Teaching Implant Dentistry in the Predoctoral Curriculum: A Report from the ADEA Implant Workshop’s Survey of Deans


Abstract: In 2004, a survey of the deans of U.S. and Canadian dental schools was conducted to determine the implant dentistry curriculum structure and the extent of incorporating implant dentistry clinical treatment into predoctoral programs. The questionnaire was mailed to the deans of the fifty-six dental schools in advance of the ADEA Implant Workshop conference held in Arizona in November 2004. Out of the fifty-six, thirty-nine responded, yielding a response rate of 70 percent. Thirty-eight schools (97 percent) reported that their students received didactic instruction in dental implants, while one school (3 percent) said that its students did not. Thirty schools (86 percent) reported that their students received clinical experience, while five schools (14 percent) reported that theirs did not. Four schools (10 percent) did not respond to this question. Fifty-one percent of the students actually receive the clinical experience in restoring implants, with the range of 5-100 percent. Of those schools that provide clinical experience in restoring implants, four schools (13 percent) reported that it is a requirement for them, while twenty-eight schools (85 percent) indicated that they did receive free components from implant companies, while five schools (15 percent) did not. The conclusions of this report are as follows: 1) most schools have advanced dental education programs; 2) single-tooth implant restorations are performed at the predoctoral level in most schools; 3) implant-retained overdenture prostheses are performed at the predoctoral level in most schools; 4) there is no predoctoral clinical competency requirement for surgical implant placement in all schools that responded to the survey; 5) there is no predoctoral clinical competency requirement for implant prosthodontics in most schools that responded to the survey; 6) prosthodontic specialty faculty are often responsible for teaching implant prosthodontics at the predoctoral level; 7) periodontics and oral and maxillofacial faculty are commonly responsible for teaching implant surgery at the predoctoral level; 8) support from implant companies is common for dental schools, with most providing for implant components at discounted costs; and 9) there is a lack of adequately trained faculty in implant dentistry, which is a significant challenge in providing predoctoral students with clinical experience with dental implants.

T he use of oral implants in the rehabilitation of partially dentate and completely edentulous jaws has been a well-established and accepted contemporary clinical method due to its success and predictability.1 In 1988, a symposium was held in Toronto on the topic “Towards Optimized Treatment Outcomes for Dental Implants.” Following this symposium, a consensus report was developed delineating the criteria that should be used with clinical trials evaluating the efficacy of implant
therapy. A careful assessment of these criteria will disclose that the discipline of implant dentistry has indeed matured tremendously in the past two decades. Although postgraduate continuing education courses are increasingly available, the need to include additional courses in implant dentistry in the dental school curriculum remains. Most dental schools here and abroad now offer a few lectures and/or a didactic course in implant dentistry. A survey conducted by Lim et al. in 2002 revealed that 84 percent of the responding U.S. dental schools required students to complete an implant dentistry course as part of their predoctoral training. Some allow predoctoral students to place implants.

An informal meeting in the fall of 2003 took place at New York University School of Dentistry to discuss what could be done to increase the number of patients being treated with dental implants. All members agreed that, although there is a large number of patients who would benefit from implant therapy, particularly patients who are edentulous, few actually receive implants and implant prosthodontics.

Out of this preliminary meeting came the concept that increasing the hands-on implant dentistry knowledge imparted to dental students would increase the number of patients benefiting from dental implants. It was felt that if a student did not perform clinical implant care on a live patient, he or she was less likely to perform that care in practice. The dental literature indicates that there is a strong correlation for recent graduates between offering and restoring implants in their practice when an implant course was taken as part of their dental school curriculum.

Towards that end, those involved agreed to assemble an implant workshop involving all deans of U.S. and Canadian dental schools, as well as representatives of their surgical and prosthodontic faculty. At this workshop, action ideas for schools were to be generated across the various clinical disciplines and school boundaries to improve the care of fully and partially edentulous patients by increasing implant therapy. The results of this workshop will be published in a separate report.

Other goals of the ADEA Implant Workshop were to share instruction methods for predoctoral implant dentistry programs, including predoctoral curriculum information that would better facilitate additional training in implant prosthodontics while students are still in dental school. This report presents the results of an implant survey sent to the deans in advance of the workshop. The survey was intended to identify the then-current status of implant education and, particularly, the predoctoral students’ clinical experience with implant treatment.

### Materials and Methods

In the summer of 2004, a questionnaire was mailed to the deans of fifty-six U.S. and Canadian dental schools. The questionnaire requested information on the schools’ predoctoral implant dentistry curriculum content. Thirty-nine of the fifty-six schools responded, yielding a response rate of 70 percent.

The survey contained twenty-eight multiple-choice questions and asked respondents to circle all responses that applied to their programs. Some of the questions allowed the respondents to write in a response.

### Results

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

**Average number of predoctoral students in each class** (question 1): The average number of predoctoral students was seventy-six with a range of thirty to 180 students.

**Whether the institution sponsors advanced dental education programs and in which areas. Participants were asked to answer all that applied** (question 2): These results are summarized in Table 1.

**Whether the predoctoral students receive didactic instruction in dental implants** (question 3): Thirty-eight schools (97 percent) reported that their students received didactic instruction in dental implants, while one school (3 percent) said that their students did not.

**Percentage of students in question 3 receiving didactic instruction** (question 4): Of the schools that

### Table 1. Question 2: advanced education programs sponsored by dental schools

<table>
<thead>
<tr>
<th>Answer</th>
<th>Number of Responding Schools (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral &amp; Maxillofacial Surgery</td>
<td>32 (82%)</td>
</tr>
<tr>
<td>General Dentistry</td>
<td>30 (77%)</td>
</tr>
<tr>
<td>Periodontics</td>
<td>29 (74%)</td>
</tr>
<tr>
<td>Prosthodontics</td>
<td>20 (51%)</td>
</tr>
<tr>
<td>None</td>
<td>4 (10%)</td>
</tr>
</tbody>
</table>
provided didactic instruction to predoctoral students in dental implants, 98 percent of their students received this instruction.

Whether the predoctoral students receive clinical experience in restoring dental implants (question 5): Thirty schools (86 percent) reported that their students received clinical experience, while five schools (14 percent) reported that their students did not. Four schools (10 percent) did not respond to this question.

Percentage of predoctoral students in question 5 receiving clinical experience (question 6): Fifty-one percent of the students actually receive the clinical experience in restoring implants, with a range of 5-100 percent.

Whether there is a predoctoral clinical competency “requirement” in implant prosthodontic procedures (question 7): Of those schools that provide clinical experience in restoring implants, four schools (13 percent) reported having a requirement, while 28 schools (88 percent) reported that they do not. Three schools (9 percent) did not respond.

From question 5, the types of implant-related procedures that predoctoral students are limited to restoring (question 8): Table 2 summarizes the types of implant procedures that the predoctoral students restore.

If answer to question 5 was yes, the percentage of the 100 patients who present with a completely edentulous mandible and receive an implant-retained overdenture (question 9): Ten percent of patients with a completely edentulous mandible received an implant-supported overdenture, with a range of 1-50 percent.

If answer to question 5 was yes, the percentage of the 100 most recent patients with a single missing tooth treated in the predoctoral clinic who were restored with an implant (question 10): Eighteen percent of the patients missing a single tooth received an implant restoration, with a range of 1-75 percent.

From question 5, the most common complications predoctoral students experience in restoring dental implants (question 11): For this question (which, in general, respondents answered as if they were addressing implant surgical placement and not strictly implant prosthodontic restoration) there were write-in responses as follows:

- The few students who get experience surgically placing implants are very closely supervised, resulting in very few complications.
- Our program is new. Only a few students have placed implants with no complications thus far.
- The students who surgically place implants are very closely supervised so complications are minimized.
- None have occurred yet.
- Inadequate time to make them competent in placement.
- Visualizing drill angulation.
- Insufficient knowledge of flap design. Letting pilot bur walk off the ridge. Insufficient retraction to allow for tension free closure of flap.

If answer to question 5 answer was no, reasons that schools were not offering predoctoral students clinical experience in restoring dental implants

<table>
<thead>
<tr>
<th>Table 2. Types of implant-related procedures restored by predoctoral students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer</td>
</tr>
<tr>
<td>Single tooth molar</td>
</tr>
<tr>
<td>Single tooth bicuspid</td>
</tr>
<tr>
<td>Implant overdenture with two implants and ball or stud attachment</td>
</tr>
<tr>
<td>Single tooth anterior</td>
</tr>
<tr>
<td>Simple 2-3-4 unit free-standing fixed partial denture</td>
</tr>
<tr>
<td>Implant overdenture with two implants and a bar attachment</td>
</tr>
<tr>
<td>No limit</td>
</tr>
<tr>
<td>Other*</td>
</tr>
</tbody>
</table>

*“Other” answers given:
- Assessed on a case-by-case basis for complexity.
- We are at the very beginning of a new clinical education program. Many answers reflect what we plan to do but have not reached the point yet of doing.
- No full mouth rehab, but do fixed-detachable mandibular prosthesis.
- Many times two implants will be placed in the posterior region of the mouth. These implants are typically restored as single crowns although occasionally they are splinted together.
- Simple two-unit free-standing fixed partial denture.
- We practically have no limits. The reason we can provide this type of experience is in part due to our surgical support from perio and oral surgery as well as the time that I invest with the students to guide them through the experience. My only specific restrictions are cases that we prefer to be under the supervision of grad prosthodontics, such as: immediate loading, fixed detachable, complex implant supported bar overdenture prostheses, and other full-mouth rehabilitations.
(question 12): For this question, there were write-in responses as follows:

- Our school began last year with implant instruction sponsored by Zimmer (Center Pulse).
- Not all students are treating implant patients at this time due to the patient pool.
- Clinical program just started. Students will be restoring cases in the future when implants are uncovered.
- Our plans are to provide experiences for all students in restoring implants. We just haven’t reached that point yet in the students’ program. We are at the beginning of the DS III year.
- We have not developed that part of the implant curriculum as of yet.
- Difficulty in management of such activity; not enough patients for all students to have the experience. All students do participate in one laboratory session; however, the experience is limited.
- Lack of workforce (faculty shortage and budget issues). However, a clinic program will be starting in January of 2005. Students will treat implant patients in the undergraduate program.

Whether predoctoral students receive clinical experience in surgical placement of implants (question 13): In twenty-six schools (74 percent), predoctoral students receive surgical experience in implant placement, while in nine (26 percent), they do not. Four schools (10 percent) did not respond to this question.

If answer to question 13 was yes, percentage of predoctoral students receiving clinical experience in surgical placement of implants (question 14): Twenty-eight percent of students receive this experience with a range of 5-100 percent.

If answer to question 13 was yes, whether there is a clinical competency requirement in surgical implant placement (question 15): Twelve schools answered this question. Of these, one said yes, and eleven said no.

If answer to question 13 was yes, types of implant cases the students are surgically placing (question 16): The results are summarized in Table 3.

If answer to question 13 was yes, most common complications with surgical implant placement by predoctoral students (question 17): For this question, which was open-ended, there were write-in responses as follows:

- Our students assist in the surgical placement of implants. They actively participate in certain phases of the procedure.
- The most common complication is infection due to loose cover screw. Also the students have a problem with becoming familiar with the instrumentation.
- Misalignment, complications with bone grafting.
- The few students who get experience surgically placing implants are very closely supervised, resulting in very few complications.
- Our program is new. Only a few students have placed implants with no complications thus far.
- The students who surgically place implants are very closely supervised, so complications are minimized.
- None have occurred yet.
- Visualizing drill angulation.
- Insufficient knowledge of flap design. Letting pilot bur walk off the ridge.

Table 3. Types of cases for implant placement (percentages are based on the nine schools that responded to this question)

<table>
<thead>
<tr>
<th>Answer</th>
<th>Number of Responding Schools (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing bicuspid</td>
<td>8 (89%)</td>
</tr>
<tr>
<td>Missing molar</td>
<td>7 (78%)</td>
</tr>
<tr>
<td>Fully edentulous mandible</td>
<td>7 (78%)</td>
</tr>
<tr>
<td>Partially edentulous mandible</td>
<td>4 (44%)</td>
</tr>
<tr>
<td>Missing anterior tooth</td>
<td>3 (33%)</td>
</tr>
<tr>
<td>Partially edentulous maxilla</td>
<td>3 (33%)</td>
</tr>
<tr>
<td>Fully edentulous maxilla</td>
<td>1 (11%)</td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
</tr>
<tr>
<td>No limits</td>
<td></td>
</tr>
</tbody>
</table>

Comments given:
- One-on-one faculty supervision at placement time.
- We do not require surgical experience with patients.
Insufficient retraction to allow for tension free closure of flap.

Reason students do not receive surgical experience in placing implants (question 18): For this question, there were write-in responses as follows:

- Predoctoral students do not have enough basic surgical skills. Should not be a predoctoral training procedure.
- We have grad programs in periodontics and an Implant Fellowship Program. The surgical cases are done by them. Predoctoral students may assist.
- Current patient “pool” does not provide enough implant patients for both oral surgery residents and students to place implants.
- Predoctoral observe and assist in the placement of implants but currently do not place implants based on knowledge/skill level, facilities, and sufficient faculty support.
- Our philosophy is that this is beyond the scope of predoc clinical education.
- Not enough patients for such an activity for all students; difficult to manage such an activity for all students.
- They are not proficient enough in surgical procedures.
- We currently have no didactic or clinical training in implant placement for predoctoral students. Since our postdoc perio, pros, OMFS, and AEGD students place implants, it is not an area that is presently planned as an experience for the predoc students.
- At the moment this is not part of the curriculum.
- Lack of adequately trained faculty and limited numbers of patients [are not good] indications for implantology.
- Our predoctoral students are entitled to select treatment plans and restore one single implant in their senior year. They have to attend the surgery of that patient. Also, as part of their predoctoral implantology course, they will get credit for every surgical observation. In the past few years, the majority of students selected to attend at least one surgery.
- Surgical placement is done by the advanced programs such as periodontics and oral surgery by residents.
- Graduate specialty training programs perform these services.
- Feel that dental students have to have a better understanding of implants before doing the surgery and [concerned about] the time involved for all the students to surgically place an implant. Plus, do not feel someone is “qualified” or learns by doing one case.
- Students will be required to attend the surgical phase of each implant they will restore. This will begin in January of 2005.
- Placement of implants is directed towards graduate dental residents and faculty. Students restoring implants are required to assist during surgical visits. They are also required to fabricate radiographic and surgical templates.
- At one time, under a different system with different faculty, the students were allowed to place dental implants. However, more recently surgical departments have minimized surgical experiences of dental students. Graduate students from multiple programs (OMS, periodontics, prosthodontics) have large need for surgically placing implants to meet the accreditation standards.
- At this time they are expected to “assist” in the placement with a resident from OMS or periodontics. Until our postdoctoral program is able to place as many implants as they need for adequate training, the predoctoral students will only be assisting.
- Students can observe placement on an ad hoc basis. Inadequate patient pool to educate preds and all postdocs that require it for accreditation.
- Our students @ UNC receive an extensive didactic, preclinical, and clinical
course. They have exposure preclinically with a surgical experience. They have experience clinically since they are required to attend the final consultation(s) and assist on the implant surgery and any bone grafting procedures. I believe that our students are well prepared to select cases, treatment plan, work up patients, intelligently communicate with and explain procedures to patients. The surgical exposure provides a much better understanding of these concepts. Also, we currently do not have sufficient manpower to take on the additional responsibility of teaching the surgical placement of dental implants. If we did so in the near future, it would only be available to students who were up-to-date with clinical and didactic requirements and have taken an additional surgical elective.

Faculty who teach implant prosthodontics to the predoctoral students. Participants were asked to answer all that applied (question 19): Results are summarized in Table 4.

Faculty who teach implant surgery to the predoctoral students. Participants were asked to answer all that applied (question 20): Results are summarized in Table 5.

Implant prosthodontic fee structure (question 21): Results are summarized in Table 6.

Percentage prosthodontic fee structure is higher than a crown or denture (question 22): The fee is 45 percent higher than a crown or a denture with a range of 0-100 percent.

Implant surgical fee structure. Participants were asked to check one answer (question 23): Results are summarized in Table 7.

### Table 4. Faculty teaching implant prosthodontics

<table>
<thead>
<tr>
<th>Answer</th>
<th>Number of Responding Schools (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosthodontic faculty</td>
<td>33 (94%)</td>
</tr>
<tr>
<td>General dental faculty</td>
<td>13 (37%)</td>
</tr>
<tr>
<td>Other (specify)*</td>
<td>4 (11%)</td>
</tr>
</tbody>
</table>

**“Other” answers:**
- Director of implantology: restorative dentist and director, division of operative dentistry
- Oral surgery faculty and residents, periodontal faculty, prosthodontic residents
- Implantology faculty
- Implant center faculty (prosthodontists)

### Table 5. Faculty who teach implant surgery to predoctoral students

<table>
<thead>
<tr>
<th>Answer</th>
<th>Number of Responding Schools (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodontics faculty</td>
<td>27 (77%)</td>
</tr>
<tr>
<td>Oral and maxillofacial faculty</td>
<td>25 (71%)</td>
</tr>
<tr>
<td>Prosthodontic faculty</td>
<td>7 (20%)</td>
</tr>
<tr>
<td>General dentistry faculty</td>
<td>4 (11%)</td>
</tr>
<tr>
<td>Other*</td>
<td>5 (11%)</td>
</tr>
</tbody>
</table>

**“Other” answers:**
- Implant Center faculty
- Implant Center faculty surgeons

### Table 6. Implant prosthetic fee schedule

<table>
<thead>
<tr>
<th>Answer</th>
<th>Number of Responding Schools (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same as crown or denture with separate abutment fee</td>
<td>14 (41%)</td>
</tr>
<tr>
<td>Higher than crown or denture</td>
<td>9 (26%)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (23%)</td>
</tr>
<tr>
<td>Same as crown or denture</td>
<td>5 (14%)</td>
</tr>
<tr>
<td>Not applicable</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Other (specify)*</td>
<td></td>
</tr>
</tbody>
</table>

**“Other” answers:**
- Implant is higher than a crown but fee includes surgery. Denture has separate abutment fee.
- Predoctoral fee schedule for implants is under the University Development Program, which provides special reduced fees, i.e., a single implant crown (including surgical and prosthodontic fees) is ~equivalent to the cost of a three unit FPD in the student clinic.
- Structured to be similar to crown fee so that this could be a viable option for patients who have the choice.
- For the overdentures, we charge as a package (placement of the two implants, two abutments, and the two dentures).
- We charge the standard rate for the prosthesis and an additional $200 for the implant service regardless of the number of implants used.
- Student fee: implant and crown equals 3 unit FPD at student rate.
- Separate fee for implant placement and abutment installation.
- The actual fee for the crown or the denture is the same. Obviously, there is the additional fee of the workup, surgical template, tomo or CT, and abutment (and any necessary bone grafting procedures).

Percentage implant surgery fees are higher than private practice (question 24): In question 23, one school reported that the surgical fee in the dental faculty practice is the same or greater than private practice. No schools noted it here.

Whether schools receive free dental implant components from implant companies (question 25): Twenty-nine schools (85 percent) indicated that they...
did receive free components from implant companies, while five schools (15 percent) did not.

**Percentage of implants placed by school as a result of free implant components** (question 26): Ninety-eight percent of the schools placed implants as a result of free implant components from companies, with a range of 1-100 percent.

**Most significant challenges in providing students with clinical implant experience—ranked by the top three with 1 being the most significant** (question 27): The results are summarized in Table 8. Additional comments or suggestions (question 28): For this question, there were write-in comments or suggestions as follows:

- Other impediments: Difficult to coordinate specialties for each case. Stocking parts and equipment a problem. Intensive instruction required, especially in planning the case. We work exclusively with one company, so have not taken advantage of other company’s offer for free implant components.

- The university development program with reduced costs to our patients has been the primary reason for the success of our predoctoral program. It is uncertain how long this program will be continued by the implant companies involved. It is critical for our predoctoral program that this program continues.

- We are starting a comprehensive implant program for the predoctoral students, which includes an implant center, education of faculty, cost of implant procedures similar to basic restorative procedures, and a clinical experience with implant restorations for every student.

- We have had a good response from our patients to accepting implants, and our fees are affordable due to the implant grant. Lack of time would be our most significant challenge. Scheduling the patients for surgery in a timely manner, so the student can restore the implant, can sometimes be a challenge.

- Our fees are very reasonable, and patients view implants as an affordable alternative. Faculty are supportive. Lack of time to schedule the surgical portion of the procedure and restore the implant before graduating is the only challenge we have, and it is not too frequent a problem.

- Workshop should be helpful to all of us in trying to determine an efficacious way to include this instruction in the curriculum in a meaningful way.

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**Table 7. Surgical implant fee structure**

<table>
<thead>
<tr>
<th>Answer</th>
<th>Number of Responding Schools (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other (specify)*</td>
<td>29 (85%)</td>
</tr>
<tr>
<td>Not applicable</td>
<td>3 (9%)</td>
</tr>
<tr>
<td>Same as private practice</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>More than private practice</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

**“Other” answers:**
- Surgery is performed by graduate students at a much reduced cost for the patients of the predoctoral student.
- Less than private practice (20 schools responded with this answer).
- Less than 50 percent of private practice fee (2 schools).
- Reduced according to the guidelines of the University Development Program.
- Fewer postdoctoral students perform implant surgery.
- Fee stated covers both surgery and prosthodontics.
- Not yet determined.
- Student fee.
- Resident fee based on discount for dental student’s patient.
- Same as crown or abutment.
- However, patients must be patients of record within our clinics.

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**Table 8. Top three challenges for offering clinical experience with dental implants**

<table>
<thead>
<tr>
<th>Rank</th>
<th>#1 (no. of schools)</th>
<th>#2 (no. of schools)</th>
<th>#3 (no. of schools)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Not enough trained faculty</td>
<td>9</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>2. Cost of implants to patients</td>
<td>4</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>3. Lack of time</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>4. Not enough patients with need of implants</td>
<td>7</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>5. Lack of interest/acceptance of implants by faculty</td>
<td>1</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6. Cost of implants to school</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
Thanks for sponsoring and supporting this type of program. We need implants as part of a comprehensive contemporary dental curriculum.

The best answer for #27 would be the coordination between predoctoral students, surgical residents, and patient for surgical consultation, surgical placement, and abutment connection.

If it is not required, have an assigned rotation, or have a competency, a number of dental students will not restore or be interested in dental implants. Some only want to do what is required of them and nothing more.

Integration into routine student clinics challenging for clinic staff. Tracking patients as well as components and “tools” is time- and labor-intensive.

NOTE 1: The answer to question #26 is based on the predoctoral clinics. We receive ALL components for predoctoral clinics free of charge from the implant companies. We purchase the implants and all components for the grad clinics and DFP. NOTE 2: My answer to question #27 does not rank these answers since we do not consider many of these points to be problematic.

Discussion

In recent years, implant dentistry has established a presence in the predoctoral dental curriculum. The provision of implant dentistry in U.S. dental schools has steadily increased from 33 percent in 1974 to 84 percent in 2002. From our survey of U.S. and Canadian dental schools, it is evident that the majority of the schools (97 percent) offer at least some didactic instruction in dental implants. The majority of the schools (86 percent) offered their students clinical experience in restoring dental implants as well. The most popular implant-related procedures performed by the students were single-tooth replacements with implants and implant-retained overdentures (two implants with stud type attachments over which a removable prosthesis is utilized).

Most schools do not have predoctoral clinical competency requirements for both surgical placement and restoration of dental implants. Frequently cited challenges that schools faced with students in restoring implants were a lack of adequately trained faculty, implants not being part of the curriculum, and the cost of implants for the patients. Many of the schools delegated implant-related procedures to their advanced education and specialty programs.

Considering the increased usage and predictability of implants and the high demand from patients for implant restorations, implant training is destined to become a mainstay in the predoctoral curriculum and a requirement for graduation. Many schools reported on programs under development. Maalhagh-Fard et al. showed that recent graduates were more inclined to offer and perform implant prosthodontics in their practices when their dental school curricula included implant courses. Therefore, in order to prepare students for viable use of dental implants in private practice, schools need to incorporate a combination of didactic and clinical experience with dental implants into their predoctoral programs.

Conclusions

A survey of predoctoral implant dentistry curricula in all U.S. and Canadian dental schools garnered a 70 percent response rate. The majority (97 percent and 86 percent, respectively) of the responding schools offered didactic and clinical experience in restoring dental implants, but did not include it as a graduation requirement. The data revealed some common trends as evidenced by the large percentage of schools agreeing that:

1. Advanced dental education programs exist in their school.
2. Single-tooth implant restorations are performed at the predoctoral level in most schools.
3. Implant-retained overdenture prostheses are performed at the predoctoral level in most schools.
4. There is no predoctoral clinical competency requirement for surgical implant placement in all schools that responded to the survey.
5. There is no predoctoral clinical competency requirement for implant prosthodontics in most schools that responded to the survey.
6. Prosthodontic specialty faculty are often responsible for teaching implant prosthodontics at the predoctoral level.
7. Periodontics and oral and maxillofacial surgery
faculty are commonly responsible for teaching
implant surgery at the predoctoral level.
8. Support from implant companies is common for
dental schools, with most providing for implant
components at discounted costs.
9. There is a lack of adequately trained faculty in
implant dentistry, which is a significant challenge
in providing predoctoral students with clinical
experience with dental implants.

In summary, the results of this workshop clearly
speak to the need to incorporate additional instruction
into the predoctoral curriculum so that predoctoral stu-
dents will be most skilled in diagnosing the need for
implants and in restoring them and, at a minimum, be
exposed to their surgical placement.

Acknowledgments
The authors would like to express special
thanks to the following sponsors of the Implant Con-
ference: Academy of Osseointegration (AO), Ace
Surgical Supply, Academy of Periodontology (AAP),
American Association of Oral and Maxillofacial
Surgeons (AAOMS), American College of
Prosthodontists (ACP), Astra Tech, Biolok, Dentatus,
Dentsply International, Inc., Henry Schein—
CamLog Division, 3i (Implant Innovations, Inc.),
International Congress of Oral Implantologists
(ICOI), Lifecore Biomedical, Nobel Biocare, NYU
College of Dentistry, Straumann, Inc., University of
Medicine and Dentistry New Jersey (UMDNJ), and
Zimmer Dental.

The authors also wish to thank Francine Berkey
and The Avenues Company for her work in organizing
the Implant Conference and in facilitating the
composition of the survey.

REFERENCES
1. Esposito M, Hirsch J-M, Lekholm U, Thomsen P. Bio-
logical factors contributing to failures of osseointegrated
oral implants: (1) success criteria and epidemiology. Eur
2. Zarb GA, Albrektsson T. Consensus report: towards opti-
mized treatment outcomes for dental implants. J Prostheth
3. Lim V, Afsharzand Z, Rashedi B, Petropoulos VC.
Predoctoral implant education in U.S. dental schools. J
Prosthod 2005;14:46-56.
dentistry in predoctoral education: the elective approach.
5. Huebner GR. Evaluation of a predoctoral implant cur-
riculum: does such a program influence graduates’ prac-
6. Afsharzand Z, Lim MVC, Rashedi B, Petropoulos VC.
Predoctoral implant dentistry curriculum survey: Euro-
7. Leggott PJ, Robertson PB, del Aguila M, Swift JJ,
Porterfield D, Phillips S, Anderson MH. Patterns of oral
care in dental school and general dental practice. J Dent
8. Wileox CW, Huebner GR, Mattson JS, Nilsson DE,
Blankenau RJ. Placement and restoration of implants by
predoctoral students: the Creighton experience. J Prosthod
9. Chappell RP. Dental school implant survey. Oral Implantol
1974;5:24-32.