Factors Influencing Oral Cancer Screening Preferences in Patients Attending Tertiary Care University Oral Health Clinic

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Abstract

Background: Understanding factors that influence patients' preferences towards oral cancer (OC) screening is imperative to provide high-quality evidence-based OC screening interventions that can be targeted for population-level uptake. This study determined adult patients' knowledge and awareness of OC, and how health behaviours influenced their preferences towards OC screening.

Methods: This cross-sectional study used a 42-point questionnaire, between February and May 2020 using a combination of in-person and telephone interviews. Chi-square test and multiple logistic regression analysis was applied to confounding factors that returned statistical significance against OC knowledge and awareness. Significance of $p < 0.05$ was accepted.

Results: 68 (38.6%) participants out of a total 176 had good knowledge of OC and 89 (50.6%) had good awareness. 31.8% reported preference for OC screening by a general dental practitioner (GDP) over a general medical practitioner (GMP). Majority (72.7%) reported acceptance of OC screening at their next GDP visit. Ages 56-70 (OR=0.357, 95% CI) and previous smokers (OR=0.336, 95% CI) significantly influenced screening preferences. Knowledge of risk factors did not significantly influence OC screening preferences ($\chi 2= 3.178$, $p=0.075$).

Conclusions: Significant gaps in OC knowledge, screening and role of GDPs exist with smoking history and age influencing OC screening preferences.

Key words oral cancer, screening, attitudes, knowledge and awareness

Introduction

Oral cancer topographically may be defined as those cancers affecting the lips, oral cavity and adjacent pharynx(1). The most common form of oral cancer is oral squamous cell carcinoma (OSCC) and others include those affecting orofacial structures such as salivary gland malignancies, lymphomas, basal cell carcinoma, melanomas, tumours affecting the bone, secondary cancers from elsewhere and other rare malignancies(2). Oral potentially malignant disorders (OPMD) are a group of lesions with a potential to change to cancer and the spectrum includes oral leukoplakia, erythroplakia , erythroleukoplakia, oral submucous fibrosis, oral lichen planus, oral lichenoid reactions, graft versus host disease, oral discoid lupus erythematosus, palatal lesions in reverse smokers, UV induced actinic cheilitis for lip cancers and rare conditions such as dyskeratosis congenita and epidermolysis bullosa(2). The characteristics of advanced stage OC often include discomfort associated with ulceration, nodularity and fixation to underlying tissues(3). The incidence of OC has been steadily increasing globally over the past twenty years(4). In Australia, between 1982 and 2008, 60,826 cases of OC were diagnosed(5). Globally, 369,200 new cases of OC were reported in 2012(6). In Australia, the most significant known risk factors for OC include increased age, tobacco and alcohol consumption(7, 8). Exposure to ultraviolet (UV) radiation is a well-established risk factor for lip cancers in Australia(7).

Population-level mass screening has been used with some types of cancer in Australia to enable early detection of minimally invasive or precancerous lesions and allow for a conservative management(9). This avoids the significant morbidity and mortality associated with late stage cancer diagnosis. National Bowel Cancer Screening Program, BreastScreen Australia and the National Cervical Screening Program have all been successful in Australia (10). A 2019 Cochrane Collaboration review reported insufficient evidence to support a mass-screening program for OC(9). This evidence applies in the Australian context. Histopathological investigations have revealed that the majority of oral mucosal lesions amongst the Australian population are benign, with less than 4% of all biopsied tissue specimens classified as malignant or dysplastic(11). Brocklehurst *et al.* (2013) have suggested that, due to this low percentage, opportunistic screening through oral mucosal examination, particularly for high-risk patients, is recommended for OC(9). The Australian Dental Association (ADA) recommends that all people, including edentulous patients, should be encouraged to attend a dental visit annually for a comprehensive oral examination(12).

Annual dental attendance presents an opportunity for oral mucosal examination for OC detection.

OC has one of the highest mortality rates of all cancers(13). Worldwide, 60% of patients who present with OC will present with extensive, late stage malignancies(14). It is well documented that detection of OC during the early and localised stages of disease increases patient survival rates(15-17). West *et-al.*-(2006) reported that most patients fail to recognize the early signs and symptoms of OC and consequently, many cancers remain undetected in the early stages of disease(18). The literature to date has identified that lack of awareness and knowledge of OC risk factors and early clinical signs and symptoms of disease may hinder early OC diagnosis(19-21). Conversely, patients with a sound awareness and knowledge of the risk factors, and clinical signs and symptoms of OC, are more likely to present to GDPs for opportunistic screenings that facilitate early detection(22).

Previous studies conducted, both in Australia and abroad, have reported that roughly 45-70% of the general population are aware of the existence of OC(11, 17, 23-25). Alarmingly, the majority of dental participants in Australian studies were unaware of having ever received an OC screening by their GDP(21, 25, 26). Early diagnosis of OC can be facilitated by opportunistic screening for OC signs and symptoms among patients attending primary healthcare settings for routine dental or medical care(21, 22, 25-27). GDPs are well-trained to identify OC and OPMD through oral mucosal examination(12). The ADA recommends clinicians perform oral mucosal examination as part of any dental examination, whether emergency or comprehensive(12). Informing patients that they are being checked for early signs of OC during a routine examination presents an unparalleled opportunity to provide OC education. The available evidence suggests that acceptance of, and satisfaction with OC screening is high, particularly where patients have previously received OC education(21, 22, 25-28).

In Australia, low rates of early asymptomatic stage OC diagnosis by GDPs have been reported. For example, Webster *et-al.*-(2019) reported that only 7% of OCs were diagnosed in the asymptomatic phase by GDPs(17). During the asymptomatic phase before diagnosis, patients often attend GMPs more frequently than GDPs(17). Most importantly, Australian GMPs have inadequate levels of knowledge of OC, risk factors and inadequate skills in performing opportunistic OC screening(17). Paudyal *et-al.*-(2014) suggested that further investigations of patient preferences for OC screening are important to consider for

streamlining an approach to OC screening taken on by any national programme(22). In addition, there is no evidence available regarding patient-reported previous history of education about OC by a healthcare profession.

To the best of our knowledge, no studies to date have investigated preferences toward OC screening, or how patients' OC knowledge and awareness influence preferences toward OC screening, in Australia. To fill in these research gaps, the present study aimed to assess whether OC knowledge and awareness, as well as health behaviours, influence preferences toward OC screening in adult patients attending a university dental clinic. It is hoped that these findings will contribute to creating effective, rational and targeted public health interventions to enable early OC diagnosis and opportunistic screening in the primary healthcare setting.

Methods

A critical review of the methodologies adopted by previous studies was performed to achieve the aims of this study. Studies completed in Australia, have largely utilised self-administered questionnaires to investigate knowledge and awareness of OC in adult patients attending dental clinics(11, 21, 24-26). This approach was therefore initially adopted for this study as it was deemed cost effective, time efficient to collect large amounts of data, and able to provide anonymous data from participants(29). The disadvantage of this approach is that it has been associated with variation in understanding and interpretation of questions and lack of conscientious responses in the form of partially completed questionnaires(29). Some Australian studies have had face-to-face interviews, though this methodology was not practical to fulfil the aims of this study due to the unexpected COVID19 social distancing restrictions, cost and time constraints for data collection and analysis(25, 30). The self-administered questionnaire was consequently deemed most appropriate to fulfil the aims of this study.

Study design and sampling

A cross-sectional study design was used to collect questionnaire data through a university dental clinic between February 2020 and May 2020. A convenient and purposive sample of adult dental patients, or adults accompanying dental patients, attending the clinic were recruited. Adult patients aged 18 years and older, irrespective of background, who were able to comprehend the obligations and consent to participation in the study were invited to

participate in the study. Patients who were below the age of 18 years and those who had literacy problems and non-English speaking individuals were excluded from the study. This is comparable to previous Australian studies where age criteria was restricted to 18 years and above(11, 24-26). Patients who met the exclusion criteria in this study made up less that 2% of possible interviewees. English language and literacy was assumed through in-person completion or verbal (*via* telephone) completion of initial patient consent form (Appendix I). The dental clinic patients included a wide range of socio-economic backgrounds, ranging from concession card holders to private paying patients, was expected.

The research proposal was approved by the human research ethics committee of the institution. A participant information sheet was used to inform all participants of the purpose of the study and gain informed consent for participation. The collected data was entered onto an electronic spreadsheet with Microsoft Excel v15.3 and stored securely on a password protected research drive account.

Sample size

The Australian Bureau of Statistics sample size calculator was utilised to calculate a minimum sample size for this study(31). University database revealed that between January 2019 and January 2020 there was an average population of 46,690 patients aged 18 years and over that attended the university dental clinic. In order to calculate the required sample size, the expected frequency of knowledge of OC risk factors between 2019 and 2020 in Australia was required. This data was retrieved from Zachar *et al.* (2020), and was identified as 77%(21). Using G-power software, a confidence interval (CI) of 90%, a design effect of 1.0 gave a minimum population sample size of 191 questionnaires.

Data collection

A 10-minute 42-point questionnaire was developed. The questionnaire was administered initially in-person, prior to coronavirus-19 (COVID-19) social distancing requirements by the Australian Government, however a telephone interview strategy was adopted following implementation of COVID-19 social distancing requirements. In-person questionnaires were conducted in the dental clinic waiting area. Phone questionnaires were conducted utilising a randomly generated list of patients that had attended the dental clinic over the previous 12 months. Phone questionnaires were conducted in the researcher's homes utilising personal

mobile phones with no caller identification. All questionnaire responses remained anonymous.

Measures

Inconsistencies exist between studies and there is no standardised questionnaire form that exists to measure OC knowledge and awareness. Accordingly, a new questionnaire form was developed that incorporated themes in the same order that have previously been used in questionnaires to assess OC awareness and knowledge in Australian studies(11, 21, 24-26). Validated questions and statements, with the same order and wording, from the questionnaires used by Zachar *et al.* (2020) and Formosa *et al.* (2015) to assess OC and OPMD knowledge and awareness were incorporated in the questionnaire for this study(21, 24). The questionnaire consisted of 10 closed-ended socio-demographic questions, 12 OC and OPMD awareness questions, 16 OC and OPMD knowledge questions and 3 patient preferences questions (Appendix II).

Awareness was assessed by asking patients to respond from a list of options to a series of OC awareness statements, including had they previously heard of OC, were they aware of previously being screened for OC, their perception of personal risk of OC, the source of their OC information, and their awareness of previous OC diagnosis personally or in someone that they know. Knowledge was assessed by asking patients to respond from a list of options to a series of OC knowledge statements related to knowledge of OC risk factors, including tobacco smoking, betel quid chewing, alcohol consumption, sun exposure, HPV exposure, fruit and vegetable consumption, age and unprotected sex. Knowledge assessment also included statements related to clinical appearance, signs and symptoms of OC. Patient preferences were assessed by asking patients about who they would consult regarding OC or OC risk factors, specifically a medical practitioner, dental practitioner or other. Patient preferences were assessed by asking the patient to respond agree, disagree or unsure to a statement about whether they would like to be screened at their next dental check-up, and if they would like to be informed of the dentist performing the OC screening whilst it is occurring. The questions and response scaling criteria utilised in this study questionnaire have previously been confirmed for validity and reliability in previously published studies (21, 23, 24, 26).

Pilot study

A small pilot study was conducted in September 2019 at the university dental clinic. A random sample of 4 participants were included in the pilot study to determine whether the questionnaire required adjustments prior to initiating data collection for the full study. Two problems were encountered during the pilot study. Question 23 asked about heavy alcohol consumption but did not elaborate on what constituted heavy alcohol consumption. Accordingly, national guidelines for heavy alcohol consumption in standard units per day for men and women were included. Additionally, question 24 was initially worded, "spending prolonged time in direct sunlight each day is associated with oral cancers" however, participants were unsure what was considered prolonged exposure. Accordingly, the question was reworded, "spending >30 minutes in direct sunlight each day is associated with oral cancers". These amendments were added to ensure participants answered questions accurately. No other adjustments were required.

Data analysis

SPSS software (IBM, Armonk, NY, USA) was used to analyse the results. A descriptive statistical analysis was performed to identify the frequency distribution of all variables. Two subscales were created for knowledge, and two subscales for awareness. Each subscale was then titled in accordance to the type of questions included and Cronbach's alpha coefficient's were calculated. The headings for each subscale are as follows; general awareness (questions 8, 9 and 19), awareness through healthcare professionals and the media (questions 10-18), knowledge in risk factors (questions 20-29) and knowledge in clinical presentation of OC (questions 30-36). The four subscales had high to acceptable level of reliability with Cronbach's alpha of 0.834, 0.834, 0.615 and 0.764 respectively. The survey structure with the four subscales were further confirmed using a confirmatory factor analysis method (Fig. 1).

Following data collection, the dataset was grouped in accordance with participant's level of knowledge and awareness. This was completed by accepting an overall score for each subgroup. "Good" knowledge and awareness was deemed with a score of greater than or equal to 50% in each subgroup. Conversely, a score of less than or equal to 50% in each subgroup was deemed "poor" knowledge and awareness. Chi-square test was used to assess for statistical significance between socio-demographic variables, knowledge, awareness and health behaviours with OC screening preferences. The level of significance used was $p<0.05$. All significant associations for OC preferences were examined using logistic regression. All

remaining demographic variables were considered confounding factors. A multiple logistic regression was employed to determine whether OC screening preferences depend on both the contributing factors (age and smoking status) and levels of OC knowledge and awareness (Figure 1).

Results

Sociodemographic-Factors

A total of 191 questionnaires were completed. Of these, 15 were excluded due to more than 10% incomplete responses, therefore 176 questionnaires were used. The study population consisted of 93 females (52.8%) and 83 male participants (47.2%) with the majority between 71-100 (n=60, 34.1%) and 56-70 (n=55, 31.3%) years of age. Most of the participants were from an urban living environment (n=153, 86.9%) and almost all respondents were neither Aboriginal or Torres Strait Islander (n=171, 98.3%). Over three quarters had secondary school education (n=135, 76.7%) and over half of the participants were retired (n=100, 57.5%). A large portion of respondents (n=107, 60.8%) were not exposed to direct sunlight for more than 3 hours per day and the majority had either stopped smoking (n=77, 43.8%) or had never smoked (n=74, 42.0%). Finally, most participants were infrequent alcohol consumers (n=124, 70.5%) and 66.1% (n=113) do not find it difficult to access health care facilities due to affordability. A summary of sociodemographic characteristics are presented in Table 1.

OC Knowledge and Awareness

More than half of the participants had poor knowledge (n=108, 61.4%), and only 38.6% (n=68) of participants had good knowledge in OC risk factors (Table 2). Similarly, with OC signs and symptoms, 67% (n=118) had poor knowledge and only 33% (n=58) had good knowledge. Just over half (n=89, 50.6%) of the participants had good general awareness of OC, whilst 49.4% (n=87) had poor awareness (Table 2). Only 2.3% (n=4) of participants had good awareness of OC through health care professionals and the media whilst the majority 97.7% (n=172) had poor awareness.

OC-Screening-Preferences

Of the 176 participants, 120 (68.2%) preferred to be screened for OC by a GMP/other, while the remaining 31.8% (n=56) preferred to be screened by a GDP (Table 2). The vast majority of participants (n=128, 72.7%) preferred to be screened for OC at their next dental check-up, while a small portion opposed (n=48, 27.3%), and over three quarters wanted the dentist to inform them when they are screening for OC (n=154, 87.5%; Table 2).

OC screening preferences were significantly influenced by age ($\chi 2$= 8.724, p=0.033) and smoking status ($\chi 2$=10.057, p=0.007; Table 3). Participants aged between 19-35 were more likely to see a GDP (n=17, 53.1%) when compared to those aged 36-55 (n=8, 27.6%), 56-70 (n=13, 23.6%) and 71-100 (n=18, 30%). Participants that were previous smokers were less likely to see a GDP (n=15, 19.5%) when compared to those who had never smoked (n=32, 43.2%) and those who are current smokers (n=9, 36.0%).

Knowledge in risk factors partially influenced OC screening preferences and was marginally significant ($\chi 2$= 3.178, p=0.075). Participants that had good knowledge in OC risk factors were more likely to see a GDP (n=27, 39.7%) when compared to those with poor knowledge (n=29, 26.9%).

In summary, gender (p=0.153), living environment (p=0.878), ethnicity (p=0.675), education (p=0.667), employment status (p=0.370), sun exposure (p=0.800), alcohol consumption (p=0.847), access to healthcare facilities (p=0.692), general awareness (p=0.825), awareness through health care professionals/media (p=0.430) and knowledge in clinical presentation (p=0.118) had no influence towards OC screening preferences (Table 3).

Relationship-between-OC-knowledge, awareness-and-health-behaviours-with-preferences-toward-screening

The odds ratio (OR) of 0.336 suggests that participants who were previous smokers were 66.4% less likely to see a GDP compared to those who had never smoked (95% CI: 0.133-0.959, p=0.005) (Table 4). Participants aged 56-70 were 64.3% less likely to see a GDP when compared to those aged between 19-35 (OR: 0.357, 95% CI: 0.133-0.959, p=0.041). Participants who had good general awareness were 1.064 times more likely to see a GDP than those who had poor awareness (OR: 1.064, 95% CI: 0.706-1.603). This relationship was considered insignificant (p=0.768). Screening preferences for participants with good awareness through healthcare professionals/media, knowledge in risk factors and clinical

presentation was also considered insignificant; (p=0.475, p=0.415 and p=0.786), respectively (Table 4).

Discussion

OC-Knowledge-and-Awareness

The results demonstrated that more than half (61.4%) of participants had "poor" knowledge of risk factors and just under half (49.4%) had poor general awareness of OC. These findings were consistent with previous Australian university-based studies, which have reported that roughly 45-70% of the population are aware of the existence of OC(17, 21, 24-26). Comparisons between other Australian studies must be interpreted with caution as no standardized questionnaire has been established to measure OC knowledge and awareness.

Lack of OC knowledge may be the result of poor communication and education regarding OC between health care providers and their patients. Additionally, lack of publicly available OC information in Australia would contribute to poor OC knowledge. An Australian-based study found that only 3% of GDPs and 9% of GMPs provide their patients with OC education(25). Zoohori *et al.* (2012) concluded that participation in OC screening may be improved by increasing knowledge of signs and symptoms of OC(28). Alarmingly, the majority of participants from previous Australian studies have reported never receiving OC screening by their GDP(21, 25, 26). These findings are of particular concern as it has been well established in the literature that a sound awareness and knowledge of OC is associated with increased likelihood of presentation for OC screenings and early diagnosis(19-22).

OC-Screening-Preferences

The research findings identified that the majority of participants reported that they wanted to be screened for OC at their next dental appointment and that they would like to be informed about the screening being performed. GDPs have a professional responsibility to perform an OC screening for all patients, whether they are seeking comprehensive care or limited care(32). There are no requirements for GDPs to inform patients of OC screening(21). Mandatory disclosure of OC screening presents an opportunity for conversation and education about OC(21). Accordingly, it is recommended that mandatory disclosure is incorporated into oral health policy and practice to increase public OC knowledge and awareness.

This study found that over two-thirds of participants (68.2%) preferred to be screened by a GMP, whilst 31.8% indicated preference for screening by a GDP. Previous studies have demonstrated that patients with oral lesions consult their GMP, rather than their GDP, even in cases where there is access to free dental care, such as in the UK(17, 22). The findings of the current study provide a unique patient perspective, specifically that the role of GDPs in reducing the risk of OC and providing education about OC prevention strategies may not be fully understood by the adult population in this study. Participant preference for OC screening by GMPs in the primary care setting have been supported by four other studies in the literature (21, 26, 28, 33). Paudyal *et al.* (2014) found that OC screening by GMPs in primary care setting was considered acceptable by patients due to its accessibility, familiarity that patients have with their GMPs and relevance to health-related intervention(22). Another study identified dental avoidance due to embarrassment as a possible contributing factor to preference towards GMP for OC screening(34). Additionally, unwillingness to receive 'bad news' has been identified a common barrier to cancer screening uptake with other types of cancer(35-37). It may be that patients are more comfortable consulting their GMP about sensitive oral health conditions, such as oral mucosal lesions, due to well-established therapeutic and trusting relationships that patients have with their GMPs (22, 38).

Lack of time and logistical barriers, such as transport, have also been cited as barriers to opportunistic OC screening(22, 38). Accordingly, higher participation in OC screening is believed to be achievable when it is integrated into a routine GDP visit(38).

In Australia, the Medicare scheme enables all citizens to access a free public health system including access to many GMPs. Access to free public oral health is not included under this scheme, and only low income populations are eligible and entitled to free treatment, which is associated with long waiting lists unless emergency dental treatment is required(38). Accordingly, the finding of patient preference for GMPs may reflect financial cost as a significant barrier to accessing oral health care in Australia. Previous studies confirm financial cost as a perceived deterrent to OC screening(21, 22, 38, 39).

The findings of this study suggests that the role of GDPs in society is poorly defined and that there is lack of knowledge amongst the general population that GDPs have OC screening training throughout their curriculum and continuing education, compared with lack of OC screening training in medical curriculum and amongst GMPs. Dost *et al.* (2016) reported that high risk populations often presented to GDPs with low health literacy, dental avoidance and other barriers that prevented uptake of screening(38). It is therefore imperative that the role of

GDPs in OC prevention and diagnosis is emphasised, in addition to increasing awareness and knowledge of OC, through education materials and national health campaigns. The present study did not assess when was the last time a patient had been seen by their GDP and GMP. It is pertinent that future studies assess this if we are to develop effective strategies to improve patient awareness on need to attend their GDP regularly for routine treatment inclusive of OC screening.

Although GDPs and other oral health professionals (OHPs) receive OC screening training throughout their curriculum and continuing education, it is well documented in the Australian literature that lack of confidence and training are the most prevalent barriers to OC screening by OHPs(40-43). Additionally, time and lack of financial incentives have been reported as impediments to oral mucosal screening(41-43). Marino *et al.* (2017) reported that only 51.4% of GDPs surveyed screened all of their patients for OC, despite 95.2% of participating clinicians agreeing that OC screening should be routinely performed(40). These studies, in addition to the current findings of this study, highlight a need for further OC-related education and screening training for OHPs, in addition to improving public awareness of the role of GDPs in OC prevention and diagnosis. Improving OHPs confidence in OC screening is important to enhance OC prevention and early detection(41-43).

Relationship-between-OC knowledge, -awareness-and-health-behaviours-with-preferences-toward-screening

The current study sought to identify whether participant health behaviours, and knowledge and awareness of OC, influenced their preferences toward OC screening. A marginal relationship was found between good knowledge of OC risk factors and likelihood of consulting a GDP, when compared to those with poor knowledge. This may be related to the fact that heightened OC knowledge and awareness may be associated with greater understanding of the role of GDPs in overall oral cavity health. Poor OC knowledge and awareness could be related to low education levels. Ellershaw (2006) identified that individuals with lower education levels were significantly disadvantaged regarding access to dental care and accordingly, may be less likely to consult a GDP for OC screening when compared to individuals of higher education status(44). Furthermore, university graduates were less likely to report having avoided or delayed dental attendance during the last 12 months due to cost, than those with lower education status(44). The present study found that education had no influence on OC screening preferences.

Age significantly influenced OC screening preferences. Participants aged between 19-35 were more likely to preference a GDP for OC screening when compared to those participants aged above 35 years of age. This finding may be related to younger age groups having grown up with a focus on regular preventative dental visits. Interestingly, participants aged between 56-70 were 64.3% less likely to see a GDP when compared to those aged between 19-35. This finding may be related to older participants tending to have well-established therapeutic and trusting relationships with their GMPs and are more likely to experience health conditions which require them to visit their GP more regularly(45).

Smoking status was also found to significantly influence OC screening preferences, with current smokers and those who had never smoked more likely to seek OC screening from their GDP than previous smokers. Current smokers may have greater preference to GDPs for OC screening compared to previous smokers as current smokers may already be accessing dental care for treatment for smoking-related oral health conditions, such as periodontal disease. This is supported by Csikar *et al.* (2016) who demonstrated that smokers in the United Kingdom were two times more likely to access oral health care due to acute dental conditions(46).

It was also discovered that participants who were previous smokers were less likely to see a GDP compared to those who had never smoked. This finding may be related to previous smokers feeling less at risk of acute conditions or alternatively, have already experienced acute disease and/or OC in the past. Given the cost of accessing private dental care in Australia, current smokers may be more inclined to present for OC screening when symptomatic, compared with previous smokers, as routine oral examination may not be affordable for this population(24). Hitchman *et al.* (2014) demonstrated that smoking is highly concentrated amongst lower socio-economic populations(47). The global burden of disease 2019 publication stated that the smoking continues to be a leading risk factor for morbidity and mortality globally(48). Mejia and colleagues (2018) revealed that higher socio-economic status and education level was associated with a higher oral health awareness and number of GDP visits per annum(49). It may be that non-smokers have greater preference toward their GDP for OC screening as these patients understand the role of GDPs in oral health and are not financially restricted from accessing their services. Accordingly, smoking status, which tends to be affiliated with low socio-economic status, is a significant

risk factor for oral disease, particularly OC, and thought should be given to making oral health care more accessible for this population.

Limitations

Although the total number of completed questionnaires was less than the initial desired sample size for this study (191), a post hoc power analysis check was completed with a total of 176 participants and the power remained at an 80% level, suggesting that the drop out of 15 participants did not have an impact on the power of the study. Accordingly, the sample size was adequate for the study. The acceptance rate for this study was 99.4%, with only one of the 192 patients surveyed declining to participate. The university reports approximately 50 000 occasions of care per year (inclusive of returning patients and new patients), making the results generalisable to the wider population. Data collection was restricted to participants attending a university oral health clinic and it would be desirable that a broader sample base be used in the future.

Researchers were required to use personal mobile phones with no caller-identification to complete telephone questionnaires due to COVID social distancing requirements. Consequently, many patients failed to answer phone calls and may have been deterred from answering phone calls. This influenced the ability to recruit participants.

Conclusion

Our study offers a unique insight into patient perspectives and OC screening preferences. The study concluded that regardless of the level of OC knowledge and awareness, adults are relatively unaware of the existence of OC screening and the role that GDPs have in OC screening for early OC diagnosis and intervention. OC screening preferences were influenced significantly by age and smoking status. This study reinforces the ongoing challenges associated with increasing the general public's OC awareness and knowledge, and facilitating opportunistic OC screening. It is high time that public health professions, public and private oral health sector collaborate to establish an effective program to improve OC awareness and knowledge amongst the general public.

Based on the findings of this study, it is recommended that discussion on OC risk factors and disclosure of OC screening results during oral examination be made mandatory to create an opportunity for conversation and education about OC with patients. Improving OHPs confidence in providing OC screening and education to patients through OC-related education and screening training is imperative to improving awareness, knowledge and early

detection of OC. Given financial barriers to receiving oral health care in Australia, it is suggested that consideration be given providing government subsidised regular OC screening by GDPs.

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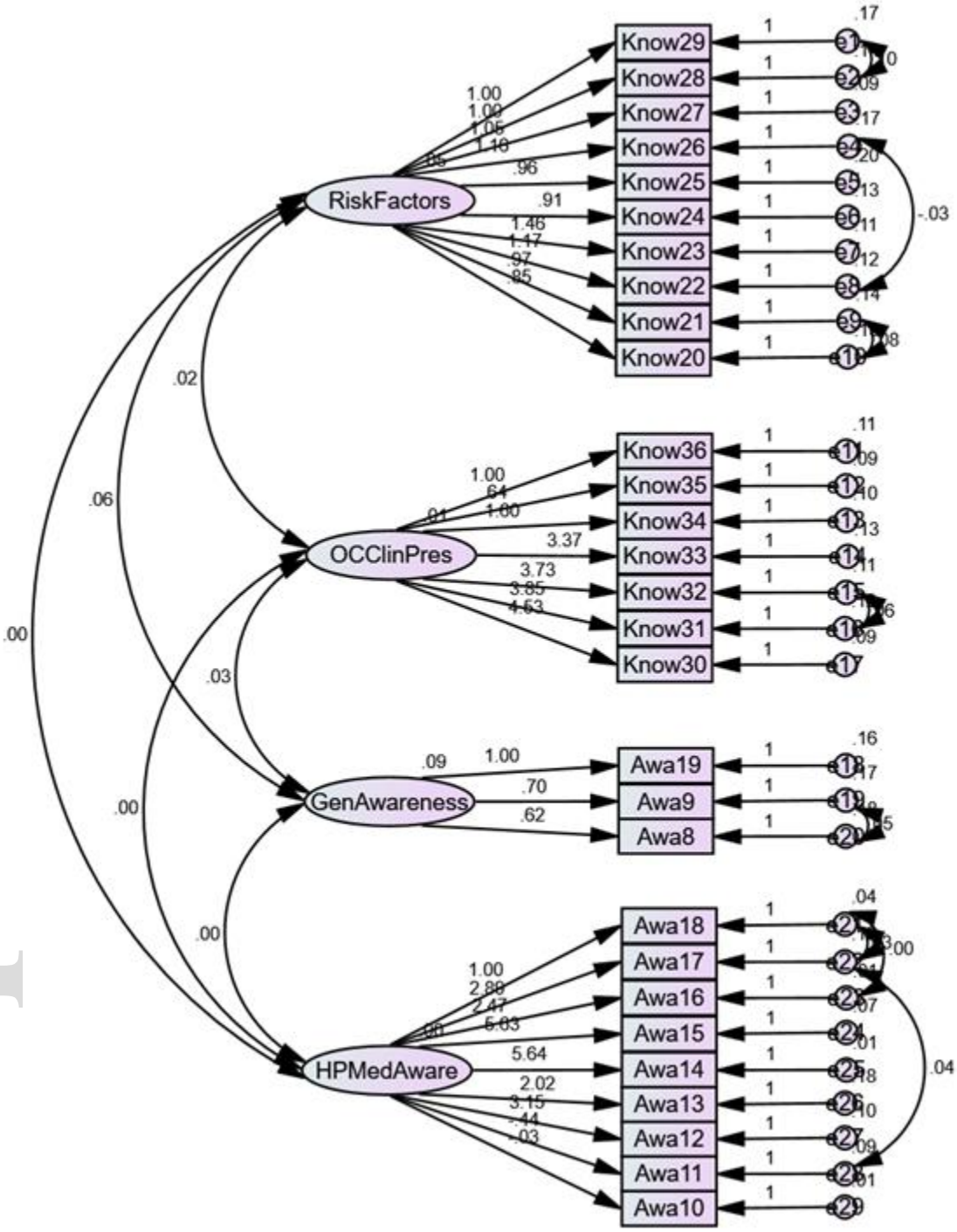
Figure 1 Confirmatory-Factor-Analysis constructed using SPSS IBM software



Tables

Table-1 Sociodemographic-characteristics-of adult-patients-attending-a-university dental-clinic - (n=176)

Socio-demographic Variables	N (%)
Gender	
Female	93 (52.8)
Male	83 (47.2)
Age	
19-35	32 (18.2)
36-55	29 (16.4)
56-70	55 (31.3)
71-100	60 (34.1)
Living Environment	
Urban	153 (86.9)
Rural	23 (13.1)
Ethnicity	
Aboriginal/Torres Strait	3 (1.7)
Non-Aboriginal/Torres Strait	171 (98.3)
Education	
Primary School	7 (4.0)
Secondary School	135 (76.7)
University or higher	34 (19.3)
Employment status	
Employed	54 (31.0)
Unemployed	20 (11.5)
Retired	100 (57.5)
Sun Exposure >3 hrs/day	
Yes	62 (35.2)
No	107 (60.8)

Unsure	7 (4.0)
Smoking Status	
Never smoked	74 (42.0)
No longer smoking	77 (43.8)
Current smoker	25 (14.2)
Consume Alcohol	
Frequent	52 (29.5)
Not Frequent	124 (70.5)
Is it difficult to access health care facilities due to affordability	
Yes	48 (28.1)
No	113 (66.1)
Unsure	10 (5.8)

Table 2 OC-knowledge, awareness and screening preferences-amongst-adult-patients-attending-a-university-dental-clinic - (n=176)

OC Knowledge Subscales	**N (%)**
Risk Factors	
Good	68 (38.6)
Poor	108 (61.4)
Presentation	
Good	58 (33.0)
Poor	118 (67.0)
OC Awareness Subscales	

General Awareness	
Good	89 (50.6)
Poor	87 (49.4)
Awareness through Health Care Professionals	
Good	4 (2.3)
Poor	172 (97.7)
OC Screening Preferences	
Who would you consult regarding OC and OC risk factors?	
Dentist	56 (31.8)
General Practitioner/other	120 (68.2)
Would you like to be screened for OC at your dental check-up?	
Yes	128 (72.7)
No/Unsure	48 (27.3)
Would you like your dentist to inform you whether they are screening for OC?	
Yes	154 (87.5)
No/Unsure	22 (12.5)

Table-3 Relationship-between-sociodemographic-variables, -knowledge, -awareness-and-health-behaviours-with-OC-screening-preferences- (Q37) (n=176)

Variable	General Dental Practitioner (GDP) N (%)	General Medical Practitioner (GMP) /other N (%)	χ^2	*p*
Gender			2.043	0.153
Female	34 (36.6)	59 (63.4)		
Male	22 (26.5)	61 (73.5)		
Age			8.724	**0.033***
19-35	17 (53.1)	15 (46.9)		
36-55	8 (27.6)	21 (72.4)		
56-70	13 (23.6)	42 (76.4)		
71-100	18 (30.0)	42 (70.0)		
Living Environment			0.023	0.878
Urban	49 (32.0)	104 (68.0)		
Rural	7 (30.4)	16 (69.6)		
Ethnicity			0.786	0.675
Aboriginal	1(50.0)	1 (50.0)		
Torres-Straight	0 (0)	1 (100.0)		
None	53 (31.0)	118 (69.0)		
Education			0.810	0.667
Primary School	2 (28.6)	5 (71.4)		
Secondary School	41 (30.4)	94 (69.6)		

University or higher	21 (61.8)	13 (38.2)		
Employment Status			1.987	0.370
Employed	21 (38.9)	33 (61.1)		
Unemployed	7 (35.0)	13 (65.0)		
Retired	28 (28.0)	72 (72.0)		
Sun Exposure >3 hrs/day			0.446	0.800
Yes	20 (32.3)	42 (67.7)		
No	30 (30.8)	74 (69.2)		
Unsure	3 (42.9)	4 (57.1)		
Smoking Status			10.057	**0.007****
Never smoked	32 (43.2)	42 (56.8)		
No longer smoking	15 (19.5)	62 (80.5)		
Current smoker	9 (36.0)	16 (64.0)		
Consume Alcohol			0.037	0.847
Frequent	16 (30.8)	36 (69.2)		
Not Frequent	40 (32.3)	84 (67.7)		
Difficulty accessing health care facilities due to affordability			0.737	0.692
Yes	17 (35.4)	31 (64.6)		
No	34 (30.1)	79 (69.9)		
Unsure	4 (40.0)	6 (60)		
Knowledge in Risk Factors			3.178	0.075
Good	27 (39.7)	41 (60.3)		
Poor	29 (26.9)	79 (73.1)		
Knowledge in Clinical Presentation			2.449	0.118
Good	23 (39.7)	35 (60.3)		
Poor	33 (28.0)	85 (72.0)		

General Awareness			0.049	0.825
Good	29 (32.6)	60 (67.4)		
Poor	27 (31.0)	60 (69.0)		
Awareness through Healthcare Professionals and Media			0.624	0.430
Good	2 (50.0)	2 (50.0)		
Poor	54 (31.4)	118 (68.6)		

*p< 0.05 **p<0.01 ***p<0.001

Table 4- The-relationship-between-age, -smoking, -level-of-OC-knowledge-and-awareness-with-the-preference-to-be-screened-for-OC-by-a-GDP- (n=176)

Variables	OR (95% CI)	*p*
Age		
19-35	1	
36-55	0.440 (0.145-1.338)	0.148
56-70	0.357 (0.133-0.959)	**0.041***
71-100	0.582 (0.220-1.538)	0.275
Smoking		
Never smoked	1	
Previous smoker	0.336 (0.156-0.725)	**0.005****
Current smoker	0.650 (0.226-1.871)	0.424
Knowledge in Risk Factors		
Good	1.069 (0.911-1.253)	0.415
Poor	1	
Knowledge in Clinical Presentation		
Good	0.972 (0.791-1.194)	0.786
Poor	1	
General Awareness		
Good	1.064 (0.706-1.603)	0.768
Poor	1	
Awareness through Health Professionals and Media		
Good	1.128 (0.810-1.570)	0.475
Poor	1	

Nagelkerke variance explained by all independent variables are 13.7%. $\chi 2 = 18.16$ *$p < 0.05$ **$p<0.01$ ***$p<0.001$

Research Project Information Sheet

1. Introduction

We would like to invite you to take part in our research project titled '**Awareness and Knowledge of Oral cancer in a Gold Coast University Dental Clinic'.** This Participant Information Sheet/Consent Form provides you with information about the research project conducted by dental students under the supervision of School of Dentistry and Oral Health faculties.

If you decide to participate in this survey, you are acknowledging that you:

- Are between 20 and 60 years of age;
- Understand the contents of this information sheet;
- Consent to take part in the research project;
- Consent to the use of the anonymous use of survey data that is provided by you.
- Should we have inadequate time to complete the survey today, you consent to us contacting you by phone should you decide to provide your contact details below.

Location of Study

Griffith University Dental Clinic Level 3, Griffith Health Centre (G40), Gold Coast campus, Cnr Parklands Drive and Olsen Avenue, Southport QLD 4215

2. What is the purpose of this project?

Identifying links between individuals' demographics and awareness of OC is important when ensuring the delivery of information is targeted at the appropriate population groups. The aim of this study is to examine awareness and knowledge of oral cancer in patients aged between 20-60 years attending at the Griffith University Dental Clinic in Gold Coast, Queensland.

3. What does participation in this research involve?

Participation in this research involves answering a short, 10-minute questionnaire. There is no apparent risk to you as a result of participating in this research study and you will not be asked to answer any sensitive personal information.

4. Do I have to take part in this research project?

Participation is **voluntary** and you may leave the study at any time. Your participation will remain completely anonymous and confidential. Your decision whether to take part or not, will not affect your relationship with Griffith Health dental clinic.

5. What are the possible benefits of taking part?

It is unlikely that this study will be of immediate benefit to you however, participation in this study does give you the opportunity to share your experiences and contribute to the outcome of this study.

6. Who has reviewed the research project?

Griffith University conducts research in accordance with the *National Statement on Ethical Conduct in Human Research*. If you have any concerns or complaints about the ethical conduct of the research project, please contact Research Ethics on 3735 2069 or research-ethics@griffith.edu.au.

7. Further information and who to contact

The person you may need to contact will depend on the nature of your query. If you would any further information concerning this project, you can contact the coordinating principal:

Prof Raj Nair

School of Dentistry and Oral Health

Telephone: (07) 567 80753 Email: r.nair@griffith.edu.au

Consent Form

Title	Evaluation of Patient's Choice in Accessing Dental health care
Coordinating Principals	Prof Raj Nair
Location	**Griffith University Health Clinic (G40),** Gold Coast, Australia

Declaration by Participant

I have read the Participant Information Sheet.	☐
I understand the purpose of the research described in the project.	☐
I agree to participate in this research project as described.	☐
I understand that the answers on the questionnaire will remain anonymous.	☐

Signature and Date_____

Name:

Contact number:

Research Questionnaire:

Awareness and Knowledge of Oral cancer in a Gold Coast University Dental Clinic

Participant's information
Age:
Gender: Male/Female
Living environment: Rural/Remote

1. Do you identify as Aboriginal and/or Torres Strait Islander?
    a. Aboriginal
    b. Aboriginal and Torres Strait Islander
    c. Torres Strait Islander
    d. None of the above
2. What's your highest level of education?
    a. No school education
    b. Primary school
    c. Secondary school
    d. Diploma/ Trade Certificate
    e. Bachelor's Degree
    f. Postgraduate Degree
3. What's your employment status?
    a. I am employed
    b. I am unemployed and I am looking for work
    c. I am unemployed and I am not looking for work
    d. I am retired

4. Do you spend prolonged time (>3 hours) outdoors in direct sunlight each day (e.g. occupation, hobbies, sport, exercise)?
    a Yes
    b. No
    c. Unsure
5. What is your smoking status?
    a. I have never smoked
    b. I no longer smoke (When did you stop? _____)
    c. I am a current smoker (less than 10 cigs/day)
    d. I am a current smoker (more than 10 cigs/day)

6. Do you consume alcohol?
    a. No, I have never consumed alcohol
    b. No, I no longer consume alcohol (When did you stop? _____)
    c. Yes, I consume alcohol occasionally (less than once a week)
    d. Yes, I consume alcohol regularly (more than once a week)

7. Is it difficult for you to access health care facilities (i.e. medical centres, dental clinics) due to affordability ?
    a Yes
    b. No
    c. Unsure

Participant's Awareness of Oral Cancer/Oral Potentially Malignant Diseases

Please, indicate your preference in regards to the following statements: below:

1 = Agree 2=Unsure 3= Disagree

	1=Agree	2=Disagree	3=Unsure
8. Are you aware of mouth cancers (oral cancers)?			
9. Are you aware of conditions in the mouth that can turn into cancer (oral potentially malignant diseases)?			
10.Have you had a previous diagnosis of oral cancer in your mouth?			
11.Do you think you are at risk of developing oral cancers in the future?			
12.Is there anyone that you know personally who has been diagnosed with oral cancer?			
13. Have you ever heard any information in the media about oral cancer?			
14. Has your doctor ever discussed oral cancer with you?			
15. Has your dentist ever discussed oral cancer or oral cancer risk factors with you?			
16. Have you been counselled on oral cancer by any other health care provider?			
17. Has the dentist counselled you to quit smoking?			
18. Has the dentist counselled you to quit drinking alcohol?			
19. Do you know where to find out more about oral cancer and/or oral potentially malignant disorders?			

Participant's Knowledge of Oral Cancer/Oral Potentially Malignant Diseases

Please, indicate your preference in regards to the following statements below:

1 = Agree 2=Unsure 3= Disagree

	1= Agree	2=Disagree	3=Unsure

20. Tobacco smoking is associated with oral cancers			
21. Tobacco chewing is associated with oral cancers			
22. Chewing areca nut is associated with oral cancers			
23. Heavy drinking of alcohol (>3 standard drinks per day for women and >4 for men) is associated with oral cancers			
24. Spending >30 minutes in direct sunlight each day is associated with oral cancers			
25. Consumption of fruits and vegetables are protective against oral cancers			
26. Elderly people are more likely to get oral cancers			
27. Human Papillomavirus (HPV) is associated with oral cancers			
28. Unprotected oral sex is associated with oral cancers			
29. Having multiple sexual partners increases your risk of oral cancer			
30. Oral cancers may present as a non-healing ulcer			
31. Oral cancers may present as a red patch			
32. Oral cancers may present as a white patch			
33. Oral cancers may present as a lump in the neck			
34. Oral cancers are painless			
35. Oral cancers always present with pain			

36. If you had a non-healing ulcer (2 weeks or more), would you seek medical advice?			

Participants preferences towards oral cancer screening/Oral Potentially Malignant Diseases

Please, indicate your preference in regards to the following statements below:

1 = Agree 2=Unsure 3= Disagree

1= Medical practitioner, 2= Dental Practitioner, 3 = Other

	1= Medical Practitioner	2= Dental Practitioner	3= Other
37. Who would you results regarding oral cancer or oral cancer risk factors ? 1. Medical practitioner 2. Dental Practitioner 3. Other			
	1= Agree	2=Disagree	3= Unsure
38. Would you like to be screened for oral cancer at your dental check up?			
39. Would you like your dentist to inform you whether they are screening for oral cancer?			