

Dental Implant Placement by Predoctoral Dental Students: A Pilot Program

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Abstract: Dental implant education is increasingly becoming part of predoctoral dental curricula. New York University College of Dentistry has developed a pilot dental implant program that trains students in implant restorations for single-tooth restorations and mandibular overdentures. Fourth-year students have the option of applying for an implant honors program, which can include surgically placing posterior implants. Eight students were selected for the implant honors program for the 2010–11 academic year. Seven of the eight students fulfilled the didactic and simulation requirements, performing forty-seven surgeries and placing fifty-two implants. Surgical protocol events were recorded: three implants did not achieve 35 Ncm torque at placement, and ten implants required a change in direction following the initial 8 mm pilot drill. All direction changes were successfully performed and resulted in implant placements. This pilot program suggests that predoctoral dental students can be trained to successfully place posterior implants, which are becoming the standard of care.

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Dental implant education is increasingly becoming part of predoctoral dental curricula. In 2005, New York University (NYU) College of Dentistry developed and implemented a curriculum integrating dental implant education with clinical experience in single implant restorations and mandibular overdentures.¹ Although dental implant placement by predoctoral students had not previously been part of a clinical competency requirement, students had been strongly encouraged to assist chair-side in implant surgeries. Starting in 2005, a senior honors program also gave selected students exposure to the surgical aspect of implant dentistry, including adjunct procedures such as bone grafting. The implant honors program had consisted of chair-side assisting and an occasional faculty-assisted implant placement by a few students.

In the 2010–11 academic year, the implant honors program was restructured to provide the opportunity for its students to place implants after successfully completing a didactic and simulation program. The need to incorporate surgical implant placement by dental students into the predoctoral curriculum has been driven by the increased number

of continuing education programs that teach practicing dentists the surgical phase of implant dentistry and by dental students' desire to gain implant skill and knowledge during their predoctoral training. The purpose of this article is to describe our pilot program and to report on the rate of surgical complications the students experienced during implant placement.

Program Design

To qualify to participate in an honors program, NYU dental students must have a cumulative GPA of at least 3.0 at the time they apply and no unremediated Fs on their transcript. Students can apply to two honors programs and are selected after an interview by the honors program director, followed by a matching process administered by the office of the associate dean for academic affairs. For the implant honors program, students apply in the fall of their junior year and enroll in the fall of their senior year.

To qualify to place implants, the implant honors students must fulfill the following requirements:

1) attend twenty weekly one-hour lectures covering foundation knowledge in implant prosthodontics and implant surgery; 2) chair-side assist a postgraduate implant or periodontics resident in a minimum of five implant surgeries; 3) attend a two-hour, hands-on preclinical session in implant placement of the pre-selected system; and 4) pass a twenty-six-question, multiple-choice, take-home examination. Students answer the examination questions with the aid of the procedures manual for the implant system² and their lecture notes.

All training and placements utilize one implant system: the Replace Select Tapered (Nobel Biocare AG, Sweden). The selection of this system for use in the implant honors program was based on its exclusive use by the predoctoral program for testing students for restorative competence. The program helps students to become familiar with the prosthetic components and basic implant body characteristics of this system.

The students identified patients to receive implants during the course of their comprehensive patient care and presented selected patients with implant options as they would routinely do. All patients were screened and approved for inclusion after an evaluation by the primary author. The criteria for patient acceptance were as follows: molar and premolar locations in the maxilla or mandible; sufficient bone height to place a 10 mm implant; sufficient bone width for implant placement without grafting; at least a ten-week healed socket following extraction; and no more than two adjacent implants in one quadrant. Students had to complete a diagnostic sheet to determine the surgical and prosthetic plan, and models were made for diagnostic purposes and surgical guide fabrication.

A step-by-step basic surgical protocol was taught to the students from flap design to suturing and postsurgical care. This protocol called for the placement of the implants in a one-stage surgery provided that a minimum of 35 Ncm insertion torque is achieved. The implant placement protocol recommended by the manufacturer in the procedure manual for the Replace Select Tapered was followed rigorously.² Potentially challenging situations were both discussed in the lectures and emphasized in the multiple-choice examination with clinical scenarios soliciting specific clinical management responses. Any deviation from an ideal implant placement sequence was recorded to monitor protocol deviation.

Program Outcome

From a class of approximately 350 students, thirty-one applied to the implant honors program as their first or second choice of honors program, and twenty-nine were interviewed. The implant honors program director selected nineteen students and submitted a list of names ranked in order of preference to the office of the associate dean for academic affairs. Eight students enrolled in the implant honors program for the 2010–11 academic year.

Seven of the eight students fulfilled the requirements and were cleared to surgically place implants. The eighth student did not participate in the lecture or the hands-on or clinical sessions and was not offered the opportunity to place implants. During this program, the seven students performed forty-seven surgeries and placed fifty-two implants (Figure 1). The distribution of implants by location is shown in Figure 2. All implants placed were 10 mm in length, seven implants had a diameter of 3.5 mm, thirty-two had a diameter of 4.3 mm, and thirteen had a diameter of 5 mm. Five implants in four surgeries received cover screws, three of which had a primary stability of the implant less than 35 Ncm. One implant received a cover screw due to the presence of a crestal defect from the residual extraction socket, and a fifth implant received a cover screw because it was placed at the same time as an adjacent implant with a primary stability less than 35 Ncm.

Once the initial osteotomy was prepared to 8 mm in depth, a periapical radiograph was taken to assess angulation. Ten implants required a change in direction (Figure 3); seven of the changes were performed by the students and three by the supervising faculty members. Of the three direction changes performed by the faculty, one included a failed attempt by the student to correct the angulation, which resulted in a buccal perforation. Following the direction change by the faculty member, the student continued the drilling sequence and the placement of the implant. The second and third faculty interventions to correct an initial pilot involved recent extractions of first mandibular molar sites requiring a direction change against dense interradicular bone.

Discussion

There is a growing consensus that implant education should be an integral part of both predoctoral³⁻⁶

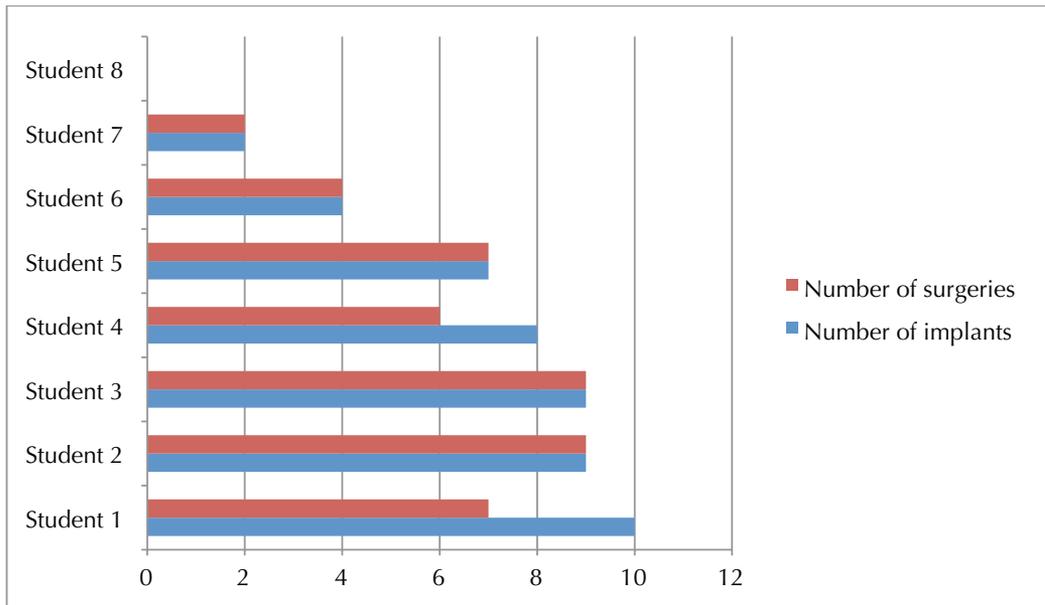


Figure 1. Number of surgeries and implants placed by students in study

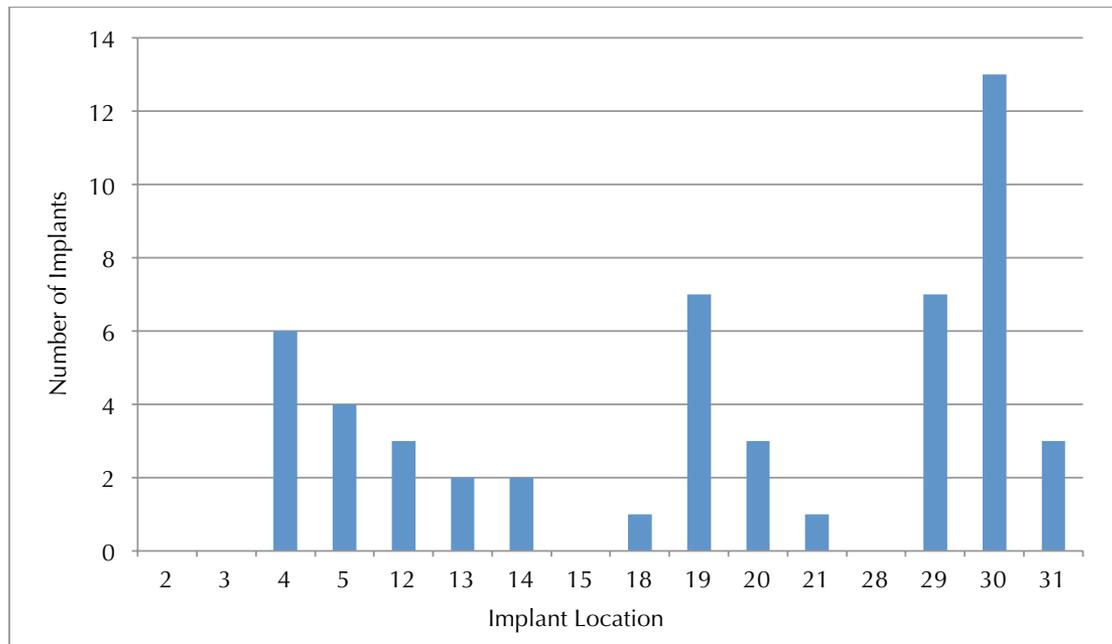


Figure 2. Implant distribution by location

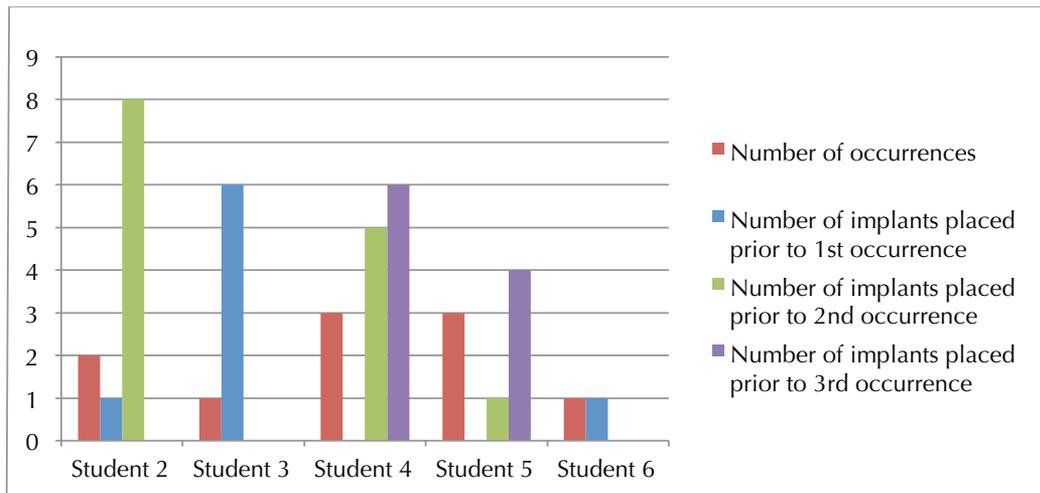


Figure 3. Angulation change occurrence in relationship to the surgical experience of the students

and postdoctoral education.^{7,8} In 2005, the American College of Prosthodontists added placement of implants to its Accreditation Standards for Advanced Specialty Education Programs in Prosthodontics, and a survey of postdoctoral prosthodontics programs in 2008 concluded that implant dentistry has become an integral part of postgraduate prosthodontics curricula.⁹ However, the surgical part of implant dentistry has remained outside the realm of predoctoral education.¹⁰ A survey of deans of U.S. dental schools in 2004 regarding implant education found that only four schools had a predoctoral requirement/competency in implant prosthodontics although thirty schools reported that their students received didactic instruction and thirty said their students gained clinical experience.¹¹ Shortly after that survey, in 2005, the New York University College of Dentistry developed and implemented a predoctoral curriculum that includes clinical competence in restoring single implant restorations and implant overdentures.¹

The critical factor that facilitated students' education in surgical implant placement in our program is the comprehensive knowledge they gained in their four-year academic curriculum.^{1,12} Additional factors were the use of a single implant system for the surgical education, which was the same as used in the predoctoral prosthodontics education program; the case selection criteria; the use of a self-assessment form for diagnosis and planning;¹³ a rigorous re-

view and emphasis on the surgical protocol recommended by the manufacturer; and adequate faculty supervision. The use of a self-assessment form for diagnosis and planning together with case selection criteria was critical for selecting cases with limited potential for complication during surgery. The cases had no potential need for adjunctive procedures and were limited to posterior areas with sufficient bone volume. The absence of significant complications and the intraoperative adjustment made to the surgical events that occurred suggest that implant placement can be performed by predoctoral students under the right circumstances and in the right educational environment. Limitations on implant placement by predoctoral students are not due to the ability of the students to perform the procedure, but rather to faculty resources, faculty training, and availability of funding and time in the predoctoral curriculum.^{3,14} If dental schools are to improve service to their communities and help make implant dentistry accessible to the widest range of the population, it is imperative that those limitations be overcome.

Conclusions

We believe that comprehensive implant dentistry education in the predoctoral dental curriculum will eventually become the norm. Carrying didactic

and limited clinical education to the surgical implant placement level using a well-controlled case selection process is the natural next step for implant education at the predoctoral level. This pilot program defined the conditions, case selection criteria, and guidelines for successful implementation of an implant placement experience in the predoctoral program. Additional implant programs are required with larger student and faculty groups before predoctoral competency requirements can be defined.

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