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A 10-Year Survey of US Deans: Trends, Challenges, and Mentoring in Prosthodontics. Part 2

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Abstract

Purpose: Part 2 of this survey reports on the 2009 survey findings distributed to the deans of US dental schools. A national, electronic survey of 58 dental school deans was distributed by e-mail to evaluate an interest in specialty training, an interest in specialty training in prosthodontics, faculty shortage issues, predoctoral curriculum in prosthodontics, ideology regarding dental specialties, and the administrative position of prosthodontics within the schools.
Materials and Methods: The survey data were transferred to an online spreadsheet program for statistical analysis (Key Survey, Inc. www.keysurvey.com, Braintree, MA). The opinions of dental school deans were viewed as legitimate indicators of change within predoctoral and postdoctoral prosthodontic education. Statistical analysis was carried out using Statistica Version 9.1 (Statsoft, Tulsa, OK).
Results: Of the 58 deans, 42 deans responded, for a 72.4% response rate. Twenty-three deans reported an increase in the number of students seeking specialty training after dental school. Only three deans reported a decrease in those seeking specialty training. In the 2009 survey, 45% the deans responded that there was an increased interest in prosthodontics. One or more open faculty positions in prosthodontics existed at 24 (59%) of the dental schools, and 30 (71%) offered at least one incentive or a variety of incentives to recruit faculty. The 2009 respondents to the deans' survey revealed predoctoral student exposure to prosthodontists was high, and exposure to advanced education in prosthodontics students was low. A survey of internal school programs that might have an impact on an increased interest in prosthodontics revealed the presence of a predoctoral mentoring program for prosthodontics in 36 (88%) of the institutions. The clinical curriculum included treatment of a variety of cases including complex cases as defined by a diagnostic classification system. The 2009 survey respondents reported an increase in the number of schools where prosthodontics is a separate entity or department.
Conclusion: Deans reported an increased interest in prosthodontics in the 2009 survey. Open faculty positions in prosthodontics existed in the majority of dental schools, and most schools offered incentives to recruit faculty. The survey of deans found a very high level of exposure of dental students to full-time prosthodontists and a very low exposure level to students enrolled in advanced education in prosthodontics. The establishment of mentoring programs in prosthodontics was reported by most deans, and the predoctoral curriculum included treating complex cases. Most deans stated that dual-specialty training in prosthodontics and periodontics would be beneficial. The 2009 survey reported an increase in the number of departments of prosthodontics in US schools.

In 2002, the American Dental Association (ADA) reported a 35.9% decrease in the number of applicants to prosthodontics programs and a 21.4% decrease in first-year enrollment between 1991/92 and 2000/01.[1] Although the ADA reported the following year that the number of applications to prosthodontics programs rose from 905 in 2000/01 to 1069 in 2001/02,[2] many authors were concerned about the decrease in enrollment and applications. In 2001, Felton et al[3] reported that from 1991 to 1999 there was a 40.2% decline in applications and a 31.7% decline in enrollment. Only periodontics faced a similar decline. This was in contrast to the other specialties of endodontics, oral and maxillofacial surgery, orthodontics, dentofacial orthopedics, and pediatric dentistry, which had a 12.2% increase in applications and a 3.5% increase in enrollment. From 1994 to 2002, there were more international graduates enrolled in prosthodontic programs than US graduates.[1,4] Prior to 1987, some training programs in prosthodontics were either fixed or removable prosthodontics. This period of decline of enrollment in and applications to prosthodontics began just 5 years after the specialty and the ADA changed the educational standards in prosthodontics to include didactic and clinical training in both fixed and removable prosthodontics. In *Dental Education at the Crossroads: Challenges and Change, Institute of Medicine*, Field[5] projected that the percentage of specialists in dentistry would increase from 15% to 25% in this second decade of the 21st century.

Despite a decade of declining applicants, disappointing enrollment numbers for US graduates, and widespread concern within the specialty, Douglass and Watson[6] predicted a large need for prosthodontic treatment that will exceed the supply and a manpower shortage extending to at least 2020. The US Department of Labor, Bureau of Labor Statistics, recently found higher earnings for prosthodontists than all other specialties of dentistry, aside from oral and maxillofacial surgery.[7] Nash and Pfeifer[8] reported that the internal rate of return for the expenses associated with prosthodontic training was a positive finding, indicating that prosthodontic training is a sound investment, and that there will be a continuing demand for prosthodontic specialty training. In another report, Nash and Pfeifer disclosed that the average net earnings for a prosthodontist were 35% higher than general practitioners and that the average net earnings are competitive with other specialties.[9] *Forbes* magazine ranked prosthodontists with the sixth highest income level among professionals, just two places lower than oral and maxillofacial surgery.[10]

Wright et al[11] reported that advanced education programs in prosthodontics have witnessed at least a 23% increase in the applicant pool since 2000, and the enrollment is now comprised of 64% US-trained graduates. Part 1 presented evidence from program directors that factors, such as mentoring, society's demand for a higher level of training and credentialing, data depicting current and projected income for prosthodontists, number of prosthodontic faculty at the predoctoral level, the dollar value of prosthodontic training, demand for prosthodontic services, and advances in implant, esthetic, and reconstructive dentistry, have had an impact on an increased applicant pool. In Part 2, Wright et al[12] reported that dental school deans observed an increased interest in specialty training in prosthodontics, high exposure to full-time prosthodontists in the clinic, and 80% of the deans reported establishing mentoring programs for students interested in prosthodontics.

Recruitment and mentoring of the best and brightest students have been the focus of many prosthodontics organizations including the Greater New York Academy of Prosthodontics, which began a program in 2000. The American College of Prosthodontists (ACP) held discussions of mentoring at each of the educators'/mentors' seminars beginning in 1999, and the 2001 seminar was described by Wright in the *ACP Messenger*.[13] Friedman et al[14] described mentoring as a strategy to address recruitment. Mentoring is defined as a voluntary or reciprocal interpersonal relationship in which an individual with acknowledged expertise shares his or her experience. Mentoring relationships are usually long term, and there are benefits not only to the mentee but personal satisfaction and stimulation for the mentor.

Esthetic dentistry, improvements in materials, implant prosthodontics, and the associated science and technology have all had a positive impact on the specialty of prosthodontics. In addition, in this contemporary era of total body fitness, patients' expectations and self-interest are driving higher standards in prosthodontics.[15]

In a report by Haden et al, the shortage of prosthodontic faculty ranked fourth out of all specialties of dentistry.[16] Faculty shortages have been scrutinized since 1999 when the American Association of Dental Schools (now the American Dental Education Association) published a report on the findings from the president's task force on the future of dental school faculty showing a high number of vacated positions, 75% of which were in the clinical sciences.[17]

In 2009, the *ADA News* reported that dental school applicants and enrollment were at their highest level since 1978. This trend in enrollment and applications is occurring while five new dental schools are being planned in Arizona, Arkansas, Maine, Nevada, and Texas. East Carolina University (Greenville, NC) and Western University (Pomona, CA) recently opened new dental schools.[18]

Materials and methods

In 2009, a national e-mail survey was distributed electronically to all US dental school deans. The same survey used in 2005 was used in this 2009 survey with the exception of the question on dual-specialty training. This one question was revised on the 2009 survey to see if deans saw a benefit to dual-specialty training in prosthodontics and periodontics. Current lists of deans were obtained from published ADA material. An Internet company (Key Survey, Inc. www.keysurvey.com, Braintree, MA) was employed to conduct the distribution and processing of completed questionnaires, validating and processing follow-up e-mails to nonrespondents, and storage of survey information in an electronic format. A cover letter (RW and DM), which communicated the purpose of the survey and included a statement of confidentiality to safeguard data and identify respondents, accompanied all electronic mailings. Approval was obtained from the Office of Research Subject Protection at Harvard Medical School, and a contact listing allowed the respondent the opportunity to validate the legitimacy of the survey. The data were

transferred to an online spreadsheet program for statistical analysis (Key Survey, Inc.).

As noted in Part 1, the first survey questionnaire was sent to program directors in 2009. The Part 2 2009 survey questionnaire was sent to 58 dental school deans and covered several topics, including:

(1) Interest in specialty training and in prosthodontics among dental students.
(2) The need for prosthodontic faculty and incentives used to recruit applicants for faculty positions.
(3) Dental student exposure to various types of prosthodontists and the types of prosthodontic cases treated at the predoctoral level.
(4) Internal programs, new technology, mentoring programs, and strategies being implemented to enhance predoctoral prosthodontic education and an interest in prosthodontics.
(5) Ideology regarding dual specialty training in prosthodontics and periodontics and autonomy of the prosthodontics department.

The ACP has developed a prosthodontic diagnostic index (PDI) for dentate prosthodontic cases.[19] Deans were asked to report the types of dentate prosthodontic cases in accordance with the ACP classification system. The category of complex implant cases was added to assess the exposure of predoctoral students to complex implant prosthodontics. The following is a list of the types of cases listed in the survey.

(1) Simple cases with minimally compromised dentition (Class 1).
(2) Complex cases with minor changes in occlusion (Class 2).
(3) Complex cases involving adjunctive therapy (endodontics, periodontics, oral surgery) without changes in occlusal vertical dimension (OVD) (Class 3).
(4) Complex cases involving adjunctive therapy (endodontics, periodontics, oral surgery) with changes in OVD (Class 4).
(5) Complex implant therapy cases.

The surveys were designed to represent an overall view of the current state of prosthodontic education in the United States over the last 10-year period. The opinions of deans and program directors were viewed as legitimate indicators of change within predoctoral and postdoctoral prosthodontic education. Statistical analysis was carried out using Statistica Version 9.1 (Statsoft, Tulsa, OK).

The survey was sent to 58 US dental school deans. Faulty e-mail addresses can occur when new faculty members are appointed, e-mail systems are changed, or alternative e-mails are used. The software was configured to allow respondents to change entries after completion of the survey but to allow one response per respondent e-mail address. Each potential survey respondent was given a unique link to the survey software to monitor progress of the questionnaire and to remove completed surveys from the reminder e-mail list.

Results

Respondents to the dean's survey included 42 dental school deans, for a 72.4% response rate. The sample represented dental schools in 32 states and Puerto Rico.

Table 1 Recruitment incentives offered by deans to address faculty shortages

Type of faculty incentives	Number of responses
Relocation	16
Tuition rebates	8
Low-interest home loans	1
Suitable university faculty housing	1
None offered	12
Other incentives offered	19

A statistically significant increase ($p \leq 0.05$) in student interest in specialty training was reported by 22 deans (53.7%). Deans from 16 schools reported no change (39.0%), and only three deans (7.3%) reported a decrease in the interest in specialty training (Fig 1).

Nineteen (45.2%) deans reported a strong or slight increase in predoctoral students' interest in prosthodontics. No change in the level of interest in prosthodontics was reported by 17 deans (40.5%). Only six deans (14.3%) reported a decrease in the interest in prosthodontics among predoctoral students (Fig 2).

Deans were also asked to report on the current status of prosthodontics faculty and the methods by which new faculty were being recruited. At least one open full-time faculty position was reported by 24 deans (59%) with 11.9% (n = 5) reporting three or more open faculty positions (Fig 3). Only 12 deans (28.6%) reported offering no incentives to recruit new prosthodontic faculty. The remainder of the deans (n = 30) reported using multiple incentives to recruit faculty (Table 1).

Deans were asked to rate their students' exposure to prosthodontic educators using a sliding scale, 1 through 7 (7 = *highest exposure*, 4 = *average exposure*, 1 = *lowest exposure*). The respondents reported a below-average exposure rate (scale 3) or no exposure (scale 1) to prosthodontic residents (53.7%, n = 22), researchers (57.5%, n = 23), and private practice prosthodontists/part-time faculty (35.9%, n = 14). Exposure rates to full-time prosthodontics faculty remained high, with 95.2% of the respondents reporting an exposure level of 4 or greater, despite the number of open faculty positions (Fig 4).

Deans at 33 dental schools reported treatment for cases without changes in OVD (78.6%). Complex implant therapy cases and cases with changes in OVD were treated by dental students at 25 (59.5%) and 9 (21.4%) of the institutions, respectively. The results reveal that dental students are exposed to complex prosthodontic cases with high frequency (Fig 5).

Deans reported a very high incidence of new programs, which would have a tendency to increase understanding and exposure to prosthodontics. Mentoring programs (88%), active faculty recruitment (73.2%), and new science and technology (82.5%) were the top three new programs being implemented to increase exposure to prosthodontics. In addition, deans reported new prosthodontics laboratory construction (17.5%) and hiring of laboratory technicians to work with dental students (45.2%) as additional internal programs (Fig 6).

The survey question to deans regarding dual-specialty training in prosthodontics/periodontics was revised from the 2005

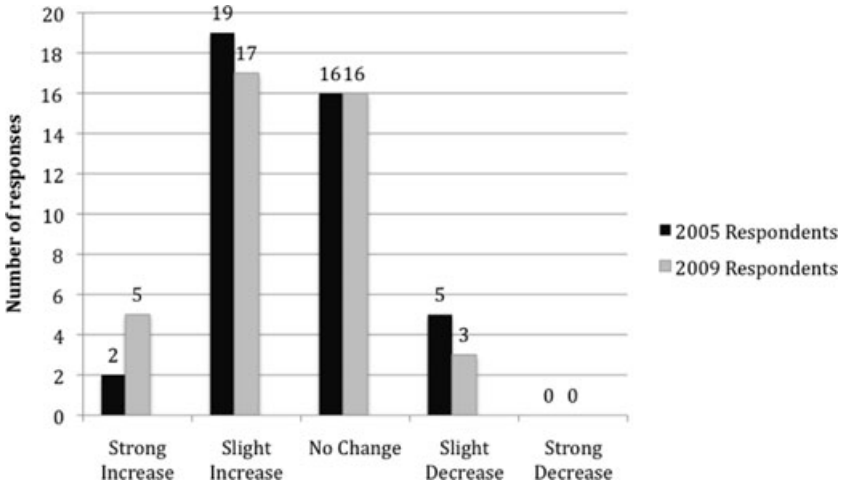

Figure 1 Deans' response to: "Have you seen a change in the number of dental students specializing?"

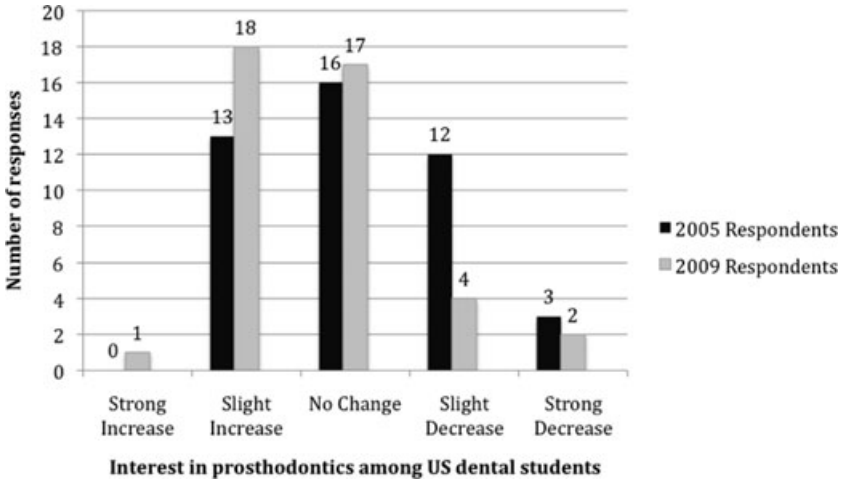

Figure 2 During the last 5 years has interest in prosthodontics among dental students changed at your institution?

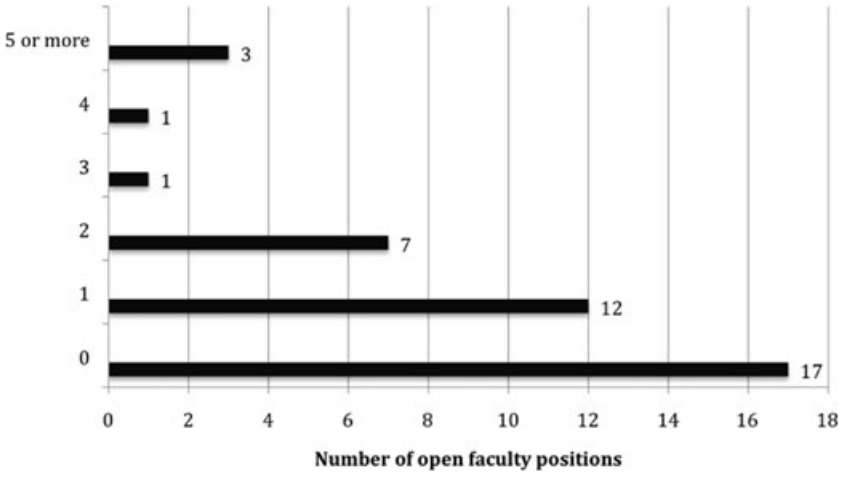

Figure 3 Number of open faculty positions in prosthodontics reported by deans' survey.

question due to ambiguity. The 2009 survey was organized with two questions regarding dual-specialty training. The first question to the deans was, "Do you provide dual specialty education?" The result was that 78.6% of the deans responded that they did not provide dual education. To ascertain a clear deans' response about dual-specialty training in prosthodontics and periodontics, deans were asked, "Do you see a benefit to dual specialty training in prosthodontics and periodontics?" Of the respondents, 62.5% believed dual-specialty training in prosthodontics and periodontics was beneficial (Fig 7).

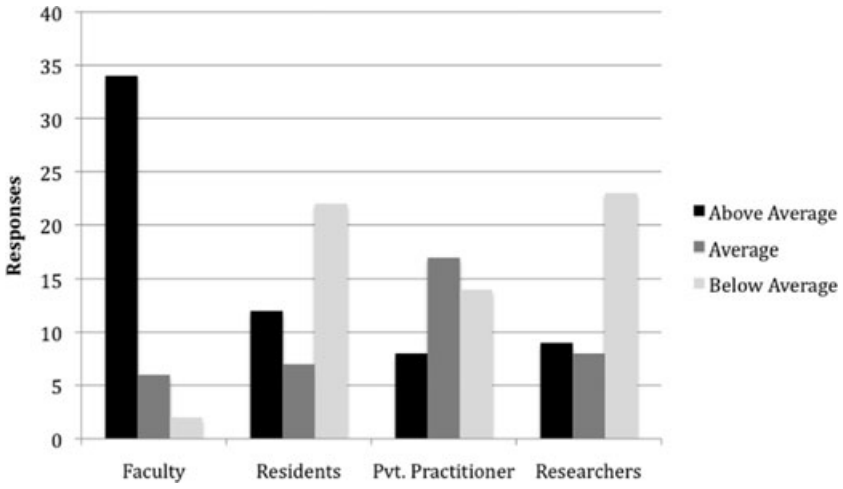

Figure 4 Exposure to prosthodontists. Responses were collapsed into above average, average, and below average to clarify the responses for the four types of prosthodontic educators.

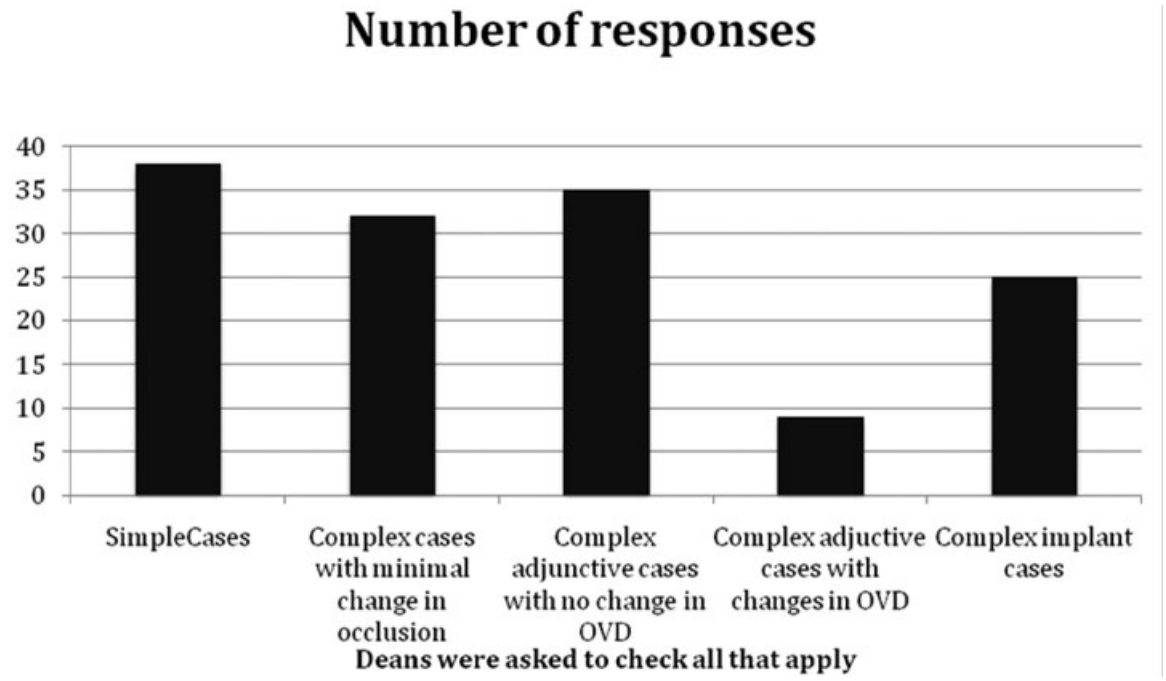

Figure 5 Number of responses to the case type.

The 42 respondents to the deans' survey reported that the prosthodontics department is its own entity in 21 schools (52.5%). In 19 schools, prosthodontics is positioned administratively in a larger department (Fig 8).

Discussion

The majority of deans reported an increased interest in specialty training, which parallels the Institute of Medicine's projection of a 10% increase in specialists in the last 10 to 15 years.[5] Related to this prediction, deans reported a large increase in interest in specialty training. Of the respondents, 58% reported an increased interest in prosthodontics during the past 5 years or no change, as opposed to only 7% who reported a decrease. There was a 16% increase in the number of deans' observing an increased interest in prosthodontics in the 2009 survey when compared to the 2005 survey.

The large number of open faculty positions in prosthodontics is consistent with the reports by Haden et al,[16,17] who revealed significant vacancies in prosthodontics and other areas of the clinical sciences. Only 12 (29%) of the respondents reported using no incentives to recruit prosthodontic faculty members.

Faculty shortages are not exclusive to prosthodontics, and it is clear that there are huge demands for faculty in all aspects of dental education. As a result, predoctoral dental students often suffer in terms of faculty-to-student ratio and predoctoral

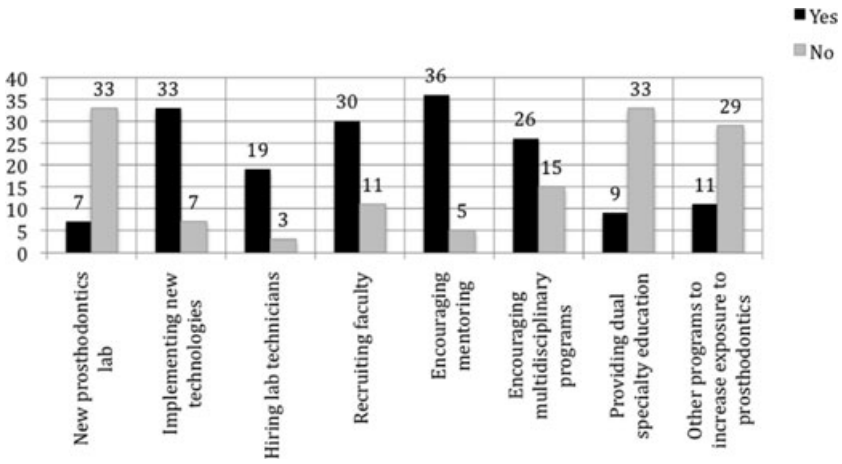

Figure 6 Deans' responses to programs that enhance student interest in prosthodontics.

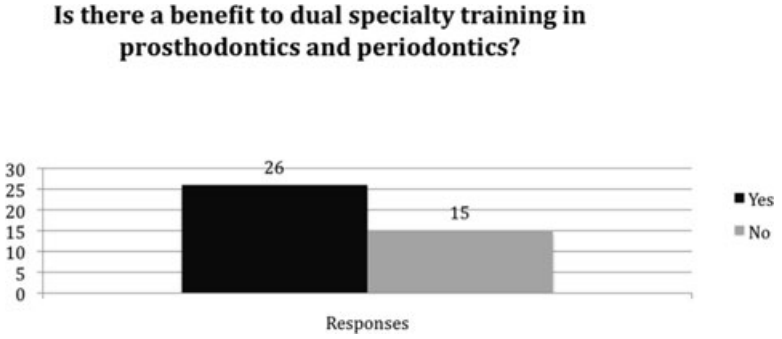

Figure 7 US deans' ideology regarding specialty training in prosthodontics and periodontics. No response = 1.

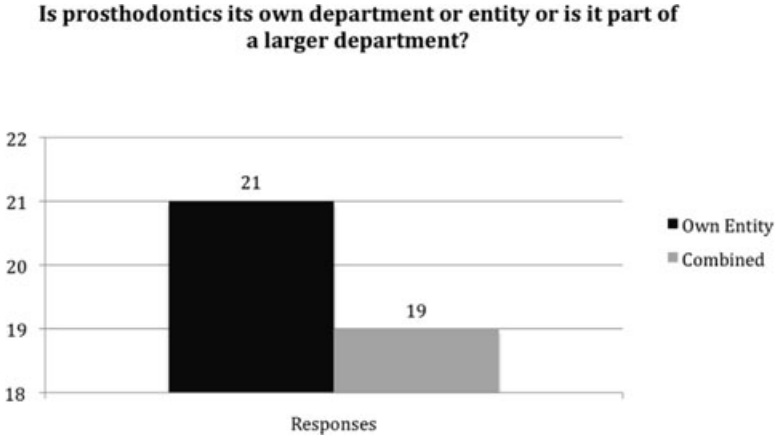

Figure 8 Number of respondents to the administrative position of prosthodontics. No response = 2.

exposure to specialty education and/or training. Predoctoral students had lower exposure to postdoctoral students in prosthodontics, prosthodontists in private practice, and prosthodontists engaging in research. The deans' report of fairly good exposure to full-time prosthodontists might be due to prosthodontists being more active with mentoring programs or due to prosthodontists being appointed to the predoctoral faculty. The low exposure to prosthodontic students, prosthodontist/researchers, and private practitioners as reported by deans should be examined more extensively in the future since these three categories of exposure would be wonderful experiences for the dental students at all schools.

Despite limited predoctoral curriculum time pertaining to prosthodontics and faculty shortages, it appears as though dental students are still exposed to complex prosthodontic cases with high frequency. Respondents reported that predoctoral dental students treat complex implant cases in 60% of the schools, an increase of 10% from the 2005 survey. Since predoctoral students are exposed in the clinics to complex treatments after having limited curriculum time devoted to prosthodontics,

a students' choice of specialty might be influenced by this factor.

Deans reported a very high incidence of new programs to increase understanding and exposure to prosthodontics. Mentoring programs at 36 schools (88%), active faculty recruitment at 30 schools (71%), and new technology at 33 schools (79%) were the top three new programs being implemented to increase exposure to prosthodontics. Similarly, new prosthodontics laboratory construction at seven schools (17%) and hiring of laboratory technicians to work with dental students at 19 schools (45%) indicate an active attempt to provide dental students more resources to provide the technological support to facilitate their prosthodontic cases. These findings are similar to the 2005 survey of deans.

The survey question to deans regarding dual-specialty training in prosthodontics/periodontics was revised from the 2005 question due to ambiguity. These results revealed that the majority of deans felt that dual-specialty training would be beneficial. Two US programs (the University of Texas Health Science Center at San Antonio and University of Connecticut) currently offer dual-specialty training in prosthodontics and periodontics in a 5-year program. Both programs were created to dual train one to two students in a 5-year program. Graduates would be educationally qualified for both the American Board of Prosthodontics and the American Board of Periodontology. Of the respondents, 79% reported they did not provide dual-specialty training, consistent with our finding of only two programs in the United States; however, when deans were asked specifically if they thought dual-specialty training in prosthodontics and periodontics would be beneficial, it is interesting that most deans had favorable opinions of this type of training. Several other schools are currently considering offering dual-specialty training. The 21% of deans reporting that they offer dual-specialty training is probably due to the fact that they offer dual-specialty training in a traditional 6-year program, as opposed to the two current programs offering dual-specialty training in a 5-year program.

The deans' responses to the administrative placement of prosthodontics reveal that the department of prosthodontics is its own entity in 21 (52.5%) of the dental schools reporting. This is a 12% increase from the 2005 survey, and now the majority of schools have prosthodontics structured as a department or administrative entity. The loss of a department of prosthodontics and consolidation of departments at most dental schools could be related to a smaller applicant pool due to the prominence of prosthodontics in the school's administrative structure; however, at many schools, other specialties have also been merged with other specialties or dental disciplines.

Conclusions

From this survey of deans a statistically significant increased interest in specialty training in prosthodontics was found. The number of open faculty positions remains high, and the majority of the respondents are using one or multiple incentives to recruit prosthodontists. Predoctoral students' exposure to full-time faculty in prosthodontics was reported to be much higher than exposure to postdoctoral students in prosthodontics, researchers in prosthodontics, and full-time practitioners. Using the PDI for dentate and partially dentate patients in the survey revealed that dental students treat complex cases. Mentoring programs, faculty recruitment of prosthodontists, and new science and technology were the three top programs deans had implemented. Although many of these findings reported by deans indicate a brighter future for prosthodontics, the specialty training programs continue to have lower applications and much lower enrollment figures when compared to orthodontics, endodontics, oral and maxillofacial surgery, and pediatric dentistry. These lower application and enrollment figures are interesting when consideration is given to data on the need for prosthodontic services. A future survey of advanced education in prosthodontics students will continue to examine trends in prosthodontics.

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