



# Complication or Substandard Care? Risks of Inadequate Implant Training

STEPHEN WHEELER, DDS, AND CYNTHIA M. BOLLINGER

**ABSTRACT** The use of dental implants has increased substantially over the past decade, as have the number of implant-related complications. One of the contributing factors is inadequate training in the prevention, recognition, and treatment of complications. Comprehensive training on implant surgical procedures that includes patient selection, risk management, and complications allows dentists to incorporate implant placement into their practices with less risk to patients and less risk of serious legal consequences.

## AUTHORS

**Stephen Wheeler, DDS,** practices oral and maxillofacial surgery in Encinitas, Calif., with an emphasis the field of implant reconstruction. He is a fellow and board member of the Academy of Osseointegration and the American Society of Osseointegration.

**Cynthia M. Bollinger** is founder of The Business of Implant Dentistry, specializing in consulting, seminars, training programs, and education materials designed specifically for implant dentistry. She also serves as the director of the Institute for Dental Implant Awareness, a nonprofit organization.

Dental implants have evolved significantly since their introduction in the 1970s. Initially, the term “dental implants” was used to refer to a wide variety of systems developed in the 1970s and 1980s, such as blades, frames, and subperiosteals, in addition to root forms. Also, the dental technology readily available today was in its mere infancy. Therefore, complications and failures were many, frequent, and considered risks of the procedures because they could happen even with the best of care provided by the best of clinicians.

Sage risk management protocols have recommended the use of written consent forms. With the use of these documents,

the practitioner was reasonably safe from liability claims alleging lack of informed consent. In the late 1980s and the early 1990s, long-term studies began to report significant success and reliability with root form implants as compared to other systems. The industry refined the implants to the point that by the mid-1990s most dental implant systems were abandoned except for root form systems that are now commonly referred to as “dental implants.”

As with many widely used technologies, advancements in implant dentistry have provided the profession with many new options through the development of shorter implants, angled attachments, and special surface treatments for more rapid integration and potential immediate

placement following extractions. Other advancements have allowed dentists to provide care to a wider range of patients by offering grafting and ridge-expanding techniques and technologies to provide the necessary bone volume for implants, and CT technology to evaluate compromised sites for safer implant placement.

While these advances provided more options for patients, they were also not without increased risks and more significant complications that could place patients at risk both in “site preparation,” as well as actual implant placement. Once again, the principles of informed consent have been used to develop specialized consent forms to reduce the exposure for “lack of informed consent,” but not eliminate liability based on the experience of the provider. The occurrence of complications once considered risks in the 1970s may now be used as evidence of negligent care (legally: failure to meet the standard of care) for which the practitioner may be held liable.

Today, dental implants have become a part of mainstream dentistry as a result of documented high survival rates and predictability, as well as significant benefits for patients, such as preservation of alveolar bone and conservation of tooth structure. Additionally, a review of the literature on fixed partial dentures indicated that the long-term prognosis is generally better with implant treatment.<sup>1-16</sup>

Dental implants have also become a legal standard of care. Arthur W. Curley, JD, stated the following in the *Journal of the California Dental Association* in December 2001, “Discussing dental implants in the appropriate case is no longer just an option. Dentists have an obligation to recommend implants to patients because there is less trauma to other teeth, the bone is preserved, and the life expectancy is longer than traditional options.”<sup>17</sup>

Due to high success and predictability,

as well as increased patient demand, the use of implants has increased significantly over the past 10 years. However, as the number of implants placed has increased, so have the number of implant-related complications. There are a number of factors contributing to the increase in complications, including the increased number of implants placed, the increased number of dentists placing implants, more aggressive treatment protocols, and inadequate training.

The 2000 *Survey of Current Issues in Dentistry*, published by the American

AS THE NUMBER  
of implants placed  
has increased,  
so have the number  
of implant-related  
complications.

Dental Association, reported that over a four-year period (1995-1999) the average number of implants placed by all dentists increased from 37.7 to 56.2.<sup>18</sup> An analysis of the U.S. dental implant market from iData Research in July 2007 reported that the number of implants sold went from 891,131 in 2003 to 1,402,287 in 2006, and was projected to be 1,591,596, representing an increase of 79 percent in five years.<sup>19</sup>

The same iData analysis reported that the total number of general practitioners in the United States rose from 126,163 in 2003 to 151,803 in 2007, representing a 20 percent increase. During that same period, the number of general practitioners restoring implants went from 24.1 percent to 31.3 percent, representing a 30 percent increase. The number of general practitio-

ners placing implants more than doubled, from an estimated 8,200 in 2003 to 20,949 in 2007. The percentage of general practitioners placing more than 30 implants per year was reported to be 3.4 percent in 2007, compared to only 1.7 percent in 2003.<sup>19</sup>

A similar report from Millennium Research Group in 2006 reported that an estimated 19 percent of general practitioners were placing implants.<sup>20</sup> In addition, there has been an increase in the number of endodontists and prosthodontists who are now placing implants.

As implant usage has increased, there is greater emphasis on the topic of complications at major continuing education conferences and in journals.<sup>21-25</sup> One of the most recent examples of this was the 34th annual USC Periodontal and Implant Symposium, titled “Plan B: Negative Outcomes, Complications and Failures in Periodontal and Implant Therapy.”<sup>25</sup>

There are several reasons that can be attributed to the increase in complications, the most obvious of which is the increased number of implants being placed. Assuming that the rate of occurrence of complications remained constant, the significant increase in the number of implants placed in the past 10 years would result in a corresponding increase in complications.

Another contributing factor is that dentists are also using more aggressive protocols than those first outlined by P.I. Brånemark, which called for placement of implants in the anterior mandible, where there is usually sufficient, thick, cortical bone. Implants were only placed in fully healed sites six to 12 months following tooth extraction. With those more conservative protocols, the critical anatomical structures, such as the maxillary sinus and inferior alveolar nerve, were avoided.

Today, implant treatment protocols include implant placement immediately

following extraction, immediate provisionalization, or immediate loading of the implants. Patients are demanding implant replacement along with faster treatment protocols, even in compromised situations, in essence pushing the dentists into situations that carry greater risks. When a compromised site is encountered, the patient then becomes a candidate for grafting protocols, which carry their own potential risks for complication. Implants placed in grafted sites require more surgical skill and experience than what is required for routine implant placement. Combining aggressive protocols with augmentation procedures provides more opportunities for complications to occur.


When the concept of osseointegration was first introduced in the United States, the early protocol called for implants to be placed primarily by oral surgeons and later by periodontists. Both of these specialties require extensive training and experience in surgical procedures, as well as an in-depth understanding of bone morphology.

Surgical implant placement involves procedures that are similar to other surgical procedures that are performed in oral surgery and periodontal practices on a routine basis. And, many of the complications that can occur with implant surgery are similar to the complications that oral surgeons and periodontists experience and trained for during their specialty residency programs, and subsequently manage in their private practices.

While there are many nonsurgically trained dentists who have diligently pursued extensive postgraduate training in surgery to safely place implants, there have been an increasing number of dentists with limited or no surgical training performing surgical procedures related to implant placement in their practices. Many of the complications experienced by these dentists

are part of their learning curve for surgical procedures that are required for implant placement, such as incision, flap reflection, primary closure, and wound healing.

Another factor, contributing to increased complications and failures is that many of the continuing education courses on surgical implant placement are sponsored by implant companies, or providers, and are designed to sell surgical kits and implants. Many of these programs are abbreviated in length, one to three days. Promotional brochures



**NOT HAVING MORE**  
extensive training can  
leave dentists ill-prepared  
to handle the full variety  
of complications and  
failures that can occur.

for some of these courses emphasize the simplicity and profitability of implant placement.<sup>26,27</sup> Many of these abbreviated surgical training courses, which typically do not cover complications, have been promoted as being sufficiently comprehensive to qualify any dentist to immediately begin surgically placing implants.<sup>26-28</sup> Unfortunately, not having more extensive training can leave dentists ill-prepared to handle the full variety of complications and failures that can occur.

There are also claims made in marketing literature that certain technologies, such as CT scans and guided surgical implant placement, make it possible for any dentist to place implants. Promotional brochures for some courses on guided surgery emphasize the simplicity of placing im-

plants utilizing the new software programs for CT scans. One example is a recent article titled "Technology Helps an 'Amateur' Place Implants" in *Dentistry Today*.<sup>29</sup>

Marketing materials from reputable companies, course brochures with esteemed colleagues as instructors, and articles written by other colleagues about the simplicity of placing implants could lead dentists to believe that it is a simple procedure that only requires unique software and relatively little training.

Even placing implants on a "virtual reality model" within a CT scan requires experience in understanding bone densities, cortical plate width, and potential pitfalls with osseous undercuts and implant angulations. While technology certainly provides additional information useful for treatment planning purposes, there is still a need for an understanding of basic biological principles, such as wound healing and vascularization, as well as fundamental surgical skills and the ability to manage potential complications. If a dentist is not experienced in laying flaps to provide augmentation procedures, he or she should not attempt "flapless" surgery as he or she may be ill-prepared to recognize or treat intraoperative complications, such as dehiscence or fenestration.

Moreover, nationwide surveys conducted to determine the extent of the training on implant dentistry provided for predoctoral students in dental schools indicate that the majority of the training is focused on the restorative aspects. In 84 percent of the dental schools that require a predoctoral student to take an implant course, the average number of lecture hours reported was only 20.4. Thirty-eight percent of the schools reported that one of the 25 lecture topics was implant surgical complications. One survey reported that 59 percent of the schools require the presence of students during surgical implant place-

ment for observation of the procedure. And another survey indicated that only three dental schools allowed predoctoral students to surgically place implants.<sup>30</sup>

In other words, the formal training on surgical implant placement upon graduation from dental school for the majority of dentists is typically limited to one- to two-lecture hours on surgery and complications, and, in some cases, the observation of implant placement for the patients they restore as part of their training. Therefore, most general dentists who wish to incorporate implant placement into their practices must seek continuing education courses to provide the surgical training they need. Unfortunately, if those CE courses are abbreviated, one to three days, and do not discuss complications and failures, the dentists attending these programs without the benefit of surgical implant placement training in dental school, or a general practice residency that included surgical training, may be ill-prepared to predict, diagnose, and manage potential complications that can occur with implant surgery and related surgical procedures.

There are a number of courses offered by independent training centers and individual clinicians that provide comprehensive training. These programs range from six to 18 days in duration over periods from one week to several months, and provide substantially more surgical training than the abbreviated courses.

There are also more comprehensive CE training programs and miniresidencies available through various dental schools, such as the 18-day maxi course offered at Loma Linda University.<sup>31</sup> However, a review of the outlines for these courses indicates that complications and failures are a very limited part of the curriculum.

Inadequate training on implant-related complications has several potential consequences. The authors are aware of an

increasing number of anecdotal reports from specialists being asked by recently “trained” dentists to evaluate and treat patients suffering from avoidable complications ranging from injury to adjacent teeth, to catastrophic esthetic failures involving substantial loss of hard and soft tissue, and nerve damage, often from the placement of only one to two implants.

Legally, such failures create liability for a breach of the duty to refer a patient to a specialist.<sup>32</sup> When a general dentist performs procedures that are primarily performed by dental specialists, due to either complexity or difficulty, the law holds all such practitioners to the standard of care expected of specialists providing similar procedures on a regular basis. The test of the standard of care is not so much a dentist’s ability to begin or initiate treatment, rather it is the experience and ability of the dentist to quickly recognize and treat all of the various potential complications.

Specifically, a generalist may provide treatment most often provided by a specialist if the practitioner can: 1) reasonably predict the potential for failure or complication and have and utilize tools and techniques to eliminate or reduce those risks; 2) be able to timely recognize and diagnose the occurrence of a risk or complication that cannot be eliminated in order to 3) timely provide or refer for treatment such as to minimize or eliminate the impact, injury, or damage to the patient.

Failure to be able to perform the aforementioned is below the standard of care, and the patient should be referred to another more experienced practitioner or specialist when proceeding with treatment. Therefore, if general dentists surgically place implants and complications arise that are not quickly and skillfully handled by a general dentist, the patient injured by a mishandled complication can initiate litigation. In such cases, the general dentist will be held

to the same standards as surgical specialists who have had a three- or four-year residency program that includes exposure to and management of numerous complications.

This obvious failure to fill the void in needed education and training in the surgical placement of implants needs to be addressed both for the protection of patients and for the protection of the treatment modality that has been so successful. Thousands of practitioners around the world have worked tirelessly over several decades to perfect techniques and develop expertise in the placing of and restoring of implants to elevate this treatment modality to one of the most predictable reconstructive procedures we can accomplish in dentistry today. These techniques can provide both long-term functional and esthetic rehabilitation in ways that conventional dentistry cannot.

Ideally, standards for education and training should be developed to provide guidance for dentists wishing to pursue a continuing education program that would adequately prepare them to incorporate implants into their practices. Such standards would protect what has been accomplished in this field and provide the best care possible for our patients in a safe environment.

If minimal educational guidelines can be established and accepted by the implant industry as a whole, most of the abbreviated training courses presently being taught outside the academic environment of the dental schools would be discontinued. Those taking the more comprehensive courses would have a very different understanding of the requirements (both knowledge and expertise) for placing implants before considering attempting surgery in their offices. With adequate training, if complications were to occur, dentists would be able to mitigate the consequences of complications by early recognition, treatment, or referral.

One of the most difficult procedures in implant reconstruction is to replace a



**FIGURE 1.** An implant and graft were placed immediately after extraction. The graft became infected and the dentist tried unsuccessfully to treat the infected site. After multiple procedures, the patient self-referred to a specialist.



**FIGURE 2.** A great deal of soft and hard tissue had been lost following multiple attempts to treat the infection. There is very little bone remaining around the implant and the patient needed multiple surgeries to correct this defect.



**FIGURE 3.** After four surgeries to graft the hard and soft tissues, a new implant was placed and restored. While the final result is less than ideal, the grafting resulted in a reasonably good esthetic outcome considering the extent of the defect — and the patient is happy.

failed implant or implants following catastrophic loss of hard and soft tissue due to complications and infection. This becomes even more critical in the esthetic zone as can be seen from this example where a general dentist attempted to place an implant immediately after removing an anterior tooth. The area broke down around the implant and after repeated inadequate attempts by the general dentist to graft and repair the defect, the patient referred herself to a specialist. The loss of the implant and the surrounding tissues required block onlay grafting and soft tissue surgery to reconstruct the area to provide the base for a new implant (FIGURES 1-3).

This case, along with ever-increasing number of cases in litigation from nonsurgically trained dentists, indicates the growing necessity for a change in education and training in this field. Ideally, development and implementation of minimal training standards would cause those corporations and individuals who are advertising the simplicity of implant placement, or teaching abbreviated courses, to realize the importance of adequate training and education for the protection of patients.

If the general dental population becomes aware of the risks of placing implants without proper training, they will come to understand that abbreviated training courses are merely one component of the training and education necessary to meet the legal standard of care and provide the best treatment possible in the rehabilitation of dental patients. ■■■■

#### REFERENCES

1. Palmquist S, Swartz B, Artificial crowns and fixed partial dentures 18 to 23 years after placement. *Int J Prosthodont* 6:279-85, 1993.
2. Lindquist E, Karlsson S, Success rate and failures for fixed partial dentures after 20 years of service. *Int J Prosthodont* 11:133-8, 1998.
3. Napakangas R, Salonen-Kemppi M, Raustia AM, Longevity of Fixed metal ceramic bridge prostheses: a clinical follow-up study. *J Oral Rehabil* 29(2):140-5, 2002.
4. Glantz PJ, Nilner K, Patient age and long-term survival of fixed prosthodontics. *Gerodontology* 10:33-9, 1993.
5. Hammerle CH, Ungerer MC, Long-term analysis of biologic and technical aspects of fixed partial dentures with cantilevers. *Int J Prosthodont* 13:409-15, 2000.
6. Scurria MS, Bader JD, Shugars DA, Meta-analysis of fixed partial denture survival: prostheses and abutments. *J Prosthet Dent* 79:459-64, 1998.
7. Priest GF, Single-tooth implants and their role in preserving remaining teeth: a 10-year survival study. *J Oral Maxillofac Implants* 14:181-8, 1999.
8. Gomez-Roman, Schulte, et al, The Frialit-2 implant system: five-year clinical experience in single-tooth and immediately postextraction applications. *J Oral Maxillofac Implants* 12:209-309, 1997.
9. Lindh T, Gunne J, et al, A meta-analysis of implants in partial edentulism. *Clinical Oral Implants Res* 9:80-90, 1998.
10. Engquist B, Nilson H, Astrand P, Single-tooth replacement by osseointegrated Brånemark implants: a retrospective study of 82 implants. *Clinical Oral Implants Res* 6:238-45, 1995.
11. Krennair G, Schmiding S, Waldenberger O, Single-tooth replacement with the Frialit-2 system: a retrospective clinical analysis of 146 implants. *J Oral Maxillofac Implants* 17:78-85, 2002.
12. Cheung GS, Ng RP, Fate of vital pulps beneath a metal-ceramic crown or a bridge retainer. *Int Endod J* 38:521-30, 2005.
13. De Backer H, Van Maele G, et al, The influence of gender and age on fixed prosthetic restoration in longevity, an up to 18- to 20-year follow-up in an undergraduate clinic. *Int J Prosthodont* 20(6):579-86, 2007.
14. De Backer H, Van Maele G, et al, An up to 20-year retrospective study of 4-unit fixed dental prostheses for the replacement of 2 missing adjacent teeth. *Int J Prosthodont* 21(3):259-66, 2008.
15. Goodacre C, Bernal G, et al, Clinical complications in fixed prosthodontics. *J Prosthet Dent* 90(2):121-32, 2003.
16. Wennström JL, Ekestubbe A, et al, Implant-supported

- single-tooth restorations: a five-year prospective study. *J Clin Periodontol* 32:567-74, 2005.
17. Curley, AW, Dental implant jurisprudence: avoiding the legal failures. *J Calif Dent Assoc* 29(12):847-53, 2001.
18. 2000 Survey of current issues in dentistry, American Dental Association, ISBN 0-910074-44-5, February 2002.
19. U.S. markets for dental implants and final abutments, iData Research, Inc., 2007.
20. U.S. Dental Implant Market, Millennium Research Group, 2006.
21. Park SH, Wang HL, Implant reversible complications: classification and treatment. *Implant Dent* 14(3):211-20, 2005.
22. Chung DM, Oh T, et al, Factors affecting late implant bone loss: a retrospective analysis. *Int J Oral Maxillofac Implants* 22(1):117-26, 2007.
23. Misch K, Wand HL, Implant surgery complications: etiology and treatment. *Implant Dent* 17(2):159-68, 2008.
24. Jung RE, Pjetursson BE, et al, A systematic review of the five-year survival and complication rates of implant-supported single crowns. *Clinical Oral Implants Res* 19(2):119-30, 2008.
25. USC periodontal and implant symposium, plan b: negative outcomes, complications and failures in periodontal and implant therapy, Los Angeles, Calif., Jan. 23-25, 2009.
26. Course brochure, Imtec and AGD, November 2008.
27. Course brochures, California Implant Institute, May 2008.
28. Course brochures, California Academy of Implant Dentistry, 2008.
29. Whitehouse J, *Dent Today*, pages 122-4, 2008.
30. Lim MVC, Afsharzand Z, et al, Predoctoral implant education in U.S. dental schools. *J Prosthodont* 14(1):46-56, 2005.
31. Loma Linda University Dental School, CE maxi course, 2008-2009.
32. Simone vs. Sabo (1951) 37 Cal. 2d 253, 257 [231 P.2d 19], Physicians who elect to treat a patient even though the patient should have been referred to a specialist will be held to the standard of care of that specialist. If the physician meets the higher standard of care, he or she is not negligent.

**TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT** Cynthia M. Bollinger, Institute for Dental Implant Awareness, 520 Broadway, Suite 350, Santa Monica, Calif., 90401.