

Prosthodontic Program Directors' Perceptions Regarding Implant Placement by Prosthodontic Residents: A 2004 Survey Conducted by the Educational Policy Subcommittee of the American College of Prosthodontists

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Abstract

Purpose: In 2004, a survey regarding implant placement by prosthodontic residents was conducted by the Educational Policy Subcommittee of the American College of Prosthodontists (ACP). The aim of the survey was to assess the current trends in implant curricula at advanced graduate prosthodontics programs in the United States and Canada and determine the issues surrounding surgical implant training for prosthodontic residents.

Materials and Methods: The survey was mailed to the prosthodontic/maxillofacial prosthetic program directors of the 59 prosthodontic graduate programs in the United States and Canada in 2004. Of these, 27 program directors replied, yielding a response rate of 46%.

Results: Of the replying programs, 43% either required residents to place or offered the option to have residents place implants. Forty-four percent reported that residents participate by functioning as first assistants for some of their implant patients, 40% have a specific curriculum to train residents in implant placement, 50% reported not having any institutional barriers that prevent program directors from training prosthodontic residents in implant placement, 51% provide implant training using plastic jaws, and 66% of the programs required residents to observe implant surgery in the clinic before they are permitted to place implants. Of prosthodontic residents who treated implant-related patients, the majority treated 11 to 20 patients during their residency. In 2004, 40% of program directors were not trained in the placement of dental implants, and if they did have the implant training, the majority (82%) stated that the nature of their training was 1- to 3-day course(s).

Conclusions: This survey showed that implant dentistry has become an integral part of the postgraduate prosthodontic curriculum. The trends to incorporate implant placement into the postgraduate prosthodontic curriculum were already evident prior to 2004. To address the demand for implant treatment in patient care and enhance surgical implant knowledge, the ACP in 2005 added placement of implants to its Accreditation Standards for Advanced Specialty Education Programs in Prosthodontics.

In the United States, the population needing prosthodontic treatment will increase over the next 20 years.^{1,2} The use of implant dentistry in restoring partially and completely edentulous jaws has become highly predictable and is becoming more commonly used. A symposium held at McGill University in 2002 produced a consensus statement recommending that two-

implant mandibular overdentures replace mandibular conventional dentures as the standard of care for edentulous patients.³ As the interest in implant treatment has increased, the demand for a provider who is well-trained in delivering total implant treatment has also increased tremendously. A 1993 American Dental Association survey reported that implant training varied

widely among dentists.⁴ The need to establish and enhance standardized instruction/curricula in implant education, including implant placement, has increased.

In 1992, Advanced Specialty Education Programs in Prosthodontics increased their training programs to a minimum of two calendar years to demonstrate the appreciation of implant treatment in prosthodontic specialty training.⁵ According to Eckert et al,⁵ most prosthodontists use implant-supported prostheses in their practices, and younger prosthodontists expressed a greater desire to surgically place implants.

Several surveys have been conducted assessing the current status of the implant curricula, but mainly in the predoctoral curricula and rarely in the postdoctoral curricula.⁶⁻¹⁰ The most recent article showed that the majority of US dental schools reported that their predoctoral students received didactic instruction and clinical experience in dental implants.¹¹ The status of implant education in predoctoral curricula was published in 1991.⁶ This survey reported that the implant curriculum was managed mainly by the prosthodontic department faculty (85%), followed by the departments of oral and maxillofacial surgery (OMFS) (68%) and periodontics (53%); however, this survey did not address the trends of the implant curricula in advanced graduate prosthodontic programs specifically.

There has not been any recently published survey assessing the trends in postdoctoral curricula, especially focusing on the advanced graduate prosthodontics programs. Therefore, the aim of this survey was to determine the current trends in the implant curricula at the advanced graduate prosthodontics programs in the United States and Canada and determine the issues surrounding surgical implant training for prosthodontic residents.

Materials and methods

In 2004, a questionnaire (Appendix) was mailed to the prosthodontic/maxillofacial prosthetic program directors of the 59 prosthodontic graduate programs in the United States and Canada. The questionnaire requested information on the prosthodontic program's implant curriculum (didactic and clinical). Twenty-seven of the 47 program directors responded, yielding a response rate of 46%.

The survey contained 22 multiple-choice questions and asked the respondents to circle all responses that applied to their program. Some of the questions allowed the respondents to write in a response or comment.

Results

The findings for each of the survey questions are as follows.

Question 1: *The policy of the program regarding placement of implants by prosthodontic residents:* Five schools (20%) reported that the residents are required to place implants; 6 (23%) reported residents have the option to place implants; 3 (12%) reported residents are prohibited from placing implants; and 11 (44%) reported residents participated in all phases of implant therapy, including implant placement, by functioning as first assistants for some of their patients.

Question 2: *Having specific curriculum to train prosthodontic residents to place implants in actual patients:* Ten schools (40%) reported having a specific curriculum to train their residents to place implants in actual patients, whereas 15 (60%) schools reported no specific curriculum.

Additional comments or suggestions if answering yes to Question 2: For this question, comments/suggestions were written as follows:

- This has been in our curriculum for quite a few years.
- Additional lectures were added.
- The residents attend implant placement courses provided by several implant companies and work with periodontists on implant placement. However, this is not yet written into the curriculum.
- A multidisciplinary seminar for OMFS, periodontics, and prosthodontics residents. Clinical simulation and clinical participation.
- At present, we are developing an off-site facility for prosthodontic residents to do actual fixture placement. A specific curriculum is also being developed to support this clinical curriculum.
- Implant prosthodontics is an INTEGRAL part of the prosthodontic courses in our residency program.
- Perio-prosthodontic literature reviews, teaching in clinical surgical placement, assisting in implant surgeries, also in the process of revising the curriculum to include implant placement by second- and third-year residents.
- The residents have a simulation course. They place implants on a plastic replica of a mandible. The school created an implant center where prosthodontic and periodontal residents perform surgical placement under the supervision of an oral surgeon and/or a prosthodontist. They do the prosthetic phase in their residency program. The implant center has regular weekly treatment planning sessions.

Question 3: *Barriers at institutions that are currently preventing program directors from teaching their prosthodontic residents to place implants for their patients:* Eleven schools (46%) reported having barriers preventing program directors from teaching their prosthodontic residents to place implants, whereas 12 other schools (50%) reported having no barriers, and 1 school (4%) reported "maybe."

Additional comments or suggestions (Question 3): For this question, comments/suggestions were written as follows:

- Since the new dean is an OMFS surgeon, she/he is making it very difficult to continue our surgical training because it is not yet required in the standard.
- Oral surgery is still not encouraging.
- Currently prosthodontic residents are not permitted to place implants. This situation is not likely to change unless the accreditation standards change, requiring this educational component to the program.
- The lack of a qualified faculty.
- We have to convince our surgical colleagues to help in training our prosthodontic residents to place implants.
- Too much didactic and clinical knowledge regarding conventional prosthodontics and implant restoration to teach in a

third-year program to include all that is necessary to thoroughly teach implant placement.

- Implants are placed by OMFS and periodontal residents with surgical guides and stents provided by prosthodontic residents. There are adequate numbers of implant patients to provide the clinical experience required by the standards for these two advanced education programs. If prosthodontists were to begin placing implants, it would interfere with the other training programs' abilities to meet their standards and undermine good clinical relationships among these specialties. Prosthodontic graduate students are required to attend the placement of implants for their own patients, and thereby, receive significant exposure to surgical procedures. They also are exposed to the surgical training provided by the major implant systems, such as Nobel Biocare, 3i, Astra, and Straumann. The training they receive is adequate to allow them to provide implant placement services in their own practices when they complete the prosthodontic program, should they desire to do so.
- No prosthodontic faculty is currently trained (qualified) to place dental implants. Oral surgeons or periodontists are unlikely to train prosthodontists.
- We teach much about implant placement. Teaching and placing are two different actions, but are not mutually exclusive. Impediments—there may be a lack of patients to share with the three disciplines (periodontics, OMFS, and prosthodontics) and restoration of all cases. This is a prosthodontic residency program, not an implant fellowship.

Question 4: *Whether the program director plans on adding the educational experience to the curriculum in the future if the program does not offer the residents any experience in placing dental implants in actual patients:* Six program directors (35%) reported yes, and 11 (65%) reported no.

Additional comments or suggestions (Question 4): For this question, comments/suggestions were written as follows:

- Yes, if the accreditation standards change to require this experience, then we will implement it as soon as possible. If the standards do not change, it is unlikely that the institution will permit adding this educational experience.
- Yes, doing it at this time.
- Yes, within 5 years.
- Yes, surgical placement of implants has been and is required for this program.
- No, because I have no interest in adding this to this curriculum.
- No, because there is no practical method of adding this to the curriculum without substantially lengthening the program beyond 33 months.
- No, because the institution will not permit this.
- No, because we do not have a qualified faculty to mentor and supervise the placement of implants by prosthodontic residents.
- No, because we do not have a sufficient number of patients to support this activity.
- No, we do not plan to change our curriculum for the reasons stated previously. Our present curriculum provides good interdepartmental relations, allows all programs to adequately meet their standards without encroaching on the other specialties, and as previously stated, provides adequate experiences in

the placement of implants to allow prosthodontic graduate students to place implants in their own practices after leaving the program, should they desire to include this in their treatment options.

- No, not in the best interest of the practice of military prosthodontics.

Question 5: *Type of laboratory simulation course(s) used for training in actual implant placement for prosthodontic residents:* Three schools reported using bones of animal cadavers; 1 (3%) reported using human cadavers; 13 (51%) reported using plastic jaws; and 2 (7%) reported using the Sim Lab (Sim-Plant, Materialise Dental Inc., Glen Burnie, MD) and are in the process of establishing the curriculum.

Question 6: *Residents' participation in the same surgical course (course that reviews the principles of surgery and/or surgical implant placement) that periodontology or OMFS residents take:* Eleven schools (44%) reported taking the same surgical course; 11 (44%) reported not taking the same course, with comments as follows: new didactic program for Perio/Pros will be initiated in support of an off-site surgical training program; the prosthodontics residents take the company courses in implant placement, but not the curriculum courses provided by the oral surgery and periodontal programs; 3 (12%) reported data not available.

Question 7: *Prosthodontic residents required to observe implant surgery in the clinic before they are permitted to place implants:* Sixteen schools (66%) reported that prosthodontic residents are required to observe implant surgery prior to placing implants; 1 (4%) reported "not required" (residents voluntarily assist/observe at numerous surgeries but are not required to do so); and 7 (30%) reported no data available.

Question 8: *Place (location) where residents perform implant placement in patients:* Three schools (11%) reported performing implant surgery at the prosthodontic clinic; 5 (19%) reported at the periodontology clinic; 4 (15%) reported at the oral surgery clinic; 2 (8%) reported at the hospital/operating room; 4 (15%) reported other: implant center, new surgical unit, off site, and all the above; 8 (30%) reported no data available; and 1 (3.4%) reported all the above.

Question 9: *Profession teaching the didactic curriculum for implant placement in the prosthodontic program:* Six schools (23%) reported periodontist; 4 (16%) reported oral surgeon; 6 (23%) reported prosthodontist; 3 (12%) reported company representative; 2 (7%) reported general dentist and PhD who teaches physiology of bone and wound healing; and 5 (18%) reported no data available.

Question 10: *Profession teaching the clinical curriculum for implant placement in the program:* Four schools (16%) reported periodontist; 7 (25%) reported oral surgeon; 5 (20%) reported prosthodontist; 2 (11%) reported company representative and general dentist; and 8 (28%) reported no data available.

Question 11: *Time the program allows residents to surgically place dental implants in actual patients:* Three schools (11%) reported during the first year of training; 9 (32%) reported during the second year of training; 6 (21%) reported during the third year of training; and 10 (36%) reported no data available.

Question 12: *Profession providing a direct supervision of the placement of implants in actual patient by prosthodontic*

residents: Seven schools (22%) reported periodontist; 7 (22%) reported oral surgeon; 5 (16%) reported prosthodontist; 2 (7%) reported general dentist; and 6 (32%) reported no data available.

Question 13: *Which profession assists/supervises in case of emergency after implant placement placed by prosthodontic residents:* Six schools reported attended by prosthodontist; 9 (32%) reported attended by surgical specialist (periodontist/oral surgeon); 2 (8%) reported others; and 11 (39%) reported no data available.

List of the incidence of the emergencies and/or complications:

- Have not encountered any emergencies with the resident cases in the past 2 years.
- Do not have the exact figures, but the percentage would generally be less than 1%. Solved poor angulations by requiring that a prosthodontic resident be present for all implant placement surgery.
- Angulation, infection, and premature exposure for two-stage procedures.
- Excess bleeding 2%, encroachment on roots 1%, paresthesia 1%, poor angulation 0%, and failure to integrate 3%.
- Failed osseointegration in all zones is approximately 7%, poor angulation is infrequent.

Question 14: *Requirement to obtain and maintain hospital privileges for residents to place implants:* Two schools (9%) reported yes; 11 (48%) reported no; and 10 (43%) reported not applicable, the residents do not place implants.

Question 15: *Program directors training in placement of dental implants:* Ten program directors (40%) said yes; and 15 (60%) said no.

Question 15a: *If answer to Question 15 was yes, the nature of training in placement of dental implants by program director:* Eight program directors (82%) reported 1- to 3-day course(s); 1 (9%) reported 1- to 3-month course(s); and 1 (9%) reported a 1-year program.

Question 16: *Average number of patients per resident that receive implant prosthodontic treatment of any type:* Four schools (15%) reported an average of 1 to 10 patients per resident; 13 schools (50%) reported an average of 11 to 20 patients per resident; 4 schools (15%) reported an average of 21 to 30 patients per resident; and 5 schools (20%) reported an average of >30 patients per resident.

Question 17: *Average number of dental implants surgically placed by prosthodontic residents:* Eight schools (30%) reported 0 implants; 3 (12%) reported 1 to 2 implants; 5 (18%) reported 3 to 5 implants; 5 (18%) reported 10 to 20 implants; 3 (12%) reported 21 to 40 implants; and 3 (12%) reported 41 to 60 implants.

Question 18: *Types of implant-surgical placement procedures commonly accomplished by prosthodontic residents:* For this question, the responses were written as follows: noncomplicated cases, single implant, two/four implants in the edentulous mandible/maxilla, implant placement without bone augmentation or bone grafting, all types of procedures from single implant to 12 implants per arch.

Question 19: *Total number of residents/graduate students in the prosthodontic program:* Six schools (23%) reported having

1 to 5 residents; 15 (55%) reported 6 to 10 residents; 5 (18%) reported 11 to 15 residents; and 1 (4%) reported 21 to 25 residents.

Question 20: *Program director providing an "implant prosthodontics" course to the surgical residents at the institution:* Thirteen (48%) reported yes, mostly through multidisciplinary courses/joint seminars/symposia, and 14 (52%) reported no.

Additional comments or suggestions (Question 20): For this question, comments/suggestions were written as follows:

- An implant prosthodontics course is part of the prosthodontic curriculum and is available as an elective for the periodontics and OMFS residents. Many advanced operative dentistry students take the course, but I cannot remember any of the surgical specialty students enrolling.
- Joint seminars bi-weekly throughout the year and a formal course.
- All cases are treatment planned in team assignment—periodontics or OMFS and prosthodontics. The cases must be presented and approved in a combined seminar.
- All prosthodontic residents, periodontology residents, and surgical residents attend a 6-day symposium on Implant Dentistry. This symposium thoroughly covers all areas of implant dentistry, including biologic, biomechanical, treatment planning, surgical, and restorative/prosthodontic aspects of implant dentistry.
- A full didactic course on diagnosis, treatment planning, surgical procedures, complications, maintenance, and restoration.
- As an integrated part of a mini-residency.

Discussion

A study conducted by Huebner in 2002 showed that intense exposure to implant dentistry during dental predoctoral training resulted in a significantly greater participation in implant dentistry in general practice. As more are trained in implant placement, more patients may receive implants.¹² In 2005, implant placement was added to the Accreditation Standards for Advanced Specialty Education Programs in Prosthodontics: "Students must participate in all phases of implant treatment including implant placement. Intent: It is anticipated that students will act as first assistant and/or primary surgeon for some of their own patients."

The results of the current survey (conducted in 2004) show that the trend to incorporate implant placement into the postgraduate prosthodontic curriculum was already evident prior to 2004. Didactic material and hands-on workshops concerning implant placement and the option of placing implants were present in some programs. Some shared surgical courses with the surgical residents in periodontology and OMFS. Interdisciplinary seminars where residents from periodontology, OMFS, and prosthodontics interacted were also common.

Some prosthodontic programs reciprocated training by providing an overview of implant prosthodontics to surgical residents. A few prosthodontic programs sent their residents off site to place implants. The faculty who did the surgical training included oral surgeons, periodontists, prosthodontists, and general dentists. As more prosthodontist faculty members are

surgically trained, the number of available faculty able to teach placement will probably increase at some schools. Only two schools required hospital privileges for prosthodontic residents placing implants.

Some schools noted that once the standard was changed, they would be ready to incorporate implant surgery into their program. Others indicated that they did not intend to add this to their programs due to their philosophy or lack of time or enough patients. In 2004, three schools prohibited their students from placing implants.

In schools where residents placed implants, it was done by some in the first, some in the second, and some in the third year. The few who responded as to implant surgical complications noted that they were between 1 and 3%. In addition, it was also reported that the majority of the prosthodontic residents placed more than three implants during their residency program, mostly the noncomplicated cases.

Most of the program directors reported not having training in placement of dental implants, and if they did, most of them reported only having 1 to 3 days of training. Although it is not mandatory, future prosthodontic program directors with an additional 1 year of training in implant placement may bring substantial benefits for their programs.

Conclusions

Within the limitations of this study, the following observations were made:

1. Implant education has become an integral part of the advanced graduate prosthodontic curriculum.
2. The trend to incorporate implant placement into the postgraduate curriculum was already evident prior to 2004.
3. Personal and institutional challenges have been cited as barriers to incorporating implant placement in the postgraduate curriculum.

With the addition of implant placement in the Accreditation Standards for Advanced Specialty Education Programs in Prosthodontics, a good follow-up to this report would be to repeat the survey to see the current levels and experience of implant placement in the postgraduate prosthodontic programs. While all programs must now provide implant placement experience to their residents, it would be helpful to know how many implants are being placed, the increased number of patients receiving implants, and how the curricula and results have evolved since this report.

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Appendix: Questionnaire Sent to the Prosthodontic/Maxillofacial Prosthetic Program Directors in the United States and Canada

Survey of prosthodontic program directors regarding implant placement by prosthodontic residents

Conducted by Educational Policy Subcommittee American College Of Prosthodontists

Instructions: Please save on your computer as "ImplSurvey-your institution." Respond by placing your answer after "Answer: " or in the line provided.

1. What is the policy of your program regarding placement of implants by prosthodontic residents?
 - a. Residents are required to place implants.
 - b. Residents have the option to place implants.
 - c. Residents are prohibited from placing implants.

- d. Residents participate in all phases of implant therapy including implant placement by functioning as first assistants for some of their patients.
- e. No policy.

Answer:

2. Do you have a specific curriculum for your prosthodontic residents to train them to place implants in actual patients (namely, didactic courses, simulation courses, and clinical experiences that were added to the established prosthodontic curriculum to provide education and training in implant placement on live patients)?
 - a. Yes, and it is required.
 - b. Yes, but it is an elective.
 - c. No.

Answer:

If your answer is "yes," could you please provide a copy of the curriculum?

Yes No

If you answered yes above, what did you add to your curriculum?

If you answered yes above, what was removed from your curriculum to provide for the implant placement-topical materials?

3. Are there any barriers at your institution that are currently preventing you from teaching your prosthodontic residents to place implants for their patients?
 - a. Yes.
 - b. No.

Answer:

If "yes," please describe below:

4. If your program does not offer your residents any experience in placing implants in actual patients, do you plan on adding this educational experience to the curriculum in the near future?
 - a. Yes. Please specify when you plan on adding this.
 - b. No, because I have no interest in adding this to this curriculum.
 - c. No, because there is no practical method of adding this to the curriculum without substantially lengthening the program beyond 33 months.
 - d. No, because the institution will not permit this.
 - e. No, because we do not have a qualified faculty to mentor and supervise the placement of implants by prosthodontic residents.
 - f. No, because we do not have a sufficient number of patients to support this activity.
 - g. No, for other reasons. Please specify.

Answer:

5. If your program provides training in actual implant placement for your prosthodontic residents, what type of laboratory simulation course(s) is/are used? (Please answer all that apply):
 - a. Residents practice implant placement in the bone of an animal cadaver.

- b. Residents practice implant placement in a human cadaver.
- c. Residents practice implant placement in a plastic jaw model.
- d. Other, please specify.
- e. Not applicable. We do not teach implant placement.

Answer:

6. Do your residents participate in the same surgical course (course that reviews principles of surgery and/or surgical implant placement) that periodontology or oral and maxillofacial surgery residents take?
 - a. Yes.
 - b. No.
 - c. Not applicable. We do not teach implant placement.

Answer:

7. Are prosthodontic residents required to observe implant surgery in the clinic before they are permitted to place implants?
 - a. Yes (they must observe a number of procedures).
 - b. No.
 - c. Not applicable. We do not teach implant placement.

Answer:

8. If your residents place implants in patients, where do the residents perform implant placement? (Please answer all that apply.)
 - a. Prosthodontic clinic.
 - b. Periodontology clinic.
 - c. Oral surgery clinic.
 - d. Hospital/operating room.
 - e. Other, please specify.
 - f. Not applicable. Our residents do not place implants.

Answer:

9. If your residents place implants in patients, who teaches the didactic curriculum for implant placement in your program? (Please circle all that apply.)
 - a. Periodontist.
 - b. Oral surgeon.
 - c. Prosthodontist.
 - d. Company representative.
 - e. Other, please specify.
 - f. Not applicable. Our residents do not place implants.

Answer:

10. If your residents place implants in patients, who teaches the clinical curriculum for implant placement in your program? (Please answer all that apply.)
 - a. Periodontist.
 - b. Oral surgeon.
 - c. Prosthodontist.
 - d. Company representative.
 - e. Other, please specify.
 - f. Not applicable. Our residents do not place implants.

Answer:

11. If your residents place implants in actual patients, at what point in their program do you allow your residents to surgically place dental implants? (Please answer all that apply.)
- During first year of training.
 - During second year of training.
 - During third year of training.
 - Not applicable. Residents are not permitted.

Answer:

What is their approximate success rate? Please specify the student year in your answer.

12. If your residents place implants in actual patients, who provides direct supervision of the placement of implants in patients by the prosthodontic residents? (Please answer all that apply.)
- Periodontist.
 - Oral surgeon.
 - Prosthodontist.
 - Other, please specify.
 - Not applicable. Our residents do not place implants.

Answer:

13. If your residents place implants, how do they handle emergencies and surgical complications?
- Attended by prosthodontist.
 - Attended by surgical specialist (periodontist/oral surgeon).
 - By referral to surgical specialist.
 - Other, please specify.
 - Not applicable. Our residents do not place implants.

Answer:

Can you please list the incidence of these emergencies and/or complications? Give type(s) and estimate percentage of total implant placement. Examples: Excessive bleeding (2%), encroachment on teeth roots (3%), paresthesia (1%), failure to integrate (5%), or poor angulation (1%).

14. If your residents place implants, are they required to obtain and maintain hospital privileges?
- Yes.
 - No.
 - Not applicable, residents do not place implants.

Answer:

15. As the director, are you trained in the placement of dental implants?
- Yes.
 - No.

Answer:

If so, what was the nature of your training?

- 1- to 3-day course(s)
- 1- to 3-month course(s) (e.g., residency-based rotation)
- 1-year program
- Dual-trained specialist.

Answer:

16. On average, how many patients, per resident, receive implant prosthodontic treatment of any type?
17. How many dental implants are surgically placed, on an average, by your prosthodontic residents? If none, please indicate zero.
18. If your residents place implants in actual patients, what types of implant-placement procedures are commonly accomplished by your prosthodontic residents? (Examples: two implants in an edentulous mandible for implant-supported overdenture; single implant for implant-supported crown) Please be as specific as possible.
19. What is the total number of residents/graduate students in your program?
20. Do you provide an "implant prosthodontics" course to the surgical residents at your institution?

Yes No

If yes, please describe.

Thank you very much for your contribution to this survey. Your assistance will help us improve the educational experiences of all residents in accredited advanced educational programs in prosthodontics.

Please provide your:

Name:

Position/title:

Institution:

Email address:

Phone number:

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