Advanced Predoctoral Implant Program at UIC: Description and Qualitative Analysis


Abstract: Dental implant education has increasingly become an integral part of predoctoral dental curricula. However, the majority of implant education emphasizes the restorative aspect as opposed to the surgical. The University of Illinois at Chicago College of Dentistry has developed an Advanced Predoctoral Implant Program (APIP) that provides a select group of students the opportunity to place implants for single-tooth restorations and mandibular overdentures. This article describes the rationale, logistics, experiences, and perspectives of an innovative approach to provide additional learning experiences in the care of patients with partial and complete edentulism using implant-supported therapies. Student and faculty perspectives on the APIP were ascertained via focus group discussions and a student survey. The qualitative analysis of this study suggests that the select predoctoral dental students highly benefited from this experience and intend to increase their knowledge and skills in implant dentistry through formal education following graduation. Furthermore, the survey indicates that the APIP has had a positive influence on the students' interest in surgically placing implants in their future dental practice and their confidence level in restoring and surgically placing implants.

Keywords: dental education, dental implants, implant-supported therapy, implant dentistry, edentulism

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Dental implants have become widely accepted and well-documented treatment modalities, leading to predictable and viable dental solutions for the edentulous. Several studies have found that there is a positive correlation between graduating dental students' intention to provide implant therapy in their future practice and their predoctoral implant educational experience. It is imperative for dental students to become exposed to this treatment modality as they will be treating partially and completely edentulous patients throughout their careers. For this reason, over the past years, predoctoral dental curricula have begun to include implant dentistry: the teaching of implant dentistry in predoctoral curricula increased from 33 percent of U.S. dental schools in 1974 to 84 percent in 2002. A 2004 American Dental Education Association (ADEA) Implant Workshop’s Survey of Deans found that 97 percent of U.S. and Canadian dental schools offered at least some didactic instructions in implant dentistry, with 86 percent providing clinical restorative experiences as well. However, the data from that study indicated that, of the thirty schools reporting that their students receive clinical experience, only 51 percent of those students actually restored implants (range of 5 to 100 percent). Furthermore, only four schools (13 percent) reported a clinical competency requirement in implant prosthodontic procedures, whereas twenty-eight schools (88 percent) reported it as not a requirement.

The Commission on Dental Accreditation (CODA)’s new accreditation standard for predoctoral programs mandates graduates to be competent in “replacement of teeth including fixed, removable, and dental implant prosthodontic therapies” as of July 1, 2013. This accreditation standard will hopefully encourage robust teaching of implants nationwide. However, there is no national competency standard in implant surgery at the predoctoral level. Historically, oral and maxillofacial surgeons were the only specialists to place dental implants, with peridontists incorporating implant therapy in
their scope of practice in the 1990s. However, more recently, other specialists as well as general dentists have been performing implant surgeries with high success rates. As the demand for dental implants continues to increase, one must consider if predoctoral students should have more exposure to the surgical aspect of this highly accepted treatment modality in hopes of sparking interest in further training. Thus far, student experiences in implant placement have been limited to observing and assisting faculty members or specialty residents as they perform the surgical procedures. In a study published in 2005, only two of the thirty-two (6 percent) responding dental schools reported that their “students place the implants,” with Creighton University School of Dentistry being the earliest program reporting clinical opportunities in placement and restoration. Recently, two dental schools reported success with the introduction of an implant surgical elective into their predoctoral curricula. There are a myriad of reasons why the majority of dental school curricula lack formal predoctoral implant placement training. Some of these include lack of appropriately trained faculty, limited patient pool, limited funding and time in dental curriculum, and traditional perspectives on when and how students should be trained in implant placement. However, once these obstacles are addressed, will predoctoral students benefit from being taught the knowledge and skills associated with placing implants?

At the University of Illinois at Chicago (UIC) College of Dentistry, all predoctoral students are given the opportunity to restore implants in the Predoctoral Implant Program (PIP). A select group are also given the opportunity to surgically place implants in the Advanced Predoctoral Implant Program (APIP). The purpose of this article is twofold: 1) to present one institution’s experience in developing and implementing an advanced predoctoral implant dental curriculum and 2) to share student and faculty perceptions of the APIP. Perceptions were sought via a qualitative research approach, using focus groups interviews as small-group discussions about a given dilemma, experience, or service among individuals with similar backgrounds and experiences. This qualitative study format has the advantage of exploring participants’ insights in ways that a simple, structured questionnaire may not be able to provide. By allowing interaction between participants, one is better able to elicit contrasting perspectives, emotions, and motives.

The Advanced Predoctoral Implant Program

In 2000, the UIC College of Dentistry established the Comprehensive Dental Implant Center to help the Chicago metropolitan area with best practice therapies associated with partial and complete edentulism while providing for a robust learning experience for the students. In 2005 and 2006, the program began to provide two implant-retained mandibular overdentures (IOD) for completely edentulous patients and single tooth implant (STI) restorations based on a well-defined set of diagnostic criteria.

Dental implants are first introduced to the second-year predoctoral students through interactive didactic sessions from faculty members in the Departments of Restorative Dentistry, Oral and Maxillofacial Surgery, and Periodontics. The didactic material is supplemented with a hands-on laboratory component that includes fabrication of STI and IOD surgical guides, implant placement in partially edentulous and completely edentulous models, final impressions and provisionalization of STI, and reline and pick-up procedures for IODs utilizing resilient attachments (Locator attachment, Zest Anchors). During the clinical component of the program, students must meet the competency standard through a series of clinical experiences that include STIs and IODs. Each student is responsible for reviewing the patient’s medical and dental history, performing a comprehensive clinical examination, identifying diagnostic criteria for implant care, performing diagnostic wax-ups, fabricating radiographic and surgical guides, assisting postgraduate residents with the implant surgery, and providing definitive restorative treatment and patient maintenance (Figure 1). Furthermore, all students must prepare an implant portfolio that documents all components of the STI and IOD therapy rendered for a single patient.

In the summer of 2011, the College of Dentistry introduced the Advanced Predoctoral Implant Program (APIP). The APIP provides opportunities for advanced fourth-year predoctoral students to engage in all phases of implant therapy. The primary goal of the program is to provide additional learning experiences in the care of patients with partial and complete edentulism using implant-supported therapies and 3D imagining techniques. Additionally, the program is designed to provide exposure to and encourage interest in the dental specialties
of prosthodontics, oral and maxillofacial surgery, and periodontics. Under strict faculty supervision, select students not only restore STIs and IODs, but also surgically place the supporting implants. Furthermore, students are given the opportunity to attend multiple meetings with postgraduate students in prosthodontics, oral and maxillofacial surgery, and periodontics. Student experiences in diagnosis and treatment planning are enhanced with participation in Postgraduate Prosthodontic Patient Presentations and literature review seminars. APIP students are also introduced to guided surgical software (Facilitate, Dentsply, Waltham, MA), custom abutment design technology (Atlantis, Dentsply, Waltham, MA), and 3D scanning technology (Procera, Nobel Biocare, Zurich, Switzerland).

Student selection into the APIP is very competitive. On average, ten students are accepted to the program each year at the end of the third year. To be considered, students must be in the top half of their class, have obtained an overall grade of 88 percent or greater in the pre-patient care implant course, and are required to assist in a minimum of two implant surgeries prior to applying to the program. The application process also includes a brief personal statement and two letters of recommendation. Once accepted, students are assigned based on their interests to one of three disciplines: prosthodontics, oral and maxillofacial surgery, or periodontics. The overall administration of the program is the responsibility of the director of predoctoral implant education. A multidisciplinary implant group comprised of the specialty program directors serve as mentors to each group of students and supervise the formulation of patient treatment plans as well as the surgical procedures, similar to most advanced educational programs. Implant surgeries are performed by the predoctoral students assisted by postgraduate residents, while the faculty mentors strictly supervise all necessary steps. All restorative treatment is completed in the Implant and Innovations Center under the supervision of the Predoctoral Implant Program faculty.
Material and Methods

A focus group script was created and sent for approval to the University of Illinois at Chicago Office for the Protection of Research Subjects for Institutional Review Board (IRB) review. After IRB approval (2013-0032) was obtained, APIP students and faculty members were contacted via email to participate in a focus group study. Student and faculty focus groups were conducted separately by different moderators (FSA, JCY). After obtaining written consent from all participants, moderators followed a semi-structured topic guide (Table 1 and Table 2). Moderators made sure that the groups had a full discussion of each item on the agenda and that all respondents were given sufficient opportunity to share their views. Apart from this, the moderators’ role was passive. The discussion was audiorecorded and subsequently transcribed. During the discussion, students were asked to complete an anonymous questionnaire on their perception of the APIP (Table 3). In addition, students were asked to indicate whether they will be pursuing advanced training following graduation and how this program affected their decision.

Raw data from the student survey were entered into Microsoft Excel 2007 (Microsoft, Seattle, WA) for analysis. The frequency, average, and standard deviation for each category was calculated and reported. Statistical software (SPSS v. 20.0, SPSS Inc., Armonk, NY) was used for descriptive analysis.

Results

Student Perceptions of the APIP

With a response rate of 100 percent, all nine APIP students volunteered to participate in the focus group discussion. As outlined in the discussion guide (Table 1), major points made by the students were as follows.

Expectations and experiences. All students unanimously found the implant placement portion of the program the most appealing when they applied. They reported that the program met their expectations. However, they realized that it was only giving them a foundation for surgical placement and, as one said, “[we] never expected to come out of this program completely competent at placing [implants].” The students found providing a patient with continuous care rewarding—more specifically, being responsible for restorative and surgical aspects of the care. A few students also had the opportunity to observe complications associated with implant surgery and optimal management approaches of these unexpected occurrences (e.g., bone grafting at fenestration site).

Positive attributes. The students unanimously agreed that the APIP helped them consolidate the information they learned in the predoctoral implant program. All students found that the experience helped them realize the close interrelationship between surgical placement and implant restoration. More importantly, they realized that the surgery is restoratively driven and the importance of the

Table 1. Student focus group topic guide

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Moderators introduce themselves to the group. Audio recorder. Interested in everyone’s views and experiences. Complete questionnaire.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Expectations and Experiences</td>
<td>What about the program was appealing? What were you hoping to get from the program? Describe your experiences.</td>
</tr>
<tr>
<td>2) Positive Attributes</td>
<td>How did the program meet/exceed your expectations?</td>
</tr>
<tr>
<td>3) Negative Attributes</td>
<td>How did the program fall short of your expectations? How can the program be improved?</td>
</tr>
<tr>
<td>4) Future Career Goals</td>
<td>What are your future career goals? How did the program influence your decision?</td>
</tr>
<tr>
<td>5) Patient Treatment Approach</td>
<td>Any influences on future patient therapy offered/ rendered?</td>
</tr>
</tbody>
</table>

Table 2. Faculty focus group topic guide

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Moderators introduce themselves to the group. Audio recorder. Interested in everyone’s views and experiences.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Experiences</td>
<td>Describe some student experiences.</td>
</tr>
<tr>
<td>2) Benefits</td>
<td>How did the predoctoral students benefit? How did the postgraduate students benefit?</td>
</tr>
<tr>
<td>3) Future Improvements</td>
<td>How can the program be further improved?</td>
</tr>
</tbody>
</table>
there was some inconsistency in the amount of help 
they were given during the surgery depending on the 
assigned department. In some disciplines, students 
were allowed to perform all aspects of the surgery, 
whereas in others there was stricter supervision and 
more “hand-holding.” The students attributed this to 
miscommunication as to student expectations.

Future career goals. All of the students in 
dicated that they will be pursuing further training 
in implant dentistry via either a specialty program 
or a general dentistry residency after graduating or 
in the future. They found the APIP program to be 
helpful in the decision process. For a few students, 
the experiences gained from the program affirmed 
their prior decision to pursue advanced training: one 
commented, “I was pretty set on what I was going to 
do. This just kind of confirmed it for me that I can 
and I like it. And I treated it as kind of like a mini-
residency.” In addition, some students expressed 
that the experiences obtained in the APIP helped 
them with the interview process for their respective 
advanced training program.

Patient treatment approach. The students 
expressed that, because of this program, they had 
become more comfortable offering patients implants 
as treatment options. The students said they were now 
able to confidently explain to the patients the steps 
involved in the implant placement, possible compli-

| Table 3. Results of survey of Advanced Predoctoral Implant Program students |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Question | 1 | 2 | 3 | 4 | 5 | Mean | SD |
| 1. Prior to this program, how interested were you in restoring implants in your future dental practice? | 0 | 1 | 0 | 0 | 8 | 4.67 | 1 |
| 2. After participating in this program, how interested are you in restoring implants in your future dental practice? | 0 | 1 | 0 | 0 | 8 | 4.67 | 1 |
| 3. Prior to this program, how interested were you in surgically placing implants in your future dental practice? | 0 | 0 | 0 | 4 | 5 | 4.56 | 0.53 |
| 4. After participating in this program, how interested are you in surgically placing implants in your future dental practice? | 0 | 0 | 0 | 1 | 8 | 4.89 | 0.33 |
| 5. Prior to this program, how confident were you in restoring implants? | 0 | 1 | 3 | 4 | 1 | 3.56 | 0.88 |
| 6. After participating in this program, how confident are you in restoring implants? | 0 | 0 | 0 | 5 | 4 | 4.44 | 0.53 |
| 7. Prior to this program, how confident were you in surgically placing implants? | 3 | 4 | 2 | 0 | 0 | 1.89 | 0.78 |
| 8. After participating in this program, how confident are you in surgically placing implants? | 0 | 1 | 3 | 5 | 0 | 3.44 | 0.73 |

Note: Rating scale ranged from least (1) to greatest (5). Means and standard deviations (SD) are reported along with the tabulated responses.
cations, and expected outcomes. They reported that the APIP helped them to better communicate with patients: one said, “You can confidently and comfortably explain the [implant surgery] to the patient . . . and they are more inclined to trust you because you speak from your own experience.” One student expressed that, in the future, with every patient that receives a mandibular denture, she will talk to them about implants and implant-supported overdentures. The students also reported they have learned how to better communicate with other clinicians and work as a team. In addition, the students said they have a better appreciation for what they consider to be an appropriate surgical outcome.

As shown in Table 3, all nine students indicated that they will be pursuing advanced training following graduation (five in a general practice residency, one in periodontics, one in oral and maxillofacial surgery, and two in prosthodontics). On a scale of 1 to 5, with 5=very relevant, the students indicated that, on average, they found this program to be “somewhat relevant” (score of 4) in helping them make the decision to enter their advanced training. Furthermore, the results showed that the APIP increased the students’ interest in surgically placing implants in their future dental practice (mean 4.56 pre-APIP to 4.89 post-APIP), confidence level in restoring implants (mean 3.56 pre-APIP to 4.44 post-APIP), and confidence level in surgically placing implants (mean 1.89 pre-APIP to 3.44 post-APIP). It must be noted that student interest prior to the program was retrospectively evaluated.

**Faculty Mentor Perceptions of the APIP**

With a response rate of 100 percent, all three program directors from the Departments of Restorative Dentistry, Oral and Maxillofacial Surgery, and Periodontics volunteered to participate in the focus group discussion. As outlined in the topic guide (Table 2), major points made by the program directors were as follows.

**Clinical experiences.** All mentors unanimously agreed that all the students showed great enthusiasm for and appreciation of every aspect of the program. One commented, “We are allowing them to make incisions, prepare flaps, remove bone, and actually drill and put the implant in place. I think that is an experience that is extremely valuable for them and they appreciate it.”

**Predoctoral and postgraduate student benefits.** The mentors agreed that much of the acquired surgical and technical skills will be extrapolated to the students’ future patient care on a limited basis. However, they commented that this unique experience will enhance student ability in diagnosis and treatment planning, realization of the intricacies and complexity of implant surgery, and understanding of the relationship between implant placement and the definitive restoration. Furthermore, the faculty members noted that this experience had helped the students realize the importance of pursuing advanced education and that not only had the APIP helped the students in their decision to pursue advanced programs, but also had assisted with the interview process. The postgraduate students who oversaw the surgeries were given the opportunity to be on the teaching side of the learning spectrum, and the faculty members commented that this experience not only helped them fine-tune their skills, but also improved their confidence in what they had already learned in the specialty program. As one faculty member said, “[The graduate students] are acting as the teacher . . . that vertical learning and that vertical teaching pattern are useful to them. For them to question their skill and their ability to teach what they are doing to somebody else is extremely valuable.” In addition, the postgraduate and predoctoral students learned to work as a team, according to the faculty members, with the ultimate goal of restoring the patient to proper function, form, and esthetics.

**Future improvements.** Some of the faculty members’ recommendations for future improvement of the program included emphasis on treatment planning skills, comprehensive assessment, and diagnoses. They also recommended more student exposure to implant surgery through observation and surgical assistance prior to entering the program and reiteration of the surgical protocols.

**Discussion**

The Advanced Predoctoral Implant Program at the University of Illinois at Chicago College of Dentistry was instituted with the objective of providing additional learning opportunities to select students in implant-supported therapies for partially and completely edentulous patients. As described, factors that have facilitated the development of such a program include a rigorous student selection process, review and training of the surgical protocol, patient selection
criteria, faculty supervision, and adequate interaction with the specialty programs. Results from this study indicate that the program has been successful at encouraging students to reach beyond their usual clinical boundaries and has sparked new interests in dentistry. As one student stated, “For me, one of the greatest things about the implant program was it was something that put a knot in my stomach and made me nervous and made me excited. . . . It just pushed you to try to keep getting better. It kind of lights a new fire and gets you excited about dentistry.”

In addition, via exposure to dental specialties, the APIP successfully motivated interested students to pursue formal education in implant dentistry as four of the nine students will enter a specialty program following graduation. Possible reasons for pursuing further formal implant training as indicated by the survey results include an increased interest in implant surgical placement as well as an increase in student confidence in both restoring and placing implants. These findings are consistent with previous studies reporting that implant training increases students’ feeling of preparedness for, positive attitude towards, and deeper understanding of implant therapy. Focus group discussions with our students and faculty also revealed that both groups agreed students gained a better understanding of implant placement, although on a limited basis, and that further training is required.

As one faculty member summarized, “I’ve heard comments from the students saying that they realize they just can’t go out and start an implant practice and start doing it. They actually appreciate all of the subtleties and challenges more and . . . [that] is why they want to get more training because they like it.”

Furthermore, positive interactions between the APIP students and faculty members in the specialty programs may have also contributed to student interest in advanced or specialty training. The influence of instructors as role models and mentors has been known to positively influence student specialty choices both in medicine and prosthodontics.

A common theme raised by the participants indicates that the predoctoral students gained both knowledge and skills from providing continuous care for implant patients compared to their counterparts. The students were responsible for reviewing the patient’s medical and dental history, performing a comprehensive clinical examination, identifying diagnostic criteria for implant care, performing diagnostic wax-ups, fabricating radiographic and surgical guides, performing the implant placement surgery under supervision of a faculty mentor, and providing definitive restorative treatment and patient maintenance. This allowed the students to realize the interrelationship of each aspect of the treatment plan: how the definitive restoration guides the surgical placement and the placement determines the final prosthetic outcomes. Furthermore, the students expressed that since they were responsible for the surgical placement, they began to understand the importance of the patient selection process and established evaluation criteria. More importantly, the students gained a better grasp of when to refer patients to a specialist. These students will be better equipped to identify the uncomplicated patient scenarios, as it is important to refer more complex patients to specialists.

On the other hand, the students and faculty members did express some drawbacks to the program. This included difficulty in acquiring patients, departmental variation in supervising patient care, and inconsistency in faculty expectation of student ability. All of these concerns will be addressed in the future as the program evolves. Another major disadvantage of the program is that the APIP provides advanced implant opportunities to only a select group of students. Therefore, results of the qualitative feedback and survey are skewed as these students are hand-picked and have a prior interest in implant dentistry and possibly specialty training. However, the success of the program is highly dependent on the participants as all students are motivated, clinically skilled, and in good academic standing. The training obtained in implant dentistry by the remaining students is still considered to be highly robust and meets CODA standards. Nevertheless, the APIP provides an additional level of experience to those motivated to pursue additional training. Via case presentations and small-group discussion, APIP students can share their experiences so as to hopefully help bridge the gap between the two student groups.

The APIP at the UIC COD may serve as a model for other institutions in implementing such programs for select predoctoral students while promoting a positive student interaction with various disciplines and sparking interest in a specialty program. The positive feedback about the program from both the students and faculty is encouraging. Further clinical outcomes of the APIP and patient perspectives on implants surgically placed by the predoctoral students as well as a follow-up with the graduating cohort of students will be reported in future studies.
Student and faculty perceptions presented in this study were based on focus group discussions. Limitations of this qualitative research methodology include an inability to draw inferences about larger populations and quantify participants’ strength of convictions. Quantitative techniques, such as questionnaires distributed to the broader populations, would be necessary for such statistical testing. Furthermore, focus group studies rely heavily on moderation and interpretation of the results. Therefore, compared to other research methods, they may easily lend themselves to provide evidence to support author preconceptions. However, focus group interviews are relatively easy, flexible, and less structured research methods that help uncover a wide range of information and emotions regarding a certain subject matter, which can be tested in subsequent quantitative studies.

Conclusion

To date, implant education has been incorporated into a majority of predoctoral dental curricula nationwide, although at varying levels. However, only a few report opportunities for surgical experience with implants. Through a well-controlled student and patient selection process, the Advance Predoctoral Implant Program provides the opportunity for a select group of students to work alongside specialty program directors and residents, diagnosing, planning, and surgically placing implants, as well as applying advanced digital imaging and prostheses fabrication techniques. Student and faculty perceptions indicate that the APIP has succeeded in achieving its goal of providing learning opportunities beyond the traditional predoctoral education in implant dentistry and encouraging students to pursue their interest in implant dentistry following graduation through accredited educational programs. Furthermore, the APIP increased the students’ interest in surgically placing implants in their future dental practice, their confidence level in surgically placing implants, and their confidence level in restoring implants, and their confidence level in surgically placing implants.

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REFERENCES