

# Oral cancer and precancer in Oral Pathology and Medicine curricula of Mexican dental schools

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## Abstract

**Objective:** To identify the teaching-learning process characteristics of Oral Pathology and Medicine (OP&M) related to oral potentially malignant disorders (OPMDs) and oral cancer (OC), in the dental schools' curricula in Mexico, to analyze the approach given to this topic worldwide, and to provide the possible solution strategies.

**Materials and Methods:** Questionnaires were sent to OP&M deans and professors from public Mexican Universities to explore the curriculum and academic profile of the dental schools. The recommendations gathered from a workshop with expert professors on the challenges in OPMD/OC teaching were reported.

**Results:** Twenty-two dental schools participated (22 deans, 30 professors). The most widely used strategies were clinical-case resolving (86%) and presentations (73%). Although 77.3% of the programs included maxillofacial lesions, only 40.9% contemplated OPMD/OC. Only 45% of the programs developed community activities for early OC detection. The workshop recommendations were (i) multidisciplinary approach to OPMD/OC teaching, involving OP&M professors in other dental and nondental courses; (ii) implementation of the most effective teaching techniques (currently, problem-based learning and clinical-case presentation) in OP&M curricula; (iii) education of OP&M professors on teaching-learning processes.

**Conclusions:** These recommendations from the Mexican context, integrated with similar experiences from other countries could contribute to develop a unique, internationally acknowledged OP&M curriculum.

## KEYWORDS

healthy oral mucosa, oral cancer, oral potentially malignant disorder

## 1 | INTRODUCTION

In Mexico, oral cancer (OC) diagnosis, as worldwide, is made at advanced stages in up to 50% of cases, and early diagnosis has not improved in the last 40 years (González-Moles et al., 2022; Holmes et al., 2003; Warnakulasuriya, 2009). Dentistry plays an essential role in the timely detection of Oral Potentially Malignant Disorders (OPMDs) and OC (Gansky et al., 2002; Seoane et al., 2006); thus, the knowledge and activities that lead to OPMD/OC early diagnosis need to be reinforced in dental school curricula (González-Moles et al., 2022).

Different studies performed worldwide (Burzynski et al., 2002; Cerero-Lapiedra et al., 2015; Hassona et al., 2017; Keser & Pekiner, 2019; Ozdemir-Ozenen et al., 2022; Poudel et al., 2020; Seoane et al., 2006; Uti & Fashina, 2006) have demonstrated the need to improve cancer education activities in undergraduate dental students. Diverse surveys showed the insufficient capacity to recognize OPMD signs and to identify OC risk factors, suggesting the need for more clinical experience and knowledge (Jaber et al., 1997; Seoane et al., 2006). Dental students from the US (Burzynski et al., 2002), Jordan (Hassona et al., 2017), Nepal (Poudel et al., 2020), Nigeria (Uti & Fashina, 2006), and Turkey (Keser & Pekiner, 2019; Ozdemir-Ozenen et al., 2022) were aware of their poor experience concerning OC and recognized the need for a dental curriculum reorganization.

These observations suggest that undergraduate dental curriculum needs to be improved to increase the perception of OPMD/OC early signs. Thus, this study aimed to identify the teaching process characteristics of Oral Pathology and Medicine (OP&M), specifically those contents related to OC, in the curricula of different dental schools and faculties in Mexico.

## 2 | MATERIALS AND METHODS

This study comprised two sections. First, a survey was accomplished by coordinators and professors of the OP&M courses from public universities in Mexico. Second, the results of a workshop involving Mexican OP&M professors. The surveys were aimed at exploring the academic and professional profile of OP&M professors in the Mexican dental faculties and schools and identifying strengths and opportunities proposed by leaders of OP&M curricula. The second section was the development of a workshop analyzing and discussing the main challenges of teaching OPMDs and OC, focused on obtaining strategies to improve diagnosis by training future stomatologists.

### 2.1 | Survey

The online survey, conducted from March to April 2021, comprised two questionnaires: the first was addressed to the directors of studies from 22 Mexican public dental schools (Appendix S1), and the second was emailed to OP&M professors.

The first questionnaire included 25 closed-ended questions and collected information about (i) curriculum models of the bachelor's

degree program (subjects, problem-solving, competency-based, or a combination of all three models); (ii) incorporation of OP&M knowledge, expertise, and skills within objectives of each course; (iii) timing of the presentation of these contents and their duration; (iv) evaluation mechanisms. Also, the questionnaire inquired about the teaching of oral examination frequency, lymph node palpation, and the use of auxiliary diagnostic methods during students' clinical activities. Finally, the participants were asked about clinical-case presentations and continuing education activities on this topic.

The second questionnaire included 18 questions that assessed (i) demographic information (sex and age); (ii) research background; (iii) career background (affiliate institution, time dedicated to teaching, highest study level, years of professional practice, and participation in research projects and scientific publications). Finally, two open-ended questions were included on (i) the respondent's perception of OP&M taught at the undergraduate level; (ii) helpful strategies that can be implemented to improve the teaching-learning process on these topics.

Descriptive statistics were made using the Statistical Package for the Social Sciences SPSS v.21 (IBM).

### 2.2 | Workshop

Qualitative identification of strengths and areas of opportunity in the programs were obtained through the online workshop "The Teaching of Oral Pathology and Medicine in the Schools and Faculties of Dentistry of Mexico" (19–20 May 2022; ZoomInfo Technologies). This workshop included 18 professors, leaders in this field of knowledge, to share their perspectives, knowledge, and understanding of OPMD/OC curricula for undergraduate students. Based on the identified opportunity areas, the organizing/scientific committee identified six straightforward questions to be analyzed, which were integrated into three working groups.

Before the workshop, three working groups were organized under freely established modalities. Each group discussed a key question. A chair and a rapporteur oversaw each group, noting the topics that arose under the questions posed in the respective guide. On the first day, each group presented the outcomes of their discussions. On the second day, a plenary session was held to obtain the final recommendations, leading to a consensus paper based on recent literature reviews and the workshop participants' research experience. Excerpts from the papers and the documents presented during the plenary lectures were reported in the present study as part of the Discussion section.

## 3 | RESULTS

### 3.1 | Survey

The questionnaire on education programs was returned by 22 deans and directors of Dentistry schools, with a response rate of 78.6%



(22/28); there were 11 (50%) females, with a median age of 43 years. As shown in Table 1, regarding the curriculum model, 36%, 27%, 14%, and 23% of respondents corresponded to subjects, competencies, problem-solving, and a combination of all three modalities, respectively.

According to the responses, 77.3% of the programs included the diagnosis of maxillofacial lesions as part of their curricula. However, only 40.9% contemplated OPMDs and OC. In more than half of the programs (14, 63.6%), OPMD- and OC-related contents were concentrated in the third year, with durations varying from 6 months (55%) to 7–12 months (33%).

The most widely used strategies for knowledge acquisition were: resolution of clinical cases (86%), case presentations (73%), and written exams (86.4%). Additionally, 45% of the programs developed community activities for early OC detection; but only 23% of the programs confirmed the presence of an OP&M expert. Furthermore, only 27% of the programs reinforced patient education on OPMD/OC risk factors.

The second questionnaire was returned by 30 OP&M professors from the 22 faculties participating in the study, with 100% response rate. As shown in Table 2, 47% of the respondents were women, with a median age of 47 years, and 83% were full-time-dedicated professors. Sixty percent of respondents had postgraduate degrees in OP&M, 20% worked in a second institution, mainly in public health services. Almost all respondents (90%) also attended private practice, with 67% specializing in OP&M, mostly part-time (5–10 hours per week).

Furthermore, 73% of the respondents had participated in research projects, although only 37% had researched OPMD and OC topics. Finally, 83% of the respondents stated that the OP&M curriculum at the undergraduate level required improvement.

## 4 | DISCUSSION

During the final plenary session of the workshop, the reports from the three working groups were discussed and resulted in three important final conclusions, summarized in Table 3.

### 4.1 | What knowledge and skills on OPMDs and OC are perceived as essential when training a general stomatologist and, therefore, must be part of the core curricula of bachelor's degrees? When must it be incorporated to achieve practical diagnosis tools?

The current definitions of the OPMDs must be included in the curricula of dental schools, considering the conceptual component, which considers the risk of OC progression, and the operational component, which is the ability to identify clinical heterogeneity. In a classical elaboration of knowledge, it is reasonable to address the clinical variability, the differences among malignant transformation risks, and, subsequently, OC development. Although there is a great diversity of academic programs, OP&M as a learning unit

**TABLE 1** Questionnaire on education programs answered by 22 deans and directors of dentistry schools.

Item	N (%)
Curriculum model	
Subjects	8 (36.4)
Competencies	6 (27.3)
Problem-solving	3 (13.6)
Combined	5 (22.7)
The study program includes diagnosis of maxillofacial lesions	
Yes	17 (77.3)
No	5 (22.7)
OPMDs and OC are included in the study program	
Yes	9 (40.9)
No	13 (59.0)
Temporality of OPMDs and OC	
Second year	3 (13.6)
Third year	14 (63.6)
Fourth year	3 (13.6)
Fifth year	2 (9.2)
Duration of the contents related to OPMDs and OC	
1–6 months	13 (59.0)
7–12 months	7 (31.8)
25–27 months	2 (9.2)
Strategies for OPMD and OC knowledge acquisition	
Resolution of clinical cases	19 (86.4)
Case presentations	16 (72.7)
Written exams	19 (86.4)
Oral exams	9 (40.9)
Written exercises	5 (22.7)
Clinical activities performed by the students	
Palpation of lymph nodes	14 (63.6)
PMD identification procedures	15 (68.2)
Supravital staining	9 (40.9)
Biopsies	17 (77.3)
Reference to a specialized service	18 (81.8)
Performing community activities for early OC detection	
Yes	10 (45.5)
No	12 (54.5)

Abbreviations: OC, oral cancer; OPMD, oral potentially malignant disorders.

is usually offered in the early stages of professional training, along with other theoretical fields (i.e., histology, embryology, and immunology, etc.); thus, it is difficult for the students to associate it with clinical experience (Bucur et al., 2006; Sun et al., 2012). Integrating the clinical experiences with the knowledge of the pathophysiological processes is challenging, but an excellent opportunity to explore teaching strategies, such as the clinicopathologic correlation, which could be a powerful tool for understanding molecular and histomorphological progression from OPMD to OC

TABLE 2 Data obtained from the questionnaires returned by the thirty Mexican Oral Pathology and Medicine professors.

Item	N (%)
Gender	
Female	14 (46.7)
Male	16 (53.3)
Age	
<40 years	8 (26.7)
40–60 years	20 (66.7)
>60 years	2 (6.6)
Degree of schooling	
Oral Pathology and Medicine Specialization/ Master	12 (40.0)
Oral Pathology and Medicine PhD	6 (20.0)
Other Dental Specialties	4 (13.3)
Other Masters	2 (6.7)
Other PhD	6 (20.0)
Time of dedication	
Half/part-time	5 (16.7)
Full time	25 (83.3)
Private dental practice	
Yes	25 (90.0)
No	5 (10.0)
Type of dental practice	
Oral Pathology and Medicine practice	20 (66.7)
Other Dental specialized practice	8 (26.7)
General practice	2 (6.7)
Participation in research projects	
Yes	22 (73.3)
No	8 (26.7)
Participation in OPMD/OC-related research projects	
Yes	11 (36.7)
No	19 (63.3)

Abbreviations: OC, oral cancer; OPMD, oral potentially malignant disorders.

(Davenport, 2019; Latoo et al., 2019; Saawarn et al., 2016; Saluja et al., 2020).

A study in the UK focusing on curriculum managers nationwide found that undergraduate OC curricula vary widely in length, format, and content (Carter et al., 2011). One strategy is to discuss and disseminate the importance of OP&M in clinical practice at dental institutions. This would bring the students closer to the scope and competencies of an expert in this discipline and eliminate the erroneous idea that the component “Oral Pathology” of OP&M is not a clinical discipline (Saluja et al., 2020).

A detailed analysis of the curricula is required to determine and standardize the knowledge, skills, and attitudes to be obtained by students; most medical schools use clinical examination and demonstration as teaching methods (do Prado et al., 2020; Kogi et al., 2019).

Students must start from the assumption that visual detection of OC is a noninvasive, simple, easy, and inexpensive procedure that may help reduce mortality (Coppola et al., 2021; Joseph et al., 2015; Mignogna & Fedele, 2005). Concerning the appropriate moment for this examination, the curriculum should focus on adequate information and skill acquisition to perform oral examinations, patient education, and boost dental students' capabilities (Jafer et al., 2021).

This panel concluded that the teaching and practice of oral examination should be implemented and reinforced from the first years of dental education. Oral exams should be carried out constantly and continuously at every clinical opportunity, both in the first consultation and subsequent appointments since it involves little execution time.

#### 4.2 | Which strategies can be applied in the classroom and clinic to improve knowledge and skills about OPMDs and OC at the undergraduate level? According to each method, which evaluation modalities are the most effective?

Few studies have evaluated teaching strategies for OPMDs (Cheung et al., 2009; de Nunzio et al., 2013; Gutiérrez & Posada, 2004; Sepúlveda & Arias, 2011). Marshall et al. (2004) suggested that this weakness could be associated with lack of incentives to develop teaching skills in an academic environment where research success is highly rewarded, and teaching is ignored.

The oral examination is a visual activity, hence, employing diverse information technologies could improve the learning experience. In recent years, teaching-learning strategies like problem-based learning, clinical-case series, project-based learning, e-learning, and gamification have become more popular in health education (Espinosa-Vázquez et al., 2013; Moro et al., 2019). Problem-based learning and clinical-case study series are the most used teaching-learning strategies in specialized oncological centers and must be encouraged to increase students' awareness of this problem (Gutiérrez & Posada, 2004; Marshall et al., 2004). Problem-based learning arouses student interest in their learning process and stimulates critical thinking in OP&M teaching (Howard & Jiménez, 2011).

On the contrary, the evaluation represents a set of continuous assessments that professors perform to obtain information on students' learning levels (Gómez, 2006; Méndez, 2021). These assessments should guarantee understanding in each phase of the learning process to develop competencies and could motivate students to learn. Hence, care must be taken when planning and executing this process to determine who completes the program and what qualifications are acquired (Álvarez et al., 2011; Sánchez & Cisterna, 2014). Different tools for student self-assessment in the health field have been proposed, such as the Booth & Ainscow Inclusion Index (Booth et al., 2002). Formative evaluation has been used qualitatively as a pillar in learning and is also considered a continuous data-collection process for student learning.

**TABLE 3** Recommendations on the main challenges in OPMD/OC teaching acknowledged by the Oral Pathology and Medicine professors participating to the workshop.

Issues to acknowledge	Conclusions
What knowledge and skills on OPMDs and OC are perceived as essential when training a general stomatologist and, therefore, must be part of the core curricula of bachelor's degrees? When must it be incorporated to achieve practical diagnosis tools?	Teaching and practice of oral examination should be reinforced from the first levels of the undergraduate curriculum map. Oral examinations should be promoted throughout the study courses, as it is not a time-consuming activity
Which strategies can be applied in the classroom and clinic to improve knowledge and skills about OPMDs and OC at the undergraduate level? According to each method, which evaluation modalities are the most effective?	Problem-based learning and clinical-case presentations are the most used teaching-learning strategies in specialized oncological centers and must be encouraged to improve students' awareness towards OPMDs and OC
How can effective learning for detecting OPMDs be achieved since they are low-incidence lesions and students may not observe them during the courses? How can a multidisciplinary approach to OP&M be achieved in university stomatology clinics?	Oral Pathology and Medicine professors must be trained to reorient the teaching-learning process, adopted from successful pedagogical models. Multidisciplinary activity is recommended

Abbreviations: OC, oral cancer; OPMD, oral potentially malignant disorders.

In closing, oral examinations make students aware of the importance and significance of this practice as a fundamental tool for diagnosing oral lesions. If graduating dental students have an increased understanding of OPMDs and OC, the number of dental practitioners skilled and competent in providing appropriate oral care to patients simultaneously increases (Keser & Pekiner, 2019).

#### 4.3 | How can effective learning for detecting OPMDs be achieved since they are low-incidence lesions and students may not observe them directly during the courses? How can a multidisciplinary approach to OP&M be achieved in university stomatology clinics?

Since dentists represent the first step in the pathway to care, they must be competent in their gatekeeping role (Hashim et al., 2019; Laronde et al., 2014). Traditionally, dental training depends on contact with patients; however, the low prevalence of some OPMDs (Webster et al., 2019; Wetzell & Wollenberg, 2020) makes it difficult to achieve an objective approach to these pathologies. Therefore, it is necessary to reorient teaching practice through relevant training processes, considering values, skills, and the four pillars of education: learning to (i) know, (ii) do, (iii) coexist, and (iv) be (Zahonero & Martín, 2012).

To achieve this change in the teaching and learning of OPMDs, adapting to a pedagogical model based on community problem-solving with a socio-formative approach seems a viable alternative. This model is based on identifying, analyzing, discussing, and solving problems and integrating knowledge from different disciplines or subjects (Tobón et al., 2017). The socio-formative approach could be based on different strategies, such as forming small groups for problem-solving, role-playing, and standardized patient simulation (Tengiz et al., 2022). Similarly, practice-based teaching methods promote reflective thinking and a meaningful understanding of complex concepts (Zitzmann et al., 2020).

Adopting virtual environments and multimedia technologies based on computers and mobile devices that facilitate access to information, promotes the constant update of content and motivation (Golzarri & Ortiz, 2006). Information and communication technologies have been increasingly used to support teaching-learning strategies to develop motivation, self-learning, and creativity in tertiary education (Morales & Diez-Martinez, 2020; Tovar et al., 2014).

Recent Latin-American experiences constructing open educational resources and virtual learning objects have been applied in different stomatology areas. A Colombian study showed the efficacy of mobile applications and virtual learning objects for learning about elementary lesion, OPMD, OC diagnostic exercises, suggesting they improve educational processes, prevention, and timely detection (Coley & Pérez, 2017; Rincón & Pájaro, 2017).

The flipped classroom, implemented to analyze the acquisition of essential competencies in applying knowledge, communication, and interpretation of data, has shown an increase in objective achievement, definition of contents usefulness, degree of satisfaction, and knowledge acquisition compared to the traditional one. Thus, inverted classroom groups are considered an effective educational tool since they could help reinforce theoretical knowledge through practical classes (Torres-Cuevas et al., 2020). Another novel student-centered teaching alternative is the Presentation-Assimilation-Discussion method. It involves dividing classes into two sections, with half the time allotted for instructors to make presentations, and the other half for students to assimilate knowledge individually and discuss it in small groups. A Chinese study found that the Presentation-Assimilation-Discussion class method was more efficient and achieved better results than traditional sessions, generating more enthusiasm and initiative to learn OP&M among dental students (Zhai et al., 2022).

Regarding multidisciplinary work, it is known that collaborative work between clinicians and specialists mainly benefits patients, increases adherence to guidelines, fosters better teaching environments, and improves physician and team satisfaction (Pillay



et al., 2016). Therefore, an integrative model transcending fields of expertise facilitates health service delivery, such as integrating medical care into dental settings (Mosen et al., 2021). This service facilitates a comprehensive patient approach, particularly in dental schools, emphasizing the systemic and nondental stomatology phases (Díaz & Castellanos, 2015).

It is necessary to foster practical communication skills during dental education and clinical training (Pérez-de-Oliveira et al., 2022). Additionally, communication skills are suggested to promote person-centered care instead of patient-centered care. This is because patient-centered care focuses on the disease, and person-centered care involves and places patients as persons, and their environment (family, emotions, economy, social aspects, previous experiences, repercussions), at the center of decisions (Pérez-de-Oliveira et al., 2022). Considering a patient based on these premises by all team members will facilitate the successful integration of OP&M in a multidisciplinary team.

In summary, OP&M professors must be trained in techniques to reorient the teaching-learning process, adopted from successful pedagogical models. Recognizing and incorporating information and communication technologies is essential since their potential for solving real problems is seldom adequately exploited. Correspondingly, multidisciplinary work is highly recommended.

#### 4.4 | Recommendations to the dental schools

The three main recommendations regarding the teaching of OP&M in Mexican public dental schools were:

- Multidisciplinary approach to teaching OPMD and OC-related issues. Teaching must be extended to other dental and nondental courses whenever possible, with the involvement of OP&M professors in multidisciplinary teams.
- Implementation of the most effective teaching techniques in all the OP&M curricula. Teaching techniques, such as problem-based learning and clinical-case presentations, that are currently considered the most effective, must be adopted in all the OP&M curricula.
- Improving the teaching skills of OP&M professors through periodical courses on teaching-learning processes. The techniques to teach OP&M, the taught topics, and the student evaluation methods are not static but are continuously evolving. It is important, therefore, that OP&M professors are continuously informed on the advancements in the teaching-learning processes.

These results reflected the situation in the public dental schools of Mexico and can be considered a first step toward the design of a unique OP&M curriculum. Indeed, the research on how to improve OPMD and OC knowledge and awareness in dental schools is not limited to a specific country and is a critical global problem requiring information exchange (Odell et al., 2004; Ozdemir-Ozenen et al., 2022).

It would be advisable to share this experience with similar experiences from other countries, to achieve a unique, effective, and internationally acknowledged OP&M curriculum.

#### AUTHOR CONTRIBUTIONS

**Ramírez-Amador Velia:** Conceptualization; methodology; data curation; investigation; validation; supervision; visualization; resources; writing – original draft. **Anaya-Saavedra Gabriela:** Conceptualization; methodology; software; data curation; investigation; formal analysis; validation; supervision; project administration; visualization; resources; writing – original draft. **Petti Stefano:** Supervision; writing – review and editing; visualization. **Lara-Flores Norma:** Data curation; supervision; visualization; writing – original draft; conceptualization. **Aranda-Romo Saray:** Conceptualization; writing – original draft; visualization; data curation; supervision. **Cruz-Monroy Eduardo:** Conceptualization; writing – original draft; visualization; data curation; supervision. **Muela-Campos Daniela:** Conceptualization; investigation; formal analysis. **Nava-Villalba Mario:** Conceptualization; writing – original draft; visualization; data curation; supervision. **Ocampo-Acosta Fabián:** Conceptualization; writing – original draft; visualization; data curation; supervision. **Pulido-Díaz Katya:** Conceptualization; investigation; formal analysis. **Rumayor-Piña Alicia:** Data curation; supervision; visualization; writing – original draft; conceptualization.

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#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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#### REFERENCES

- Álvarez, M., Navas, P., Rojas-Morales, T., & Quero, V. (2011). Evaluación del aprendizaje en el contexto clínico-odontológico. *Ciencia Odontológica [Internet]*, 8(2), 112–119.
- Booth, T., Ainscow, M., Black-Hawkins, K., Vaughan, M., & Shaw, L. (2002). *Index for inclusion. Developing Learning and Participation in Schools*. Centre for Studies on Inclusive Education (CSIE).

- Bucur, M. V., Shanley, D. B., & Claffey, N. (2006). Contents of stomatological curricula in Europe. *European Journal of Dental Education*, 10(2), 61–66. <https://doi.org/10.1111/j.1600-0579.2006.00384.x>
- Burzynski, N. J., Rankin, K. V., Silverman, S., Scheetz, J. P., & Jones, D. L. (2002). Graduating dental students' perceptions of oral cancer education: Results of an exit survey of seven dental schools. *Journal of Cancer Education*, 17(2), 83–84. <https://doi.org/10.1080/08858190209528804>
- Carter, L. M., Parsonage-Grant, S., Marshall, A., Achal, K. S., & Kanatas, A. (2011). Oral cancer teaching of medical students in the UK: Time for a new approach? *Journal of Cancer Education*, 26, 308–314.
- Cerero-Lapiedra, R., Esparza-Gómez, G. C., Casado-de la Cruz, L., Domínguez-Gordillo, A. A., Corral-Linaza, C., & Seoane-Romero, J. M. (2015). Ability of dental students in Spain to identify potentially malignant disorders and oral cancer. *Journal of Dental Education*, 79(8), 959–964.
- Cheung, W. Y., Fishman, P. N., & Verma, S. (2009). Oncology education in Canadian undergraduate and postgraduate training programs. *Journal of Cancer Education*, 24(4), 284–290. <https://doi.org/10.1080/08858190902973143>
- Coley, M., & Pérez, V. (2017). *Diseño de un objetivo virtual de aprendizaje sobre desórdenes potencialmente malignos y Cáncer oral (Licenciatura en odontología)*. Universidad de Cartagena.
- Coppola, N., Mignogna, M. D., Riviaccio, I., Blasi, A., Bizzoca, M. E., Sorrentino, R., Lo Muzio, L., Spagnuolo, G., & Leuci, S. (2021). Current knowledge, attitudes, and practice among health care providers in OSCC awareness: Systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18(9), 4506. <https://doi.org/10.3390/ijerph18094506>
- Davenport, R. J. (2019). How to do it: The clinicopathological conference. *Practical Neurology*, 19(2), 143–146. <https://doi.org/10.1136/practneurol-2018-001993>
- de Nunzio, N. J., Joseph, L., Handal, R., Agarwal, A., Ahuja, D., & Hirsch, A. E. (2013). Devising the optimal preclinical oncology curriculum for undergraduate medical students in the United States. *Journal of Cancer Education*, 28(2), 228–236. <https://doi.org/10.1007/s13187-012-0442-0>
- Díaz, G., & Castellanos, S. (2015). Plan de tratamiento odontológico. In J. Saavedra (Ed.), *Manejo dental de pacientes con enfermedades sistémicas* (3rd ed., pp. 597–599). Editorial El Manual Moderno.
- do Prado, N. S., Bonan, R. F., da Silva Leonel, A. C. L., de Amorim Carvalho, E. J., da Motta Silveira, F. M., & da Cruz Perez, D. E. (2020). Awareness on oral cancer among patients attending dental school clinics in Brazil. *Medicina Oral, Patología Oral y Cirugía Bucal*, 25(1), e89–e95.
- Espinosa-Vázquez, O., Martínez-González, A., & Arceo, F. D. B. (2013). Formas de enseñanza y evaluación utilizadas por los docentes de Odontología: resultados y su clasificación psicopedagógica. *Investigación en educación médica*, 2(8), 183–192.
- Gansky, S. A., Ellison, J. A., Kavanagh, C., Hilton, J. F., & Walsh, M. M. (2002). Oral screening and brief spit tobacco cessation counseling: A review and findings. *Journal of Dental Education*, 66(9), 1088–1098.
- Golzarri, A., & Ortiz, R. (2006). La tecnología informática y sus aplicaciones para la enseñanza de la odontología. *Revista odontológica Mexicana*, 10(3), 138–142.
- Gómez, F. (2006). La evaluación de los estudiantes: una discusión abierta. *Revista Iberoamericana de educación*, 39(7), 4.
- González-Moles, M., Aguilar-Ruiz, M., & Ramos-García, P. (2022). Challenges in the early diagnosis of oral cancer, evidence gaps and strategies for improvement: A scoping review of systematic reviews. *Cancers (Basel)*, 14(19), 4967. <https://doi.org/10.3390/cancers14194967>
- Gutiérrez, R., & Posada, S. (2004). Tendencias mundiales en educación médica. *Iatreia*, 17(2), 130–138.
- Hashim, D., Genden, E., Posner, M., Hashibe, M., & Boffetta, P. (2019). Head and neck cancer prevention: From primary prevention to impact of clinicians on reducing burden. *Annals of Oncology*, 30(5), 744–756. <https://doi.org/10.1093/annonc/mdz084>
- Hassona, Y., Scully, C., Abu Tarboush, N., Baqain, Z., Ismail, F., Hawamdeh, S., & Sawair, F. (2017). Oral cancer knowledge and diagnostic ability among dental students. *Journal of Cancer Education*, 32(3), 566–570. <https://doi.org/10.1007/s13187-015-0958-1>
- Holmes, J. D., Dierks, E. J., Homer, L. D., & Potter, B. E. (2003). Is detection of oral and oropharyngeal squamous cancer by a dental health care provider associated with a lower stage at diagnosis? *Journal of Oral and Maxillofacial Surgery*, 61(3), 285–291. <https://doi.org/10.1053/joms.2003.50056>
- Howard, M., & Jiménez, M. M. (2011). El aprendizaje basado en problemas como una estrategia didáctica innovadora en la enseñanza de la patología oral. *Odvotso-International Journal of Dental Sciences*, 13, 6–16.
- Jaber, M. A., Diz, D. P., Vázquez, G. E., Cutando, S. A., & Porter, S. R. (1997). Spanish dental students' knowledge of oral malignancy and premalignancy. *European Journal of Dental Education*, 1(4), 167–171.
- Jafer, M., Crutzen, R., Moafa, I., & van den Borne, B. (2021). What do dentists and dental students think of Oral cancer and its control and prevention strategies? A qualitative study in Jazan dental school. *Journal of Cancer Education*, 36, 134–142.
- Joseph, B. K., Sundaram, D. B., & Ellepola, A. N. (2015). Assessing Oral cancer knowledge among undergraduate dental students in Kuwait University. *Journal of Cancer Education*, 30(3), 415–420. <https://doi.org/10.1007/s13187-014-0734-7>
- Keser, G., & Pekiner, F. N. (2019). Assessing Oral cancer awareness among dental students. *Journal of Cancer Education*, 34(3), 512–518. <https://doi.org/10.1007/s13187-018-1332-x>
- Kogi, S., DaSilva, J., Mikasa, Y., Lee, C., Ishikawa-Nagai, S., Yang, Q., Kihara, H., Abe, R., & Yamada, H. (2019). Knowledge and practice of Oral cancer screening in teaching faculty-comparison of specialty and year of clinical experience. *Journal of Cancer Education*, 34(3), 455–462. <https://doi.org/10.1007/s13187-018-1323-y>
- Laronde, D. M., Williams, P. M., Hislop, T. G., Poh, C., Ng, S., Zhang, L., & Rosin, M. P. (2014). Decision making on detection and triage of oral mucosa lesions in community dental practices: Screening decisions and referral. *Community Dentistry and Oral Epidemiology*, 42(4), 375–384. <https://doi.org/10.1111/cdoe.12093>
- Lattoo, S., Gupta, S., & Dar, M. (2019). Assessment of dental students about the problems faced in studying oral pathology: A cross-sectional study. *Annals of International Medical and Dental Research*, 5(4), DE67–DE71.
- Marshall, R., Cartwright, N., & Mattick, K. (2004). Teaching and learning pathology: A critical review of the English literature. *Medical Education*, 38(3), 302–313. <https://doi.org/10.1111/j.1365-2923.2004.01775.x>
- Méndez, L. A. M. (2021). Evaluación Educativa, una Forma de Comenzar por Concretar la Educación Inclusiva. *Revista Peruana de investigación e innovación Educativa*, 1(2), e20758.
- Mignogna, M. D., & Fedele, S. (2005). Oral cancer screening: 5 minutes to save a life. *Lancet*, 365(9475), 1905–1906. [https://doi.org/10.1016/S0140-6736\(05\)66635-4](https://doi.org/10.1016/S0140-6736(05)66635-4)
- Morales, V., & Díez-Martínez, D. (2020). Revisión de metodologías para diseñar Objetos de Aprendizaje OA: un apoyo para docentes. *Revista Iberoamericana de Tecnología en Educación y Educación en Tecnología*, 26, e4.
- Moro, C., Smith, J., & Stromberga, Z. (2019). Multimodal learning in health sciences and medicine: Merging technologies to enhance student learning and communication. *Biomedical Visualisation*, 5, 71–78.
- Mosen, D. M., Banegas, M. P., Dickerson, J. F., Fellows, J. L., Pihlstrom, D. J., Kershah, H. M., Keast, E. M., & Keast, E. M. (2021). Evaluating the effectiveness of medical-dental integration to close preventive

- and disease management care gaps. *Frontiers in Dental Medicine*, 2, 670012. <https://doi.org/10.3389/fdmed.2021.670012>
- Odell, E. W., Farthing, P. M., High, A., Potts, J., Soames, J., Thakker, N., Toner, M., & Williams, H. K. (2004). British Society for Oral and Maxillofacial Pathology, UK: Minimum curriculum in oral pathology. *European Journal of Dental Education*, 8(4), 177–184. <https://doi.org/10.1111/j.1600-0579.2004.00350.x>
- Ozdemir-Ozenen, D., Tanriover, O., Ozenen, G., Ozdemir-Karatas, M., Ozcakil-Tomruk, C., & Tanalp, J. (2022). Dental education for prevention of Oral cancer in Turkey: Needs for changing the curriculum. *Journal of Cancer Education*, 37(5), 1496–1503. <https://doi.org/10.1007/s13187-021-01989-1>
- Pérez-de-Oliveira, M. E., Heerden, W. V., Motta, A. C. F., Rodrigues-Fernandes, C. I., Romañach, M. J., Agostini, M., Gueiros, L. A. M., Vargas, P. A., Lopes, M. A., Ribeiro, A. C. P., Brandão, T. B., Almeida, O. P., Khurram, S. A., & Santos-Silva, A. R. (2022). The need for communication between clinicians and pathologists in the context of oral and maxillofacial diseases. *Brazilian Oral Research*, 36, e008. <https://doi.org/10.1590/1807-3107bor-2022.vol36.0008>
- Pillay, B., Wootten, A. C., Crowe, H., Corcoran, N., Tran, B., Bowden, P., Crowe, J., & Costello, A. J. (2016). The impact of multidisciplinary team meetings on patient assessment, management and outcomes in oncology settings: A systematic review of the literature. *Cancer Treatment Reviews*, 42, 56–72. <https://doi.org/10.1016/j.ctrv.2015.11.007>
- Poudel, P., Sree, R., & Marla, V. (2020). Oral cancer awareness among undergraduate dental students and dental surgeons: A descriptive cross-sectional study. *JNMA; Journal of the Nepal Medical Association*, 58(222), 102–107. <https://doi.org/10.31729/jnma.4847>
- Rincón, F., & Pájaro, A. (2017). *Aplicación móvil para guía diagnóstica de desórdenes potencialmente malignos y prevención de cáncer oral: Una herramienta educativa didáctica (Licenciatura de odontología)*. Universidad de Cartagena.
- Saawarn, S., Gupta, A., Jain, M., Saawarn, N., Ashok, S., Ashok, K. P., & Pardhe, N. (2016). Assessing difficulties encountered by dental students studying Oral pathology and addressing their concerns. *Journal of Clinical and Diagnostic Research*, 10(11), ZC55–ZC59. <https://doi.org/10.7860/JCDR/2016/19184.8908>
- Saluja, P., Khurana, C., Dave, A., Arora, M., & Kumar, S. (2020). Perception and willingness toward oral pathology and histology as a subject and profession among Indian dental undergraduates. *Dental Research Journal*, 17(6), 472–479.
- Sánchez, S., & Cisterna, C. (2014). La evaluación de los aprendizajes orientada al desarrollo de competencias en Odontología. *Educación Médica Superior*, 28(1), 104–114.
- Seoane, J., Warnakulasuriya, S., Varela-Centelles, P., Esparza, G., & Dios, P. D. (2006). Oral cancer: Experiences and diagnostic abilities elicited by dentists in North-Western Spain. *Oral Diseases*, 12(5), 487–492. <https://doi.org/10.1111/j.1601-0825.2005.01225.x>
- Sepúlveda, G., & Arias, O. (2011). Competencias diagnósticas en oncología en los estudiantes de último año de medicina. *Hacia la Promoción de la Salud*, 16(1), 124–144.
- Sun, H., Yang, J., Kawashima, N., Li, Y., Zhang, W., & Wang, P. (2012). A brief comparison of curricula at dental schools in China and Japan. *Journal of Dental Education*, 76(6), 765–773.
- Tengiz, F., Sezer, H., Başer, A., & Şahin, H. (2022). Can patient-physician interview skills be implemented with peer-simulated patients? *Medical Education Online*, 27(1), 2045670. <https://doi.org/10.1080/10872981.2022.2045670>
- Tobón, S., Guzmán, C., & Tobón, B. (2017). Evaluación del desempeño docente en México: Del proyecto de enseñanza al proyecto formativo. *Atenas Revista Científico Pedagógica*, 1(41), 18–33.
- Torres-Cuevas, I., García, M., Ribelles, L., & Marques, M. (2020). Flipped classroom en prácticas de ciencias de la salud. *Congreso In-Red*, 2020, 184–192.
- Tovar, L., Bohórquez, J., & Puello, P. (2014). Propuesta metodológica para la construcción de objetos virtuales de aprendizaje basados en realidad aumentada. *Formacion Universitaria*, 7(2), 11–20.
- Uti, O. G., & Fashina, A. A. (2006). Oral cancer education in dental schools: Knowledge and experience of Nigerian undergraduate students. *Journal of Dental Education*, 70(6), 676–680.
- Warnakulasuriya, S. (2009). Global epidemiology of oral and oropharyngeal cancer. *Oral Oncology*, 45(4–5), 309–316.
- Webster, J. D., Batstone, M., & Farah, C. S. (2019). Missed opportunities for oral cancer screening in Australia. *Journal of Oral Pathology & Medicine*, 48(7), 595–603. <https://doi.org/10.1111/jop.12915>
- Wetzel, S. L., & Wollenberg, J. (2020). Oral potentially malignant disorders. *Dental Clinics of North America*, 64(1), 25–37. <https://doi.org/10.1016/j.cden.2019.08.004>
- Zahonero, R., & Martín, B. (2012). Formación integral del profesorado: hacia el desarrollo de competencias personales y de valores en los docentes. *Tendencias Pedagógicas*, 20, 51–70.
- Zhai, J., Dai, L., Peng, C., Dong, B., Jia, Y., & Yang, C. (2022). Application of the presentation-assimilation-discussion class in oral pathology teaching. *Journal of Dental Education*, 86(1), 4–11. <https://doi.org/10.1002/jdd.12767>
- Zitzmann, N. U., Matthisson, L., Ohla, H., & Joda, T. (2020). Digital undergraduate education in dentistry: A systematic review. *International Journal of Environmental Research and Public Health*, 17(9), 3269. <https://doi.org/10.3390/ijerph17093269>

## SUPPORTING INFORMATION

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