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Preface

Dental informatics

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Guest Editor

In October 1986, the *Dental Clinics of North America* published its first (and until today, last) issue about computers in dentistry, titled "Computer Applications in Dentistry." As we have learned since then, 16 years is a long time in the information technology field. Since 1986, we have witnessed a period of technological innovation like few others. Information technology has altered our lives significantly; however, many of the promises that technology put before us remain unfulfilled.

Reading through "Computer Applications in Dentistry" shows how far we have come, but also how far we still have to go. In 1986, the microcomputer revolution was still young. IBM introduced its first personal computer in 1982. People spoke of microcomputers, minicomputers, mainframes, and time-sharing. About 3000 electronic bulletin boards existed, very few of them in dentistry. About 25% of all dentists in the United States were using computers in their practice. Computer use was almost exclusively limited to basic administrative tasks, such as patient data management and billing; however, the authors in 1986 had definite ideas of how computers could be used in dental practice and education. Applications described and envisioned included financial planning and computer modeling, computer-aided instruction, computer-assisted dental diagnosis, an online information and communication system for dental professionals, and large-scale automation throughout the profession.

In the year 2002, computer use in the dental profession looks quite different. As of 2000, 85.1% of all dentists were using computers in their offices. While billing, insurance processing and other administrative tasks still

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account for the majority of computer usage, dentists and their staff have begun to integrate a multitude of other applications with their daily activities. Many dental offices have adopted electronic charting, digital radiology, intraoral cameras, patient education software, and various Internet resources. No one attempts to count the number of dental electronic bulletin boards anymore. Their replacement, the World Wide Web, provides a vast amount of dental information to dentists, hygienists, assistants, office staff, patients, and the public. Some of this information is excellent, much of it is average, and some is horrific. Many dentists use e-mail to communicate with colleagues and patients, to participate in electronic study clubs, and to receive news and alerts of interest. Electronic communication methods have brought dentists closer together. Time will tell what effect this circumstance has on what historically has been a rather insular profession.

While this diffusion of computer technology throughout the profession represents a major advance, significant milestones remain elusive. We have largely finished picking the low-hanging fruit in automating the dental practice. We can submit insurance claims electronically, reorder supplies over the Internet, or remind our patients about their upcoming appointments by e-mail; however, we have not made much progress in more important areas:

1. Most dentists still do not use computers routinely during clinical practice. This is not because they are unable to do so, but because most dental systems are not designed to be used in a clinical environment. Until systems are designed with patient care as the central focus, they will remain of marginal usefulness for clinical dentistry.
2. It is still impossible to easily and seamlessly exchange patient information among colleagues. We cannot readily review dental and medical histories compiled by colleagues, obtain the latest radiographs, or access the record of an emergency dental visit. The Veterans Administration has begun to demonstrate the power and efficiency of such an infrastructure at work; however, this goal remains elusive for the larger dental care environment.
3. The promises of clinical decision support systems remain largely unfulfilled. The few prototypical systems that have been developed never achieved widespread distribution. To date, no one has attempted the development of a comprehensive diagnostic or therapeutic decision support system in dentistry.
4. True innovation in education and continuing education is rare. For many, a brochure on the Web, an e-mailed PowerPoint file, or an electronic syllabus already represent educational software; however, innovation in education consists of things that cannot be achieved with traditional methods, such as studying dental anatomy by interacting with a 3D-model of a real tooth (Fig. 1).

To be sure, none of these challenges is trivial; however, dentists must recognize that they can only be met by concerted action, qualified people,

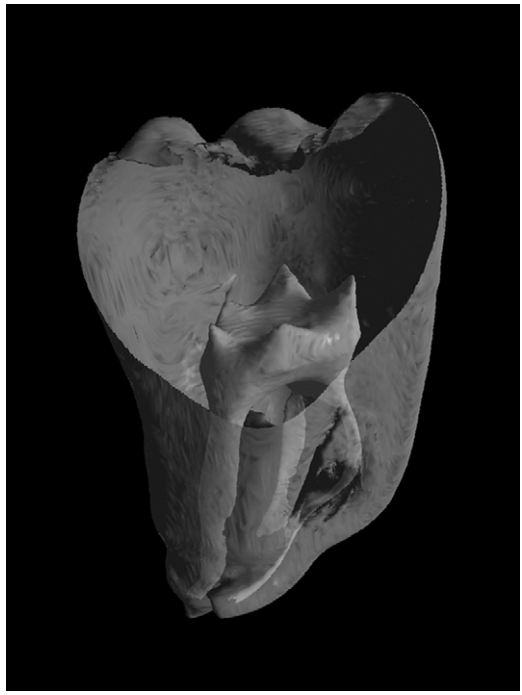

Fig. 1. Computer-based three-dimensional reconstruction of a lower left third molar. (Courtesy of Dr. Paul Brown, National Biocomputation Center, Stanford University, CA.)

commitment of resources, and rigorous research and development. Dental informatics is not the domain of the interested hobbyist. It is a scientific discipline that integrates dentistry, cognitive sciences, computer science, information science, and telecommunications to support practice, research, and education. True advances require a cadre of researchers with systematic training and comprehensive qualifications. Much time and money has been wasted on failed information technology projects, both in dental education and dental practice. In the future, dentistry cannot afford the past degree of inefficiency in this area.

The slow emergence of dental informatics is primarily a failure of academic dentistry. Unless dental education invests in dental informatics as a research and education enterprise, its promises will remain largely unfulfilled. Investing in dental informatics requires money and resources for qualified faculty, academic departments and/or centers, and research projects. The current age of financial scarcity for dental schools requires sound allocation of resources. Developing dental informatics is not an option, but a necessity.

This issue of the *Dental Clinics of North America* describes some current and emerging technologies, applications and methods. It covers topics such as information retrieval on the Internet, application service providers, clinical

decision support, simulations, dental practice Web sites, the Health Insurance Portability and Accountability Act, handheld computing, digital radiology, educational software, teledentistry, and data integration. None of the papers was written to generate unqualified support for a particular technology or method. Rather, each paper is intended as an anchor for readers to evaluate new technologies critically. The problems we are trying to solve should never be obscured by the buzz and hype about a particular technology.

I would like to thank the authors and the staff at W.B. Saunders for their hard work and dedication. Producing an issue such as this one requires significant effort. I would like to express special thanks to my colleague Dr. Heiko Spallek, without whom this issue would not have been possible.

Sixteen years ago, in this very journal, the term ''dental informatics'' appeared for the first time in the biomedical literature. The authors then were no less visionaries and pioneers than the authors of today. We hope that you will enjoy reading the articles in this issue, and that the *Dental Clinics of North America* will provide you with another update on dental informatics somewhat sooner than the year 2018.

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