

The Impact of Educational Intervention on Junior Dentists' Capacity to Detect Oral Mucosal Lesions and Suspect Malignant Potential

Kamis Gaballah^{1*}, Omar Kujan²

Abstract

Objectives: This study aimed to assess the impact of Continuing Education (CE) activity on junior dentists' competency to identify oral mucosal abnormalities those suggestive of oral cancer or potentially malignant disorders. **Materials and Methods:** This multiphase study administered a pre-validated quiz to dental interns and junior dentists. The quiz was designed to assess the respondent's competency to recognize different oral lesions and stratify their potential for malignancy. Invited candidates attempted the quiz and then attended an informative half-day workshop focused on identifying oral mucosal changes, diagnosing various oral lesions, and recognizing the risk factors and features that suggest the malignant potential of oral lesions. The post-intervention survey was sent to the workshop attendees by 7 months. **Results:** 67 out of 110 invitees attended the workshop, with an overall response rate of 60.1%. In the initial quiz, the overall accuracy of diagnosis was 55.1±9.04%. The participants correctly identified most normal variations (80.60±5.05), but less than half of the benign lesions (40.96±8.30) and potentially malignant lesions (43.62±6.02). The malignant lesions were correctly diagnosed by 55.22±3.98% of the participants. The CE intervention has improved the overall diagnostic accuracy (74.81±5.84% (p,0.015); benign to 70.18±6.68% (p,0.02), the potentially malignant lesions to 62.99±4.63% (p,0.01). **Conclusions:** This study highlights the importance of CE activity in improving the role of dentists in the detection of oral cancer. CE activity has remarkably enhanced the junior dentists' ability to accurately diagnose various oral lesions and effectively stratify their malignant potential.

Keywords: Oral cancer- oral potentially malignant disorders- continuing professional development- education

Asian Pac J Cancer Prev, **23** (11), 3673-3676

Introduction

Lip and oral cavity cancer (OSCC) is the most common malignancy in the head and neck region accounting for 377,713 new cases and 177,757 deaths worldwide each year (Sung et al., 2020). The patient's five-year survival rate is affected by the stage of the disease at the time of initial diagnosis (Kujan and Sloan, 2013, Philip and Kannan, 2021). The five-year survival rate with treatment ranges from 30 to 70 percent depending on the stage of tumor's presentation. The knowledge and awareness of oral cancer by public and health professionals is variable from one geographic area to another; however, it is still below the expectation (Seoane-Lestón et al., 2010; Kujan et al., 2014; Alhazzazi, 2016; Macpherson, 2018; Gaballah, et al., 2021; Saleem et al., 2021; Somathunga et al., 2021; Nazar et al., 2022). This lack of knowledge has contributed significantly to unnecessary delays that resulted in the diagnosis of OSCC at advanced stages leading to poor clinical outcomes and significant economic burden (Allison et al., 1998; Gómez et al., 2010). Knowledge of

oral cancer among current and future dentists is crucial for early detection and prevention of the cancer (Seoane et al., 2012; Braun et al., 2021; Gaballah, et al., 2021). Several studies have found that dental practitioners fail to recognize oral cancer at an early stage due to poor attitudes and a lack of knowledge about the disease's symptoms and signs (Seoane-Lestón et al., 2010; Marino et al., 2017; Gaballah, et al., 2021). A large proportion of dentists do not perform routine oral mucosal screening to detect oral cancer attributing that to the lack of training in oral medicine and pathology during their dental undergraduate training (Yellowitz et al., 2000; Macpherson et al., 2003; Mariño et al., 2017). Since visual examination is a key step in assessing oral mucosa, dentists should competency in recognizing changes of the oral mucosa and to stratify their risk of malignancy. Studies have shown that oral cancer-related continuing education programs for primary care providers may improve the dentists' ability to early detect oral cancer (Silverman and Rankin 2010; Braun et al., 2021). However, they recommended that continuing

¹Department of oral and Craniofacial Health sciences, College of Dental Medicine, University of Sharjah, UAE. ²Oral Diagnostic and Surgical Sciences, UWA Dental School, The University of Western Australia, Nedlands, WA, Australia. *For Correspondence: kyoumus@sharjah.ac.ae

education (CE) activities should be expanded to include oral potentially malignant disorders (OPMD) since the recognition of OPMDs can significantly enhance detecting oral cancer at early stage. Hence, this study aims to assess the impact of CE activity on junior dentists' ability to recognize oral mucosal changes suggestive of oral cancer and OPMDs.

Materials and Methods

Study design and participants

The study was reported in accordance with STROBE guidelines for observational cross-sectional investigations,²⁹ and was approved by Ajman University Research Institutional Review Committee (Ref: D-F-H-19-03-04). All participants signed an informed consent form before participating in all stages of the study with a freedom to withdraw any time point without any prejudice.

A convenient sample of 110 dental interns and junior dentists, graduated from College of Dentistry, Ajman University, who practiced for less than 5 years were invited to participate. Sixty-Seven completed the pre-workshop quiz and then attended CE activity in form of interactive half day workshop hosted an experienced oral and maxillofacial surgeon (KG). The workshop comprised lectures, case discussion using problem based learning approach to identify oral mucosal changes, diagnosing various oral lesions, and recognizing the risk factors and features that suggestive of oral malignancy. The activity aimed to improve the candidate's competency in preventing and early detecting oral cancer. Forty-nine participants returned a complete post-intervention quiz sent 7 months after the educational intervention.

The quiz

The quiz included 30 high-resolution clinical photographs of variable oral lesions and brief patient information and history. The information provided included the gender and age in addition to the duration, symptoms and relevant risk factors. Participants were asked to make a provisional diagnosis based on the photograph and case history provided. The participants were then asked to rate the likelihood of the lesion being malignant on a scale of a) unlikely; b) potentially malignant; and c) Frank malignancy. The lesions were divided into four categories to make the analysis and presentation of the findings easier: a) normal mucosal variations, b) benign lesions, c) potentially malignant lesions, and d) oral malignant lesions. The examined cases

were selected by both authors from archival oral medicine cases that have confirmed final diagnosis based on clinical and histopathological evaluation. The first version of quiz was reviewed by a panel of four oral medicine and oral surgery specialists. The quiz was then piloted to 25 dentists to eliminate any confusing questions, photos, or words. Twenty-one completed surveys the questionnaire, and few changes were made to refine the quiz. The 21 respondents were not invited to participate in the study.

Statistical analysis

The data was tabulated in an Excel sheet before being imported into IBM SPSS Statistics® software version 28 (IBM Corporation, NY, USA) for analysis. Data represented in means of correct answers and standard deviations. A paired T-test of the means with at 95 % confidence interval was used to examine changes in the accuracy of diagnosis and suspicion of malignancy of lesions. $P < 0.05$ was considered statistically significant.

Results

110 dental interns and junior general practitioners working at Ajman College of Dentistry clinics were invited to participate in the study. Sixty-Seven (60.9%) completed the quiz pre-CE activity and then attended the educational workshop on oral cancer and OPMDs. Forty-nine of the participants (73.1%) returned a complete and valid post intervention quiz that was sent 7 months after the CE activity.

The Accuracy of the Diagnosis of Oral Mucosal Lesions

The overall accuracy of the diagnosis of the examined cases prior the educational intervention was 55.1 ± 9.04 . The highest diagnostic score was the normal mucosal variations (80.6 ± 5.05) and the lowest accuracy result was noted in diagnosing both benign lesions (40.96 ± 8.30) and OPMDs (43.62 ± 6.02). The education intervention has significantly improved the overall diagnostic accuracy ($p = 0.015$). The improvement was most evident in the ability of dentists to diagnose pathological changes either in form of benign lesions ($p = 0.02$) or OPMDs ($p = 0.01$). No significance improvement was observed in the accuracy of diagnosing cases with either normal variation ($p = 0.11$) or malignancies ($p = 0.78$). Table 1 summarized the diagnostic accuracy of the examined oral mucosal changes prior and post the education intervention.

The Suspicion of Malignancy of Oral Mucosal Changes

Table 2 summarizes the ability of the participant to

Table 1. The Accuracy of the Diagnosis before and after the Educational Intervention

Accuracy of the Diagnosis	Means of the correct answers ± SDs		Means difference	95% Confidence Interval of the Difference		P value
	Before	After		Lower	Upper	
Accuracy of Diagnosis of Normal Variation	80.60±14.27	90.58±6.69	9.97	22.68949	2.73949	0.11
Accuracy of Diagnosis of Benign Lesions	40.96±31.06	70.18±26.24	29.22	58.65101	0.19387	0.02
Accuracy of Diagnosis of Potentially Malignant Lesions	43.62±19.03	62.99±14.65	19.37	34.69108	4.04892	0.01
Accuracy of Diagnosis of Malignant lesions	55.22±12.12	75.49±21.91	20.27	43.29775	2.75775	0.78
Overall Accuracy of Diagnosis	55.1±18.09	74.81±11.69	19.71	32.22388	7.19612	0.015

Table 2. The Accuracy of the of Suspicion of Malignancy in Various Cases before and after the Educational Intervention

Suspicion of malignancy	Means of the correct answers \pm SDs		Means difference	95% Confidence Interval of the Difference		P value
	Before	After		Lower	Upper	
Suspicion of malignancy in Normal Variation	90.06 \pm 8.49	89.15 \pm 5.21	0.91	4.77	6.59	0.715
Suspicion of malignancy in Benign Lesions	58.05 \pm 21.59	77.50 \pm 14.16	19.45	31.98	6.91	0.005
Suspicion of malignancy in Potentially Malignant Lesions	40.70 \pm 10.13	62.99 \pm 8.38	14.18	22.24	6.11	0.003
Suspicion of malignancy in Malignant lesions	44.99 \pm 7.73	94.53 \pm 5.37	49.54	57.35	41.72	0.001
Overall Accuracy of the malignant suspicion	58.45 \pm 22.32	81.04 \pm 13.97	22.59	55.56	10.38	0.11

judge the malignant potential of the examined cases prior and post the CE intervention. The participants shown the best judgement of the malignant potential of lesions in the group of normal mucosal variation cases (90.06 \pm 3.00) and the worst performance in assessing the malignant potential of OPMD cases group (40.70 \pm 3.20), followed by frank malignancies (44.99 \pm 2.35). The CE activity improved the overall suspicion of the malignancy (81.04 \pm 6.98). The improvement of the ability of junior dentists to suspect the malignancy in oral mucosal change was mostly noted cases with pathological findings in which they have shown significant recognition of the malignant potential of malignancies group (p= 0.001), OPMD group (p= 0.003) and benign lesions group (p= 0.005).

Discussion

This study reports the changes in the accuracy of junior dentists in recognizing oral mucosal changes and assessing their potential of malignancy before and after attending a workshop on oral cancer education. Our CE activity comprised lectures and Case-based discussion of prepared cases with images. We followed a teaching approach is highly recommended for teaching oral medicine (Moghell et al., 2018). Further, we utilized a validated tool to ensure the reliability of the findings. We limited the study to dental interns and junior dentists who practiced for less than 5 years and graduated from the same institute to ensure that the participating dentists have similar and recent knowledge concerning oral cancer knowledge and training. Further like previously published reports (Seoane et al., 2012; Pentenero et al., 2014; Braun et al., 2021), our data imply that the engagement with continuing education activity has improved junior dentists' ability to detect oral mucosal abnormalities and, more critically, increased their accuracy in stratifying the malignant potential of oral lesions. The participants showed competency in identifying the normal variation of the oral mucosa since 90% of them were able to correctly recognize the mucosal change and also being able to exclude the malignant potential in this group of cases. This is very important to avoid unnecessary anxiety and stress to the patient and health system. Further, many participants in this study reported having some difficulties in diagnosing oral mucosal changes ranging from benign to frank cancer including OPMDs. This could be attributed to the preference of dentists to refer patients with oral disorders to specialist care irrespective of the lesion's nature (Kujan et al., 2006; Grafton-Clarke et al., 2019). Excessive referrals lead to long waiting lists and an

overburdening the health system, which may contribute to delays in detection of several significant oral disorders, including oral cancer. There were attempts to standardize the curriculum of oral medicine including the teaching of oral cancer in dental schools (Kragelund et al., 2010; Mighell et al., 2018). However, there is still no studies that specifically report on the effectiveness of the current oral medicine curriculum. Further, the curricula on oral cancer to ensure that dental students develop the necessary didactic and clinical skills and competencies are yet to be established. We know from the existing literature that dentists believe that the time spent on practical training during their dental undergraduate training is insufficient (Carter and Ogden 2007; Hassona et al., 2015; Shrestha et al., 2017). Interestingly, Boroumand and coworkers (2008) showed that most of the students lose their clinical competency and knowledge regarding oral cancer diagnosis at the time of graduation. They postulated that creating a mandatory review course for students before graduation would be a beneficial approach to topple this problem. The improvement shown in our report in the ability of dentists to diagnose and stratify the potential of malignancy may reinforce the call for regular mandatory educational activities on oral cancer to maintain satisfactory level of competency. We acknowledge that our study has limitations and the findings should be interpreted in the context of the study given the small sample size and being administered in one geographic region.

In conclusion, the present findings point out the importance of the continuing educational intervention on early detection of oral cancer and potentially malignant disorders to equip dentists with the required skills and knowledge to contribute to the efforts in fighting against oral cancer. We also suggest that an international consortium to be established to oversee the development of oral cancer education resources that be used widely.

Author Contribution Statement

Both authors confirm contribution to the paper as follows: study conception and design: KG and OK. Data collection: KG. Analysis and interpretation of results: KG. Draft manuscript preparation: KG and OK. Both authors reviewed the results and approved the final version of the manuscript.

Acknowledgements

Conflict of interest

The authors declared no conflicts of interest.

References

- Alhazzazi TY (2016). Evaluation of head and neck cancer awareness and screening status in Jeddah, Saudi Arabia. *Asian Pac J Cancer Prev*, **17**, 1135-9.
- Allison P, Franco E, Feine J (1998). Predictors of professional diagnostic delays for upper aerodigestive tract carcinoma. *Oral Oncol*, **34**, 127-32.
- Boroumand S, Garcia AI, Selwitz RH, Goodman HS (2008). Knowledge and opinions regarding oral cancer among Maryland dental students. *J Cancer Educ*, **23**, 85-91.
- Boroumand S, Garcia AI, Selwitz RH, Goodman HS (2008). Knowledge and opinions regarding oral cancer among Maryland dental students. *J Cancer Educ*, **23**, 85-91.
- Braun LW, Martins MAT, Romanini J, et al (2021). Continuing education activities improve dentists' self-efficacy to manage oral mucosal lesions and oral cancer. *Eur J Dent Educ*, **25**, 28-34.
- Carter LM, Ogden GR (2007). Oral cancer awareness of general medical and general dental practitioners. *Br Dent J*, **203**, E10, discussion 248-9.
- D Somathunga EAS, H Dissanayaka DMS, L Ratnayake DRD, Jayasinghe RD (2021). Awareness of oral cancer and OPMDs among patients attending the University Dental Hospital, Peradeniya, Sri Lanka. *Asian Pac J Cancer Care*, **6**, 47-51.
- Gaballah K, Faden A, Fakhri FJ, et al (2021). Diagnostic accuracy of oral cancer and suspicious malignant mucosal changes among future dentists. *Healthcare (Basel)*, **2021**, 9.
- Gómez I, Warnakulasuriya S, Varela-Centelles PI, et al (2010). Is early diagnosis of oral cancer a feasible objective? Who is to blame for diagnostic delay?. *Oral Dis*, **16**, 333-42.
- Grafton-Clarke C, Chen KW, Wilcock J (2019). Diagnosis and referral delays in primary care for oral squamous cell cancer, a systematic review. *Br J Gen Pract*, **69**, e112-e26.
- Hassona Y, Sawair F, Baqain Z, et al (2015). Oral cancer early detection--a pressing need for continuing education in Jordan. *Asian Pac J Cancer Prev*, **16**, 7727-30.
- Kragelund C, Reibel J, Hadler-Olsen ES, et al (2010). Scandinavian fellowship for oral pathology and Oral Medicine, statement on oral pathology and oral medicine in the European Dental Curriculum. *J Oral Pathol Med*, **39**, 800-e1.
- Kujan O, Abuderman A, Azzegahiby S, Alenzi FQ, Idrees M (2013). Assessing oral cancer knowledge among Saudi medical undergraduates. *J Cancer Educ*, **28**, 717-21.
- Kujan O, Alzoghbaibi I, Azzeghaiby S, et al (2014). Knowledge and attitudes of Saudi dental undergraduates on oral cancer. *J Cancer Educ*, **29**, 735-8.
- Kujan O, Duxbury AJ, Glenny AM, Thakker NS, Sloan P (2006). Opinions and attitudes of the UK's GPs and specialists in oral surgery, oral medicine and surgical dentistry on oral cancer screening. *Oral Dis*, **12**, 194-9.
- Kujan O, Sloan P (2013). Dilemmas of oral cancer screening, an update. *Asian Pac J Cancer Prev*, **14**, 3369-73.
- Macpherson LM, McCann MF, Gibson J, Binnie VI, Stephen KW (2003). The role of primary healthcare professionals in oral cancer prevention and detection. *Br Dent J*, **195**, 277-81.
- Macpherson LMD (2018). Raising awareness of oral cancer from a public and health professional perspective. *Br Dent J*, **225**, 809-14.
- Mariño R, Haresaku S, McGrath R, et al (2017). Oral cancer screening practices of oral health professionals in Australia. *BMC Oral Health*, **17**, 151.
- Mighell AJ, Freeman C, Atkin PA, et al (2018). Oral Medicine for undergraduate dental students in the United Kingdom and Ireland-A curriculum. *Eur J Dent Educ*, **22**, e661-e8.
- Nazar HS, Ariga J, Shyama M (2022). Oral cancer knowledge, attitudes, and practices among newly graduated dentists in Kuwait. *Asian Pac J Cancer Prev*, **23**, 459-65.
- Pentenero M, Chiecchio A, Gandolfo S (2014). Impact of academic and continuing education on oral cancer knowledge, attitude and practice among dentists in north-western Italy. *J Cancer Educ*, **29**, 151-7.
- Philip PM, Kannan S (2021). Patient interval and associated factors in the diagnostic journey of oral cancer, A Hospital-Based Cross-Sectional Study from Kerala, India. *Asian Pac J Cancer Prev*, **22**, 3143-9.
- Saleem L, Mahmoud H, Joseph B (2021). Knowledge and attitude about oral cancer among medical and dental students at Kuwait University, A Cross-sectional Study. *Asian Pac J Cancer Care*, **6**, 277-83.
- Seoane J, Varela-Centelles P, Tomás I, et al (2012). Continuing education in oral cancer prevention for dentists in Spain. *J Dent Educ*, **76**, 1234-40.
- Seoane-Lestón J, Velo-Noya J, Warnakulasuriya S, et al (2010). Knowledge of oral cancer and preventive attitudes of Spanish dentists. Primary effects of a pilot educational intervention. *Med Oral Patol Oral Cir Bucal*, **15**, e422-6.
- Shrestha A, Marla V, Shrestha S, Agrawal D (2017). Awareness of undergraduate dental and medical students towards oral cancer. *J Cancer Educ*, **32**, 778-83.
- Silverman S, Jr., Rankin KV (2010). Oral and pharyngeal cancer control through continuing education. *J Cancer Educ*, **25**, 277-8.
- Sung H, Ferlay J, Siegel RL, et al (2021). Global Cancer Statistics 2020, GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin*, **71**, 209-49.
- Yellowitz JA, Horowitz AM, Drury TF, Goodman HS (2000). Survey of U.S. dentists' knowledge and opinions about oral pharyngeal cancer. *J Am Dent Assoc*, **131**, 653-61.



This work is licensed under a Creative Commons Attribution-Non Commercial 4.0 International License.