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Oral Health Training in Osteopathic Medical Schools: Results of a National Survey

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Context: Oral health is a critical aspect of overall health, yet many vulnerable communities struggle to access regular dental care and instead seek urgent treatment from physicians. In addition to addressing the consequences of untreated dental disease, physicians are in an ideal position to provide preventive and referral dental services to patients. Osteopathic physicians make up a substantial portion of the physician workforce and can play a central role in increasing oral health care provision in medical settings.

Objective: To assess the extent of oral health curricula in osteopathic medical schools in the United States, including content taught, evaluation practices, and influences and barriers to providing oral health training perceived by educators at these institutions.

Methods: An invitation to participate in the survey was sent electronically to deans of education at all osteopathic medical schools in the United States. Four email reminders followed the initial invitation. In addition to descriptive statistics, the associations between the number of curriculum hours, affiliation with a dental school, and curricular content were evaluated.

Results: Of the 42 institutions contacted, 22 responded (response rate, 52%). The majority of respondents (20 of 22 [91%]) reported the presence of some oral health education at their institutions. Eighteen of 20 respondents (90%) reported that their institution offered at least 1 hour of oral health curriculum over the course of students' education. Greater numbers of curriculum hours were not significantly associated with dental school affiliation or a formalized relationship with oral health educators. Institutions affiliated with dental schools were significantly more likely to include oral health in interprofessional education exercises (P=.023) but were not significantly more likely to cover any specific oral health topics. Seven of 17 respondents (41%) were satisfied with the level of oral health competence their graduates possessed.

Conclusion: Oral health education is present at many osteopathic medical schools, but the content covered and the extent of training varies considerably.

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Although it is preventable, dental disease remains highly prevalent, with dental caries being the most ubiquitous infectious disease in the world.[1] In the United States, the burden of dental disease is disproportionately distributed among low-income, rural, and minority communities, whose residents are more likely to have untreated decay, periodontal disease, and missing teeth across the age spectrum.[2-5] Poor oral health has been linked to numerous adverse health outcomes,[6-8] as well as psychological distress[9] and perceived difficulty obtaining employment.[10] Children and adults with dental pain miss millions of hours of school and work annually.[11,12]

Known disparities among populations with significant dental disease are driven in part by the separation between the medical and dental fields, which has resulted in separate funding mechanisms, training pathways, and health care infrastructure.[13] Because of this separation, 34% of adults in the United States lack dental insurance.[14] Medicare provides no dental coverage, and Medicaid only mandates dental coverage for children.[14] The financial burden of dental treatment remains the greatest reported barrier to dental access for people in the United States.[15]

As a result of barriers to accessing oral health care, many patients turn to the medical system when dental problems arise. More than 1% of all emergency department visits nationwide are due to dental pain, which cost the health care system almost $1 billion annually.[16] Patients with dental pain may also frequently seek relief in the primary care setting.[17] Even before acute problems occur, patients at greatest risk for dental disease are more likely to see a physician than a dentist, because more than half of the US population does not see a dentist annually.[18] Thus, medical encounters can serve as an opportunity to provide a screening and risk assessment for patients.[19]

Physicians have an opportunity to prevent, diagnose, and manage dental disease while also serving as champions for innovations in oral health care.[20] Osteopathic physicians make up an increasingly large share of the physician workforce[21] and are more likely to pursue residency training in primary care specialties, such as family medicine, internal medicine, and pediatrics.[22,23] As such, preparing osteopathic medical students to manage dental conditions may contribute to improving oral health, especially for those with diminished access to a dentist. Although studies[24,25] have described oral health training programs at specific osteopathic medical schools, the extent of osteopathic medical education regarding oral health topics is unknown. A 2011 study[26] indicated that osteopathic and allopathic medical schools provided a comparably low number of curriculum hours in oral health throughout medical training. In 2012, the annual survey of osteopathic and allopathic medical school graduates reported that 91% of students were either neutral or not well trained to address oral or dental health topics.[27]

The purpose of the current study was to assess the extent of training in oral health topics at osteopathic medical schools in the United States, the format of oral health curricula, evaluation tools for oral health competencies, and the perceived barriers to and influences of oral health training.

Methods

This study is a project of the recently formed Center for Integration of Primary Care and Oral Health, a joint endeavor of the Harvard Schools of Medicine and Dental Medicine and the University of Massachusetts Medical School's Department of Family Medicine and Community Health. The study was approved by the University of Massachusetts Medical School Institutional Review Board and received an exemption waiver. The deans of education at all 42 accredited osteopathic medical schools and additional locations in the United States as of January 2017 were emailed a 19-item survey. Contact information for the deans was obtained from the American Association of Colleges of Osteopathic Medicine. Recipients were asked to forward the survey link to another faculty member if that person could more accurately and completely respond to the survey.

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Data Collection

A 19-item survey was created based on a 2011 survey[26] and additional relevant literature.[28-30] The survey included 13 questions regarding oral health training, the presence of dental professionals in curricular components, awareness and use of educational resources, barriers to the inclusion of oral health in the curriculum, evaluation methods of students regarding oral health competence, attitudes toward the integration of oral health and primary care, and satisfaction with students' competence in oral health. Response options included a yes or no format, items in which respondents could choose all response options that applied, and a 5-point Likert scale in which respondents ranked their level of agreement with statements from 1 (strongly disagree) to 5 (strongly agree). An additional 5 demographic questions regarding the location of respondents' institution, size of the community in which his or her institution is located, the number of osteopathic medical students trained per year at the institution, the length of tenure of the institution, and the position of the respondent were also included. A panel of national oral health experts initially reviewed and edited the survey, which was then piloted with 3 senior osteopathic and allopathic faculty members. The survey was finalized based on their feedback.

Using SurveyMonkey, a cover letter that described the study's objectives, its voluntary nature, and the anonymity of participants was emailed to potential respondents by a senior officer of the American Association of Colleges of Osteopathic Medicine. The survey, estimated to be completed in 15 minutes, was fielded from February 2017 through June 2017. In an effort to improve the response rate,[31] 3 reminders were emailed at 2- to 3-week intervals. As a final, fourth reminder, the primary investigator (L.S.) sent a personal email to anyone who did not respond to encourage their participation.

Statistical Analysis

Using SPSS software version 23 (IBM) for the analyses, univariate statistics (frequencies, percentages, means, and other measures of central tendency) were initially computed to describe all survey items. Based on the categorical or continuous nature of the study variables, relationships were examined using χ^2 and *t* tests, as appropriate, with α=.05 representing statistical significance. Likert scale responses were subsequently dichotomized for bivariate analyses to responses of "strongly agree" and "agree" vs "neutral," "disagree," and "strongly disagree." Of particular interest were analyses identifying factors regarding the inclusion of oral health in the curriculum, including having a faculty oral health champion, characteristics of the residency program, and the number of hours of oral health education. Incomplete surveys were included in the analysis.

Results

Of the 42 institutions invited to participate, 22 responded to the survey, providing a response rate of 52%. However, because of some incomplete surveys, each survey item had a maximum of 20 responses. Characteristics of the respondents' institutions are shown in **Table 1**. The majority of responses were provided by a dean of education (9 of 17 [53%]), followed by education directors (4 of 17 [24%]), associate deans (3 of 17 [18%]), and other faculty (3 of 17 [6%]). Of the 20 respondents who provided the region of their institution, 8 (40%) were in the south, 4 were in the northeast (20%), 4 were in the midwest (20%), and 4 were in the west (20%). Thirteen of 17 respondents (76%) were from institutions in communities with fewer than 500,000 residents, and the majority of institutions (13 of 18 [72%]) had been in operation for more than 15 years.

Eighteen of 20 respondents (90%) reported that their students receive at least 1 hour of didactic, nonclinical oral health education over the course of their training, and 4 of 20 (20%) reported that their students receive 7 or more hours of oral health education (**Figure**). Among respondents who indicated the presence of some oral health teaching in their institution, the most frequently taught subjects included oral cancer (17 of

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Table 1.
Survey of Oral Health Training in Osteopathic Medical Schools: Reported Characteristics of Participating Institutions

Characteristic	No.
Institution Region (n=20)	
Northeast	4
Midwest	4
South	8
West	4
Community Population (n=17)	
<30,000	6
30,001-75,000	1
75,001-150,001	3
150,001-500,000	3
500,001-1 million	2
>1 million	2
No. of DO Students Enrolled Per Year (n=17)	
<100	1
101-150	6
151-200	3
>200	7
Institution Length of Tenure (n=18)	
1-5 y	1
6-10 y	2
11-15 y	2
>15 y	13
Respondent Current Position (n=17)	
Dean	9
Dean of education	4
Dean of students	3
Faculty	1

18 [94%]), followed by adult oral lesions (15 of 17 [88%]) and medical conditions that affect oral health (15 of 17 [88%]) (Table 2). Additional commonly taught topics included salivary physiology (15 of 18 [83%]), urgent oral issues (14 of 18 [78%]), caries/cavity risks and causes (12 of 16 [75%]), and oral conditions that affect overall health (12 of 16 [75%]). The least commonly taught subject matter was fluoride varnish application in a clinical setting (2 of 16 [13%]).

When asked about additional oral health educational experiences available to trainees at their institution and relationships with oral health professionals, 1 of 20 respondents (5%) reported the presence of an oral health elective at their institution (Table 3). Three of 19 respondents (16%) indicated that an oral health interest group was present, and 3 of 19 (16%) indicated that their institution had a relationship with a state or national oral health coalition. Six of 19 respondents (32%) reported the presence of a faculty "oral health champion." Ten of 19 respondents (53%) reported that a dental professional taught their oral health curriculum, 6 of 19 (32%) reported that their institution incorporated teaching from a nondental oral health expert, and 5 of 19 (26%) formally partnered with a dental education program.

Respondents identified several barriers to teaching more oral health topics. The most commonly cited barrier was lack of time in the curriculum (14 of 19 [74%]) followed by the presence of competing priorities (9 of 19 [47%]) and lack of faculty expertise in oral health (8 of 19 [42%]). Lack of faculty interest (6 of 19 [32%]), lack of national oral health competencies for osteopathic medical schools (5 of 19 [26%]), and lack of oral health accreditation standards for osteopathic medical schools (4 of 19 [21%]) were less commonly identified as barriers. One of 20 respondents (5%) reported that there were no institutional barriers.

Seven of 18 respondents (39%) were aware of the national oral health curriculum, "Smiles for Life,"[32] and, of those 7 respondents, 1 (14%) reported that the institution was using at least 1 of the 8 modules or online resources. When asked what resources were being used in addition to or instead of "Smiles for Life," 6 of 18 (33%) indicated *American Family Physician* oral health articles, 3 of 18 (17%) indicated American Academy of Pediatrics PACT[33] curriculum, and 3 of 18 (17%) indicated "Oral Health During Pregnancy: A National Consensus Statement."[34]

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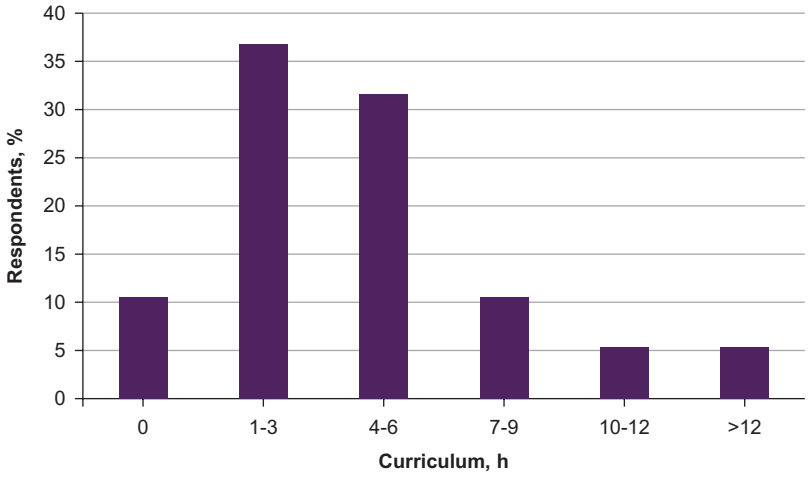

Figure.
The reported number of oral health curriculum hours taught in osteopathic medical schools (n=20).

When asked to rank their level of agreement with several statements, the majority of respondents (11 of 18 [61%]) agreed or strongly agreed that it is important for osteopathic physicians to address their patients' basic oral health care needs. Seven of 18 respondents (39%) agreed or strongly agreed that there was support at their institution for integrating oral health into training, and 9 of 18 (50%) agreed or strongly agreed that students were prepared for oral health questions on the osteopathic medical board examinations. Seven of 17 respondents (41%) agreed or strongly agreed that they were satisfied with the current level of competence of their students in oral health.

Respondents from institutions with higher numbers of curriculum hours were not significantly more likely to indicate graduate readiness, competence, or presence of school support for oral health training. There was also no statistically significant relationship found between affiliation of an institution with a dental school, the presence of an oral health elective or student group, or the presence of an oral health champion and the number of curricular hours spent on oral health. Institutions affiliated with dental schools were significantly more likely to include oral health in interprofessional education (IPE) exercises (P=023), but were not significantly more likely to cover any specific oral health topics.

Discussion

Results of the survey showed that the majority of osteopathic medical schools are providing some oral health training to their students. Although responses indicate that two-thirds of the schools offer fewer than 6 hours of curricular training, some respondents indicated a substantially higher number of curriculum hours, and 1 respondent indicated that more than 15 hours of training are devoted to oral health content at his or her institution. No significant differences were found in perceived oral health readiness or knowledge between schools with varying numbers of curricular hours. This finding could be due to differing levels of confidence or awareness of barriers to oral health among these institutions, but it is also possible that the format or content provided, rather than the hours dedicated to oral health, may have affected respondents' perception of graduate outcomes. It may be that a respondent who had been away from full-time clinical practice of medicine was not fully aware of the current oral health issues a physician may be exposed to.

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Table 2.
Survey of Oral Health Training at Osteopathic Medical Schools: Oral Health Topics Included at Participating Institutions

	No.	
Oral Health Topic Covered in Curriculum	**Yes**	**No**
Risk Assessment		
Caries/cavity risks and causes	12	4
Oral conditions that affect overall health (eg, periodontitis)	12	4
Medical conditions that affect oral health (eg, diabetes)	15	2
Impact of medications on oral health	13	5
Urgent/emergent oral issues (eg, infections, trauma)	14	4
Oral cancer	17	1
Assessment of the impact of oral health on a patient's quality of life	8	9
Oral Health Evaluation		
Pediatric oral screening examination (including teeth)	10	7
Adult/adolescent oral screening examination (including teeth)	10	7
Prevention Intervention		
Fluoride risks, benefits, and promotion	10	6
Fluoride varnish indications and application	4	12
Applying fluoride varnish in a clinical setting	2	14
Communication and Education		
Oral disease prevention/anticipatory guidance (including brushing and flossing)	8	7
Interprofessional Collaborative Practice		
Interprofessional education with oral health component	7	10
Other Topics		
Oral anatomy	18	0
Saliva physiology (benefits, function)	15	3
Pregnancy oral health issues	9	8
Adult oral lesions (eg, lichen planus, mouth ulcers)	1	2
Geriatric oral health issues	13	5
Disparities in oral health/social determinants of health	5	10
Clinical practicum in a dental setting (half day or more)	4	12

The oral health topics most commonly included in medical school curricula were those that overlap with conventional medical education, such as medical conditions that affect the oral cavity, oral dermatologic lesions, and oral anatomy. Although these topics are important, they may be less useful to physicians than topics such as fluoride varnish application, dental emergencies, and oral screening examinations, as these needs commonly arise outside of a dental office setting.[35-37] Furthermore, applying fluoride varnish in the medical setting for children younger than 6 years is a level B recommendation from the US Preventive

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Table 3.
Survey of Oral Health Training at Osteopathic Medical Schools: Information Regarding Oral Health Programs and Partnerships Included at Participating Institutions (n=19)

Does your osteopathic medicine program have ...	Yes, No.
…an oral health elective option?	1
…an oral health student interest group or community oral health projects?	3
…a faculty "oral health champion"?	6
…a relationship with a state or national oral health project or coalition?	3
…routine teaching from a dental professional (eg, dentist, dental hygienist)?	10
…routine teaching from a nondental oral health expert (eg, family physician or pharmacist with extensive oral health knowledge and skills)?	6
…a formal relationship with a dental school, dental residency, or dental hygiene program (ie, faculty with appointments in a dental school, dental residency, or dental hygiene program)?	5

Services Taskforce and is reimbursed in all 50 states for medical providers.[38] Research[39] has indicated that osteopathic medical students may not feel comfortable with their level of knowledge about oral cancer. Although 93% of respondents in the current study indicated that oral cancer was a topic covered in the curriculum at their institution, only 50% of respondents indicated that their students are taught how to conduct an examination of the adult oral cavity. This finding is concerning because Medicare beneficiaries with metastatic head and neck cancer often see multiple physicians before a diagnosis is made.[40]

In addition to covering a diverse array of topics, curricular formats regarding oral health can vary considerably. Training can be computer-based, such as the "Smiles for Life" electronic curriculum,[41] lecture-based, or hands-on clinical training, such as fluoride varnish application and tooth extraction.[24,42] Increasing awareness of oral health curricular resources may increase the potential for online learning to supplement oral health training for osteopathic medical students. Osteopathic medical schools with more robust oral health curricula should consider sharing best practices at academic meetings and through peer-reviewed publications to improve dissemination and uptake of oral health training.

With less than 50% of respondents reporting that they were satisfied with the current level of oral health competence of their students, new strategies are needed to raise their satisfaction level. A potential inroad for oral health training is IPE, which is a mandated standard for accreditation among schools of osteopathic medicine and dentistry.[43,44] The 3 respondents in the current study with affiliated dental schools indicated that the IPE experience at their institution had an oral health component, as did 2 additional institutions. It has been suggested that, even if dental trainees are not involved in IPE experiences, oral health may serve as a meaningful topic for IPE because many students in health profession programs may have similar levels of unfamiliarity with the topic.[45] Institutions without local dental schools could also consider collaborating with dental residency, dental hygiene, or dental-assisting training programs for similar benefits.

Respondents indicated that available time in the curriculum was the most common barrier to increasing oral health training. Similarly, the presence of competing priorities was also often identified as a barrier. Integrating oral health content into preexisting materials, such as through IPE cases, standardized patient encounters, or problem-based learning cases, may ease the perceived time burden on faculty and students and present oral health in a more comprehensive and realistic context for future physicians. Free online curricula, such as "Smiles for Life," may also play a role in reducing challenges in accessing oral health training.

This study had several limitations. Although the response rate included approximately half of all osteopathic medical schools, there is a relatively small number of osteopathic medical schools nationwide, so

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the results may not be widely generalizable. Because of the anonymity of respondents, we were not able to assess possible nonresponse bias. Information bias is also possible, as persons who chose to respond to the survey may have been more passionate about oral health compared with persons who were not included. Deans of education that were asked to respond to the survey may not have been fully aware of all curricular efforts at their institution. Additionally, respondent attitudes regarding readiness of students may not match students' own evaluations of their readiness to answer board questions on oral health or to provide oral health care while in practice. An additional consideration is that certain specialties (eg, family medicine, internal medicine, pediatrics, emergency medicine) may require greater oral health competency than others. As such, the importance of continued training during residency will play an important role in addressing oral health disparities.

Future studies should move beyond self-report surveys and assess student and resident clinical outcomes regarding oral health care. Studies should also be directed at patient and health systems outcomes as they relate to oral health, including rates of urgent dental visits in emergency department and primary care settings, rates of hospitalization for dental abscesses, and rates of opioid prescriptions for dental pain.

Conclusion

The institutions of most respondents offered some oral health content during medical training. The number of curriculum hours and the content covered varied considerably among institutions. Given the high rate of untreated dental disease in underserved groups, ensuring oral health competence in medical school graduates can play an important role in addressing oral health disparities. Osteopathic medical schools can play an especially important role, as osteopathic physicians are more likely to serve in the primary care workforce.[22] Osteopathic medical schools should consider leveraging extant curricula and IPE opportunities to ensure that future physicians are prepared to address their patients' oral health needs.

Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; all authors drafted the article or revised it critically for important intellectual content, gave final approval of the version of the article to be published and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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