poor diet<br>Excessive alcohol | 88%<br>68%<br>61%<br>53%<br>50% | No data collected | |
| Zachar et al[36] (2020) | 444 | Five regional Charles Sturt university dental clinics in New South Wales | Self-administered questionnaire | Women (2.57 times)<br>Year 12 Education or higher (5.8 times)<br>Previous university clinic Patient (2.89 times)<br>Excellent level of oral health (3.34 times)<br>Smokers (45 times)<br>Ex-smokers (2.5 times) | Tobacco smoking<br>Poor oral hygiene<br>Family history<br>Excessive alcohol<br>Poor diet<br>Stress<br>Increasing age<br>HPV | 96%<br>77%<br>63%<br>57%<br>53%<br>38%<br>36%<br>24% | Non-healing ulcers<br>Bleeding<br>Pain on swallowing<br>Red patch<br>White patch<br>Painless ulcers | 90%<br>65%<br>54%<br>45%<br>44%<br>44% |

* Also included data collected from other clinics (3 public dental clinics, 3 indigenous health clinics and 1 community pharmacy)

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