Introduction of an Implant Surgical Selective into a Predoctoral Dental Curriculum

Richard Zimmermann, D.D.S.; William D. Hendricson, M.A., M.S.

Abstract: This article describes the introduction of an implant surgical selective into a predoctoral dental curriculum. It outlines the various challenges encountered in developing the program and the methods used to overcome those challenges. The article also discusses the outcomes of the first year of the program.

Dr. Zimmermann is Assistant Professor of Comprehensive Dentistry, Dental School, University of Texas Health Science Center at San Antonio; Mr. Hendricson is Assistant Dean, Educational and Faculty Development, Dental School, University of Texas Health Science Center at San Antonio. Direct correspondence and requests for reprints to Dr. Richard Zimmermann, Dental School, University of Texas Health Science Center at San Antonio, Mail Code 7914, 7703 Floyd Curl Drive, San Antonio, TX 78229-3900; zimmermannr@uthscsa.edu.

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Until the 1980s, when a patient was missing either a single tooth or multiple teeth, the only option was modification of the remaining teeth via a fixed or removable prosthesis. In many of these cases, the prosthesis either compromised the abutment teeth or was itself compromised in some fashion by poor retention, stability, esthetics, or even patient dissatisfaction. The advances made in the area of dental implants give dentists the ability to rehabilitate a patient with a more functional, esthetic, and successful prosthesis.1,2

An implant is made of an “alloplastic material [i.e., titanium] . . . that is surgically placed into orofacial tissues and used for anchorage, functional, therapeutic, and/or esthetic purposes.”3 Implant surgery was initially performed by the dental surgical specialties (periodontics and oral surgery); however, the long-term success and innovations in procedures have motivated other specialties and general dentists to begin performing implant surgeries.4,5 The dissemination of information about dental implants to the public has also increased dramatically over the past twenty-five years, which has further fueled exploration of this therapeutic modality throughout dentistry. The sales of various implant parts have grown tenfold from $100 million in 1995 to an estimated $1 billion in 2005.6 This growth demonstrates the widespread acceptance of dental implants by both patients and dentists.

In the past ten years, nonclinical aspects of implant dentistry have been incorporated into dental school curricula. Through didactic courses and preclinical laboratory exercises, dental students are now exposed to the various aspects of dental implants from surgery to prosthetics (e.g., crowns, denture attachments). In a 2004 survey of the deans of U.S. and Canadian dental schools, 86 percent reported that their students received clinical experience with implants.7 However, review of the literature indicates that the majority of dental students’ actual clinical experiences with implant therapy involves prosthetic rehabilitation, whereas their surgical experience with implants is limited to observing and assisting a faculty member or resident or occasionally performing certain surgical steps.8-11 Multiple reasons have been cited for not providing dental students the opportunity to surgically place implants: finding adequate time to incorporate this clinical experience into an already crowded curriculum; not enough patients for both dental students and dental residents; traditions, such as that surgical placement of implants historically has been performed only in dental residency programs and not at the predoctoral level; and lack of adequately trained faculty. However, oral health care in the twenty-first century is evolving as new diagnostic and treatment technology and strategies emerge. In order to develop clinicians who are capable of providing optimal care, teaching institutions must develop strategies to ensure that their faculty members develop competence in emerging patient care techniques that were not included in the curriculum when they were students and must also incorporate these new modalities into the curriculum for current dental students.

Like many dental schools, the University of Texas Health Science Center at San Antonio Dental
School (UTHSCSA-DS) annually conducts surveys with graduates who are now in practice as a component of the institutional outcomes assessment plan. Surveys are sent to one or more graduating classes each year who have been in practice for five to six years and thus have an experience base to allow reflection on the strengths and limitations of their predoctoral education. As part of this assessment, alumni are asked to identify patient care competencies that are critical to their current practice that could have been addressed more substantially during their dental school experience. Since UTHSCSA-DS began conducting alumni surveys in the early 1990s, surgical placement of implants has been among the top three competencies identified by graduates for enhanced predoctoral educational experience.

At one time, UTHSCSA-DS had an elective that gave participating students the opportunity to surgically place implants. However, that program was not continued after the program director left the institution. Therefore, the short-term goal of the new implant program at the school was to develop a cohort of general dentistry faculty members who are competent in implant surgery and to begin teaching a select group of dental students. The long-term goal over the next five to ten years is to establish a group of general dentistry faculty members who are competent at surgical placement of implants and to utilize this initial cohort of trained faculty members to provide additional education and mentoring for a larger group of faculty members and, by doing so, to expand the number of predoctoral students who can receive instruction and guidance for implant placement. This strategy protects the program from being dependant upon one or two individuals and at the same time allows room for program expansion.

The specific objectives of the program are as follows:
1. To implement a professional development program using a train the trainer model to expand capacity of the UTHSCSA-DS faculty to provide implant therapy and thereby expand the capacity to implement implant education for dental students;
2. To evaluate the professional development program to determine satisfaction of participating faculty members with the training model and obtain their self-assessment of implant knowledge, attitudes, and confidence before and after training;
3. To implement and evaluate an implant selective for dental students using faculty members who participated in the professional development program; and
4. To assess the quality of students’ clinical performance in the selective and obtain their assessments of the implant education experience.

This article reports on the introduction and preliminary outcomes of the program.

Introduction of the Program

In January 2009, a strategic plan was developed at the UTHSCSA-DS to prepare fourth-year dental students to surgically place implants. A cornerstone of the plan was enhancement of faculty skills in implant therapy to build a cadre of trained clinicians who could effectively supervise dental students and also facilitate the development of implantology skills among their colleagues. Faculty development is a critical, yet often overlooked, element for implementing and sustaining curriculum innovations. Analysis of the outcomes of frequently advocated reforms in health professions education—including implementation of problem-based learning, transition from disciplinary-based to thematically organized, interdisciplinary curricula, incorporation of information technology, and infusion of evidence-based practice into clinical education—indicate that the presence of, or lack of, faculty development often determines the success or failure of the initiative.

For the new implant program, a train the trainer model (peer education) is being utilized for faculty development, organized into three phases. The first phase consisted of sending a select group of four general dentistry faculty members to an implant training course. These faculty participants were selected from the General Dentistry Department based on their prior experience with implants and surgical procedures. The training course used was the one UTHSCSA-DS conducts in conjunction with the Zimmer Institute in Carlsbad, CA, an institute that has been recognized for its high quality programming. This three-day course consists of both didactic and patient-simulated laboratory sessions. The didactic sessions address the restorative and surgical aspects of implants, immediately followed by a hands-on session in the patient-simulated laboratory. After completion of this course, the second phase of the faculty development program began. These trained faculty members first began to place
implants in patients within the Graduate Periodontics Program at UTHSCSA-DS under the guidance of third-year residents. Then they increased their surgical experience by placing implants in the General Dentistry Clinic under each others’ guidance. In the third phase, a new cadre of faculty members will receive peer training in the surgical placement of implants by the initial group of implant-trained faculty members, who will now assume the role of trainers and mentors for their colleagues. The second group of general dentistry faculty members to participate in this training also will attend the Zimmer implant course, but instead of being mentored by the graduate periodontics faculty, they will be mentored by the first group of implant-trained faculty. Throughout the training and continuing to the present, the faculty and residents of the Graduate Periodontics Department have been positive about and supportive of the implant program, including being instrumental in the development and implementation of faculty development to support it.

After the faculty development program, the next set of questions that needed to be addressed related to students: how many would participate in the implant program, how would it fit into an already tight clinical schedule, and where would the implant program take place? At UTHSCSA-DS there are approximately 100 students in a class. Given that number, it was determined that the most feasible approach for the initial, start-up component of the program would be to create a selective course for nine fourth-year students. By limiting the number of students, concerns regarding equipment, patient pool, and faculty-student ratio became manageable. In regard to the time and location the selective would occur, it was decided that it would take place during the fourth-year students’ unscheduled afternoon.

A final question involved patient acquisition and selection. It was determined that the selective would accept only those patients who presented a low risk of difficulty (e.g., ASA I/II, adequate bone quantity, and low esthetic risk). One of the concerns related to implementing a surgical implant placement program for predoctoral dental students was that the need for a patient pool might mean that the graduate programs would not have enough patients for their residents to gain needed clinical experiences in surgical placement. However, given the restrictions self-imposed on the selective (limited number of students, straightforward cases), the graduate training programs have not experienced such a problem.

A unique opportunity for the selective arose from the International Dentist Program (IDEP) at UTHSCSA-DS. This program provides foreign-trained dentists with the opportunity to obtain their U.S. dental degree and become eligible for licensure. One of the IDEP students had extensive training and experience in implant dentistry in his country and assumed the role of a teaching assistant for the selective, working in close collaboration with the faculty members who supervised and mentored students’ learning experiences in the clinic.

Program Outcomes

By July 2009, a group of four faculty members had completed the training and were performing implant surgery. The selective was announced to the students in the spring of 2009, with the first group of nine students selected in May 2009. Since the selective was limited in space, students were required to submit an application consisting of three parts. At UTHSCSA-DS, the predoctoral clinics are divided into eight general practice groups (GPGs) directed by a GPG leader and assistant group leader. The first part of the application was a recommendation letter from the student’s group or assistant group leader. The second and third parts of the application were the student’s curriculum vitae and a letter of intent. The applications were reviewed, after which the students participated in an informal interview.

The students selected completed a preclinic surgical course and began to perform implant surgery in the fall 2009 semester. The preclinic surgical course was conducted in a two-week period during summer break between the third and fourth years; it consisted of lectures, case presentations, and simulation (surgery on models). Topics for the lectures included diagnosis and treatment planning, surgical evaluation, and implant surgery. Simulation was accomplished with the use of models that allowed for the placement of a single posterior implant, single anterior implant, and two adjacent posterior implants. The focus of these sessions was primarily on the surgical aspect since the students had had a hands-on implantology course during their second year.

For the clinical aspect of the course, the implant surgical team consisted of four individuals: the surgeon, an assistant, a photographer, and a supervising faculty member. The student on the team performed all aspects of the surgery, under the close
guidance of the faculty member. For most cases, other students in the selective acted as assistants, thus increasing their exposure to implant surgery. All cases were documented with photographs taken by another student enrolled in the selective, providing yet another method of exposure to different types of implant surgeries and collaborative learning among the participating students as well as supporting post-surgery debriefings.

At the end of the 2009–10 academic year, seven of the nine students remained in the selective. Two withdrew for personal reasons. These students placed twenty-seven implants; the only complications involved early exposure (five implants) and poor initial stability (three implants). In the cases of early exposure, the cover screw was removed and a healing collar placed; these implants were restored without other complications. This experience resulted in changing the surgical protocol by placement of the healing collar at the time of the surgery. For the implants with poor initial stability, a larger diameter and/or a longer implant were placed during the same appointment. Table 1 summarizes the clinical outcomes of the 2009–10 implant selective for predoctoral dental students.

As of April 2010, the participating students had restored twenty-one of the placed implants. Three implants were placed near the end of the academic year and were restored in the next academic year; one patient with two implants (overdenture) did not return for the attachments; and one other patient failed to make her restorative appointments and has not been able to be contacted.

Two surveys were created to evaluate the selective: one for the faculty, the other for students currently enrolled. For the faculty, there were six questions that addressed their opinions of the selective and its effect on their ability to teach implant dentistry. Eighty percent of the faculty members believed that the course and the training had a positive impact on teaching implantology to students.

The students’ questions addressed their opinions of the selective and its role in their understanding of dental implants. The vast majority stated it was a positive experience that was extremely beneficial. In the survey, the nine students were asked to indicate their agreement with seven statements on a scale of strongly disagree, disagree, neutral, agree, and strongly agree. Regarding the statement “The students’ case presentations in the clinical implant selective promoted student-faculty interaction/communication related to implant therapy,” four students strongly agreed, four agreed, and one was neutral. Regarding the statement “I received useful feedback and supervision from faculty during implant procedures in this selective,” five strongly agreed, and four agreed. Regarding the statement “My experiences during the clinical implant selective improved my ability to integrate implant therapy into comprehensive dental treatment,” seven strongly agreed, and two agreed. Regarding the statement “My experience in the clinical implant selective enhanced my confidence in addressing minor surgical complications,” six strongly agreed, and three agreed. For more findings, see Figures 1–3. The students’ main criticism (expressed in both the survey and in conversations) was the discrepancy among the number of implant surgeries performed by each student. This discrepancy was attributed to the fact that the students found their own patients for surgeries, and some of them were more aggressive than others in identifying acceptable cases.

### Conclusions

Since dentistry is a rapidly evolving health care discipline, educational institutions need to be just as progressive. To date, many dental schools in the United States have implemented implant courses at the predoctoral level focusing primarily on the restorative aspect of dental implants. However, the majority of schools limit or omit altogether opportunities for students to have an actual surgical experience with implants. In recent years, nearly 50 percent of dental students do not continue into a residency directly after graduation, and these new practitioners are likely to learn implant placement at a two- or three-day continuing education course. There are numerous reasons for the lack of implant placement surgery in the dental school curriculum: lack of trained faculty,

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<th>Total Number of Implants Placed</th>
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<tr>
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<tr>
<td>Premolars (5, 12, 20, 21)</td>
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<tr>
<td>Canine (22/27)</td>
<td>4</td>
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<td>Anterior (8)</td>
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5. The Clinical Implant Selective increased my understanding of implantology.

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<th>Response</th>
<th>Percent</th>
<th>Count</th>
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<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Disagree</td>
<td>0.0%</td>
<td>0</td>
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<td>Agree</td>
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<td>88.9%</td>
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answered question 9
skipped question 0

Figure 1. Students’ agreement that the selective increased their understanding of implantology

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6. The Clinical Implant Selective has contributed to increased awareness of implants as a treatment option within my GPG.

<table>
<thead>
<tr>
<th>Response</th>
<th>Percent</th>
<th>Count</th>
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<tr>
<td>Strongly Disagree</td>
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<tr>
<td>Disagree</td>
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</table>

answered question 9
skipped question 0

Figure 2. Students’ agreement that the selective contributed to their increased awareness of implants as a treatment option
limited patient pool, and traditional perspectives within the dental education community about when and where dentists in training should receive implant education and experience. However, the experience at UTHSCSA-DS indicates that a strategy that emphasizes faculty development and careful case selection can overcome these challenges and have significant benefits for both students and faculty.

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REFERENCES