Research Square

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Oral Cancer knowledge and confidence in discussing oral cancer-associated behaviours among Australian Oral-Health Professionals

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Abstract

Background

The aim of this study was to investigate oral cancer screening practices among Australian dental practitioners (DPs) and to assess their knowledge of oral cancer risk-factors and confidence in discussing related behaviours with patients.

Methods

A 41-item survey was promoted widely to practicing Australian DPs (dental hygienists, dental prosthetists, dental therapists, dentists, oral health therapists). Items included socio-demographic; work-related characteristics; self-assessed oral cancer knowledge (utilising a 10-point numerical scale), knowledge about risks factors for oral cancer (responses 'Yes'/'No'/'Unsure'), and level of confidence in discussing seven health behaviours with patients (utilising a 10-point scale).

Results

A total of 395 DPs were included in the analysis. The majority were dentists (80.7%). Almost all DPs (98.5%) agreed that they should screen routinely for oral cancer. However, only 52.2% of respondents reported 'Always' conducting comprehensive oral cancer screenings.

Background

Oral cancer is a disease of rising incidence and global significance due to its high mortality rate and the substantial impact it has on quality of life [1]. Oral cancer describes a number of cancers that start in the region of the mouth including the lips, tongue and floor of the mouth; however, it can also start in the cheeks, gums, roof of the mouth, tonsils and salivary glands [2]. Classified as a subgroup of head and neck cancers, oral cancers are the 6th most common cancer worldwide [3]. The 5-year survival for oral cancer remains very poor, at about 50–60%, and has not changed significantly in last 50 years [4], and is particularly prevalent in certain geographic areas [5–7]. A high level of morbidity is associated with oral cancer treatment leading to significant oro-facial deformity and long-term reductions in quality of life [8, 9]. It is estimated that more than 3122 people were diagnosed with oral cancer in Australia in 2022 [10, 11], with mortality rates remaining high [12–14].

Evidence-based primary risk factors for oral cancers are tobacco and alcohol consumption, both of which are modifiable behaviours [15, 16]. Other recognised risk factors include ultraviolet light exposure for lip cancer and chewing areca/betel nut that are highly prevalent in Asia-Pacific regions [17]. These factors can interact to further increase an individual's risk.

Health practitioners play a key role in identification and management of oral cancer, in particular Dental Practitioners (DP). Their role is crucial as treatment options and prognosis are strongly dependent on the stage at diagnosis: early detection and treatment significantly improve clinical outcomes and overall survival rates. The signs and symptoms associated with oral cancer are often first detected by an DP during a routine oral examination, although lesions may also be first noted by patients through self-examination [18]. Many oral cancers, however, are asymptomatic and can be overlooked [19] meaning a substantial proportion are diagnosed at advanced stages, which markedly restricts therapeutic options and worsens prognosis [20].

Screening is defined as 'the identification of unrecognised disease by the application of a test to people who are asymptomatic, in order to identify those who probably have the disease and to distinguish them from those who probably do not.' [5]. Oral Cancer has been considered a suitable condition for screening [21], and opportunistic screenings by DPs are proven cost-effective [22–24].

Despite this, there is no established national screening program for oral cancer in Australia, raising concerns about how routinely dental practitioners incorporate oral cancer screening into their clinical practice. A recent review of clinical practice guidelines for oral cancer concluded that their overall quality was suboptimal and that high-quality clinical practice guidelines are needed to provide accurate, up-to-date, and evidence-based guidance [25]. Understanding current screening practices of DPs is essential for identify gaps in implementation and to design targeted education and training programs to improve oral cancer detection. A 2015, a cross-sectional survey conducted among Victorian dental practitioners found that only half of respondents performed oral cancer screening for all patients [26, 27], underscoring the need for continuing professional development initiatives for DPs. Following this study, the Victorian Government funded some initiatives through the Victorian Cancer Plan improve early detection of oral cancer, ultimately enhancing outcomes and public health [28]. Ongoing monitoring and evaluation are required to determine whether these strategies to improve early detection are effective and to ensure sustained improvements in DPs practice and oral cancer outcomes.

Consequently, the objective of this study was to explore changes in the self-reported oral cancer screening practices among Australian dental practitioners in the ten years since 'Oral cancer screening practices of oral health professionals in Australia' was last evaluated. It also aimed to evaluate their ability to distinguish true risk factors from non-risk factors for oral cancer and to assess their level confidence in providing oral health education to patients. By collecting and analysing these data, the study sought to generate actionable insights into the current state of oral cancer screening in Australia, identify gaps in knowledge and practice, and inform targeted education and quality improvement initiatives to enhance early detection and care.

Methods

Study Design and Setting

This study employed a cross-sectional design (Clinical trial number: not applicable) to assess oral cancer screening practices and knowledge among Australian dental practitioners This study was conducted in strict compliance with the Helsinki Declaration (https://www.wma.net/policies-post/wma-declaration-of-helsinki) with the approval of the Human Research Ethics Committee at the University of Melbourne (ID 2025-29012-66010-7).

Study population

Eligible participants were currently registered and practicing Australian dental practitioners including dental hygienists, dental prosthetists, dental therapists, dentists (general and specialists) oral health therapists. Dental practitioners not currently involved in clinical practice (i.e., seeing patients) were ineligible to participate.

According to Dental Board of Australia registration data from this period, there were 27,350 registered dental practitioners [29], however this number may overestimate the target respondents as not all registered dental practitioners see patients in clinical practice. However, operating on that number for sample size calculations indicated that a minimum of 379 participants would be required, for a 5% margin of error and a 95% confidence level (https://surveyplanet.com/sample-size-calculator).

Study design and procedures

An anonymous survey was developed as an updated version of the 2015 Victorian questionnaire [27], revised for use in a national study and to include contemporary factors (e.g. vaping, COVID-related items). It included a plain language statement, and consent was implied by choosing to complete the survey. The questionnaire was reviewed by an expert panel and piloted with practicing DPs (See Supplementary files).

Initially, members of the Australian Dental Association, the Australian Dental and Oral Health Therapists Association, the Australian Dental Prosthetists Association, and the Dental Hygienists Association of Australia were invited to participate in the study via a notice in bulletins. The notice included a link to the digital survey. To improve the response rate, an ethics amendment was subsequently sought to distribute a paper-based survey with return paid envelopes to members of the Australian Dental Association Victorian Branch; returned paper responses were entered manually into the electronic database. Recruitment was further promoted through professional networks (e.g. Oral Health Victoria) and via social media platforms. Data for the online survey was collected between October 2024 and July 2025 and for the paper version between June and December 2025.

Instrument

The revised questionnaire consisted of the following sections:

1. Demographics and work characteristics (10 Items). This section collected data on: gender; division of registration: 'Dentists' (further divided as either General Dental Practitioners or 'Dental Specialists'), 'Dental Therapists and Oral Health Therapists (OHT/DT)' 'Dental Hygienists (DH)' and dental prosthetist; country where primary dental qualification was completed; years of practice (reclassified into six timeframes: '5 years or less', '6 to 10 years', '11 to 15 years', '16 to 20 years', '21 to 25 years', and 'More than 25 years'; the Australian state(s) and territories currently practicing; location of practice based on the Modified Monash Model (MMM) [30]; clinical setting (public, private, hospital).
   Participants were also queried about their regular treatment of adult patients and courses and training completed in the last 5 years related to oral cancer; and place of the course. Practitioners were asked whether they took the Oral Cancer Learning Hub training, delivered as part of Victorian Oral Cancer Screening and Prevention Program [28].
2. Oral cancer screening practices (10 Items): This section asked participants which dental practitioners should screen for oral cancer; their frequency of oral cancer screening; the factors influencing their decision to screen; if they inform the patient they are conducting a screening; what components they include in screenings; if they use additional diagnostic aids; how they would manage an abnormal lesion; and whether they have ever detected a malignant lesion.

3. To assess their understanding of oral cancer risk factors, participants were asked to rate their knowledge on 10-point scale (0 = 'Very poor' to 10 = 'Excellent'): their frequency of discussing risk factors with patients, what prompts them to discuss oral cancer; which age groups they screened for oral cancer, their knowledge about oral cancer risk factors; and identification of risk factors from a list of 18 factors including: smoking, periodontal disease, caffeine intake, family of oral cancer, chewing betel nut, human papillomavirus (HPV), hepatitis C, chewing tobacco alcohol consumption, herpes simplex virus infections, and history oral cancer. A scoring system was created to quantify knowledge by summing the weighted responses for each factor, yielding scores from 0 to 18.

4. Self-perceived oral cancer training needs (3 Items): This section assessed participants self-rated confidence discussing behavioural factors (including tobacco, alcohol, oral sex, oral hygiene, diet and nutrition, e-cigarettes, and immunisations) on a 10-point scale (0 = 'Not at all' to 10 = 'Highly confident'); and perceived professional development and training needs related to: a) oral cancer risk factors, assessment procedures, and b) oral cancer signs and symptoms.

Data analysis

The analysis provides descriptive information on the participants' work and various socio-demographics. Chi-squared analysis was used for nominal or ordinal variables. For variables on an interval scale, results were analysed using one-way analysis of variance (ANOVA). A significant ANOVA was followed by post-

hoc comparisons using Tukey's Honestly Significant Differences tests. Multiple linear regression was also employed to determine the relative importance of independent variables (e.g., age, gender, location, knowledge) in explaining variation continuous dependent variables (e.g., confidence) using stepwise selection procedures. Variables with $p < 0.20$ were included in the model. Missing values were handled using case-wise deletion. For categorical dependent variables, multivariate logistic regression was used. Adjusted odds ratios (ORs) were used to estimate the magnitude of effect. All p-values < 0.05 were considered significant. Data manipulation and analyses were conducted using IBM SPSS Statistics (Version 33.0, IBM Corporation, Endicott, NY, USA).

This manuscript adheres to the STrengthening the Reporting of OBservational studies in Epidemiology. (STROBE) statement [31].

Results

A total of 505 DPs responded via either paper or web-based questionnaire. One-hundred and ten respondents were excluded from further analysis: twenty-nine DPs were not currently practicing, another eight DPs indicated that they did not routinely treat adult patients, 21 indicated being current practitioners but did not answer any sociodemographic or work questions, and another 52 responses were incomplete with the SES and work items completed, but none of the knowledge, attitudes, and confidence items. Thus, a total of 395 DPs were included in the final analysis. Table 1 shows the sociodemographic and work characteristics of the sample.

Table 1
Demographic, work characteristics of Australian dental practitioners (%).

	Dentists	DHs	OHT/DTs	Prosthetist	Total
	(n = 319)	(n = 42)	(n = 31)	(n = 3)	(n = 395)
Gender					
Male	43.3	2.4	6.5	100.0	36.5
Female	55.8	7.6	93.5	--	62.8
Prefer not to say	0.9	--	--	--	0.7
Length of practicing					
5 or less	9.1	7.1	19.4	0.0	9.6
6–10	9.7	9.5	51.6	0.0	12.9
11–15	13.2	14.3	9.7	0.0	12.9
16–20	8.8	23.8	12.9	66.7	11.1
21–25	11.3	11.9	3.2	0.0	10.6
26–30	12.2	7.1	3.2	0.0	10.9
> 30	35.7	26.2	0.0	33.3	31.9
Working hours					
10 or less	8.7	10.0	13.3	33.3	9.4
11–20	14.6	20.0	3.3	0.0	14.2
21–30	25.8	40.0	13.3	66.7	27.5
31–40	42.5	30.0	13.3	0.0	41.7
41–50	8.4	0.0	6.7	0.0	7.2
Place of work					
Urban	73.7	61.9	54.8	100.0	71.1
Regional	14.7	16.7	25.8	0.0	15.7
Remote	5.0	9.5	9.7	0.0	5.8
Mixed	6.6	11.9	9.7	0.0	7.4
Sector of practice					
Private	85.6	100.0	67.7	33.3	85.3
Public	5.6	0.0	19.4	67.7	6.6

	Dentists	DHs	OHT/DTs	Prosthetist	Total
	(n = 319)	(n = 42)	(n = 31)	(n = 3)	(n = 395)
Mixed Private/Public	8.8	0.0	12.9	0.0	8.1

The majority of participants were dentists (80.7%; n = 319), either general practitioners (71.6%) or specialists (9.1%). 10.6% (n = 42) were dental hygienists; 7.8% (n = 31) were oral health therapists or dental therapists, and 3 (0.9%) were dental prosthetists. The majority (63.2%) of each division of DPs were female, except for specialist dentists where the majority (61.1%) were male.

All Australian states and territories were represented in the study. Nonetheless, the majority of participants (77.2%) were from Victoria; another 6.6% from Queensland, 6.3%, were from New South Wales, and the remaining 9.9% were either from other states or territories or worked in more than one state. When participants were asked about the location of their practice, the majority (71.1%) indicated a 'Metropolitan' location; another 15.7% indicated regional centres, 5.8% nominated rural towns, and the remaining 7.4% indicated they work in mixed locations. Although the majority of DPs worked in metropolitan areas, a significantly higher proportion of DTs/OHTs ($p < 0.05$) worked in regional or rural areas (e.g. 19.7% of dentists vs. 35.5% and 26.2% of OHTs and DTs, respectively).

Most participants worked solely in private practice (85.3%); only 6.6% worked in public dental clinics, and 8.1% worked in both settings. Based on weekly hours as a clinician, the largest proportion (41.7%) worked between 31–40 hours. Another 27.5% worked between 21–30 hours per week, 14.2% between 11 to 20 hours per week, and the remaining 16.6% reported working either less than 10 hours or between 41 to 50 hours per week. Regarding their length of time practicing as an DP, the largest group (42.8%) indicated more than 25 years of practice; 9.6% reported 5 years or less of practice; 12.9% reported between 6 and 10 years, another 12.9% between 11 and 15 years, 11.1% reported between 16 and 20 years of practice and the remaining 10.6% between 21 and 25 years.

Oral cancer screening training

When asked about the type training/professional development related to oral cancer completed over the last 5 years, 45.1% (n = 178) reported no such training or were unsure. Those who attended courses, completed a mean of 2.5 courses (range 1–4). By course type, 44.1% completed oral cancer risk assessment or screening practices, and 31.9% completed oral cancer prevention courses. Overall, 54.9% indicated having completed some oral cancer training in the last five years. Of the practitioners from the state of Victoria, 16.7% reported participating in the Victorian Oral Cancer Screening and Prevention Program (29). DPs not from Victoria were asked whether they took the Head and Neck Cancer Australia GP and Dentist Education Module, and 7.8% reported that they had.

Oral cancer screening examination

Almost all DPs (98.5%) agreed that they should screen routinely for oral cancer. However, only about half of those surveyed (52.2%) reported 'Always' conducting comprehensive oral cancer screenings (See Table 2). A further 34.4% reported conducting screenings 'Most of the time', while a minority (13.4%) reported doing so 'About half of the time' 'Sometimes' or 'Never'.

Table 2
Oral screening behaviours of dental practitioners in Australia

	Dentists	**DHs**	**OHT/DTs**	**Prosthetist**	**Total**
	(n = 319)	**(n = 42)**	**(n = 31)**	**(n = 3)**	**(n = 395)**
How frequently do you complete an oral cancer screening examination? (%)					
Always	50.2	64.3	58.1	33.3	52.2
Most of the time	36.7	19.0	32.3	33.3	34.4
About half of the time	4.7	4.8	3.2	0.0	4.6
Sometime	7.5	9.5	3.2	33.3	7.6
Never	0.9	2.4	3.2	0.0	1.2
How often do you discuss risk factors for oral cancer with your patients? (%)*					
Always	10.0	21.4	16.1	33.3	12.0
Most of the time	27.3	23.8	32.3	0.0	27.3
About half of the time	11.0	26.2	19.3	0.0	13.3
Sometime	46.1	23.8	32.3	66.6	42.6
Never	5.6	4.8	0.0	0.0	4.8
What factors influence your decision to perform an oral cancer screening examination? (%) (Multiple answers) ** (n = 159)	(n = 15)	(n = 13)	(n = 2)	(n = 189)	
Patient complaints of a problem	62.3	20.0	46.2	50.0	57.7
Age of the patient	65.4	40.0	61.5	50.0	63.0
Medical history	64.2	40.0	53.8	100.0	61.9
Type of appointment	45.9	33.3	61.5	50.0	46.0
Behavioural risk factors	64.8	33.3	46.2	100.0	61.4
Other	8.2	26.6	23.1	0.0	10.5

*Only those who did not report more frequently than "Sometimes" conducting oral cancer screenings (n = 360).

**Only those who did not report "Always" conducting oral cancer screenings.

When asked which registered DT, they considered qualified to perform oral cancer screenings, almost all selected general dentists (99.2%), followed by DT/OHT (87.1%), and DH (83.3%); 73.9% nominated dental specialists, while only about one-third (36.6%) thought dental prosthetists were qualified to conduct this examination.

Among those who did not 'Always' conduct an oral cancer screening (n = 189), the decision to screen was influenced by the patient's age (63.0%), the patients' behavioural risk factors (61.4%), the patient's medical history (61.9%), the patient complaining of a problem (57.7%); or the type of appointment (e.g., new patient assessment, check-up) (46.0%). Additionally, 10.5% of participants indicated other reasons. Of the respondents, 37.0% screened patients older than 20 years of age, 23.4% routinely screened all patients, 16.8% examined all patients older than 40 years of age and the remaining 22.8% nominated other age groups.

When including only those who regularly ('Always', 'Most of the time' or 'About half of the time') conducted an oral cancer screening for their patients (n = 360), 54.4% indicated they 'Sometimes' informed the patient they were screening for potentially malignant or malignant lesions. Only 26.4% 'Always' informed patients and almost one-fifth (19.2%) 'Never' informed patients about the purpose of the screening. For only those who regularly conducted an oral cancer screening, the screenings almost always involved an intraoral visual inspection of the patient's oral cavity (98.1%), and for 83.5% also included an extraoral visual inspection. A screening that 'Always' involved a visual inspection of the oropharynx or a neck palpation was lower (53.5% and 34.1%, respectively). Except for neck palpation, none of the screening techniques reached statistical significance levels by DP background (See Table 3). Neck palpation was more likely to be performed by DTs/OHTs (OR = 2.63; 95% CI 2.22 to 5.66). Of this group, 40 participants (11.1%) indicated using additional diagnostic aids/tools to detect potentially malignant lesions. Most reported diagnostic aids/tools were biopsies (n = 7), oral cancer screening tools (e.g., Velscope) (n = 8) and various imaging techniques, OPG in particular (n = 11). Photographic documentation (n = 11), including intraoral cameras and standard photos, were also used to support diagnosis.

Table 3
Frequency of oral cancer screening examination behaviours of dental practitioners who reported 'Always' or 'Most of the time' or 'About half of the time' conducting an oral cancer screening.

Screening examination involved:	Dentists	DHs	OHT/DTs	Prosthetist	Total
	(n = 292	(n = 37)	(n = 29)	(n = 2)	(n = 360)
Extra-oral visual inspection of the oral cavity (%)					
Always	84.5	75.7	82.8	100.0	83.4
Sometimes	13.8	18.9	17.2	0.0	14.6
Never	1.7	5.4	0.0	0.0	2.0
A visual inspection of the oral cavity (%)					
Always	98.3	94.6	100	100	98.1
Sometimes	1.7	5.4	0.0	0.0	1.9
Never	0.0	0.0	0.0	0.0	0.0
A visual inspection of the oropharynx (%)					
Always	52.9	56.8	55.2	50.0	53.5
Sometimes	40.9	37.8	31.0	50.0	39.8
Never	6.2	5.4	13.8	0.0	6.7
Neck palpation (%)					
Always	31.4	40.6	55.2	0.0	* 34.1
Sometimes	48.8	29.7	34.5	100.0	45.9
Never	19.8	29.7	10.3	0.0	20.0
	* Chi- squared test; p-value: 0.05.				

Participants were asked what procedures they followed when an abnormal lesion was detected for which they could not determine the cause. The most reported courses of action were: 'Referral to an oral medicine specialist' (n = 342; 95.3%); 'Ask the patient to monitor the lesion' (n = 126; 35.1%) and 'Consult with another colleague' (n = 126; 32.9%). The least selected action was: 'Referral to the patient's general medical practitioner' (n = 63; 17.6%).

When DPs were asked whether they have ever referred a patient to an oral medicine specialist for a lesion that turned out to be malignant, the majority (59.2%) indicated they had (n = 232). When controlling for number of courses taken, and for each additional screening procedure performed, the odds of referring a patient to an oral medicine specialist increased by about one third (OR = 1.28; 95% CI

1.05 to 1.55). The most common malignant lesion diagnosed after referral was Squamous Cell Carcinoma of the tongue. There were also cases of other oral cancers, and 13 cases of either dysplasia or an oral potentially malignant disorder.

Oral cancer risk factors

Regarding knowledge about risk factors for oral cancer, 99.7% of participants indicated smoking was a risk factor. Previous experience of oral cancer was second most frequently selected (99.2%), followed by chewing tobacco products (97.7%); chewing betel nut (97.2%); alcohol consumption (96.9%), HPV (94.1%); and e-cigarettes (86.7%). Participants' understanding that exposure to UV light as a risk factor (85.4%), and age (74.9.1%) was also high. By contrast, DPs were uncertain or gave incorrect responses about the role of periodontal disease (55.6%), herpex simplex virus (81.2%), hepatitis C infection (80.1%), poor oral hygiene (59.9%), poor nutrition (82.1%), sex/gender (69.8%), caffeine consumption (39.8%), and to a lesser extent, family history of oral cancer as risk factors. For the human papilloma virus, 94.1% incorrectly identified it as is a risk factor for oral cancer.

The participants self-reported oral cancer risk knowledge ranged from 3.0 to 15.0 with a mean of 8.4 (SD: 2.5). To examine whether any variables (including gender, profession, sector of practice (private versus other), rurality and number of years work experience) explained variation in risk knowledge scores, linear regression analysis was conducted, with profession, location of practice, and sector of practice (public versus private) significant after adjusting for other independent variables [$F(3,343) = 5.52$; $p < 0.01$], explaining just 3.8% of the variance in risk knowledge. The final model indicated that, after adjusting for other variables, participants with the lowest score were more likely to be DT/OHT working in private practice and in rural areas.

When DPs were asked how often they discuss risk factors for oral cancer with their patients, the largest group (42.6%) indicated 'Sometimes' (Table 2). Another 27.3% reported they 'Most of the time' discussed risks factors with their patients. 'Always' or 'About half of the time' was reported by 12.0% and 13.3% of participants, respectively. Nineteen DPs (4.8%) 'Never' discussed risk factors with patients. Significant differences were present by practitioner division ($p < 0.02$). DPs indicated that they discuss risk factors with a patient when they are identified as at-risk (78.0%), when the patient asks (33.4%), or as part of the routine dental appointment (28.7%).

Level of confidence about discussing oral cancer risk factors with patients

When asked about their about confidence discussing behavioural issues that may affect oral health with their patients, participants generally felt confident discussing oral hygiene practices (Mean 8.1; SD: 2.6), diet and nutrition (Mean 7.5; SD: 2.8), tobacco use (Mean 8.6; SD: 1.7), and to a lesser extent, alcohol consumption (Mean 7.6; SD: 2.3) and use of e-cigarettes (Mean 7.8; SD: 2.5). In contrast, the mean levels of confidence for discussing oral sex practices and immunisation were low 3.6 (SD: 3.2) and 4.6 (3.4),

respectively. The overall self-assessed confidence score ranged from 1.3 to 10.0 with a mean 6.8 (SD: 1.7).

To examine whether any variables (including gender, profession, type of practice, rurality, number of years work experience, and number of oral cancer training courses) explained variation in confidence scores, linear regression analysis was conducted, with profession, location of practice, and sector of practice remained statistically significant after adjusting for other independent variables [$F(4,342) = 14.69$; $p < 0.01$], explaining 13.7% of the variance in the level of confidence score. The final model indicated that, after adjusting for other variables, participants with the highest confidence score were more likely to be those who had received training in oral cancer, with longer (more than 25 years) work experience, who had referred patients for oral pathology, and working outside of regional centres. In fact, those who work in regional areas had lower confidence scores. (See Table 4).

The probability of conducting an oral cancer health screening examination ('Always' and 'Most of the time'=1 vs. other categories = 0) was explored utilising a linear regression analysis with gender, profession, sector of practice (private vs other), rurality, number of years work experience, risk knowledge index, oral cancer training, self-confidence, and having ever referred a patient to an oral medicine specialist as independent variables. After controlling for the other independent variables included in the model, two variables remained statistically significant [$c2(3) = 24.707$; $p < 0.001$]. Results indicated dentists were more likely to conduct oral cancer screenings (OR = 2.10; 95% CI 1.04 to 4.20). Further, as training increased, so did the likelihood of conducting an oral cancer screening examination (OR = 1.74; 95% CI 1.30 to 2.33). In contrast, those with the longest work experience (i.e., more than 25 years), were least likely to perform an oral cancer screening examination (OR = 0.46; 95% CI 0.23 to 0.90). The variance for oral cancer screening examination, using the full model, was 13.0% (Nagelkerke $r^2 = 0.13$) (See Table 5).

Table 4
Final multivariate model identifying the dental professional confidence score.

Independent variable	**Multiple regression coefficient *B*** **(Std. Error)**	***p***
Number of training courses attended in oral cancer	0.29 (0.06)	< 0.001
More than 25 years of profession (No = 0; Yes = 1)	0.59 (0.18)	0.001
Regional practice (No = 0; Yes = 1)	-0.69 (0.24)	0.003
Constant	6.05 (0.16)	< 0.001
Adjusted $r^2 = 0.137$		

Table 5. Regression coefficient, odds ratios and 95% confidence interval for odds ratios for the factors associated with the probability of dental professional conducting oral cancer screenings.

Dentist	**β coefficient**	**Odds ratio**	**95% Confidence interval**
	0.74	**2.10**	**1.04 to 4.20**
Number of training courses attended in oral cancer	0.55	1.74	1.30 to 2.33
More than 25 years of profession (No = 0; Yes = 1)	-0.78	0.46	0.23 to 0.90
Constant	1.28		
Nagelkerke r^2 = 0.130			

Discussion

The study provides valuable insights into the current practices, knowledge, and attitudes of dental practitioners towards oral cancer screening. The study included a diverse sample of 395 DPs, predominantly dentists, working in various settings across Australia. DPs involved in the present study have a profile (e.g., gender and professional role and location) that is similar to those in an earlier survey where 335 Victorian DPs participated [27], suggesting consistency in the demographics of DPs surveyed.

Findings relating to the attitudes and practices of oral cancer screening were very similar to the findings from the 2015 survey. The results indicate that while the majority of DPs agree on the importance of routine oral cancer screening (98.5%), there remains a significant discrepancy between that belief and actual practice, a significant proportion (13.4%) indicated that they only ‘Sometimes' or 'Never' conduct a comprehensive oral cancer screening. Interestingly, the factors influencing the decision to screen, such as patient age, lifestyle, and medical history, suggest a selective approach that may overlook at-risk populations. When compared to the 2015 study [27], recognition of the importance of routine oral cancer screening remained high, but screening practice improved by only 0.9 percentage points (52.2% vs 51.3%) demonstrating minimal change. It was also surprising that nearly one-fifth of DPs (19.2%) never discuss the rationale for screening for malignant oral lesions with patients. This highlights a gap in communication and education, underscoring the need for targeted training. Patient awareness is vital for promoting preventive health behaviours; enhancing education and communication about oral cancer screening could help increase patient awareness and promote positive behaviour change [32, 33].

The discrepancy between belief of the importance of screening and actual practice may reflect barriers such as time constraints, lack of confidence, or inadequate training [34]. The multivariate analysis identified that more years worked was associated with a lower likelihood of conducting oral cancer screenings, which seems counterintuitive, especially given experienced practitioners confidence to

discuss risk was high, and suggests that DPs may become complacent in their screening practices over time. This finding also emphasises the need for continuing education and updates on the importance of routine oral cancer screening to improve early detection and intervention. Importantly, more training opportunities correlated with a higher likelihood of conducting screenings, further reinforcing the need for structured educational programs targeting DPs.

The present findings suggest that a majority of DPs conduct oral cancer screenings primarily through visual inspections. Other studies similarly identified this to be the most widely used oral cancer screening method, and have associated its use with significantly reduced morbidity and mortality [22, 35]. This present study also found a lower practice of oropharyngeal inspections and neck palpation which is somewhat similar to findings from the previous Victorian study [27]. When compared, both studies show a philosophical commitment to oral cancer screenings. Despite this commitment, concerning variations in practice persist. Our findings show a higher proportion "Always" include neck palpation (34.1% vs. 28.1%) and a slightly higher rate for visual inspection of the oropharynx (53.5% vs. 52.3%). A transoral visual inspection of the oropharynx is technically difficult and limited in scope; however, neck palpation can be performed easily and should be more readily undertaken by a DPs. Interestingly, mobile and digital technologies and other clinical decision support tools were not mentioned by participants. Applications have been developed and piloted in India, Argentina, Chile, and Malaysia, enabling practitioners working in remote or underserved areas to send images of potentially abnormal lesions to specialists [5, 36]. Additionally, studies have looked at how artificial intelligence (AI) and machine learning (ML), can help detect oral cancer [37].

Dental practitioners' knowledge of oral cancer risk factors may influence their screening practices; this matters because practitioners could be overlooking at-risk cohorts who would benefit from screening and missing opportunities to address major and modifiable risk factors through behaviour change interventions (e.g. referral to smoking cessation services). The results showed that DPs had a good awareness of common risk factors such as smoking, chewing tobacco, alcohol consumption, and betel-quid use. However, there was misunderstanding of the role, of some factors (e.g. HPV, herpes virus, periodontal disease) for which there is no evidence of a causal link with oral cancer. The mean knowledge score of 8.4, out of 15, indicates room for improvement in comprehensive understanding. Notably, there were variations in knowledge scores based on professional background, location of practice, and sector of practice. These results suggest the need for targeted educational interventions to improve knowledge of oral cancer risk factors among DPs, particularly OHTs.

The present study explored DPs' confidence in discussing behavioural issues that may affect oral health with their patients. Although confidence varied, DPs generally reported high confidence in discussing oral hygiene practices, tobacco use, and diet and nutrition, while they were much less confident addressing more sensitive topics such as oral sex practices and immunisations. This highlights the need for more training so DPs can confidently address sensitive issues without compromising patient care. At the same time, it is understandable that many hesitate as, while HPV and sexual behaviours are clear risk factors for oropharyngeal cancer, they are not causally linked to cancer of the oral cavity.

Unsurprisingly, multivariate analysis revealed that training in oral cancer was associated with higher levels of confidence, further underscoring the importance of continued professional development. DPs with greater confidence advising patients were more likely to perform oral cancer screening examinations [38]. Furthermore, Rindal and collaborators [39] in a study assessing the feasibility of performing opportunistic screenings in dental settings, reported that most patients (85%) felt comfortable discussing their tobacco use and sexual behaviours (69%).

Dentists with more than 25 years' clinical experience reported being less likely to perform oral cancer screening but were more confident discussing sensitive topics with patients. This apparent paradox raises several conflicting explanations. Experienced dentists might perceive their patients as lower risk or rely more on behavioural counselling than formal screening. Furthermore, a study in Ontario identified several barriers that influence dentist approach to oral cancer screening, despite a good understanding of the disease and recognition of the importance of screening [40].

A concerning finding is the limited engagement of DPs in oral cancer-related training and professional development. A significant proportion (45.1%) of participants reported no such training in the last five years, in areas critical for early detection (risk assessment, screening practices, and prevention). Given that earlier detection and timely treatment markedly improve prognosis and survival, this training deficit represents a likely contributor to the low rates of routine oral cancer screening identified in this study. Indeed, DPs who reported specific oral cancer training were more likely to conduct regular screenings.

Overall, the findings from this study reveal a gap between knowledge and clinical practice in oral cancer screening among DPs. These results have important implications for clinical education and service delivery, indicating an urgent need to develop targeted continuing professional development programs to strengthen knowledge and skills, promote standardised screening protocols, and improve communication with patients., with measurable goals such as greater patient awareness, increased screening uptake and earlier oral cancer detection.

When interpreting these findings, it is important to acknowledge certain limitations. Although the sample size exceeded minimum requirements, the low overall response rate may have introduced non-response bias. Response rates can vary with population size with larger cohorts often requiring a lower percentage of responses [41]. While lower than desired, the response rate still falls within the expected range for online surveys of dental practitioners [42, 43]. Response rates are also affected by saturation of surveys which can desensitise participants, making them less likely to engage, regardless of the different ways surveys can be administered [44]. Additionally, the reliance on self-reported data, and predominance of participants from Victoria limit generalisability. As a result, conclusions drawn from this study may not be representative of the oral cancer screening practices of all Australian DPs.

Despite its limitations, this study offers valuable insights into DPs current practices and attitudes towards oral cancer screening. Consistent with previous surveys, DPs strongly endorse the importance of oral cancer screening, yet its routine implementation remains limited. Because early detection is associated with substantially better patient outcomes and several oral cancer risk factors are modifiable,

DPs should adapt clinical practice and strengthen patient education and engagement to increase screening uptake. These findings can inform targeted continuing professional development programs and public awareness campaigns, and support the development of best-practice guidelines. Addressing these gapes through focussed educational initiatives and standardised protocols should enhance early detection and prevention, and ultimately lead to better patient outcomes. Future research should include longitudinal evaluations of training interventions and resulting changes in oral cancer screening practices and patient outcomes, together with in-depth exploration of the barriers to routine screening.

Abbreviations

ANOVA
One-way analysis of variance
CPG
Clinical practice guidelines
DHs
Dental Hygienists
DP
Dental practitioners
DT
Dental Therapists
HPV
Human Papilloma Virus
MMM
Modified Monash Model
OHTs
Oral Health Therapists
SD
Standard deviation

Declarations

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Authors' contributions

RMc contributed with the conception of the study, carried out part of the fieldwork, the design and draft of the manuscript, and read and approved the final manuscript; RM contributed with the conception of the study, design, draft of the manuscript, read and approved the final manuscript; MMc contributed with the conception of the study, interpretation of the data and the design and draft of the manuscript; KT

carried out part of the fieldwork, interpretation of the data and final drafting of the manuscript; NS carried out part of the fieldwork contributed with interpretation of the data and drafting of the manuscript.

All the authors revised and approved the manuscript.

Ethics approval and consent to participate

This study was approved by The Human Research Ethics Committee of The University of Melbourne, Australia (ID 2025-29012-66010-7).

Availability of data and materials

The dataset used and analysed during the current study is available from the corresponding author upon reasonable request.

This study employed a cross-sectional design (Clinical trial number: not applicable). This study was conducted in strict compliance with the Helsinki Declaration (https://www.wma.net/policies-post/wma-declaration-of-helsinki). With the approval of the Human Research Ethics Committee at the University of Melbourne (ID 2025-29012-66010-7), Informed consent was obtained from all participants using an information and consent letter approved by the Human Research Ethics Committee at the University of Melbourne.

This is not a clinical trial. Clinical trial number: not applicable.

Consent to publish:

Not Applicable

Competing interests:

Rodrigo Mariño is a Senior Editor for BMC Oral Health. The other authors declare no conflict of interest.

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