Esthetic Dentistry in North American Dental Schools

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Abstract

Objectives: *To assess the frequency and extent of the teaching of esthetic dentistry in North American dental schools and to report how it differs among the various schools.*

Materials and Methods: *A 19-question survey was distributed to 64 North American dental schools in August 2001. The questions inquired about the priority given to the teaching of esthetic dentistry; how the subject was taught (through regular curricular courses, through a multidisciplinary approach or through elective classes); the duration of the esthetic dentistry course; the nature of the course content (theoretical or practical); the esthetic procedures taught to undergraduate students; the level of interaction among different disciplines in the teaching of esthetic dentistry; and the techniques and commercial materials used. Ethical issues related to the teaching of esthetic dentistry were also addressed. The responses were calculated as percentages based on the number of schools that responded to each question.*

Results: *Fifty-two (81%) of the 64 North American dental schools responded to the survey. Twenty-five of these schools (48%; designated group A) had an esthetic dentistry course. Twenty-seven of the schools (52%; designated group B) reported that esthetic dentistry was addressed in multiple courses, i.e., no specific course was available. Four schools in group B (15%) were in the process of developing courses. In the majority of the dental schools that did have a specific course, the esthetic dentistry course was given through the operative dentistry division or department.*

Conclusions: *The teaching of esthetic dentistry in North American dental schools is highly variable and is often shared among different disciplines.*

MeSH Key Words: *curriculum; education, dental; esthetics, dental; schools, dental*

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Esthetic dentistry is among the most dynamic areas of contemporary clinical dentistry. Widespread interest in esthetic dentistry among members of the profession, the dental industry and the public has had a marked effect on general dental practice. Patients' increased awareness of esthetic outcomes and their desire to look better and to feel better about themselves have led to enormous demands on dentists to perform esthetic procedures. Dentists' ability to fulfill patients' expectations is directly related to their knowledge and clinical skills in this area.

Over the past decade, knowledge about esthetic dentistry has expanded rapidly through basic and clinical research, which has led to the development of a multitude of new restorative materials and clinical techniques. Several factors have played a role in this rapid evolution.

Tooth-coloured resin-based materials have gradually enhanced the quality of esthetic restorations. The first generations of these materials left much to be desired, but present-day materials, when properly used, allow esthetically pleasing restorations of anterior and posterior teeth. They may also be used to modify the anatomy of teeth, adjust misalignment and close diastemas while preserving healthy tooth structure, with minimal tooth preparation.

Although dental schools are responding as quickly as possible to the demand for training in esthetic services, changing the curriculum to cover these new materials and

clinical techniques is a slow process that often cannot keep up with the developments in this domain. As a result, it has been increasingly difficult for dental schools to provide state-of-the-art knowledge in esthetic dentistry for their graduating students. To become competent in this area, many dentists rely on continuing education courses, but these courses sometimes provide incomplete and conflicting information. A previous study showed that the teaching of principles of esthetic dentistry in dental schools is variable.[1]

Teaching programs in dental schools have a strong effect on the practice of dentistry, not only for recent graduates, but also for established clinicians, especially when new techniques and concepts are introduced. However, what is being taught in dental schools and what is being practised may differ considerably. The teaching of Class II resin-based composites, for example, lagged behind the use of these restorations in general dental practice in many parts of the world, and marked deviations between teaching programs were reported.[2–4] Similar discrepancies between what is being taught and what is being practised are found in other areas of dentistry.[5–8] Such discrepancies between teaching and practice should lead to discussions of what constitutes evidence-based dentistry and what changes are called for, both in the curriculum and in practice. These discussions will have a valuable educational component for both teachers and practitioners.

The purpose of the present study was to assess the frequency and extent of the teaching of esthetic dentistry in North American dental schools and to report how it differs among the various schools.

Materials and Methods

A survey composed of 19 questions was mailed to 64 North American dental schools in August 2001; a covering letter addressed to a specific faculty member in the operative or restorative department was included with each survey. Recipients were given 6 weeks to complete the 2-page survey. In September 2001, a reminder letter, along with a copy of the questionnaire, was sent to the schools that had not responded. No further responses were received after November 2001.

The questions on the survey were of several types: yes or no, alternative or multiple-choice, or written answer. The respondents were encouraged to illustrate and describe, on the back of the questionnaire, any special procedure or technique employed.

The questions inquired about the priority given to the teaching of esthetic dentistry in the dental school; how the subject was taught (through regular curricular courses, through a multidisciplinary approach or through elective classes); the duration of the esthetic dentistry course; the nature of the course content (theoretical or practical); the esthetic procedures taught to undergraduate students; the level of interaction among different disciplines in the teaching of esthetic dentistry; and the techniques and commercial materials used. Ethical issues related to the teaching of esthetic dentistry were also covered. The responses were summarized as percentages based on the number of schools that responded to each question.

Results

Fifty-two (81%) of the 64 dental schools completed and returned the questionnaire.

Twenty-five schools (48%; hereafter designated group A) reported having a course exclusively for the teaching of esthetic dentistry. Among these schools, the esthetic dentistry course had been in place for an average of 3 years.

Twenty-seven schools (52%; hereafter designated group B) reported that esthetic dentistry was addressed in multiple courses, i.e., no specific course was available in the curriculum. Four schools in group B (15%) were in the process of developing a separate course for the teaching of esthetic dentistry.

Teaching Methods

Among the 25 schools in group A, 16 (64%) offered the course through the operative dentistry department or division. The prosthodontics department was responsible for the esthetic dentistry course in 8 of the schools (32%). The restorative department offered the course in 1 school.

The most frequent course duration was 4 to 6 months, but there was marked variation (**Fig. 1**). Thirteen (52%) of the group A schools had didactic and practical teaching at both the preclinical and the clinical levels. The other schools reported various combinations of teaching types, e.g., limited to clinical instruction.

On average, 4 faculty members were involved in teaching the esthetic dentistry course in group A schools. Several concerns were addressed in these courses: extrinsic and intrinsic discoloration, bleaching, diastemas, malformation and malpositioning of teeth (the latter including rotation, intrusion and labio-linguoversion), and replacement of amalgam and gold restorations. A number of clinical procedures were included in the didactic and clinical parts of these esthetic dentistry courses (**Fig. 2**), but 7 (28%) of the group A schools did not teach nonvital bleaching and all-ceramic crowns in the esthetic dentistry course.

Twenty-three (92%) of the group A schools reported that esthetic assessments were included in the diagnosis and treatment-planning phases. Tooth colour and tooth width-to-length proportion were assessed in 24 (96%) of the schools; surface texture and tooth characterization according to age and sex were addressed in 22 (88%) of the schools; facial symmetry, "golden proportion" and facial contour were covered in 21 (84%) of the schools; and evaluation of incisal and posterior occlusal planes were included in the curriculum at 18 (72%) of the schools.

Figure 1: *Duration of courses in esthetic dentistry in the 25 North American dental schools that had a special teaching program (group A).*

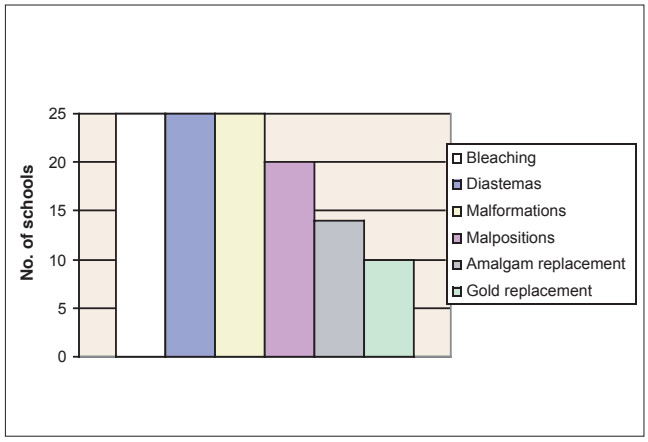

Figure 2: *Esthetic treatments taught in the esthetic dentistry courses at 25 North American dental schools with dedicated courses in this area (group A).*

Only 7 (28%) of the group A schools reported having the support of an in-house laboratory.

The esthetic procedures taught were similar in group A and group B schools. However, the use of direct posterior composite restorations, all-ceramic crowns and nonvital bleaching was more common among group B schools. Ceramic inlays, onlays and indirect posterior composite restorations were not taught by 7 (26%) of the group B schools and 4 (16%) of the group A schools.

Materials Used

The schools reported using a variety of materials for the establishment of esthetic features. The most commonly used materials are listed in **Table 1**.

Ethical Issues

The results for ethical questions related to the promotion of esthetic dentistry and the replacement of otherwise healthy restorations for esthetic reasons are outlined in

Table 1 **Commercial products used most frequently[a] in dedicated esthetic dentistry courses in North American dental schools (*n* = 25)**

Esthetic procedure and commercial product	No. (and %) of schools
Anterior composite	
Esthet-X[b]	10 (40)
Vitalescence[c]	9 (36)
Posterior composite	
Esthet-X[b]	10 (40)
Filtek Z-250[d]	10 (40)
Bonding agent	
Prime&Bond NT[b]	9 (36)
Single Bond[d]	8 (32)
Bleaching	
Opalescence[c]	23 (92)
Ceramic material	
Empress[e]	11 (44)

[a]*Any brand that was used by 5 schools or fewer (≤ 20%) is not included in this table.*
[b]*Denstply/Caulk, Milford, Del.*
[c]*Ultradent Products, Inc., South Jordan, Utah.*
[d]*3M/ESPE Dental Products, St. Paul, Minn.*
[e]*Ivoclar/Vivadent, Inc., Amherst, N.Y.*

Table 2. Four schools (3 from group A and 1 from group B) did not answer these questions.

Discussion

The response rate of 81% is similar to[2,5,8–11] or better than[10,11] that achieved in other surveys of teaching programs in dental schools.

The results of this survey indicate that most dental schools are teaching some esthetic dental procedures. However, certain procedures, such as placement of all-ceramic crowns and indirect tooth-coloured posterior restorations, were not taught by about a third of the schools.

The cost of indirect restorations is known to be higher than that of directly placed restorations,[2] which might explain why a number of direct procedures, such as bleaching and direct resin-based restorations, were more commonly taught than indirect procedures. Apart from the cost of making indirect restorations, another challenge is to coordinate the manufacturing procedures with outside laboratories. Only 28% of the group A schools had the support of an in-house laboratory. In addition, the student–faculty ratio for these highly technical procedures, the patient population available to dental schools and the time available in student clinics may affect the type of treatments selected for teaching.

Another possible explanation for not emphasizing the teaching of certain esthetic procedures may be the difficulties in keeping the dental school curriculum up to date

Table 2 **Opinions about ethical issues among teachers of esthetic dentistry in North American dental schools (n = 48)[a]**

Question	Group A (n = 22)			Group B (n = 26)		
	Yes	No	Undecided	Yes	No	Undecided
The dentist suggests esthetic dentistry to a patient without the patient initiating a conversation about the appearance of his or her teeth (i.e., the patient does not think there is anything wrong with his or her teeth). Is this "ethical" professional behaviour?	17	5	0	20	4	2
The dentist agrees to a patient's demands for porcelain veneers or full porcelain crowns for correction of minor discrepancies when more conservative measures would provide acceptable results. Is the dentist practising ethically?	12	9	1	6	16	4
The dentist agrees to a patient's demands for replacement of clinically acceptable amalgam restorations by composite resin restorations. Is the dentist practising ethically?	15	7	0	13	8	5

[a]*Group A schools had an established course for esthetic dentistry, group B schools presented information on this subject in the context of courses on other subjects (i.e., no specific course available). Four schools (3 from group A and 1 from group B) did not answer the ethical questions.*

when the technology is evolving quickly and appropriate long-term clinical research may be lacking or deficient. It should be kept in mind that an evidence base can be established only if the foundations of basic and applied science and confirmed clinical experience have been laid. Close relationships among dental school faculty, alumni and local clinicians could facilitate the transfer of real-life practice to teaching. New designs for research projects, incorporating practice-based research, could also generate the evidence base that may be lacking. For instance, it took a long time for North American dental schools to implement the teaching of posterior resin-based composite restorations; in fact, teaching of this procedure was deficient long after the method had been in common use in general dental practice.[2] This lack of teaching may at least partly explain the limited age recorded for these types of restorations in the 1980s and 1990s.[12] These results are not exclusive to North American dental schools, and similar results have been obtained in European,[3] Japanese[4] and Brazilian[13] dental schools.

Few of the schools surveyed here addressed esthetic concerns in multidisciplinary courses; however, not all students were exposed to similar procedures, as some students may not be assigned to patients who require esthetic treatments. A team-building approach, whereby students present their cases and share their experiences in a group, may to some extent remedy this situation. The use of seminars on contemporary topics given by full-time faculty with the support of local clinicians and part-time faculty would also enhance students' learning experience and reduce the lag time that was apparent in the current survey; for example, almost half of the responding schools did not teach theoretical concepts related to esthetic dentistry.

Public Demands

A demand for esthetic dentistry has been created by the media and by advertising, with the goal of obtaining white and perfectly aligned, symmetric teeth. Unfortunately, such efforts often result in overtreatment, if traditional measures for dental health care are applied.[14–16]

Implications

The potential for overtreatment with certain esthetic procedures was reflected to some extent in the results for the ethical questions in the current study. Fifty-four percent (12/22) of the respondents in group A reported that a dentist who agreed to a patient's demand for porcelain veneers or full-porcelain crowns for correction of minor tooth discrepancies, even when more conservative measures could provide acceptable results, would be acting ethically. On the other hand, 62% (16/26) of the respondents in group B reported that they would view this behaviour as unethical. Therefore, multidisciplinary teaching, which involves more specialties, reflected a more conservative approach to this issue.

Over half of the respondents indicated that a dentist who agreed to a patient's demand for replacement of clinically acceptable amalgam restorations with composite resin restorations would be acting ethically (**Table 2**). However, in vitro and clinical studies have shown a significant increase in cavity size when composite and amalgam restorations are replaced.[17–22] This loss of tooth tissue may be detrimental to the dentition in the long run.

The results of this study indicated that among schools with a multidisciplinary teaching effort, a smaller proportion taught indirect posterior restorations (i.e., ceramic and indirect posterior composite, inlays and onlays) than was the case for dental schools with a separate course for esthetic dentistry. Conversely, nonvital bleaching and all-ceramic crowns were taught less frequently in schools with a separate course, possibly because of overlap in teaching with the endodontic and prosthodontic departments. Nonetheless, almost one third of the schools in groups A and B did not teach certain esthetic procedures that are generally used by private practitioners, including some that are taught in continuing education courses, e.g., all-ceramic crowns and indirect tooth-coloured posterior restorations.

Conclusions

This questionnaire-based study revealed that 25 (48%) of 52 North American dental schools had a specially designed esthetic dentistry course. Twenty-seven schools (52%) reported that esthetic dentistry was addressed in multiple courses, i.e., no specific course was available.

Dental schools must work together to establish the parameters for teaching this subject and formulate the necessary standards for education and research in this new and rapidly growing field. ◆

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