Journal of the American College of Dentists

Winter 2002
Volume 69
Number 1

New Relationships with Laboratories

Journal *of the* American College *of* Dentists

A Publication Presenting Ideas, Advancements, and Opinions in Dentistry

The *Journal of the American College of Dentists* (ISSN 0002-7979) is published quarterly by the American College of Dentists, Inc., 839J Quince Orchard Boulevard, Gaithersburg, MD 20878-1614. Periodicals postage paid at Gaithersburg, MD.

Postmaster: Send address changes to:
Managing Editor
Journal of the American College of Dentists
839J Quince Orchard Boulevard
Gaithersburg, MD 20878-1614.

The 2002 subscription rate for members of the American College of Dentists is $30 included in the annual membership dues. The 2002 subscription rate for nonmembers in the U.S., Canada and Mexico is $40. All other countries are $60. Foreign optional air mail service is an additional $10.
Single copy orders: $10.

All claims for undelivered/not received issues must be made within 90 (ninety) days. If claim is made after this time period, it will not be honored.

For bibliographic references, the *Journal* is abbreviated J Am Col Dent and should be followed by the year, volume, number, and page. The reference for this issue is J Am Coll Dent 2002; 69(1):1-47.

Publication Member of the American Association of Dental Editors

Mission

THE *JOURNAL OF THE AMERICAN COLLEGE OF DENTISTS* shall identify and place before the Fellows, the profession, and other parties of interest those issues that affect dentistry and oral health. All readers should be challenged by the *Journal* to remain informed, inquire actively, and participate in the formulation of public policy and personal leadership to advance the purposes and objectives of the College. The *Journal* is not a political vehicle and does not intentionally promote specific views at the expense of others. The views and opinions expressed herein do not necessarily represent those of the American College of Dentists or its Fellows.

Objectives of the American College of Dentists

THE AMERICAN COLLEGE OF DENTISTS, in order to promote the highest ideals in health care, advance the standards and efficiency of dentistry, develop good human relations and understanding, and extend the benefits of dental health to the greatest number, declares and adopts the following principles and ideals as ways and means for the attainment of these goals.

A. To urge the extension and improvement of measures for the control and prevention of oral disorders;

B. To encourage qualified persons to consider a career in dentistry so that dental health services will be available to all and to urge broad preparation for such a career at all educational levels;

C. To encourage graduate studies and continuing educational efforts by dentists and auxiliaries;

D. To encourage, stimulate and promote research;

E. To improve the public understanding and appreciation of oral health service and its importance to the optimum health of the patient;

F. To encourage the free exchange of ideas and experiences in the interest of better service to the patient;

G. To cooperate with other groups for the advancement of interprofessional relationships in the interest of the public;

H. To make visible to professional persons the extent of their responsibilities to the community as well as to the field of health service and to urge the acceptance of them;

I. To encourage individuals to further these objectives, and to recognize meritorious achievements and the potentials for contributions to dental science, art, education, literature, human relations or other areas which contribute to human welfare—by conferring Fellowship in the College on those persons properly selected for such honor.

Correspondence relating to the *Journal* should be addressed to the Editor:
American College of Dentists
839J Quince Orchard Boulevard,
Gaithersburg, MD 20878-1614

The business office of the *Journal of the American College of Dentists* can be reached by:

Phone: (301) 977-3223
Fax: (301) 977-3330

New Relationships with Laboratories

18 Future of Dentistry Report–Education Chapter

Manuscript

Issues in Dental Ethics

Student Ethics Essay

Departments

FROM THE EDITOR

Picking Your Patients

If pastureland has a few fruit trees or oaks on it, it always has a distinctive appearance when the cattle or sheep are present. Regardless of their size or shape on top, trees in an active pasture are smoothly groomed to a uniform height on the bottom. They are neat and trimmed parallel to the ground at exactly the maximum reach for the kind of livestock pastured there.

The same is true in healthcare markets. Everyone goes for the low hanging fruit. That's exactly what HMOs did when they came on the scene. They recruited patients in the suburbs, through professional associations, and by other convenient means with a view toward assembling cohorts of potential patients who are stable and have low healthcare needs. These firms are run by good businessmen and they know they will have to sell those cohorts to dentists and physicians who are also good businessmen.

Some smart healthcare economists who understand these things, predicted that the market penetration of dental HMOs would reach only about 20%. The rest of the fruit was just too high to reach. The reason for the much deeper penetration of managed care in the general health area is that medical costs represent so much greater a proportion of personal income then do oral healthcare expenses. Some economists have even noted that HMO market share will track aggregate dental fees and healthcare benefits and that dentists can drive managed care out of the marketplace by lowering costs or by adding additional value to their services.

There's something very uncomplimentary in the push and tug between dentistry and managed care. It implies that dentists are economic competitors with insurance companies. Dentistry, patients, and the public at large have always seen dentists as first and foremost professionals. The challenge to which all others are subordinated is increasing oral health. Only crassly commercial interests would condone picking the lowest hanging fruit rather than cultivating a healthy, thriving tree.

There's something very uncomplimentary in the push and tug between dentistry and managed care.

It surprises me, given this background, that cherry picking patients is now the rage in the dental management literature. Here are some recent examples of advice offered to dentist in publications. "Profile your patients—are the patients who are most loyal, fastest paying, and compliant those selecting the most high-priced services?" "Replace discounted fee patients with full-fee patients through more aggressive internal and external marketing." "Most dentists spend too much time and energy problem-solving for problem patients and not enough time pampering their preferred patients." "Choose your patients before they choose you." "Instead of simply filling your chairs with anyone who needs care, wouldn't you rather select the patients with whom you really want to work?"

This gives a new meaning to "case selection." Not one word in the preceding paragraph about reducing insurance patients, the advice offered is to select only the most convenient of the cash customers.

The turndown in the economy should place a damper on this gospel of greed.

What does the ADA code of ethics have to say in this matter? Under the section on "justice," patient selection is specifically approved: "Dentists, in serving the public, may exercise reasonable discretion in selecting patients."

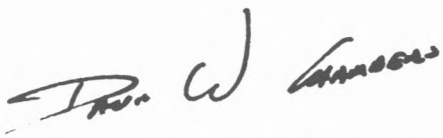
The emergence of such frank commercialism is probably, at least in part, made possible by recent economic good times. The turndown in the economy should place a damper on this gospel of greed.

Market segmentation is a venerable strategy in the commercial world, but it is not any part of professionalism.

Market segmentation is a venerable strategy in the commercial world, but it is not any part of professionalism. It is fine to be a Lexus automobile dealer if there are enough people to buy a Lexus and if there are dealers selling Fords and Toyotas. The car business is a free market, unregulated economy. But healthcare is not. It is a monopoly. If one dentist in town takes only high-end, cash-paying patients, he or she is dumping the others on colleagues or leaving them without access to care. This works fine in a business world. But it erodes the fabric of a profession.

By its nature, dentistry has elements of business and of professionalism. Maintaining the proper balance is essential for long term health. A sure sign of imbalance is one segment of the profession seeking economic advantage at the expense of another section of the profession. Another untenable position is insisting on a monopoly without providing service to all customers.

Restoring the balance between commercialism and professionalism calls for some combination of more public professionalism and less commercialism. Increased awareness of professional obligations, of ethics, excellence, and professionalism, ethics courses in dental schools and tests of licensure examinations, and in our editorials are welcome trends. The American College of Dentists is certainly a leader in this regard. But it would be flat wrong to allow the public professions of professionalism to mask an increasing commercialism in dentistry. The correct way to restore balance is to label commercialism as such and to reduce it and its corrosive effects on both patients and colleagues.



David W. Chambers, EdM, MBA, PhD, FACD
Editor

Ethics in Journalism

Committee Members: David W. Chambers, Eric K. Curtis, James P. Fratzke, Howard I. Mark, Robert Rosen, Margaret H. Seward

The American College of Dentists has addressed growing concerns over ethical issues in dental journalism. The College and the American Association of Dental Editors have developed a Code for Dental Editors. This code has been approved by the Regents of the College and the Officers of the AADE.

The need for such a code was recognized in a program on ethical issues in dental journalism which took place in San Francisco in 1998. The program was sponsored jointly by the AADE and the ACD and organized by Drs. James Fratzke and David W. Chambers (who are members of both groups). For the past four years, AADE and ACD has jointly sponsored a session at the October Convocation of the College (one of the LeaderSkills programs) and the annual meeting of the American Association of Dental Editors which meet simultaneously. A committee, representing overlapping leadership in both organizations, developed the code over a three-year period.

The Code for Dental Editors takes a strong and unusual position in asserting that the primary responsibility of the editor is to the readership. There have been several cases recently where editors of high-profile publications such as the *New England Journal of Medicine* and *JAMA* have been forced to resign over conflicting obligations to readership and to the sponsoring organization. The code is also filled with practical standards for effective journalism.

It is more than a coincidence that the American College of Dentists and the American Association of Dental Editors should have common core interests and individuals in leadership positions in both organizations. In 1932, the Commission on Journalism of the American College of Dentists issued its 225-page report on *The Status of Dental Journalism in the United States*. This report summarized three years of investigation into the strengths and weakness of dental publications seventy years ago. A primary theme of the report was concern over the commercialism that held a grip on the dental literature. A stern warning was also sounded against the threat that commercialism might even be invited into professional meetings.

Members of the ACD Commission on Journalism also worked to provide long-range financial support for the fledgling *Journal of Dental Research* that had been undertaken by William J. Gies. When the International Association for Dental Research assumed responsibility for that journal, the funds that had been raised became the nucleus for the William J. Gies Foundation, which continues to this day to support journalism through prizes such as the Gies Award for Dental Editorials. Another significant result of the Commission's work was the creation of the American Association of Dental Editors.

Code for Dental Editors

Adopted by the Regents of the American College of Dentists, March 2001 and the Officers of the American Association of Dental Editors, October 2001:

A. The first responsibility of the editor is to the readers.
   1. The primary criterion for selecting content, format, and timing of publication should be to enable readers to better function in their roles.
   2. Active steps should be taken to ensure that content is from reputable sources, factually accurate, balanced, and unbiased.
   3. Label opinion as such, disclose potential conflicts, and identify sources.
   4. Publish the mission of the journal and relevant disclaimers.
   5. Make the publication as readable as possible through a style that is standardized for the publication and careful editing for grammar and clarity.
   6. Correct errors when recognized.
   7. Provide an opportunity for responsible alternative opinions.
   8. Provide references and contact information so that interested readers can verify content and pursue further study.

B. The second responsibility of the editor, representing the professional community, is to authors.
   1. Promote the dignity of the profession, all individuals, and all groups.

2. Publish regularly the standards for selection of content and format for submission of material.
3. Review submitted material in a fashion that is timely, confidential, constructive, and ensures consistency in the selection process.
4. Work to improve the skills of authors.
5. If peer reviewed, standards should be stated for selection of reviewers and the rules under which they operate and efforts should be made to improve the skills of reviewers.

C. The third responsibility of the editor is to the organization publishing the journal.
   1. Never place the sponsoring organization in a legally questionable or intentionally embarrassing position.
   2. The editor must have timely and complete access to policy, mission, and important emerging issues within the organization.
   3. The organization should determine the selection and terms of employment of the editor.
   4. Advertising must be in good taste and not false or misleading.
   5. A policy on copyright ownership should be developed and communicated.

D. The fourth responsibility of the editor is to the community of editors.
   1. The editor must conscientiously strive to remain informed of emerging trends in the fields and subjects covered in the publication.
   2. The editor should receive training needed to perform duties assigned and should keep such skills current.
   3. The editor should have final say over content of the publication.
   4. The editor must seek advice from and be open to guidance from peers.
   5. A policy covering republication and other use of published material should be published, and sharing of material, with proper acknowledgment, is encouraged where the profession benefits from this practice.
   6. The editor should be above suspicion of party influence, conflict of interest, or personal agenda.

The Changing Roles of the Dentist and Dental Laboratory

Reynolds Challoner

Abstract

There are growing pressures on the relationship between the profession and laboratories, including increased use of sophisticated prosthetic services, rapid evolution of materials, more "educated" patients, declining numbers of laboratory training programs and relatively reduced hours in dental schools in traditional prosthodontics subjects, and consolidation in the dental laboratory industry. Restorative services represent the greatest cost/value center in most practices, and the ADA's "Future of Dentistry Report" calls for the profession reasserting its "control" in this area. It is proposed instead that a partnership among the profession, laboratories, manufacturers, and education represents the most effective way to guide the emerging future of restorative dentistry for the benefit of patients and the concerned parties.

As dental materials and systems have evolved over the past five to ten years, the quality and the efficiency of delivery of dental prosthetics to the patient have improved significantly. This rate of technological change has and will continue to increase at a geometric rate as new materials, procedures, and equipment at both the dental office and dental laboratory continue to be developed. As an example, look what bonding has done for all-ceramic restorations by improving the esthetic result as well as the function for those dentists who are able to handle this technique-sensitive method. In the future, bonding materials and techniques will continue to be simplified, making them easier to handle by the average dentist, while at the same time bringing the efficiency closer to that of cementation of the workhorse PFM.

PFMs themselves have seen dramatic increases in esthetics over the last three to five years through improved materials, not to mention the reduced wear characteristics, all of which benefits patients. These improvements have not come without additional cost. In some cases these costs are more than offset with reduced chair time and improved efficiency through improved laboratory quality and standards of production, including improved communication and partnering between the laboratory and dentist.

Where are dentists learning about these new techniques today? Twenty years ago dentists learned new techniques from the dental school, while today it comes from the dentists on the lecture circuit, the various institutes or academies for hands-on-training and, yes, the dental laboratory! Laboratories and laboratory technicians are many times the initial link in the delivery chain for dentists to learn about and try new technologies for the limited number of the more progressive early adopting dentists. In addition, dental laboratories are in a unique position to see tens to hundreds of cases per day, therefore they know what works and doesn't work in the hands of the various skill levels of dentists they serve. Therefore, laboratories have become a very significant "resource" to a growing number of practices throughout the United States. This

Literally none of the skills training for larger laboratories is being done within the formal education system of the technical college or dental school since the schools have not produced the "skill sets" required for larger laboratory production methods from a technical or attitude standpoint.

Mr. Challoner is a former laboratory owner and currently president of N.E.W. Paradigm Advisors, newparadignllc @earthlink.net. He is Past Chairman of the Board of the American Dental Trade Association.

trend will only continue and accelerate into the future.

At the same time there has been a 50% reduction in laboratory technical training schools (from fifty-seven to twenty-six), and the training of laboratory technicians in many cases has moved to manufacturers' or suppliers' courses in the laboratory or at dental or laboratory meetings. Literally none of the skills training for larger laboratories is being done within the formal education system of the technical college or dental school since the schools have not produced the "skill sets" required for larger laboratory production methods from a technical or attitude standpoint.

Is this really bad? Has the quality of prosthetics increased or decreased over this period of time? It appears that based on what is happening day in and day out, this has been a positive move for the dentist and patient with improved quality and variety of products even while technical education at the technical schools has declined significantly.

Overlay that with the fact that there is a natural consolidation of laboratories, with the larger labs becoming larger and the smaller labs (one to ten associates) remaining static or declining. This is due to two important factors, the first being the need for efficiency and cost containment and the second being the increasingly high capital cost of the development and the introduction of new technologies into the laboratory. This trend will only increase, as technologies become much more capital intensive and require increasingly excellent business skills to be successful versus just excellent technical skills.

Add to this picture that dentists are seeing a much more educated and demanding "consumer" particularly for esthetic restorations, not to mention highly functional restorations such as the single tooth implant. The dental market is segmenting and there appears to be a very limited understanding about the impact of this phenomenon among dentists or the bulk of dental laboratories, primarily the 80% of the smaller laboratories. The laboratory industry and dentistry as such are going through a natural segmentation, some, on the one hand, toward lower cost good quality restoratives for high volume HMO or PPO cost-sensitive markets with the balance of the market toward the high quality restorative and high service options. This high end could be as much as 20% to 40 % of the market and represents those patients and dentists demanding quality and options and willing to pay for the improved esthetics, shorter turnaround times, lower chair times, improved function, lower wear, easier adjustment, etc. When recent articles in some journals talk about improving practice profit through choosing cheaper prosthetics, they miss the point of segmentation that deals with "value" creation developed by both the service as well as the functional side of the product and market. With the changing demographics of the patient population and the "new consumerism," this segmentation trend should increase. The majority of the market will still remain with the "good" quality, moderate priced products for some time to come but the high end will continue to grow. Dental education, (be it in dental schools or by lectures) in addition to laboratory education in the future, needs to focus more on these "business" and "value" concepts in their curricula to help dentists and laboratories deal with this increasingly complex marketplace. This will reduce stress in the delivery system and allow adequate returns to the dentist and laboratory while they provide a service that is deemed valuable by the patient.

In my view, "increasing control" of the process could be very difficult to achieve for dentistry and perhaps it is time to recognize the irreversible shift that has taken place and encourage a true "partnering" between the profession, dental educators, and the laboratory industry to deal with the new environment.

In the ADA's "Future of Dentistry Report" the association states, "The dentist must remain the repository of laboratory skill and knowledge" and "The laboratory industry should not become the authority in laboratory procedures." One of the recommendations for the dental profession is to develop strategies to take a greater control over the integration of these new technologies. This is based on the fact that the education of dentists on prosthetics and restorative techniques has been declining in dental schools due to their need to focus on other curriculum such as the biological aspects of the oral environment.

In my view, "increasing control" of the process could be very difficult to achieve for dentistry and perhaps it is time to recognize the irreversible shift that has taken place and encourage a true "partnering" between the profession, dental educators, and the laboratory industry to deal with the new environment. The laboratory industry and the organizations that support it and eventually deal with these long-term strategic issues have declined in effectiveness over the last twenty years. This has been due to the profession not recognizing the importance of these organizations in setting standards and long-term programs that enhance the quality and efficiency of the prosthetics they receive. The laboratory industry at the same time, due to its fragmentation (with over twelve thousand laboratories, 90% of which are smaller than ten technicians), has been a craft and technically driven industry that has not focused on the business and strategic issues until now. Compliment that with the dental profession that is 80% solo practitioner and looked at by many as a "cottage industry" itself, with little focus on the business and strategic aspects of the profession—one can see why we are

where we are. The ADA's report is very timely and solutions must be identified that take into account the issues in both the laboratory industry and the profession.

Prosthetics can represent roughly 10% to 15% or more of the costs in a practice, yet they can bring in 50% to 60% of the revenue, sometimes generating almost all of the gross profit. This is due to preventative services taking up the bulk of the time, but with suppressed fees due to their low reimbursement levels. In fact, if dentistry was truly interested in only the dollars and cents, the profession could look just at the restorative side of dentistry and not the preventative side, which has been its focus over history that has improved the nation's oral health and the retention of teeth in patients today. Our reimbursement system literally incents restorative work and dis-incents preventative procedures through these fee structures that have developed over the years. What should be done about this is not the subject of this article, but is an issue that impacts us and should be the focus of some studies in the future. Our role is to bring efficiency, recommendations, quality, and value of the restorative process to patients.

Prosthetics can represent roughly 10% to 15% or more of the costs in a practice, yet they can bring in 50% to 60% of the revenue, sometimes generating almost all of the gross profit.

Recommendation. So what do we, as an industry and profession in partnership, need to do to make sure that the quality and available supply continue to be a reality in the years ahead? First, we need to look in depth at dental education and the role of prosthetics within it. Then we need to look at laboratory education. All players in the prosthetic delivery system need to truly understand what is happening in the environment we are all participating in. Organized dentistry and the organized laboratory industry need to sit down and agree on where we are and what the needs of the future are going to be, then establish standards, programs, and directions to get us there. Where are the next qualified technicians going to come from? How is the dentist going to learn about the newest techniques?

The dentist today is a licensed practitioner and has the responsibility and liability in the delivery of quality prosthetics to the patient. At the same time dentists are declining in their understanding of laboratory technology, systems, and economics that affect the prosthetics they purchase. Additionally, the laboratory has not only seen a geometric increase in materials and system costs but also a significant improvement in quality, esthetics, and function of the prosthetics. This has created increased complexity within the laboratory, additional costs, and the need for even more standardized education of technicians in evaluation of techniques for new products and systems being presented to their operations. Bring the manufacturer or supply industry along with education into the equation and a four-way dialogue and partnering, and progress can be made.

The issues of new product evaluation and introduction without appropriate technician training complicated with too much marketing hype to the dentist has created concern among dentists as well as laboratories and is a prime need for a partnering among dentistry, the laboratory industry, education, and manufacturers to resolve this issue. Dental chair efficiency, which is a major cost component of the delivery of prosthetics to patients, is something all partners can focus on. Communications between the laboratory and the dentists cannot only improve efficiency but also the quality of the result with the patient. Manufacturers understand this component and could be an excellent partner in the future.

The profession needs to provide the leadership in raising the level of true understanding of the extent and nature of the issues and risks relative to delivery of efficient high quality prosthetics to the public. Through this leadership, the profession will in fact gain increased control of that delivery through a true partnering and not just trying to control the laboratory industry and manufacturers. We need to use everyone's unique skills against the problems. As dentistry and dental technology become increasingly complex, we each have our own role in the delivery system to develop and perfect. We must do that together after we first study and truly understand the issues, including technology and its implications and economics, technical skills required at the laboratory, and the dental market, with the patient demographics that will drive us all. Our entire dental prosthetic delivery system must move from its fragmented and cottage industry nature to one of business and professionalism at all level of the system. That can only happen through true partnering.

The dentist is the licensed provider. With the increasing demands of training in all aspects of oral health today, laboratory technology issues cannot be put aside any longer but must be dealt with immediately. To do that, a consortium of the dental profession, dental education, the laboratory industry, and the supply industry must be established.

The Dental Laboratory Dilemma in America

Gordon J. Christensen, DDS, MSD, PhD, FACD

Abstract

Dentistry has lost some of its "touch" with the technical, laboratory aspects of the profession. More cooperation is needed between dentists and laboratory technicians in their education, in practice, and at the organizational level.

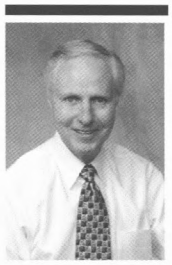
The relationship between dentists and dental technicians has changed several times over my long career in dentistry. My early experiences with dental technology were in dental school at the University of Southern California in the 1950s. At that time, the dental school curriculum included a significant amount of laboratory involvement. I have always enjoyed the laboratory aspects of dentistry as much as the clinical portions. I have had the opportunity to start four practices over my career span. With each initiation, I accomplished most of the laboratory work myself for the first few years, until the cash flow increased. However, my experience with laboratory technology has been quite varied. For more than forty years as a prosthodontist, I have used remote laboratories, accomplished the laboratory work myself, employed laboratory technicians in my office, and used independent technicians in my own building. Each method of accomplishing dental laboratory work for a practice has its advantages and disadvantages. My various laboratory involvements have provided a significant insight into the challenges in laboratory technology. At this time, I see the lack of interaction between the dental profession and dental technology at an all time high. Change is needed immediately.

I encourage dental schools to have laboratory schools in their facilities, or to team with local laboratory schools to integrate courses for dental and dental technology students.

In this article, I will make observations on the current state of the dental laboratory industry in the United States, discuss the apparent challenges, and make suggestions to overcome the current challenges. My comments will be expressed as an experienced prosthodontist, who has had significant laboratory experience, and who speaks with thousands of dentists each year, hearing of their successes and their frustrations in the dental technology area.

Laboratory Challenges in Dental Schools

It is common knowledge that the current degree of dental laboratory education taught to dental students is minimal when compared to the past. I made this case in a 1995 article in the *Journal of the American Dental Association* ("A needed remarriage: dentistry and dental technology"), and the need is as great today. In my opinion, this challenge is related to many uncontrollable factors including: lack of time in the constantly expanding dental curriculum; lack of dental laboratory schools associated with dental schools; lack of dental instructors who have knowledge of, or interest in, dental technology; and a lack of respect by some dental instructors for the technical aspects of dentistry. I spent the first thirteen years of my career as a full-time dental educator. I was often appalled at the attitudes of some faculty members who thought that the technical aspects of dentistry were not important and should be de-emphasized in the dental curriculum. It was always interesting that in spite of their apparent disdain of technical dentistry, when these same people needed dental therapy, they usually found themselves in the office of a strong supporter of technical excellence.



Dr. Christensen is a practicing prosthodontist in Provo, Utah, and Director of Practical Clinical Courses. He is a co-founder and Senior Consultant, Clinical Research Associates, and an Adjunct Professor, at Brigham Young University and the University of Utah.

I am very proud of our profession! I find dentists repulsive who do not respect the very aspect of American dentistry that has made it the highest quality in the world—technical excellence at a moderate cost for the majority of the population. In my opinion, there is nothing wrong with a technical orientation in dental education. What would happen if general surgeons felt that the technical aspects of surgery were below them? As with general surgery, much of what we do is primarily technical. Let's accept the inherent technical quality of dentistry. In fact, let's flaunt it!

In my strong opinion, there should be a revival of activities that combine dental technicians and dentists. I encourage dental schools to have laboratory schools in their facilities, or to team with local laboratory schools to integrate courses for dental and dental technology students. Until dental school faculties recognize the importance of dental technology and the sad state of affairs that currently exists, the dental technology situation will find no solutions, and the quality of American dentistry will continue to suffer.

Dental Technology Education

Although there are some notable exceptions, the level of dental technology school integration with clinical dentistry could be much better. Does it seem logical that a student technician sees only stone casts when learning about the construction of crowns or dentures? I feel that dental students and dental laboratory technology students should see patients together, at the initiation of the restorative or prosthodontic services. Decisions about color, tooth anatomy, lip and cheek contours, type of restorative materials, and many other factors should be made conjointly by dentists and technicians.

The last half of my career has allowed me to have dental technicians in my immediate environment, accomplishing the tasks previously described. The level of oral therapy that I have been able to accomplish by this close association with the technology part of the team has been highly superior to having no clinical involvement with the technicians. Students in dental technology schools should have strong clinical involvement with dentists, dental students, and patients during their school experience as well as later in their laboratories.

Decisions about color, tooth anatomy, lip and cheek contours, type of restorative materials, and many other factors should be made conjointly by dentists and technicians.

Many technicians have received excellent education in dental technology schools and have continued their education after graduation. Formal education in dental technology allows technicians to have scientific background behind their decisions. It improves their self-esteem; it provides exposure to others in technology with their diverse opinions and techniques; it forces students to think and to make logical decisions, based on facts; and it improves the ability of the dental profession and dental technology to better serve the American public. However, many technicians learn their laboratory skills on-the-job. Although lack of formal education has not impeded some technicians from having successful careers, it is well known that education produces a more predictable and consistent result. Formal education has been impeded by lack of technical schools and the cost of receiving the education. As in any area of endeavor, I encourage dental technicians to seek and find education and to continue their education for the full length of their careers.

Strengthening Laboratory Technology

I have been informed that the average age of dental technicians in the U.S. is increasing each year. Why is that occurring? Not enough young people are coming into dental technology. Can the situation be improved? Every vocational area needs to recruit new people on a constant basis. Dental technology is an attractive area for people who have artistic skills, good hand-eye coordination, and an interest in learning and advancing their abilities. To improve recruitment into dental technology, leaders in both dentistry and dental technology should exert more effort.

Why do not all technicians obtain the CDT designation? The CDT certification requirements force technicians to improve their education, knowledge, and experience. I would like to see the CDT status emphasized by the various organizational groups in dentistry and in dental technology. I encourage laboratories to emphasize the desirability of becoming a CDT and to motivate their employees to obtain and maintain the designation. The requirements to maintain certification encourage continuing education to update continually and stay on top of new techniques and materials.

Joint Efforts by Dentistry and Dental Technology Organizations

At this time, dental and dental technology organizations do their best to keep their own separate groups viable and productive. However, in my opinion, there should be far more interaction and communication between the two areas. The problem is similar to some of the challenges between dentistry and the other parts of medicine. Dentists and physicians are treating different parts of human bodies. Each group has much to tell the other, but interaction between the groups and communication on matters of mutual interest is minimal at best. I sense there could be far better patient care if dentists and physicians interacted more. Of greater importance to dental

patients is the lack of interaction between dentists and laboratory technicians. In my opinion, we need to develop committees that include both dentists and technicians from our major organizations. These committees need to be organized immediately to solve some of the challenges addressed in this article. The problems will not solve themselves. They need help from both areas working together on an equal basis.

Many dentists prefer to use a small laboratory located near their offices, while others prefer to use large labs far removed from their offices. Although this situation is thought to be a problem by some, I do not see it as such. Quality laboratory work can be obtained from either type of laboratory, and communication between dentist and technician can be good or bad in either situation. Personally, I prefer to have technicians in the clinical environment for reasons I have mentioned earlier, but I respect dentists who have learned to work with remotely located laboratory technicians. I do not see any reason to encourage or discourage any type of laboratory or the manner in which they function. The variety of modes to deliver laboratory skills is adaptable to the needs of the profession.

The immediate popularity of implants beginning about fifteen years ago caused a significant challenge in the profession. What seemed to be a relatively simple restorative-prosthodontic technique confounded many treatment plans of dentists and technicians. After discouraging results, some laboratory owners actually eliminated implants from their standard production. Dentists were just as confused as technicians. Fortunately, this situation is being overcome by education from many sources.

The major problem is the current lack of interaction between the dental profession and dental technology.

The introduction of the numerous CAD-CAM concepts is a situation of even greater magnitude. It is imperative that education on the CAD-CAM concept is provided to dentists and technicians to avoid serious clinical problems.

The most successful and influential continuing education courses I have given in the restorative-prosthodontic area have been courses offered to both dentists and technicians at the same time. After completing such courses, both dentists and technicians are pleased with the amount of information they receive when there is significant dentist-technician interaction. There is observable increased respect for one another. Both groups seem to learn much more when they are in an educational setting together. After delivering thousands of continuing education courses, I must sadly admit that there is little encouragement from dental organizations to provide courses designed for dentists and technicians together. To provide such courses is one of my upcoming priorities.

The Future

There must soon be significant change to divert the challenges easily anticipated in dental technology. The major problem is the current lack of interaction between the dental profession and dental technology. There must be strong effort exerted to bring these two areas together. Leadership from both groups cannot ignore the situation any longer — they must get together to solve their mutual challenges. Working together can solve the problems, but trying to solve them independently has not been successful. In my opinion, the future of dental practice is very bright, and the opportunities for both dentists and dental technicians are many, but the lack of interaction between the dental profession and dental technology will limit those opportunities unless recertified.

The Dentist-Laboratory Relationship: A System for Success

Don Warden

Abstract

There are many changes occurring in the field of dentistry that are impacting the way dental offices and dental laboratories must work with each other. Materials and procedures are changing at an extremely rapid pace. At the same time, the knowledge and demands of the patient continue to rise. In order to navigate through these challenging waters, the relationship between dental office and laboratory must become one of corroboration and partnership. The relationship between dentists and laboratories should be viewed as an interactive system. With full participation, better education, and wise management of information, this partnership can grow to the benefit of all concerned.

Two things really made an impression on me when I began working in this industry ten years ago. The first was how naturally close the employees of a dental laboratory were to their dentists. Prior to joining the dental laboratory industry, I was involved in quality engineering and management in the electronics manufacturing industry. Many of the quality gurus of the day were writing and teaching that the best way to ensure quality products and services was to get all the employees of your company working closely and directly with the customer. Many of our "quality improvement" activities focused on that very difficult challenge. After joining the dental field, the naturally close proximity of technician to dentist was very refreshing to see. The second impression I had was that this relationship between laboratory and dentist was very personal, and sometimes adversarial.

A System

Fortunately, the adversarial relationships have greatly diminished in the ten years that have passed. Technicians and dentists have learned that predictable results are best accomplished by working together. This collaboration forms the core of a system of dental health care delivery. Before discussing the dental health care system specifically, it may be beneficial to review the fundamentals of any generic system.

Any system can be broken into four major components: inputs, processes, outputs, and a feedback loop. The output can be anything you are trying to achieve: a healthy patient, a high performing employee, profit, a crown that fits, or a scratch golf game. The feedback loop is the most critical part in any system. Here corrections are made and continuous improvement is achieved. Any time you are trying to solve a problem, either in the office or at home, try breaking it down to the basic system format. You'll be surprised how much easier it is to deal with if you do.

A System with a Personality

Dental healthcare delivery is a very complex system. The output of this system must focus on a satisfied and healthy patient. The patient is the ultimate consumer. A primary role of the dentist in this relationship is to understand the expectations and needs of the patient. This understanding is dovetailed with the training and experience of dentists to create a treatment plan. The technician's primary role is to understand the many material systems available that can be matched with the treatment plan. At the highest performing level in this system, the dentist and technician will teach each other so well about what they have learned in the primary roles that the dentist will intuitively know what the techni-

Technicians and dentists have learned that predictable results are best accomplished by working together.

Mr. Warden is President of Lord's Dental Studio in Green Bay, Wisconsin; dwarden@lordsdental.com.

cian will recommend and the technician will intuitively know what the patient and dentist want. It is this interdependence that makes the system so incredibly personal.

Following are some of the specific ideas that have been and can be used to reach that order of relationship.

Getting Everyone Involved in Product Development. One of the major challenges we face with the rapid advances in technology is making sure that these new materials and procedures work properly before using them *in mass*. Unfortunately, there have been instances historically where the rush to get a product to the commercial market has compromised the quality of service received by the patient and put at risk the integrity of the dentist, the laboratory, and the industry as a whole. One way to address this issue from the laboratory perspective is to take a very active role with both dentists and the dental manufacturers in bringing new technologies to market.

On the development side, a few laboratories are working very closely with manufacturers. We discuss ideas that can answer the questions we receive from dentists and patients. Many laboratories are also parts of larger networks, both formal and informal, that share ideas with each other and try to leverage the strengths of each member. Ideas are often taken from the abstract to testing in the laboratory for viability. Clinical tests are then frequently conducted between the laboratory and their dentist clients. Many years ago, we took the step of formally organizing a dental advisory group who would dedicate time on a regular basis to help us clinically evaluate new materials prior to making them available to the general marketplace. This is a great way to develop the relationship between the laboratory and the dentist. It also gives other dentists in the market additional peace of mind knowing that their peers have given a "thumbs up" to a new product they would like to use.

There has been a trend in the industry over the last decade of bringing in outside people to manage the business side of the laboratory.

Continuing Education. The need to be able to teach each other and the necessity of being open to learning from each other makes continuing education fundamental in this relationship. A lot has developed with CE in the last decade. In the past we saw lecture halls filled with dentists and staff learning about clinical techniques and practice management from leading clinicians in the industry. Learning centers were created where dentists and staff could be certified through various levels of technical competency. More recently, an emphasis is being placed on dentists completing courses with their dental technicians. This has been a tremendous development in building the dentist-laboratory relationship. In the future, the collaborative educational effort will continue. Laboratories are now hosting courses of their own, teaching dentists and staff how to take shades and produce accurate models. There will be increasing cooperation between the laboratory and manufacturer or distributor as well to deliver hands-on courses for various office procedures.

Information Management Critical. We have often said that while prosthetic devices are the "deliverable" that generates most of a laboratory's revenue, the "product" we manage more than anything is information. After giving tours of the laboratory and describing the prosthetic fabrication process to people from outside of the industry, a question that is often asked is, "With so many variables to manage, how do you ever get anything to work?" If you think about it, that is a very legitimate question.

In the future, there will be continued emphasis on developing the communication tools used between the laboratory and the dental office.

The process starts with a patient, a human being, who brings emotions, expectations, and concerns to the dental chair. Then the dentist and assistant, with various levels of skills and experience, begin working in the oral environment, an environment that is very difficult to work in with the types of tools and materials necessary for dental procedures. Anatomical structures, prosthetic options, and treatment plans must be communicated to the laboratory technician, typically with an impression and a piece of paper. Then, technicians of various skill levels and experience try to turn that communication into a prosthetic that fits, functions, and is visually pleasing to both the dentist and patient. The dentist then needs to place the finished product in the patient's mouth.

In addition to each of the twenty to fifty process steps (depending on the procedure), there are dozens of material and equipment choices that must be made at each step. It becomes obvious why consistency is a major objective in the dentist-technician relationship and why lack of consistency is the number one reason a dentist will switch laboratories. In the future, there will be continued emphasis on developing the communication tools used between the laboratory and the dental office: from greater use of photos and diagnostic tools to computer networks that will directly link the information systems of both dentist and laboratories. These networks are already being tested today.

Managing Success in the Future

The dental practice-laboratory relationship will need to become even stronger in the future. Dental material and procedure advancements will continue at an ever-increasing rate. Communication systems will become more sophisticated. Dental access issues will become even more significant as the number of dentists per population continues to decline and geographic imbalances of dental offices become more prevalent. As we see these many forces acting on our industry, we must continually look at how we can assist each other through challenges that will go beyond prosthetics.

The pressure for increased access to dental healthcare will result in a push for greater productivity. This will happen during a time when many will be also putting a higher priority on achieving a better balance between work and life. Managing time in the office will be paramount, with a focus on using the dentist's time on only those things a dentist is qualified to do, using auxiliary staff in expanded roles, and integrating competent professionals, both inside and outside of the office, to manage the business of the practice.

As a dentist, you have many hats to wear, many roles that you have traditionally had to fill to keep your practice running. In dental school and in the practice, most of the time is spent on the clinical side. As a dental patient, that's a very comforting thought. Unfortunately, that doesn't leave much time to devote to office and staff management, marketing and communicating the value your practice has to offer, and ensuring that the financial aspects of your business are sound and on track to meet both practice and personal goals. Even in this area I believe that there is incredible potential for collaboration between the dental office and the laboratory.

I believe this because laboratory owners are experiencing the very same evolution. The laboratory owner or manager has traditionally filled a role very similar to that of the dentist. Dental laboratory training, both formal and on-the-job, has focused primarily on the technical aspects of fabricating a prosthesis. But like the dentist in the practice, this has not left the technician-owner much time to manage the other aspects of the dental laboratory that are needed to secure the long-term performance of the business.

There has been a trend in the industry over the last decade of bringing in outside people to manage the business side of the laboratory. This experience is a resource that will be able to be leveraged in the dental office as well. Laboratories are already providing patient education pieces to assist offices in their marketing efforts. Hiring, training, and managing staff are challenges that both dental offices and laboratories face. Why couldn't this issue be tackled together? Total quality management techniques and strategic planning are also areas for collaboration.

New Spirit of Cooperation and Partnership

Many changes are occurring in the dental industry. These changes are causing each of the participants in it to continually re-evaluate how they are approaching their market places and running their business. The bad news: the rate of change that we are experiencing can make it very difficult and stressful to sort through options and make good decisions. The good news: there is a new spirit of cooperation and partnership between the dental office and the laboratory. This cooperation is the key to a continuously improving and very personalized feedback loop in the dental healthcare system. With this feedback loop, the output of the system becomes very consistent and predictable, regardless of the changing inputs. The patient, our ultimate customer, becomes the primary beneficiary of this system.

It is exciting and empowering to know that the challenges ahead do not have to be faced alone. As we tell the senior dental students from Marquette University every year in a day-long course we hold at the laboratory: "If you learn nothing else today, remember this: Visit your laboratory! Get to know your technicians! You might be surprised by how they can help you and your practice be successful!" Dental laboratories should get to know their dentists as well. They might be surprised by how much a dentist can help them be successful.

There Is No Standing Still

Robert A. Ganley

Abstract

Changes in dentistry are leading to new and more interdependent relationships among dentists, patients, and laboratories. Most important among these emerging forces are the rapid development of new product technologies, dentists' desire to increase their financial and creative satisfaction, and changing demographics and customer involvement.

Twenty years ago, the communication and relationship between the laboratory technician and the dentist generally could be characterized as a one-way street—from the dentist to the lab technician. The most typical messages were, "Upper right centered crown, shade A3," and "When is that case going to be ready?" The lab technicians were receivers and fillers of prescriptions. They made what was asked for to the best of their abilities, given the information and the time constraints. Communication from the manufacturer and the dealer to the laboratory was limited to product information, the purpose of which was to answer the laboratory's questions and earn the sale. And communication to the patient was even more limited. The patient asked few questions and the dentist asked fewer. In fact, the patient was not intrinsically involved in the case plan nor therapy decisions.

In short, the flow of information emanated from the dentist to the other parties involved. This one-way, autocratic model was the norm for many years.

Today, the relationships among the patient, dentist, laboratory technician, and manufacturer—and consequently the communication that is symptomatic of the nature of the relationship—are undergoing revolutionary change. It is a change that is greatly altering the direction, tone, and nature of the way each party deals with the others.

The purpose of this article is to explain how and why this change is occurring and what it means for the laboratory technician, the dentist, and the other players in the dental industry.

Change is exciting and these are exciting times. We are witnessing and experiencing a revolution that is bringing the laboratory technician and the dentist closer together as they both move closer to the patient. As we examine the causes of this change, we will find new relationship and communication formulas for the future. From this vantage point, we are witnessing the maturing of a caring industry dedicated to working together to serve the needs of the patient.

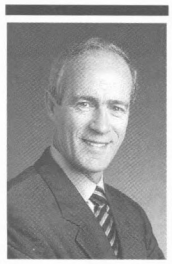
We have seen more change in dentistry in the last ten years than we did in the previous twenty-five. Change is all around us. We have seen changes in the products we use, the education we promote, the techniques we employ, the markets we serve, even the industry as a whole. This change is also causing further realignment of the roles and responsibilities of each of us who participate in this industry.

What is causing this dramatic change at this time? The answer is the convergence of three basic conditions that have become strong catalysts of change throughout the industry. These catalysts are:

1. The advancement of new product technologies and techniques.
2. The dentist's desire for increased financial and creative satisfaction
3. Patients becoming dental consumers and taking more informed control of the process.

New Technologies

The continuous development and release of new products are perhaps the most obvious and tangible change in dentistry. The introduction of dentin bonding materials opened a new avenue of restorative dentistry. By providing adhesion to dentin and enamel, these materials provided a foundation for the expansion and introduction of restorative materials for minimally evasive dentistry. New composite resin and cementation systems were introduced that expanded indications for chairside and laboratory fabricated restorations. Additionally, these new materials were stronger, more wear



Mr. Ganley is President, Ivoclar Vivadent, Inc. He can be reached at robert.ganley@ivoclarvivadent.com.

resistant, and longer lasting than any previous materials. The new shades, new translucencies, and new modifiers fortified the goal of esthetics in dentistry.

The excitement truly arrived with the introduction of all-ceramic systems. These products provided true-to-life esthetics not previously available. The possibility of metal-free crowns and bridges captured the interest of the dentist, allowing the dentist to expand the indications for this type of dentistry and also expand the market. A revolution in esthetics and, in fact, a revolution in restorative dentistry was born.

However, these materials were truly of a new chemistry and required new techniques for fabrication, preparation, cementation, and bonding. The techniques followed by the dentist would change by necessity, and the methods followed by the laboratory technician would also need to change. This is where the first evidence of role change became apparent.

In order to be successful with the onslaught of these new products, a new partnership was required. Two-way communication, common education, and case coordination between the laboratory technician and the dentist became critical. As they stepped into these new areas of dentistry together, each learned complementary skills and began to recognize each other's value in this new equation. At first, the reason for the partnership was to avoid failure. Soon the purpose matured to the achievement of excellence.

New Aspirations for Dentists

The second catalyst for change in the roles and responsibilities of the laboratory technician and the dentist stems from growth within dentists.

More than 80% of dentists are sole proprietors of their business. As entrepreneurs, they reap the rewards and feel the frustrations of any small business owner. Not only are they required to advance their dental knowledge and clinical skills, they must also be accountants, human resource managers, operations and inventory managers, technology gurus, sales and marketing experts, and more. For the most part, they bear these duties alone, with only the well-meaning but often incomplete council of a spouse sitting across the kitchen table. Faced with this isolation, managed care threats and the tedium of a drill and fill practice, is it any wonder that in a recent survey nearly 48% of dentists stated that they would probably not go into dentistry if they had it to do over again. In another survey 60% of the dentists stated that they wanted to be working less, retired, or out of the business all together in the next ten years.

A model had been established. It promised quality dentistry, esthetic dentistry, and patient oriented dentistry built on a foundation of the dental professional team.

The good news is that as products improve and shared partnerships with other dental professionals grow, more and more dentists are gaining the financial and creative satisfaction they desire. This personal satisfaction, achieved through restorative work that restores patients' self-esteem as well as their dentition, grows with each new case. Along with personal satisfaction, came business success as patient volume and patient acceptance grew. The formula for success of the dentist became clear—combine the new materials and techniques (used in conjunction with quality, traditional materials) along with a new partnering relationship with a laboratory technician and communicate these options to the patient. Those dentists experiencing this success wanted more, and those observing this success or hearing about it from the podium or journal articles wanted the opportunity for themselves. This became a simple but powerful dynamic. Practices expanded as dental opportunities expanded.

The role of the dentist as a professional focused only on dental restoration and occlusion maintenance changed. As Dr. Gordon Christensen has stated, "The practitioners who continue to concentrate on strictly mandatory dentistry will be left behind." Restoring smiles and patient attitudes as part of the dental process redefined outcomes for the patient as well as the dentist, and the participation and recognition of the dental technician became central to this success. A model had been established. It promised quality dentistry, esthetic dentistry, and patient oriented dentistry built on a foundation of the dental professional team.

Today, as the patient become more aware and involved in the dental process, he or she will become the most dominant catalyst for change, as well as the primary beneficiary of that change.

Patients Want More

The third catalyst for alteration in roles and responsibilities is at the same time the most unexpected and the most obvious. Today, as the patient becomes more aware and involved in the dental process, he or she will become the most dominant catalyst for change, as well as the primary beneficiary of that change. This role change, though still in its early stages, has been dramatic. But for this trend to be valuable, we as an industry need to be aware of the messages we are sending.

Market Segmentation

(Figures taken from the U.S. Census Bureau)

2001 U.S. Population	2010 Projected U.S. Population	%Growth
Total: 227.8 Million	Total: 299.9 Million	7.3%

Projected demographic growth rate:	
White:	5.8%
Hispanic:	23.1%
Black:	10.2%
American Indian:	14.2%
Asian:	15.3%

In our industry's recent past, dentists have been confronted with and encumbered by the patient's perception of dentistry. Until recently, dentistry has failed to build public awareness of the true benefit of the procedures beyond "Fix it, it hurts!"

The profession's aversion to self promotion has left us with at best a patch quilt of independent messages and at worst, the inability to create future value in the minds of the consumer. It is clear that dentistry provides services that everyone needs, but more than half of the population only uses its services under duress.

The degree of reluctance to visit the dentist was a direct consequence of the degree of discomfort experienced during your last visit to the dentist where the only tangible outcome was the elimination of pain (unfortunately, eliminated through the administration of new pain ... sometimes).

Today, however, the outcome can be dramatically different. Frequently, patients leave the dental office with a new view of dentistry. The clear benefits to appearance, self-esteem, as well as function create a reward worth the cost. We see these outcomes published in magazines and newspapers, as well as on television. An informational and educational dynamic is taking place that is changing dentistry by changing dentistry's guest — the patient. We are witnessing a change in the person from patient to consumer; and from now on, the rules of consumerism will apply. To understand these rules and their consequences we will require a deeper understanding of changing consumer demographics and attitudes. Here are a few interesting facts: Between now and 2010, the U.S. population will increase to nearly 300 million people. Asians and Hispanics will be the fastest growing groups, each reaching a growth rate of more than 23%. The boomers will be retiring and the Xers will be reaching middle age. By 2020 there will be no ethnic majority in the US. By 2020, there will be more than 200,000 people in America over the age of one hundred. Also by 2020, 20% of the population will be more than sixty-five.

Each of these various demographic groups tends to use dental services differently. Communicating the value of dentistry to this wide spectrum of consumers will need a highly integrated approach from all members of the dental community.

In addition to demographic changes, there are also attitude changes evident in the rise of a new type of consumer. This new consumer is substantially more demanding and engaged in the decision making process.

These new consumers are more educated. By 2005, more than half of the population will have the equivalent of one year of college. This matters because people with some college are twice as likely to seek dental care as those who have not attend college.

These new consumers will be wired, with more than half of the population owning a computer with the ability to access information on the Internet. In fact, of those who are currently on line, nearly 70% have searched the Internet for health-related information this past year. These new consumers will have the ability to get what they want. By 2005 almost 50% of the population will have a family income of at least $53,000. Higher incomes have traditionally meant higher use of dental services.

In summary, as the percentage of these new consumers who are educated, can access information, and have the means to follow through increases, they will demand a more active role in the selection of products that are used and the treatment they receive.

Summary

Dentistry includes only about one million people, fewer than half of 1% of the U. S. population. The size of our profession and industry in dollars is only about $60 billion, or about one half of the size of General Electric. We receive less than 5% of the total healthcare expenditures in the U.S. Ours is a somewhat modest enterprise, but an important one. Its main goal is to serve our patients. As the roles and responsibilities within dentistry change, we need to remember that along with great opportunity comes great responsibility.

It may help to think of dentistry as a delicate chain of trust from researchers to educators, to manufacturers, to dealers, to laboratories, to dentists, to patients. And like all chains, we are only as strong as our weakest link. So, as change occurs, we must continue to build on and support the fundamentals that have always been part of dentistry; education, quality tested products, and a genuine concern for the health and well being of our patients.

Change is happening. We will either move forward or backward, because there is no standing still. The future will depend on how well we will be able to come together, alter and mature our roles, respect and rely on each others' individual strengths, and work toward our common goals.

Future of Dentistry—Education Chapter

The Future of Dentistry Report was accepted by the ADA House of Delegates at the annual meeting in October 2001 in Kansas City. This report addresses issues of significance to the future of the profession, offering both in-depth factual background and recommendations.

The thirty recommendations having to do with education are reprinted below with permission. Readers are strongly encouraged to obtain a copy of the full report from the ADA, to read it thoroughly, and to become involved in the future of dentistry.

David W. Chambers, EdM, MBA, PhD, FACD
Editor

RECOMMENDATIONS FOR DENTAL EDUCATION

Education is expected to undergo dramatic changes in the next 15 years. The cost of dental education, probably the highest of all the major academic offerings, threatens to price dentistry out of the education marketplace.

Greater integration of the dental school into the surrounding academic community will help to sustain support but will not prevent cash-starved health science centers from looking at their dental schools as a potential financial resource for its medical programs.

All of this is taking place at a time when expansion of oral and craniofacial science, changes in disease patterns, advances in dental materials, coupled with technologic advances are competing with the traditional elements of dental education for curriculum time. Compounding these issues is the recent reduction in dental school applicants, the lack of progress in increasing the diversity of dental school students and faculties, and an inadequate pool of qualified faculty members.

Reduced government support and increased regulatory requirements have contributed to the escalating educational cost. This eliminates large segments of the college population from considering dental school as a career. This is even more evident among certain minority groups who are enrolling in other career programs with shorter training periods and higher rates of return. A continuation of this trend promises to negatively impact attempts to increase the diversity of the dental workforce. Upon graduation, large educational debt may be a factor in career choice, forcing many of these young practitioners to place undue emphasis on monetary priorities during the formative phase of their careers. For some, this means forgoing a career in dental education.

FINANCIAL SUPPORT FOR HIGH QUALITY DENTAL EDUCATION

The provision of quality dental service for all Americans must be considered a national goal. Critical to obtaining that goal is the education of a high-quality, diverse cadre of dental practitioners.

Education Recommendation-1: The provision of sustained federal/state funding to support dental student training, either in the form of scholarships or direct unrestricted block grants, should be a high priority issue.

Education Recommendation-2: Creative financing and partnership with various communities of interest should be developed to increase the diversity of the dental workforce.

Education Recommendation-3: Programs should be developed to educate dental students and young graduates in debt and financial management.

Government leaders have suggested that reductions in federal and state support of educational institutions, such as dental schools, should be made up by the private sector including corporations, faith-based organizations, foundations and individuals. In this regard, dentists have proven to be charitable individuals by virtue of providing large amounts of free care to the poor. However, they generally have not focused their charitable giving on their dental educational institutions. Since corporations and foundations frequently assess alumni support as a measure of the worthiness of the institution, an increase in support by dentists for their alma mater would likely be highly leveraged. Such support would make the dental educational system less dependent on tuition and clinic income, and would likely lead to the graduation of dentists in less debt, as well as the development of a dental educational system which is in greater resonance with the issues that confront clinicians in private practice.

Education Recommendation-4: Dentists should be encouraged to provide significantly increased financial support for their educational institutions. They should also suggest to grateful patients as well as to other philanthropic individuals among their friends, that they consider a gift to the local dental school.

COST REDUCTION

Non-tuition revenue sources for the education industry have been pushed to limits. Thus, additional costs must be absorbed by tuition increases that add to high student debt. State contributions to health education centers are often controlled by medical administrations that, with their own budget pressures, are becoming increasingly reluctant to share their declining funds. To address the potential of reduced or insufficient funding, dental schools should seek ways to provide education at reduced cost without compromising quality.

Education Recommendation-5: Dental schools should explore regionalization in dental education in which dental schools collaborate to reduce costs and enhance quality in dental education. Dental schools should examine the cost effectiveness of sharing teaching faculty through electronic distance learning.

Innovative techniques, such as placing curriculum on a DVD, clinical simulation, and virtual reality warrant further evaluation as means of reducing instructional costs.

Education Recommendation-6: Dental educators should seek to use new technology and scientific advances which have the potential to reduce the cost of instruction.

OFF-SITE CLINICS

Maintaining a fixed clinical site, owned and operated by the dental school, is exceedingly costly. The medical model of sending students to hospitals and clinics for third and fourth year training experiences has resulted in significant cost reductions relative to corresponding dental school-based training. Off-site training opportunities for dental students that are educationally sound and provide access to care for the underserved should be encouraged.

Attempts to increase the dental school's clinical income through establishment or expansion of clinic activities outside of the school's primary location could put the school in direct competition with its practicing community. When dental schools have established clinics staffed by clinical faculty in affluent neighborhoods, the local professional response has not been supportive.

Education Recommendation-7: Any plans for a dental school to expand its clinical activities outside the school's primary location should be discussed with local practitioners, alumni and local components of organized dentistry.

Education Recommendation-8: Research should be conducted on the cost effectiveness of off-site training opportunities.

CULTURAL COMPETENCY

The dental profession should reflect the diversity of the population and have the cultural understanding and skills needed to provide services to a growing and diverse patient population. Dental schools have a responsibility to recruit and retain under-represented minority students and faculty and for training students to be culturally competent in dealing with various populations.

Education Recommendation-9: Dental schools should develop programs in which students, residents and faculty provide care for members of the underserved populations in community clinics and practices.

Education Recommendation-10: Dental education curriculum should include training in cultural competency, as well as the necessary knowledge and skills to deal with diverse populations.

CURRICULUM DEVELOPMENT

The explosive growth in dental knowledge will challenge dental educators to provide programs that enable the new graduate to deliver quality dental care to the public within the traditional curriculum length. The dental education curriculum should become more relevant to the practice of modern dentistry. Areas which should receive greater emphasis include: special needs populations; applied pharmacology, including pain management; business management; esthetic dental techniques; implant prosthodontic therapy; and increased knowledge of systemic disease. This would better prepare dentists to treat patients with complex medical problems. The skills necessary to evaluate the safety, efficacy, and cost effectiveness of new treatments also should become an integral part of the curriculum.

Education Recommendation-11: Dental schools should undertake a comprehensive evaluation of undergraduate curricula to assure that that the appropriate and modern scientific and clinical content is included.

Education Recommendation-12: Dental researchers (especially clinical researchers) should become more integrated in the foundation of curriculum and, when possible, in clinical activities.

Education Recommendation-13: The education community should enhance undergraduate exposure to the ethics of dental practice while also providing cultural competency that provides information and training on delivering care to all segments of the population.

INTEGRATING ORAL HEALTH EDUCATION INTO OTHER HEALTH CURRICULUM

Oral health is an integral part of total health. A closer collaboration between dentistry and the other health care disciplines is imperative to assure that the public is best served.

All health care professions should convene to discuss how best to incorporate oral health content into their curricula and practices. To do this, the dental profession should be prepared to consider those aspects of the respective health care professions that could be incorporated into dental education and practice. This effort will require the cooperation of health teaching institutions and universities.

Education Recommendation-14: A formal dialogue among all health care professions should be established to develop a plan for greater cooperation and integration of knowledge in medical and dental predoctoral education, hospital settings, continuing education programs, and research facilities.

Education Recommendation-15: An inter-disciplinary structure between dental and medical schools should be established to promote close cooperation between health teaching institutions and universities.

CLINICAL TRAINING OPPORTUNITIES

The practice of dentistry has become increasingly complex. New clinical and technologic information competes for time in the overcrowded dental curriculums with traditional clinical skills. While there is general consensus that an additional year of education and clinical training would enhance the ability of tomorrow's dentists to treat patients with complex needs, the cost associated with additional clinical training, coupled with its subsequent impact on student debt, has put a damper on its adoption. Developing sufficient numbers of programs that allow all students to participate would further enhance the students' clinical and diagnostic abilities. Postgraduate Year One (PGY-1) students could receive their initial licensure following graduation from dental school.

Education Recommendation-16: When economically and logistically feasible, a PGY-1 year should be a requirement for all dental graduates.

Education Recommendation-17: In order to make PGY-1 economically feasible, the dental profession should develop lobbying efforts directed to increasing the funding support for additional General Practice Residency and Advanced Education in General Dentistry programs. This funding should be sufficient to offer all future dental graduates the opportunity for further clinical training.

FACULTY DEVELOPMENT

The growing number of faculty vacancies, especially in the clinical specialty areas, appears to be related to the significant disparity in income available through the private dental practice and that associated with faculty positions. The many full-time vacancies for faculty, reported to number between 300 and 400, could make it difficult to maintain high dental education accreditation standards. The long term ramifications of a continuing problem in this area include reduction in new knowledge and techniques, diminished quality of teaching and care, and greater dependence on dental graduates from non-accredited schools.

Using distance learning combined with structured hands-on training, a significant number of practitioners could be trained as faculty clinicians within a short period of time.

Education Recommendation-18: The dental profession should design and implement a formal education program to train existing dental practitioners to become members of the dental faculty.

Education Recommendation-19: The dental profession should develop educational tracks with special degrees or certification for students interested in research, education, or public health futures. Specialized curricula should be developed to train these individuals for work in those areas.

Education Recommendation-20: The dental profession should seek actions to extend debt forgiveness programs to dental graduates who are willing to make a commitment to academic dentistry.

Insufficient numbers of specialty-trained faculty could lead to a shortage of specialists in the distant future. Affordable, high quality, postdoctoral training opportunities for the development of dental specialists are essential to the viability of the profession. All components of the dental care system are dependent on the training of sufficient number of specialized clinicians, practitioner consultants, dental researchers and educators.

Education Recommendation-21: Federal programs that underwrite research and specialty training need to be enhanced with sufficient funds allocated to dental applicants.

Education Recommendation-22: Specialty organizations should be encouraged to continue efforts dedicated to funding teaching scholarships and fellowships.

Education Recommendation-23: Dental educators should be encouraged to test alternative, less faculty-dependent models for educating dental students.

CENTERS FOR RESEARCH EXCELLENCE

Dental schools must be supportive of the development of new knowledge and its incorporation into practice. The success of the future of dentistry depends upon the dental schools' expansion of scholarly activities. The conduct of and resources for these activities will increasingly rely on multi-disciplinary and multi-institutional collaborations. Competition for scarce research dollars, which can enhance faculty productivity and offset portions of educational salary commitments, is expected to increase. It is unlikely that all dental schools will be able to successfully compete for the funds necessary to develop and maintain a sophisticated research program. The mission of these research mega-centers would focus on developing the research capabilities of faculty members of a research consortium. Both on-site and off-site research involvement would be offered.

Education Recommendation-24: The dental profession should support the establishment of centers for research excellence that provide research training and opportunities for organized research for dental faculty within a defined geographic area.

MAINTENANCE AND ENHANCEMENT OF EDUCATIONAL FACILITIES

Many of dental education's physical facilities require major renovation. Many students are not using state-of-the-art equipment. With schools unable to set aside funds for deferred maintenance, the financial resources needed to purchase new technologies to enhance student learning are unavailable.

Education Recommendation-25: The dental profession should develop lobbying efforts directed towards the development of new assistance programs for the improvement of the physical facilities of dental schools.

ALLIED DENTAL PERSONNEL TRAINING

Training opportunities for some members of the dental team are not sufficient. There are shortages of all dental allied personnel. If the dental team is to function in the most efficient manner, a sufficient number of competent team members should be available. In addition, dental practitioners need to provide a stimulating work environment with sufficient reward systems to acknowledge performance excellence by dental team members. Continuing education opportunities, supported financially by dental practices, may provide the incentives for existing team members to stay in practice.

Education Recommendation-26: Well-funded, innovative recruitment programs to identify and enroll quality candidates for dental hygiene, dental assisting, and laboratory technology education should be developed.

Education Recommendation-27: The development of additional training programs for allied dental personnel, which employ both traditional and innovative educational programs, needs to be encouraged. This could be accomplished through the combined efforts of national, state, and local dental societies, working with various allied communities of interest.

Education Recommendation-28: Credit against educational debt should be sought for dental team members who work with dentists in designated underserved locales.

Education Recommendation-29: Continuing education programs, designed to provide upward mobility for dental team members, need to be developed and offered.

CONTINUING EDUCATION OPPORTUNITIES

Opportunities for high quality, relevant, continuing education appear to be one of the top-ranked issues among practitioners. The change in disease patterns and case mix necessitate that high quality, hands-on programs are offered to these individuals. Reasonable cost and flexibility of offerings need to be basic tenets of any system. Suitable reward systems are important for continuing education participants. Whenever possible, rewards should be integrated with continuing competency initiatives.

Education Recommendation-30: The dental profession should continue its efforts to ensure quality control, educational counseling, and appropriate recognition for achievement.

Bridge to Dentistry: One Dental School's Approach to Improving Its Enrollment of Underrepresented Minorities

Ernestine S. Brooks, DDS; Tamara C. Gravely, DMD; Sheryl A. Hornback, MA; La Chelle P. Cunningham, MA; Ann L. McCann, RDH, MS; Jack L. Long, DDS

Abstract

Presently, 25.7% of the U.S. population is comprised of Blacks/African Americans, Hispanics, and Native Americans. The dental school enrollment of underrepresented minorities (URM) does not reflect this demographic distribution. In 1994, URM students comprised 12.68% of enrolled dental students, but in 1999, enrollment decreased to 10.53%. This trend is evident at Baylor College of Dentistry (BCD). Bridge to Dentistry involves formal linkages with local school districts, Texas colleges and universities, community organizations, dental clinics, community dentists, and BCD. The program is unique in that it targets students from kindergarten through dental school. The key components are awareness, attraction, preliminary education, facilitated-entry, admissions, financial aid, and retention. Some important features of the program are visits to area schools, visits to colleges and universities, summer enrichment programs, and academic advising. Preliminary results indicate the effectiveness of the program. BCD has increased its enrollment of URM students 325% over that of 1998. In 1998, 4.7% of the college's first-year student enrollment was URMs. In 2001, 14.6% of Baylor's first-year student enrollment was URMs. Since 1995, BCD has retained 90.6% of its URM students.

There is a disturbing trend being manifested in applications submitted to schools of the health professions. According to Dr. Richard Valachovic, Executive Director of the American Dental Education Association, total applications to dental schools have decreased by 20% since 1996. The Association of American Medical Colleges (AAMC) reports that total applications to medical schools during that same time period have decreased by over 21% (Gabriel, 2000). ADEA recently conducted a survey of other health professions regarding application trends since the 1996 peak year and results indicate that the trend extends further than dentistry and medicine. Pharmacy is down by 30%; podiatry is down by 55%; osteopathic medicine is down by 27.5%; and optometry is down by 18% (American Dental Education Association, 2000).

According to the Association of American Medical Colleges, several factors may be contributing to the decline in medical school applications. These factors may be applied to the health professions in general. They include (Association of American Medical Colleges, 2000):

All authors are at the Baylor College of Dentistry—The Texas A&M University System Health Science Center in Dallas TX. Dr. Brooks is the Director of Student Development in the Division of Student Development, esbrooks@tambcd.edu.

This project was supported by the Division of Health Professions Diversity, Bureau of Health Professions, Health Resources and Services Administration, Department of Health and Human Services (Grant # 1D18MB02893 01), the Baylor Oral Health Foundation, and Baylor College of Dentistry. A description of this program was a finalist in the American Dental Education Association research competition in March 2001.

In 1999, URM students constituted 10.53% of dental school enrollment although the 2000 census indicates that 25.7% of the U.S. population is composed of Blacks/African Americans, Hispanics, and Native Americans.

- Relatively strong economy and the increasing variety of exciting and intellectually challenging professional opportunities outside the traditional career choices
- Natural ebb and flow of interest in professional schools in general
- Perceived loss of physician autonomy due to recent changes in the health care marketplace
- Continued backlash to affirmative action efforts
- Concern over the high levels of educational debt typically required to complete medical training

The good news in all of this is that although applications to health professions schools have been declining, the total enrollments in these schools thus far have not been negatively affected. In fact, the total first-time enrollees in dental schools have increased since 1996. Unfortunately, the same cannot be said about the enrollment of underrepresented minority students in dental schools.

The article, "Losing Ground: Shifts Among Underrepresented Minority Dental Students," by Dr. Jeanne C. Sinkford (1999), indicated that Black/African-American and Hispanic enrollment in U.S. dental schools had declined for three straight years, 1995, 1996, and 1997. This trend continued for 1998 and 1999 (American Dental Education Association, 2000b). In 1994, underrepresented minorities (URMs— specifically, Blacks/African Americans, Hispanics, and Native Americans) constituted 12.68% of dental school enrollment and 21.4% of the U.S. population (Sinkford, 1999). In 1999, URM students constituted 10.53% of dental school enrollment although the 2000 census indicates that 25.7% of the U.S. population is composed of Blacks/African-Americans, Hispanics, and Native Americans (American Dental Education Association, 2000b; Thurmond & Cregler, 1999; Rylander, 2000). Hispanic enrollment, which showed the greatest decline in both numbers and percentages from 1994 to 1998, showed an increase from 1998 to 1999 (Sinkford, 1999; American Dental Education Association, 2000b). Black/African-American enrollment declined steadily from 1994 through 1999 (American Dental Education Association, 2000b). While Native-American enrollment increased from 1994 through 1999, it appears to plateau during 1997 to 1999 (American Dental Education Association, 2000b). (See Table 1.)

In 1999, Thurmond and Cregler published the results of a study conducted at the Medical College of Georgia that cites reasons minority students give for dropping out of the pipeline to health professions careers. These reasons include: "(1) loss of interest; (2) fear of problems with grades; (3) feeling of inadequate preparation in science (chemistry most frequently cited); (4) internships, summer jobs, and mentorships had stimulated interest in other areas; (5) recruitment by other schools and fields (especially engineering); (6) availability of financial scholarships in other areas; (7) the long time required to achieve the career goal; (8) distaste for illness; and (9) new interest and career possibilities arising from other courses" (Thurmond & Cregler, 1999, p. 450).

The disparity between percent of URM graduates and percent of these groups in the general population is caused by both a decrease in URM students and an increase in general popula-

Table 1. Total Dental School Enrollment of Underrepresented Minorities for 1994-1999.

Year	Black/African-American	Hispanic	Native American	URM Total
1994	973 (5.95%)	1045 (6.39%)	56 (0.34%)	2074 (12.68%)
1995	951 (5.75%)	966 (5.84%)	73 (0.44%)	1990 (12.02%)
1996	891 (5.40%)	824 (5.00%)	83 (0.50%)	1798 (10.90%)
1997	883 (5.22%)	825 (4.87%)	96 (0.57%)	1804 (10.66%)
1998	841 (4.93%)	823 (4.83%)	97 (0.57%)	1761 (10.33%)
1999	810 (4.68%)	913 (5.28%)	99 (0.57%)	1822 (10.53%)
% of U.S. Population (2000 U.S. Census)	12.3%	12.5%	.9%	25.7%

(Data from ADA Survey of Predoctoral Dental Educational Institutions (American Dental Education Association, 2000b)

tion numbers. It is projected that by the year 2010, 27.9% of the U.S. population will be composed of Blacks/African-Americans, Hispanics, and Native Americans and by 2050, Blacks/African-Americans and Hispanics are expected to make up 42.6% of the population (Rylander, 2000; U.S. Census Bureau, 2000). A study conducted in California found that Hispanic physicians were far more likely to care for Hispanic patients, and Black/African-American physicians for Black/African-American patients, than other physicians. Hispanic physicians treated the greatest proportion of uninsured patients, while Black/African-American physicians served more Medicaid patients (Komaromy et al, 1996). Another study, using two large national surveys of physicians and conducted in 1987 and 1991, found that minority-group and female physicians were more likely than others to serve minority, poor, and Medicaid patients. It also found that physicians whose parents had low incomes or less than a high school education treated more patients from underserved groups than did other physicians (Cantor et al, 1996).

Although these studies suggest that the presence of physicians from educationally or financially disadvantaged backgrounds and minority-group physicians are vital in meeting the health care needs of poor and minority communities, such groups of physicians continue to be underrepresented in the medical profession (Garcia & Ramon, 1988; Bureau of Labor Statistics, 1987; Health Resources and Services Administration, 1990). The same can be applied to other professions, including dentistry (DeVore, 1995). Additionally, "not only are minority practitioners more likely than their White counterparts to practice in underserved minority communities, but minority practitioners, educators, and researchers can influence other health professionals to be more culturally sensitive in both communication and care for minority and other patients" (DeVore, 1995, p. 631).

Baylor College of Dentistry (BCD) in Dallas, Texas, recognizes the urgent need to train more African-American and Hispanic dentists. In Texas, the numbers of Hispanics and Blacks/African-Americans are rapidly increasing with their proportion of the population reaching 43.5% in 2000. However, demographic data indicates that less than 10% of dental practitioners in Texas are ethnic minorities.

Starting in 1996, Baylor College of Dentistry pulled together existing recruitment strategies and incorporated additional components in order to develop its "Bridge to Dentistry: Awareness to Graduation" program to recruit, enroll, and retain Black/African-American, Native American, and Hispanic students as well as students from disadvantaged backgrounds. Essentially all current literature on enhancing diversity in health professions emphasizes improving the "pipeline" (DeVore, 1995; Wiggs and Elam, 2000). This is a critical area and must be addressed because of the attrition rate of minority students as they move through the middle and high school educational pipeline. For example, "26% of Hispanic girls leave school without a diploma, compared with 13% of Black girls and 6.9% of White girls. The only group that has a higher dropout rate among students is Hispanic boys. Thirty-one percent of Hispanic boys drop out, compared with 12.1% of Black boys and 7.7% of White boys" (Canedy, 2001, p.1). Minority students in the pipeline must be mentored closely because, traditionally, many Hispanic and Black/African-American students do not fare well through science and math courses in public schools due to a number of factors including lack of: encouragement to succeed in courses labeled "difficult"; mentors or role models; tutorial assistance; creativity or interest stimulation from the teacher; and effective teaching in science and math (Institute of Medicine, 1994; Massey, 1992). Students facing these obstacles are thus ill-prepared for college-level courses in science and math, and consequently, are not competitive in the dental school applicant pool. Additionally, average DAT scores for minority students traditionally have been below the average scores for White students, a barrier that minority students face when trying to gain admission to dental school. This makes it even more difficult for the disadvantaged minority student to become a competitive dental school applicant. Many minority applicants who come from disadvantaged backgrounds may be discouraged before applying due to poor scholastic records or low Dental Admission Test scores. Thus, programs designed to strengthen academic skills of minority students are critical elements for increasing the flow of academically prepared minority students (DeVore, 1995; Wiggs & Elam, 2000).

Bridge to Dentistry is a comprehensive programs that addresses dental career awareness, attraction, preliminary education, facilitated entry, admissions, financial aid, retention and ultimately, graduation of students.

The Institute of Medicine concludes that efforts to increase minority representation in dentistry must reach far beyond the dental schools, involving practitioners, educators at all levels, policy makers, foundations, and corporations (DeVore, 1995). Therefore, Baylor College of Dentistry tried to embody these philosophies and others in "Bridge to Dentistry: Awareness to Graduation."

Program Description

Bridge to Dentistry is a comprehensive program that addresses dental career awareness, attraction, preliminary education, facilitated entry, admissions, finan-

cial aid, retention and ultimately, graduation of students. The program targets students in grades Pre-K through dental school and is a collaborative effort. Baylor College of Dentistry's partners in this collaboration are the Department of Health and Human Resources, the Baylor Oral Health Foundation, two local school districts the majority of whose students are Hispanic and Black/African American, three Historically Black/African-American Colleges and Universities, three Hispanic Serving Institutions, four colleges and universities that serve a significant number of Hispanic or Black/African-American students, community entities (Junior Achievement of Dallas, Inc. and University Outreach Center), professional organizations (Dallas County Dental Society, M. C. Cooper Dental Society, and the Hispanic Dental Association), and private practitioners and dental clinics in the Dallas area.

Objectives. The ultimate goal of "Bridge to Dentistry: Awareness to Graduation" is to significantly increase the enrollment of disadvantaged students including, Hispanic, Black/African-American, and Native American students at Baylor College of Dentistry. Specific objectives of the program are annually to:

- Increase the exposure to dentistry of at least 7,000 students in grades Pre-K through 6.
- Increase awareness of the dental profession of at least 525 middle and high school students.
- In the face of declining applications to dental schools, initially maintain (and ultimately increase) the number of applications submitted by underrepresented minority students.
- Increase awareness of and interest in dentistry of at least twenty-five 11th grade students and emphasize the importance of PSAT-related and other academic skills to these students.
- Increase SAT-related skills of at least twenty-five 12th grade students and facilitate the entry of these students into college.
- Increase DAT-related skills of at least 25 college students, enhance these students' competitiveness for admissions into dental school, and to facilitate their entry into dental school.
- Beginning Fall, 2000, increase the admission of disadvantaged students to Baylor College of Dentistry with the result that underrepresented minority acceptances to the first-year class of the college increases to at least 150% of the number admitted in 1998 (from four to ten). Effective Fall, 2001, the percentage should increase to at least 175% of the 1998 admissions (from four to eleven), and effective Fall, 2002, to at least 200% of the 1998 admissions (from four to twelve).
- Retain and graduate at least 90% of the disadvantaged and URM students enrolled in each class of Baylor College of Dentistry.

Grades Pre-K through 6 Exposure to Dentistry Programs. Baylor College of Dentistry offers three programs in which students in grades Pre-K through 6 are exposed to dentistry as a career. These programs are "Project Dental Awareness," "By the Roots," and "Tooth Talk." College personnel go into elementary schools in our partnering school districts, and schools in other districts as well, to engage students in grade-level appropriate educational activities such as hands-on dental laboratory exercises and oral hygiene and nutrition instruction. Students are also provided an introduction to the dental profession. At each visit to elementary schools, Project Dental Awareness personnel give pencils, book covers, bookmarkers, etc. with dentistry-related pictures and information on them to the students.

Middle and High School Awareness and Attraction Program. This program is designed to provide students the opportunity for exploration of the dental field. Students in grades 7 through 12 visit Baylor for a day to hear presentations on dentistry; participate in roundtable discussions with the college's faculty, staff, and students; tour the college; and participate in a dental laboratory activity. These students also receive promotional items with dental-related pictures and information on them. The goal is to increase the students' awareness of and interest in dentistry.

College Recruitment Program. In addition to its usual college recruitment activities, Baylor College of Dentistry has special linkages with ten colleges and universities, three of which are Historically Black/African-American Colleges and Universities, three are Hispanic Serving Institutions, and four have significant enrollments of Black/African-American and/or Hispanic students. Baylor College of Dentistry personnel visit these colleges and universities to give dental career awareness presentations to students in science classes and career orientation classes. Students also visit Baylor for similar presentations. Students showing an interest in dentistry are encouraged to join the pre-dental or pre-health club on their campuses and to observe dental practitioners in the area. The goal is to encourage students to seriously consider dentistry and to track and mentor those who decide to pursue the dental profession.

Pre-Summer Academic Enrichment Program (for 11th graders). Up to fifty rising 11th grade students in the Dallas and Wilmer-Hutchins Independent School Districts with an interest in the health professions are selected to participate in a one-week academic enrichment program at Baylor College of Dentistry. Program activities include PSAT preparation, presentations on dentistry and the dental specialties, and hands-on dental activities. The primary goal of this program is to increase students' awareness of dentistry and to highlight the benefits of the dental profession. The secondary goal is to help strengthen the students' academic foundation in preparation for college.

Summer Academic Enrichment Program and Saturday Academies (for 12th graders). Twenty-five rising seniors who have a definite interest in dentistry participate in an intensive seven-week Summer Academic Enrichment Program. The program's curriculum consists of four core courses: SAT Preparation, Learning Strategies/Study Skills, Preclinical Dentistry, and Computer Technology. Workshops and semi-

nars are presented on career awareness, pre-college admissions, and social skills. Additional activities include visits to private dental practices and public dental clinics, shadowing dental students, and weekly field trips to colleges and universities. During September and October, students participate in Saturday Academies that focus on SAT review. Program participants are mentored and tracked through the completion of college and into dental school. The primary goal of this program is to assist students to successfully take the SAT. Secondarily, students are assisted in strengthening their general academic foundation.

Summer Pre-Dental Enrichment Program (for college students). At least twenty-five college students who are interested in dentistry are selected for participation in Baylor College of Dentistry's Summer Pre-Dental Enrichment Program. This eight-week program has as its major focus to strengthen the academic background of the participants and provide them an opportunity to become more competitive for admission into dental school. More than 65% of the student's time is spent in academic courses and activities. The program's six core courses are: DAT Preparation, Introduction to the Human Body, Introduction to Dental Sciences, Preclinical Dentistry, Learning Strategies, and Cultural Competence. Additional activities include mock admissions interviews, dental school application preparation workshops, financial aid workshops, dental career awareness workshops, and clinical observations. Most Summer Pre-Dental Enrichment Program participants are granted an interview at Baylor. The primary goals are to assist the students in making a competitive score on the DAT and, subsequently, improve their chances of gaining admission into dental school.

Affiliation and Early Entrance Agreements. Baylor College of Dentistry has established affiliation agreements with three Historically Black/African-American Universities, one Hispanic Serving Institution, and one university with a significant Hispanic enrollment. The college will pursue additional agreements with other Hispanic Serving Institutions. The agreements comprise one element of an effective recruitment and facilitated-entry strategy because Baylor agrees to accept students meeting criteria outlined by their university or college and Baylor College of Dentistry. The students who enter into affiliation agreements with Baylor have the option of entering dental school after three years of college and being awarded a BS degree from their home institutions upon successful completion of the first year of the dental program.

Pre-Application Counseling and Post-Application Advocacy. Pre-application counseling by several directors in the Office of Student Services is provided to applicants before they proceed with the final submission of their applications and the interview process. The counseling provides helpful advice with respect to application strategy, to the end that the applicant would present herself or himself in an optimum fashion. The directors serve as members of the Admissions Committee and may serve as applicants' advocates where appropriate before the committee. The counseling and advocacy process is available to all applicants. However, it is especially beneficial for underrepresented minority students.

Admissions. Baylor has revised its admissions policy, and this policy has become one of the college's most significant commitments to promote and facilitate the matriculation of individuals from disadvantaged backgrounds (of whom underrepresented minorities represent a large percentage) into the dental school. The current policy reflects substantial revisions that minimize statistical hurdles for applicants with grade point averages and DAT scores that are not reflective of their abilities. This new policy allows for major consideration of non-cognitive criteria in determining the selection and acceptance of dental students. Among these are impacting factors such as:

- Economic hardship
- Employment while in college
- Residence in a poor county
- Attended a low-performing high school
- First in immediate family to attend college
- Bilingual
- Academic improvement
- Residence in underserved county
- Overcame extreme hardship
- Leadership positions and participation in organizations

Fifty-six percent of the applicant's rating is determined by non-cognitive criteria. In addition, the interview screening process is enlarged by individually reviewing applications of all applicants who have GPAs between 2.5 and 3.0 to determine if their academic history has been negatively affected by extreme hardship or multiple impacting factors. (A GPA of 3.0 is the usual minimum GPA for screening applicants to interview.) Applicants whose GPAs fall in the 2.5 to 3.0 range and who show tenacity, stamina, and a potential for success in the face of extreme hardship or multiple impacting factors are granted an interview and are given consideration in the selection process. The Admissions Committee assists to participants in the College's Summer Pre-Dental Enrichment Program by granting them some preference in the interview process and consideration in the selection process.

Mentoring and Support. The Student National Dental Association (SNDA) and the Hispanic Dental Association (HDA) have a very strong presence at Baylor College of Dentistry. Every Black/African-American dental and dental hygiene student belongs to and participates in the SNDA. Hispanic students belong to the HDA. The members tutor each other, share experiences, socialize together and, generally, provide support for each other. In addition, the Directors of Student Development and Community Outreach Services, the Student National Dental Association Advisor, the HDA Advisor, as well as other Black/African-American and Hispanic faculty, have an open-door policy that encourages students to visit with them about professional, educational, financial, and social issues.

Tutoring Program and Academic Support Services. Although the academic progress of all students is tracked, that of first- and second-year students is very closely monitored. Academically "at risk" students are identified early and are encouraged to participate in the peer Tutoring Program. In addition, academic counseling is provided for students who are "at risk." Areas counseled include study skills, time management, organization, test-taking skills, and stress management. These students are encouraged to enroll in a Learning Strategies course as well.

Learning Strategies Course. Learning Strategies for Health Professions Students, a course offered during the first year, teaches students active strategies that promote learning. Topics include academic skills such as identifying learning styles, reading comprehension, note-taking, and test-taking. Life skills include time management, stress management, concentration, and listening, and memory techniques.

Supplemental Study Materials. Computer-aided instructional materials are available to assist students who experience academic difficulty in Gross Anatomy, Physiology, and Microscopic Anatomy courses. Test bank data sets are also available in Gross Anatomy and Microscopic Anatomy.

Alternative Dental Curriculum. In 1994, Baylor College of Dentistry instituted an alternative dental curriculum to address the needs of students who need to slow down the pace of first-year course work due to health, family, personal, or academic reasons. The Five-Year Program divide the traditional first-year curriculum into two years, thus spreading the academic load of the first year, traditionally heavy in biologic sciences, into a more manageable course load.

Financial Assistance. Since 1996, the Hopwood ruling has prohibited awarding minority scholarships. However, the college is continuously striving to compensate for this dilemma by increasing the number of scholarships, and securing private funds for additional scholarships.

Results

Because "Bridge to Dentistry: Awareness to Graduation" is in the early phases of deployment, results are not available for all programs described above.

Project Dental Awareness. Between September, 1999 and December, 2000, dental health and career awareness activities were presented to more than 23,000 Pre-K through 6th graders, the majority of whom were URM or disadvantaged. Teachers of these students indicated that they found these activities to be beneficial in increasing the children's awareness of dentistry as a profession.

During this same period, 563 students in grades 7 through 12 participated in field trips to Baylor College of Dentistry. On an exit survey to measure participant satisfaction, 80% of these students agreed that the program enhanced their interest in dentistry. In addition to sponsoring 7th through 12th graders on field trips to the College, Baylor personnel went into schools and made dental presentations to more than 2,500 junior high and high school students.

Preliminary-Education and Facilitated-Entry Programs. In the summer of 2000, thirty-one rising 11th grade students participated in and completed the college's one-week Pre-Summer Academic Enrichment Program. Results from an exit survey indicated that participants' awareness and understanding of the dental profession was enhanced. Participants also expressed their eagerness to apply to the seven-week Summer Academic Enrichment Program to further their knowledge of dentistry.

Twenty-five rising 12th grade students participated in the college's seven-week Summer Academic Enrichment Program. Twenty-two of the twenty-five students completed the program and on an exit survey "strongly agreed" that the program "improved their understanding of dentistry and the dental profession" and "agreed" that it "improved their preparedness for taking the SAT."

To evaluate the effectiveness of the SAT preparation, participants took a pre- and post-SAT. Their scores significantly improved on the Math section, (paired t-test, $p = .016$). There was no change on the Verbal section of the post-test given during the summer. However, SAT preparation continued in the fall during Saturday Academies. Stronger emphasis was placed on the Verbal section during these sessions. Students who have taken the official SAT subsequent to program activities, showed improved scores compared to those from the Summer Program. So far, nineteen of the twenty-two students who completed the Summer Program have applied to and been accepted into college. Of the participants who completed the Summer Academic Enrichment Program, 85% said that they plan to apply to dental school.

Although Baylor College of Dentistry had been offering a three-week Summer Enrichment Program to minority students since 1991, it began to offer a more rigorous eight-week Summer Pre-Dental Enrichment Program in 1997. Since the primary objective of the Summer Pre-Dental Enrichment Programs is to assist the participants in becoming more competitive for admission into dental school and DAT scores are important in determining competitiveness, the effectiveness of the DAT preparation course is critical in determining the success of the program. Formal DAT preparation was provided in the 1998, 1999, and 2000 Summer Programs.

Students took a DAT examination at the beginning and end of the programs. Paired t-tests indicated significant increases in scores for all areas of the DAT ($p<.001$) for the 1999 and 2000 Enrichment Programs. During the summers of 1997, 1998, and 1999, forty-eight students who were more likely to serve in underserved communities and serve underserved populations participated in and completed the college's Summer Pre-Dental Enrichment Program.

There were twelve participants in 1997, fifteen participants in 1998, and twenty-one participants in 1999. Thirty-one of these students applied to dental schools for admissions into their 1997,

Table 2. Baylor College of Dentistry New Enrollees.

Race	1994	1995	1996	1997	1998	1999	2000	2001
Asian	16	25	17	27	30	26	23	19
Black/African-American	6	4	4	1	2	5	3	6
Hispanic	4	4	9	13	2	6	6	7
American Indian	0	1	1	1	0	0	0	0
White	68	52	52	42	51	49	57	57
Total	94	86	85	84	85	85	89	89

1998, 1999, and 2000 first-year classes. Twenty-seven of these thirty-one students (82%) have been accepted into dental school. Twenty-three students are currently in dental school; one student who was accepted into the 2000 first-year class deferred his enrollment to the 2001 school year and another who was accepted into the 2000 first-year class decided to go to medical school; one student is in an affiliation agreement with Baylor College of Dentistry and will enter in 2001; and one student entered an affiliation agreement with another dental school. Thirty-one students participated in and completed the 2000 Summer Pre-Dental Enrichment Program. Twenty-nine participants from this program have applied to dental school. So far, twenty-five of these students have been accepted into dental schools.

Admissions. The most significant results are revealed in the data highlighting the changes in the enrollment of underrepresented minority students at Baylor College of Dentistry since 1998. As Table 2 shows, in 1998 the college enrolled a total of four new first-year students who were underrepresented minorities. The 1999 enrollment of these students increased by 175% over their 1998 enrollment (from four to eleven). Their 2000 enrollment increased by 125% over their 1998 enrollment (from four to nine). Two others were accepted and had planned to matriculate into the college in 2000, but due to personal reasons, one student deferred his enrollment until 2001 and the other student decided to go to medical school. The first-year enrollment of URMs for 2001 is thirteen students, a 325% increase over their 1998 enrollment. The results stated above indicate that BCD's efforts are working.

Retention. Once underrepresented minority students matriculate into Baylor College of Dentistry, the college has been successful in retaining and graduating the overwhelming majority of these students. Since 1995, Baylor has retained 90.6% of its Hispanic and Black/African-American students. These retention rates are comparable to those of non-underrepresented minority students. It should also be noted that all former Summer Pre-Dental Enrichment Program participants except one who enrolled in Baylor and other dental schools are being retained and progressing well.

Discussion

The initiatives discussed in this paper, taken separately, are not unique to dental schools. The American Dental Education Association's publication entitled "Opportunities for Minority Students in United States Dental Schools" lists dental schools and programs offered to minority students. Based on the information in this publication, twenty-eight dental schools offer structured awareness and academic enrichment programs for minority students and students who are more likely to practice in underserved areas or serve underserved populations. However, no other dental school is shown to have a formal, structured, continuous program which targets students from grade Pre-Kindergarten through dental school (American Association of Dental Schools, 1999). Therefore, the uniqueness of "Bridge to Dentistry: Awareness to Graduation" is that it is a comprehensive program that spans all education levels and addresses career awareness through dental school graduation.

Although the long-term results are not yet available, short-term indicators show that this program, among other initiatives, has enabled Baylor College of Dentistry to start reversing the trend of losing ground with respect to the enrollment of underrepresented minority students at the college. Baylor College of Dentistry has a long way to go, however, it is making significant strides in the right direction.

Future plans to continue the college's success of increasing the enrollment of disadvantaged students, and thus URMs include expanding offered programs so that more students have the opportunity to participate in them. In addition, college personnel plan to conduct a study to determine reasons for the attrition of URMs specifically from the pre-dentistry pipeline and to use the results to help the leaks.

References

American Association of Dental Schools (1999). *Opportunities for minority students in United States dental schools: 2000-2002.* 3rd ed. Washington, DC: The Association.

American Association of Dental Education (2000). Unpublished data from a survey.

American Dental Association (1999). *Survey of Predoctoral Dental Education — 1998-1999.* Chicago (IL): The Association.

American Dental Education Association (2000a). *Applicant Analysis: 1999 entering class.* Washington DC: ADEA Publications.

American Dental Education Association (2000b). 2000 Update: Losing ground — underrepresented minority dental student enrollment shifts. *Bulletin of Dental Education, 33,* (July), 2.

Association of American Medical Colleges (2000). U.S. medical school applicants still exceed available positions: Underrepresented minority applicants increase for the first time since 1996. [press release online]. (Oct 25), 1-2. Available from URL: http//

www.aamc.org/newsroom/pressrel/001025.htm.

Bureau of Labor Statistics (1987). *Projections 2000.* Washington, DC: U.S. Department of Commerce.

Canedy, D. (2001). Troubling label for Hispanics: Girls most likely to drop out. The New York Times on the Web, (March 25), Available from URL: http//www.nytimes.com/2001/03/25/national/25LATI.html-pagewanted=print.

Cantor, J. C., Miles, E. L., Baker, L. C., & Barker, D. C. (1996). Physician service to the underserved: Implication for affirmative action in medical education. *Inquiry, 33*, 167-180.

Chalkley, Y. (1995). A survey of minority student recruitment and retention efforts in dental school. *Journal of Dental Education, 59*, 645-648.

DeVore, L. R. (1995). Participation of minorities in U.S. dental education. *Journal of Dental Education, 59,* 631-639.

Gabriel, B. (2000). Med school applicant pool still runs deep. AAMC Reporter [online], 10, (Dec), 2 screens. Available from URL: http://www.aamc.org/newsroom/ reporter/dec2000/apps.htm.

Garcia, R. A., & Ramon, G. (1988). Hispanic enrollment trends in the health profession: Rethinking the problems and solutions. Paper presented at the Hispanic Health Status Symposium, San Antonio, TX: Center for Health Policy Development.

Health Resources and Services Administration, U.S. Department of Health and Human Services (1990). *Minority women in the health fields.* Washington, DC: U.S. Government Printing Office; DHHS Publication No.: HRSA-P-DV 90-93.

Institute of Medicine (1994). *Balancing the scales of opportunity: Ensuring racial and ethnic diversity in the health professions.* Washington, DC: National Academy Press.

Komaromy, M., Grumbach, K., Drake, M., Vranizan, K., Lurie, N., Keane, D., and Bindman, A. B. (1996). The role of Black and Hispanic physicians in providing health care for underserved populations. *New England Journal of Medicine, 209*, 1305-1310.

Massey, W. E. (1992). A success story amid decades of disappointments. *Science, 258*, 1177-1180.

Rylander, C. K. (2000). *Texas Comptroller of Public Accounts. Spring 2000 state population forecast: Texas population by race and ethnicity 1970 to 2025.* Austin, TX: Office of the Comptroller.

Sinkford, J. C. (1998). Dental education issues and trends. *Journal of the American College of Dentists, 65*, 39-42.

Sinkford, J. C. (1999). Losing ground: Enrollment shifts among underrepresented minority dental students. *National Dental Association Journal, 19*, 18-19.

Texas State Data Center (2000). Scenario One for Dallas County.

Thurmond, V. B., & Cregler, L. L. (1999). Why students drop out of the pipeline to health professions careers: A follow up of gifted minority high school students. *Academic Medicine, 74*, 448-451.

U.S. Census Bureau, Population Projections Program, Population Division (2000). Projections of the residential population by race, Hispanic origin, and nativity: Middle series, (1999 and 2000, 2006 to 2010, 2025 to 2045, and 2050 to 2070) [Internet release], (Jan 13), Washington, DC: The Bureau, Publication Nos.: NP-T5-A, NP-T5-C, NP-T5-G, and NP-T5-P.

U.S. Census Bureau (2001). Overview of race and Hispanic origin 2000: Census 2000 brief [Internet release]. Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration.

Wiggs, J. S., & Elam, C. L. (2000). Recruitment and retention: The development of an action plan for African-American health professions students. *Journal of the National Medical Association, 92*, 125-130.

Issues in Dental Ethics

Professional Ethics in Dentistry Network

Correspondence relating to the Dental Ethics section of the *Journal of the American College of Dentists* should be addressed to:

PEDNET
c/o Center for Ethics
Loyola University of Chicago
6525 North Sheridan Road
Chicago, IL 60626
e-mail dozar@luc.edu

Use of an Inventory for Ethical Awareness in Dental Hygiene

Donna F. Homenko, RDH, PhD

Abstract

This is a study of practicing dental hygienists and dental hygiene students undertaken to ascertain their perceived awareness of ethical, moral, and legal matters and their convictions about being knowledgeable in dealing with them. The study focused on identifying ethical concerns that dental hygienists maintain as being professionally significant and the differences, if any, between currently enrolled students and dental hygiene practitioners.

The American Dental Hygienists' Association revised its Code of Ethics in 1995 to reflect "standards of professional responsibility" and offer guidance for practitioners (Scott, 1999; Hasegawa, 1998). The revision further refined the relationship and duties that exist when a dental hygienist interacts with patients, other professionals, employees, and the community. Since the revision, the practice of dental hygiene has continued to be challenged by changes in technology, treatment protocols, increases in third-party payments, managed care, and consumer awareness (Kress, Hasegawa, & Guo, 1995; American College of Dentists, 1996). Many hygienists have less time for documentation, infection control, patient education, and making critical therapeutic choices in the delivery of services (Chally & Loriz, 1998). Additionally, in some states, new legislative guidelines have permitted increased duties for dental assistants and enabled the hygienist to practice without the dentist being physically present in the office (Ohio State Dental Board, 2000). These changes have created new circumstances in which dental hygienists need to practice ethically and to maintain an acceptable standard of care (Brisack, 1995).

Dental hygiene curricula have begun to include more formal education in ethics and the discussion of ethical case scenarios throughout the program to prepare students for workplace dilemmas (Bebeau & Thoma, 1994; Brutvan, 1998; Winslow, 1996). The American Dental Association Commission on Accreditation (CODA, 2000) has specified stan-

Dr. Homenko is a Professor in the Departments of Dental Hygiene and Philosophy at Cuyahoga Community College. Donna.homenko@tri-c.edu.

The author thanks Larry Early, Ph.D. for his statistical assistance with the data analysis.

dards for graduates to be "competent in applying ethical, legal, and regulatory concepts to the provision or support of oral health care services" (Standard 2.24). Licensed hygienists must not only understand ethical terminology, but apply it to the practice setting.

This study was designed to determine, for both dental hygiene students and graduates, perceived awareness of ethical, moral, and legal matters and convictions about being knowledgeable in dealing with them. It also sought to identify the differences, if any, between students participating in an ethics course and professionals in the practice setting, both recent graduates and hygienists five years post-graduation.

Review of the Literature

Relatively few studies were found that compared students to dental hygiene professionals regarding their awareness of ethical issues in practice. Nolan (1995) studied first-year medical, dental, and nursing students at the commencement of their training. He found that students had experience with relevant reading, learning, and workplace experiences that could be incorporated into ethics curricula. They identified the teaching of ethics as important and wanted a course that was practically based to assist them in developing and applying moral reasoning skills with the patients they encountered (Nolan, 1995). Using standardized assessments, Newell (1992) found that practitioners with higher levels of education and work experience achieved scores above other less experienced dental hygiene professionals when resolving professional issues cases (Newell, 1992).

In a comparison of first-year and graduating dental students regarding HIV knowledge and attitudes to care for infected patients, Anderson, Call, and Vojir (1994) found attitudinal differences were apparent among the groups. The freshmen students exhibited a higher degree of professional responsibility to provide care than did the seniors and in general the first-year students had more favorable attitudes toward this type of client. It was proposed that instructional methodologies incorporate assignments into the curriculum so students can examine their own values related to personal risk and access to care. Behar-Horenstein, Dolan, Courts, and Mitchell (2000) reported on the importance of dental practitioners acquiring critical thinking skills. One of their findings suggests that faculty need to challenge students frequently through "what if" questions to promote and enhance their reasoning abilities (Behar-Horenstein, Dolan, Courts, & Mitchell, 2000). While Gaston, Brown, and Waring (1990) identified three ethical dilemmas most encountered by practicing dental hygienists as observation of behavior in conflict with standard infection control procedures, failure to refer patients to a specialist, and nondiagnosis of dental disease.

Current accreditation guidelines for dental hygiene programs have resulted in competency documents inclusive of curricular content in ethics and decision-making skills. DeWald and McCann (1999) identified ethics as a major core competency in the Caruth School of Dental Hygiene: the dental hygienist must be able "to discern and manage ethical issues in a rapidly changing environment and apply ethical reasoning." The authors also identified major topics for ethical issues to include in the curriculum, among them informed consent, managed care, whistleblowing, and patient management. They also proposed inclusion of ethical decision-making models, *prima facie* duties, the obligations of dental professionals and central values (DeWald & McCann, 1999).

Another report of a competency-based dental hygiene program by Gadbury-Amyot, Holt, Overman, and Schmidt (2000) suggests that authentic assessments and performance-based activities should be employed to demonstrate the "use of higher-level thinking skills and problem-solving abilities." One such activity involves a student's development of a professional portfolio that documents evidence of attainment of competencies in the utilization of information technology, treatment planning, and the use of infection and hazard control procedures. The competencies would also be used to ensure that decision-making uses an evidence-based format (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996).

Forrest and Miller (2001) echo this focus on evidenced-based decision-making by recommending greater emphasis on student-centered learning and critical thinking that actively engages stu-

Table 1. Items Significantly Different Among Hygiene Students and Practitioners with One and Five Years of Experience.

Item	Chi-squared	Significance
20. Help patients make decisions	18.768	.016
36. Dealing with difficult issues	18.746	.005
27. Read Code of Ethics (current version)	17.227	.028
29. Share information with patients	16.212	.039
25. Infection control	14.319	.006
30. Respect members of the dental team/conflicts	11.006	.026
22. Use clinical & professional judgment	9.347	.053

dents in patient problems where variability and differences of opinion exist. DeVore, Fried, Dailey, and Qori (2000) apply a theory of reasoned action to dental hygienists in self-assessments of their performance as professionals. In addition to being a critical component of quality assurance, applying the specific criteria of self-assessment for job performance is also viewed as a central component of ethical practice in which the dental hygienist is held self-accountable for the standard of care provided.

Methods

The study used a convenience sample of students and graduates from a metropolitan community college dental hygiene program (Cleveland, Ohio). The population included seventeen members (of twenty-two surveys mailed) from the class of 1998, fifteen members (of twenty-six surveys mailed) from the class of 1994, and twenty students of the class of 2000 (100% of surveys distributed). The currently enrolled students had received core content on ethical, moral, and legal concepts associated with dental hygiene. In addition to the survey, the students also responded twice in writing to a case that presented ethical issues in the workplace that a licensed hygienist might encounter. Though the students were not required to participate, all chose to do so.

The survey was a self-designed instrument, the Ethics in Dentistry Inventory (EDI), consisting of thirty-nine items in Likert-scale format (Appendix A). The first twelve items contained demographic information and received minimal modifications related to the dental hygienist's education and position in the workplace. This demographic information will not be presented in this report because of the small, relatively homogeneous population. Items 13-39 were modeled after the Bioethics Inventory (Homenko, 1996) that was used to study a variety of allied health professionals and their preparedness when ethical issues were encountered in the workplace. The revisions made to the Bioethics Inventory reflected the intent of the EDI to identify ethically-related issues specifically confronting dental hygienists.

In addition, on the first day of a capstone Dental Hygiene Practice course (DHP), the student participants were asked to respond in writing to a case (Appendix B) as if they were the hygienist in that office. Sixteen weeks later at the conclusion of the course, they were asked to respond again to the identical case.

Both qualitative and quantitative approaches were used in data evaluation. Quantitative measures consisted of the use of Pearson chi-squared statistics with alpha = .05 (Table 1). Qualitative analyses were used in two situations. First, the themes presented in Appendix A as summaries of the content of the EDI survey were established *a priori* based on content presented in the students' DHP course. The "frequency" of awareness was compared from the responses rather than the "content" of ethical awareness. Second, qualitative analyses were performed in the presentation of the students' written responses to the case scenario from the first and last days of the course (Table 2).

In addition to being a critical component of quality assurance, applying the specific criteria of self-assessment for job performance is also viewed as a central component of ethical practice in which the dental hygienist is held self-accountable for the standard of care provided.

Table 2. Themes Coded from Case Exemplar Beginning and End of DHP Course

First Day of Course (35 theme)

Concern about performing duties (n=13)
Malpractice by dental assistant (n=9)
Need to inform the individual of their wrongdoing (n=11)
Report the incident to other office staff (n=2)

Last Day of Course (41 theme)

Documentation important (n=4)
Discuss rules/laws of the state, standard of care, at risk (n=9)
Direct supervision & obligations of dental assistant (n=8)
Dentist ultimately responsible for actions of staff (legal liability) (n=9)
Meet with dental team (n=6)
Change offices if illegal performance ignored or continues (n=5)

Results

Participants were asked in the survey how knowledgeable they felt they were in various areas. To sum their responses, the combining of common themes was performed. Maintaining client confidentiality was included under the theme of professional protocol rather than health care law to focus on the rights of the patient (Nicol, 1997). Licensure and health care law were also combined, as were decision and judgment and personal beliefs. The results, in terms of participants judging themselves knowledgeable, are given in Table 1. Because each item had responses numerically scaled from 1 to 5, all of the numbers selected for the responses in each item were tabulated. The total number per item for each category is presented as a weighted summary.

Chi-squared analysis of possible differences among the three groups of participants revealed no statistically significant differences among the student responses when compared to those of the dental hygiene practitioners for items 13-39 in the EDI. In contrast, Table 1 pre-

sents, by descending magnitude of chi-squared value, those specific items of the survey inventory which showed statistical significance across all groups surveyed (students and both one-year and five-year post-graduation practitioners).

A qualitative analysis of the students' written responses to the case scenario from the first and last days of the course was performed by coding the major themes of the student responses on the first day of class and at the completion of the capstone DHP course. Their decisions about the case were also coded and summarized based on reoccurring phrases (Lincoln & Guba, 1985). The ethical and legal constructs that emerged in response to the case are presented in Table 2.

In general, the students viewed discussing the situation with the dental assistant as an important part of resolving the conflict and noted that the dentist ultimately has the legal responsibility in this situation. An increase in the frequency and content of the ethical and legal constructs actually stated for the case became apparent when comparing the number and variety of responses from the first day to the last day of the class.

Dental hygiene practitioners tended to focus on the importance of treatment planning related to the delivery of dental services.

Discussion

Dental hygiene practitioners tended to focus on the importance of treatment planning related to the delivery of dental services. This concept was most apparent with the practitioners one year post-graduation from the program. These findings may be related to their more recent completion of formal training and knowledge of current therapeutic protocols. Some dental hygienists viewed treatment planning as a *prima facie* duty that is related to pertinent ethical issues such as informed consent, resource allocation, and decision-making. Although the EDI did not specifically address treatment planning, the issue of assisting patients with treatment care decisions (Item 20) was identified with significant chi-square values. The responses by the graduates indicated they are involved with helping patients make health care decisions on a daily basis.

One aspect of the decision-making construct involved in the delivery of care was addressed in Item 36 asking respondents how they prefer to deal with a difficult issue in the office. This item somewhat paralleled the situation presented in the written case. Both participant groups indicated the need to seek the facts and discuss them, which the students tended to highlight as the primary action for resolving the ethical scenario as well. The students' essays also identified related constructs including documentation, standards of care, and concepts of supervision. They stressed the importance of a dental staff working together in the delivery of oral services, the team approach. Item 30 on the survey also focused on respect for members of the dental team when conflict or disagreements occur in treating patients. The statistical significance of this item might even indicate that the respondents perceived few conflicts among the team members related to patient care (Tamparo & Lindh, 2000).

In general, all groups of respondents were familiar with the ADHA Code of Ethics. Since the students were in the DHP course, their responses may be expected. However, it was encouraging that a significant number of graduates also indicated familiarity with the Code (Item 27). While this report deals only with a very limited sampling of individuals who are working in or studying to be a dental hygienist, DeVore, Fried, Dailey, and Qori (2000) reported that through self-assessment positive outcomes can be linked to improved quality of care and practice skills, similar to those standards outlined in the ADHA Code (Scott, 1999). Introduction of the Code at student orientation and frequent discussions using practical cases or examples from the clinic setting involving ethical issues should be implemented throughout the curriculum. While the standards exist for all dental hygienists, familiarity with the basic beliefs and responsibilities defined in the Code can only further enhance the normative beliefs and values practiced by the licensed hygienist on a daily basis.

In the area of health care law, one of the main issues surveyed dealt with the process of informed consent. Several items asked how patients were informed (Item 29), what they were told (Item 28), and who was given information regarding their options for treatment (Item 16). Through varying forms of data, the group cross-tabulation and chi-squared analysis, it was found that the respondents provided informed consent either verbally or, less frequently, in writing.

Infection control was viewed as both an ethical and legal concern (Item 25). Respondents currently in practice identified infection control as a "major concern" indicating that any deviations from accepted norms would be viewed as unethical or illegal. This is an excellent example of an instructional topic that is generally introduced early in the curriculum and reinforced with every patient.

It is becoming increasingly evident that a foundation for incorporating a critical thinking competency for students and practice in applying decision-making models is essential throughout the curriculum.

Finally, reference to the use of "clinical and professional judgment when providing dental health services" as identified in Item 22 referred to the frequency of critical thinking in dental hygiene practice. The graduate respondents indicated they do this every time they interact with a patient. The range of preventive dental hygiene services lends itself to developing a protocol that meets the individualized needs of the patient. Inclusion of information from the medical/dental history, pharmacological records, oral examination, and tissue charting must be considered when determining periodontal therapies or home care education for the patient. Besides the use of critical thinking, it also involves an analysis of all available resources as indicated in evidenced-based decision making. This is especially important as more authority for the dental hygienist is considered (Baergen & Baergen, 1997; Kassirer, 1994). These two categories are within the instructional realm of the core content in an ethics course, and students must learn to apply them, especially when a difficult ethical decision occurs. Ethical scenarios would therefore be a valuable instructional methodology in this regard and should be presented throughout the clinical and didactic dental hygiene curriculum.

The content topic area with the lowest weighted summation was in the basic ethics category. Further study is needed to identify which ethical and legal constructs specifically assist dental hygienists in the delivery of dental health services. As dental hygiene curricula continue to define competencies related to ethics and professionalism, it will be important to include the philosophical foundations of the ethical principles and theories related to health care and to oral health care specifically. There will also be a continuing need to develop curricular materials relevant to the impact of new technologies on oral health care. For example, the ethical aspects of genetics and its application to oral health services will need to be defined in ethical constructs because of the ethical issues it raises about accessibility, discrimination, and the confidentiality of patient information (Slavkin, 2001).

One further observation is that the EDI can be fruitfully developed once its validity and reliability are more clearly determined through studies involving larger samples of subjects. For example, a Phase II of the EDI could be applied to evaluating the ethical awareness among dental students, practicing dentists, and other members of the dental team based on similar assessments, i.e., DIT (Bebeau & Thoma, 1994; Rest & Narvaez, 1994). Moreover, since teamwork has been identified as a pertinent ethical issue, other such inventories could focus on the specific concerns of particular types of practice settings, such as general dentistry versus specialty offices.

Issues involving other staff members, such as resolving conflict in the office, were considered to be important ethical concerns that could affect the delivery outcomes of oral health.

Conclusions

The dental hygiene practitioner, as a member of the dental health team, is involved in delivering care directly to patients. With public view this professional comes some preconceived expectations that they provide dental hygiene services ethically, morally, and legally similar to the professional responsibilities outlined in the ADHA Code of Ethics. The Ethics in Dentistry Inventory was administered to explore the perceptions of licensed hygienists toward their performance and duties when providing treatment and interacting with the team in the overall delivery of care. Based on this survey, practitioners are aware of ethical issues in the workplace related to infection control, treatment planning, and informed consent. More emphasis must be placed on curricular methodologies that reinforce strategies for making decisions in the practice setting. Issues involving other staff members, such as resolving conflict in the office, were considered to be important ethical concerns that could affect the delivery outcomes of oral health. It is becoming increasingly evident that a foundation for incorporating a critical thinking competency for students and practice in applying decision-making models is essential throughout the curriculum. Students should be exposed to real-life situations they may encounter in the practice setting. In this sampling, student and graduate hygienists identified ethical dilemmas as being more complex than ethical issues. Graduate hygienists may not be as familiar with specific ethical and legal constructs given their years since formal training, but acknowledge a perceived awareness of ethics in the workplace when providing daily preventive care to patients.

References

American College of Dentists-Officer & Regents (1996). Dental managed care in the context of ethics. *Journal of the American College of Dentists, 63*, 19-21.

American Dental Association, Commission on Dental Accreditation (2000). *Accreditation standards for dental hygiene education programs.* Chicago, IL: The Association.

Anderson, D. G., Call, R. L., & Vojir, C. P. (1994). Differences in HIV knowledge and attitudes between first- and fourth-year dental students. *Journal of Dental Education, 58*, 668-672.

Baergen, R. & Baergen, C. (1997) Paternalism, risk and patient choice. *Journal of the American Dental Association, 128*, 481-484.

Bebeau, M. J. & Thoma, S. J. (1994) The impact of a dental ethics curriculum on moral reasoning. *Journal of Dental Education, 65,* 12-14.

Behar-Horenstein, L. B., Dolan, T. A., Courts, F. J., & Mitchell, G. S. (2000). Cultivating critical thinking in the clinical learning environment. *Journal of Dental Education, 64*, 610-615.

Brisack, N. J. (1995) For your information: establishing the standard of care. *Practical Hygiene, November-December*, 32.

Brutvan, E. L.(1998).Current trends in dental hygiene education and practice. *Journal of Dental Hygiene, 72*, 44-50.

Chally, P. S. & Loriz, L. (1998) Ethics in the trenches: decision-making in practice. *American Journal of Nursing, 89,* 17-20.

DeVore, L., Fried, J. L., Dailey, J., & Qori, C. G. (2000). Dental hygiene self-assessment: a key to quality care. *Journal of Dental Hygiene, 74*, 271-279.

DeWald, J. P. & McCann, A. L. (1999). Developing a competency-based curriculum for a dental hygiene program. *Journal of Dental Education, 63*, 793-804.

Forrest, J .L. & Miller, S. A. (2001). Evidence-based decision making in dental hygiene education, practice, and research. *Journal of Dental Hygiene, 75*, 50-63.

Gadbury-Amyot, C. C., Holt, L. P., Overman, P. R., & Schmidt, C. R. (2000). Implementation of portfolio assessment in a competency-based dental hygiene program. *Journal of Dental Education, 64*, 375-380.

Gaston, M. A., Brown, D. M., & Waring, M. B. (1990). Survey of ethical issues in dental hygiene. *Journal of Dental Hygiene, 64*, 216-224.

Hasegawa, T. K. & Welie, J. V. (1998). Role of codes of ethics in oral health care. *Journal of the American College of Dentists, 65*, 12-14.

Homenko, D. (1996). *Implications for bioethics on the moral reasoning of allied health professionals.* University of Akron, unpublished PhD dissertation.

Kassier, J. P. (1994). Incorporating patients' preferences into medical decisions. *New England Journal of Medicine, 330*, 1895-1896.

Kress, G. C., Hasegawa, T. K., & Guo, I. Y. (1995). A survey of ethical dilemmas and practical problems encountered by practicing dentists. *Journal of the American Dental Association, 126*, 1554-1562.

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publishers.

Newell, K. J. (1992). Dental hygiene students' and Practitioners' resolution of professional issues. *Journal of Dental Hygiene, 66*, 34-41.

Nicol, T. E. (1997). Confidentiality versus disclosure of a patient's infectious status. *Journal of General Dentistry, 45* (January-February), 78-80.

Nolan, P. W. & Smith, J. (1995). Ethical awareness among first-year medical, dental and nursing students. *International Journal of Nursing Studies, 32*, 506-517.

Ohio State Dental Board (2001). *Ohio state dental board law and rules.* Columbus, OH: Government Publications.

Rest, J. R. & Narvaez, D. (1994). *Moral development in the professions.* New Jersey: Lawrence Erlbaum Associates Publishers.

Sackett, D., Rosenberg, W., Gray, J., Haynes, R., & Richardson, W. (1996). Evidenced-based medicine: What it is and what it isn't. *British Medical Journal, 312*, 71-72.

Scott, B. L. (1999) Ethics: dialogue in dental hygiene. *Access* (December), 14-22.

Slavkin, H. (2001). Impact of the human genome project on oral health care. *Access* (May-June), 36-46.

Tamparo, C. T.& Lindh, W. Q. (2000). *Therapeutic communications for health professionals* (2nd ed). Canada: Delmar Thompson Learning.

Winslow, G. (1996). Casuistry in dental ethics: a case for cases. *Journal of the American College of Dentists*, 63, 31-34.

Appendix A: Content Items for the Ethics in Dentistry Inventory.

Consider the statements below and decide how knowledgeable you feel in the following content areas using the scale provided. CIRCLE your answer directly on the questionnaire/form provided.

13. I am able to differentiate between the terms ethics, morality, and values.
This is an easy task **1 2 3 4 5** *This is a difficult task*

14. I am able to give several examples of what makes a dental care provider a professional .
I can describe at least one example **1 2 3 4 5** *I can describe many examples*

15. I understand the rules of licensure (or certification) and feel the rules have a positive impact on the dental profession.
I strongly agree **1 2 3 4 5** *I strongly disagree*

16. My duty to treat patients involves making them aware of their rights (as a dental patient).
I inform all clients before procedures **1 2 3 4 5** *I inform some clients*

17. I maintain confidentiality with regard to the information on patient records and have never discussed patients outside of the dental operatory.
Confidentiality is always maintained **1 2 3 4 5** *Confidentiality is not maintained*

18. I apply the principles of ethics to the practice of my profession.
This is done daily **1 2 3 4 5** *This is never done*

19. I have encountered an ethical dilemma within my scope of practice as a dental professional.
In the last week **1 2 3 4 5** *In the last year*

20. I am involved in helping patients make dental health care decisions. This occurs ...
Daily **1 2 3 4 5** *Very seldom through the year*

21. I use information from my formal education to be a competent dental practitioner.
Frequently **1 2 3 4 5** *Rarely*

22. I need to use clinical/professional judgment when providing dental health services.
Every time I interact with patients **1 2 3 4 5** *Only with difficult patients*

23. I have been involved in an ethical issue(s) related to another dental professional or colleague.
This occurs often **1 2 3 4 5** *This has never occurred*

24. I understand the legal aspects of the state's dental practice act in relation to my role as a dental professional.
Applicable laws are very clear **1 2 3 4 5** *Laws are confusing, irrelevant*

25. I view infection control as an ethical and legal concern in the practice of dentistry.
This is a major concern **1 2 3 4 5** *This is not at all a concern*

26. I believe my personal values _____ influence the type of relationship I have with my patients in the dental setting.
Greatly **1 2 3 4 5** *Do not*

27. I have read the Code of Ethics specific to my dental profession.
Within the past year **1 2 3 4 5** *Have never read the Code*

28. I make sure my patients know exactly what services they will receive and why along with any risks, benefits or alternatives for care before I begin. This is done....
For every patient **1 2 3 4 5** *With more involved cases*

29. I share the above information with my patients.....
Verbally only **1 2 3 4 5** *In writing only*

30. I respect every member of the dental team and recall _____ conflicts or disagreements with the staff when treating patients.
Very few **1 2 3 4 5** *Frequent, ongoing*

31. I respect every member of the dental team and recall _____ conflicts or disagreements between the dental professionals themselves.
Very few **1 2 3 4 5** *Frequent, ongoing*

32. I render safe, individualized care to my patients.
I reflect on this with each patient **1 2 3 4 5** *I never reflect on this concept*

33. I treat every patient equally regardless of their personal or financial status.
This is easily done **1 2 3 4 5** *This is not always done*

34. I am confident that I provide the highest standard of care in _____ situations I encounter.
All dental **1 2 3 4 5** *Some of the dental*

35. I understand universal precautions, and I am _____ of treating a known HIV patient differently by using additional safeguards when I treat them.
Conscious **1 2 3 4 5** *Not aware*

36. I prefer to deal with a difficult issue in the office by ...
Seeking the facts and discussing them **1 2 3 4 5** *Ignoring the problem*

37. I believe my responsibilities as a member of the dental team should focus on _____ when it comes to patients.
Only my role **1 2 3 4 5** *Role of every office professional*

38. I _____ experience difficulty telling the patient about the condition of their oral cavity and approximate costs involved to correct the situation.
Often **1 2 3 4 5** *Never*

39. I attribute my ability to reason through ethical decisions in the workplace to
Formal training **1 2 3 4 5** *Family background morals*

Frequency of major themes reflected in the Ethics in Dentistry Inventory

Content Topic/Theme	Items	Weighted Summation
Licensure and Health Care Law	15, 16, 21, 24, 28, 29, 34	269
Professional Protocol	14, 17, 25, 27, 32, 35	196
Decision/judgment and Personal Beliefs	20, 22, 26, 33, 38, 39	195
Teamwork	30, 31, 36, 37	145
Basic Ethics	13, 18, 19, 23	88

Appendix B: Case Used for Hygiene Students

This is your first position in a large group practice containing three general dentists, a periodontist, and an orthodontist. The complete office staff totals fourteen members and includes chairside assistants, an office manager, roving infection control assistant, and two dental hygienists. Each day you are scheduled to work there is a new composition in the office staffing due to the large number of personnel who rotate between operatories or are part-time employees.

As a hygienist your duties are quite varied, and the office manager encourages independence among the auxiliaries. On your way to find the supervising general dentist to check your patient, you notice one of the dental assistants scaling a child's teeth in the next operatory. You question the dentist who seems to be unaware of the situation and who suggests you discuss it with the office manager. At the end of the day, the office manager leaves early, but you encounter the chairside assistant who was performing the prophylaxis. She is in the dental lab area where several other office employees are present.

What should the dental hygienist do?

Ethical Dentistry: A Time Proven Solution to a Modern Problem

James Kelley, DMD

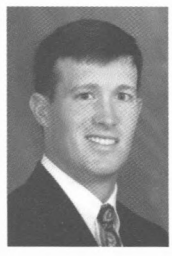
As a senior dental student I now realize what practicing dentists have known for years: dentistry goes with you wherever you go. Upon hearing that I am a dental student, people almost instinctively point to a tooth and begin telling of their dental experiences, be it at a party, on the golf course, or even in church! So I was not surprised when a friend began sharing her latest dental concern with me. Apparently her seven-year-old cousin was told that she would need a frenectomy to allow space closure between her central incisors. Her cousin's parents, however, were balking at the idea of putting their child through what they perceived as an unnecessary and traumatic surgery. They wondered why the surgery was necessary. Couldn't the space be closed with braces? In another instance, a fellow dental student related how he had to drive two hours home to look in his mom's mouth to confirm what her family dentist had recently told her: that she needs a new bridge after wearing a hole through the connector of her current FPD of thirty-seven years.

Upon hearing these stories, I was not really sure what to make of them. However, what stood out in my mind was the perceived lack of need by the patients for the treatment the dentists were presenting. Where is the breakdown occurring that causes patients to question their dentists' judgement? Is it simply a lack of communication regarding the need for treatment, or is it public perception not to trust the dentist? As a result, I began thinking of what it means to be a part of the profession of dentistry.

While in dental school I have often heard patients exclaim, "So why are we doing this?" or "What exactly are we doing today?" only moments before the student is about to perform the procedure. These trends can be extended to practicing dentists, who often do not take the time to fully explain each procedure and its benefit to the patient. In dentistry, where time is indeed money, patients are often uninformed as to all of their treatment options. As in the case mentioned earlier regarding the frenectomy, the patient's parents did not understand the consequences of non-treatment or the overall benefits of the procedure. As dentists, we may take many things for granted, such as the understanding that the patient's diastema will not remain closed following orthodontic treatment without surgery to reposition the frenum. In this case, my friend asked me to e-mail her cousin's parents and briefly explain the procedure and its need. Upon doing so, they gladly had the procedure done. In this case, as in many, the dentist could have saved a great deal of confusion while also building patient confidence by simply taking the time to be sure that the patient understood the importance of the service provided.

As dentists we are charged with the responsibility of being professionals the moment we are accepted into dental school. A professional "is honest, ... competent, ... has integrity, ... [and] is ethical" (American College of Dentists, 2000). With these responsibilities in mind, it is the dentist's ethical and professional obligation to provide patients with a full understanding of their treatment needs. Understanding does not simply mean informing the patient of what they need, but additionally why they need it. It is the dentist's duty, therefore, to fully explain the treatment options, as only then can the patient make an informed decision concerning his treatment.

It is the dentists's duty, therefore, to fully explain the treatment options, as only then can the patient make an informed decision concerning his treatment.



Dr. Kelley graduated from the Medical College of Georgia, School of Dentistry in May 2001 and is currently an orthodontic resident. This essay placed first in the Student Ethics Competition sponsored by the Georgia Section of the American College of Dentists.

Many dentists may counter that they frankly do not have the time to sit with patients and discuss treatment concerns. With today's overhead often running at least 60%, dentists argue that we can ill-afford to spend the invaluable minutes discussing treatment options. However, spending a few extra minutes with patients to help build their trust will only pay off in the long run. In the example of the FPD with a hole in it, the dentist might have been more convincing with the use of an intraoral camera coupled with a little more explanation.

Clearly, there is a thin line between the amount of information a patient does or does not need in order to make a competent decision regarding treatment. Too much information can be exactly that: too much. The ADA Code of Professional Conduct begins by stating: "The dentist's primary professional obligation shall be service to the public" (American Dental Association, 1999). With this code in mind, some dentists may feel that patients should simply trust our judgement—that our opinion should suffice. The problem, like it or not, is that dentistry is in competition with Circuit City and Best Buy: we are competing for a patient's disposable income. For the most part, the services we provide do not involve life-or-death situations. Dentists, therefore, must spend the extra time to make clear to patients their need for treatment.

Many dental students and dentists alike list serving the public and the degree of respect held within the community as driving forces in their choosing dentistry as a career. As reported by a 1997 Gallup Poll, dentistry enjoys being the fifth most respected profession in America. This respect is garnered despite several articles in recent years questioning the fairness and consistency of dental treatment plans. Dentists and dental organizations have worked very hard to promote public awareness of dentistry and the issues the profession faces. With this continued work and dentists' concerted effort to help our patients understand not only what they may need but also why they need it, the profession of dentistry will certainly have a very bright future.

As I prepare to graduate dental school, I am indeed proud to call the profession of dentistry my own.

References

American College of Dentists (2000). *Ethics handbook for dentists: An introduction to ethics, professionalism, and ethical decision making.* Gaithersburg, MD: The College.

American Dental Association, Council on Ethics, Bylaws and Judicial Affairs (1999). *Principles of ethics and code of professional conduct.* Chicago, IL: The Association.

Why

David W. Chambers, EdM, MBA, PhD, FACD

Abstract

There are two kinds of cause and effect. The scientific notion that is taught as part of the formal model is rigorous, but often limited in its generalizability across situations. The study of cause and effect in natural settings is also a rigorous field, with several useful and easily applied techniques. Root cause analysis is a set of approaches to identifying the factors in natural settings that initiate a chain of events with outcomes of interest. It is easier to improve processes when their true root causes have been identified. Risk management is a special case of root cause analysis.

In college and graduate school I worked in a research group headed by former president of the American Psychological Association, Dr. George Miller. He was fond of reminding us that we would always have a decent job if we knew how to do something well. Then he would grin and add, "And you'll always be working for someone who knows why."

There are two sciences of why. The most familiar is the scientific method. Cause-and-effect relationships are isolated in controlled environments to reveal fundamental principles. This is the why of natural sciences. The other kind of why is concerned with naturally occurring events that are individual and personal. Why do I choose this bonding agent? Why did the patient miss the 9 o'clock appointment? Why did the handpiece break down? And why do I have to follow OSHA rules? There may be some science in each of these questions, but none of them can be studied scientifically in the traditional sense. Engineers, businessmen, economists, lawyers, and ordinary people know a lot about why in this second sense, and that is what this article is about.

One of the great research teams studying why in natural circumstances was Daniel Kahneman and Amos Tversky. In a classic study they asked people to explain why an innocent individual died in a car accident. The story involved a faculty member at the University of British Columbia whose wife phones just before he leaves work and asks him to run an errand, thus taking him home by a different route through Stanley Park. There is also a young man driving a truck through Stanley Park. The young man has been drinking heavily and the breaks on his truck are in disrepair. As the professor begins to pull away when the traffic light turns green, the youth slams on the breaks but skids through the intersection, hitting the car broadside and killing the professor instantly.

The question posed was simple — why did this event happen? While there were numerous events preceding the accident, and different individuals focused on each of these, there was a marked preference for simple causes. Almost all explanations mentioned only a single cause. There is also a tendency to identify events close to the tragedy, and positive actions (drinking) are more conspicuous than omitted ones (bad breaks). Personal values color reasoning: youth more likely blaming the old professor and teetotalers more likely blaming the drinker.

Kahneman and Tversky are respected scientists studying why. Dentistry is based on this kind of why just as surely as it is on the why of natural science. The patient, the lawyer, front desk staff, public safety officers, dental politicians, and dentists for the most part are constantly engaged in asking why in the nonscientific sense.

Cause and Effect

Plaque causes caries. Poor staff training causes inefficiency and error. Rapid curing of composite causes marginal shrinking. Availability of insurance causes oral health to improve. Scores below 75 cause failure on National Dental Board examinations.

Each of these cases meets three conditions: the cause precedes the effect, there is an association of time and space between the cause and the effect, and the conditional requirement is met. The conditional requirement states that the effect will be observed when the cause exists and the effect will not occur when the cause does not exist. The conditional requirement is a thorny issue and not nearly as straight forward as it may appear. Presence of plaque does not always cause caries. Diet and host factors significantly modify that relationship. Some staff are brilliant without training and some continue to make a mess of it

after hours of instruction and coaching. The only example given above that completely meets the conditional requirements is the one regarding failure on the National Boards with a score under 75, and that is true by definition, and not a cause and effect relationship in the natural science sense.

The problem with the conditional requirement is *ceteris paribus*; the requirement that "everything else is equal." Cause and effect can be must easily demonstrated in isolation, where only the effect and the causes of interest are operative. Most of the cause and effect relationships we encounter in real life are complex and qualified. For example, rapid curing causes marginal shrinkage for certain materials, for certain applications of the curing light, for specific cavity designs, in particular locations, etc.

The claims made for dietary supplements (crucifers prevent cancer), diet (avoiding foods that are white in color reduces weight), and alternative medicine (laetrile cures cancer) as well as the fear mongering of anti-fluoridationists or anti-amalgamists can all be supported by a few examples where effect really did follow cause. But do they consistently follow cause in general situations so that they would support a general policy or action? Usually not. Exactly the same logic applies when translating clinical and laboratory research, especially *in vitro* studies, to everyday practice in the dental office. This is the fatal flaw in evidence-based dentistry. *Cetris* isn't *paribus* as often as we would like it to be, and single answers to the question why are more applicable in the laboratory than in the operatory.

Causes

The simple notion of cause and effect has been exhaustively studied by philosophers and academics. Most serious students of the concept now agree that claims about causal relationships are ultimately based on probability. That is why researchers perform statistical tests in order to determine the probability associated with claimed causal relationships.

A good definition of cause in practical situations is anything that can be changed in a particular context to produce better or worse results with some degree of confidence. Table 1 shows a variety of events that might be called causes. The one we want to focus on is the root cause. This is the event in a causal chain that has the most consistent and powerful effect on the outcomes that concern us. It is the wrong diagnosis for which no technical skill is sufficient remedy. It is the OSHA regulation that caused the inspector to look for the infraction. It is the overextended cavity preparation that lead to a broken inlay (and not the cherry pit the patient crunched when the event occurred). With a little imagination, it is possible to string together extensive chains of causes. Root cause analysis is the business of systematically examining such causal trees in search of the single precursor that makes the most difference, the one that consistently changes success into failure or vice versa.

Cetris *isn't* paribus *as often as we would like it to be, and single answers to the question why are more applicable in the laboratory than in the operatory.*

Armchair root cause analysis is easy but not always effective. Consider the following example involving an unacceptably high rate of insurance billing errors. In order to pinpoint the problem the front desk has been keeping a tally of the returned requests and some of the factors associated with them. It appears that the error rate is about three times as high for bills prepared on Fridays. In a staff meeting, several potential causes are identified by comparing the differences among the days. Some of these differences include (a) Alice alone at the front desk on Monday while Gail and Fran share the desk and chairside on Fridays; (b) a high volume of restorative cases on Mondays compared to larger, reconstruction cases at the end of the week; (c) an associate in the office on Monday and Tuesday only; (d) a hygienist in the office on Wednesday through Friday; and (e) a normal lunch hour and closing at 5:30 on Monday through Thursday and no lunch and a 3 PM closing on Friday.

The dentist could admonish Gail and Fran or send them to an insurance billing CE program. Perhaps the presence of an associate or a hygienist throws off the office schedule. Maybe it is the hurried schedule on Fridays. The point is that no one can be certain from the information provided or from actually being in such an office and looking around which of these causes, or which other is the fundamental condition that ignites the chain of events leading to the high error rate. Without this knowledge it would be hit or miss trying to correct the problem or worse yet there might be a partial fix, leaving the true cause undiscovered and the potential gain from corrective action only partially realized.

Root cause analysis is a set of approaches designed to identify the sources of problems and failures in naturally occurring situations. It is not science in the research sense; it is sciences in the practical sense.

Approaches to Identifying Root Causes

Root cause analysis is a set of approaches designed to identify the sources of problems and failures in naturally occurring situations. It is not science in the research sense; it is science in the practical sense.

There are four steps in root cause analysis: (a) understanding the process, (b) identifying causes, (c) analyzing causes, and (d) verifying corrections. Notice that "fixing the problem" is not part of root cause analysis. That will happen as a natural consequence of the other four steps, but going for fixes will not necessarily lead to understanding, analysis, or isolation of meaningful causes. Affecting a "fix" without verifying that it is the best fix is just plain foolish (though common).

Understanding the Problem. Customers are their own worst enemies when they ask for service by specifying how they want something done rather than the result they are seeking. When you tell you tax advisor you want a 1031 rollover for a piece of property you own, you immediately limit the way your advisor could help you solve the true problem, which is reducing your tax burden. You may indeed save money, but you might equally foreclose an option that would be even more beneficial. Dentists think poorly of patients who arrived with requests such, as "I want a three-quarter crown on #13." These are just examples of a basic fallacy of mistaking the solution for the problem. In understanding the problem it is helpful to use a formula such as "I would be happier if the results of this process looked like ..."

Another simple tool for understanding problems is to draw a picture. At the bottom of the page, draw a home plate from baseball and write there the outcomes you want from the process to

Table 1. Commonly Made Distinctions Regarding Causes

Cause	Anything that can be changed in a particular context to produce better or worse results with some degree of confidence.
	Inconsistent coding on insurance claims predictably results in those claims being returned
Root Cause	The cause that is regarded as being the sufficient initial stimulus for the chain of events leading to the (usually) unwanted effect
	The staff member responsible for preparing claims has not been properly trained
Symptom	Conspicuous event that signals the presence of an (usually) unwanted outcomes
	Insurance rejections come in recognizable envelopes
Contributing Cause	Factor or condition that must accompany a root cause in order to produce the expected effect, but would not lead to the result in and of itself
	The dentist must have an affiliation with the insurance company before the incorrectly completed form will be returned for correction (having an affiliation will not cause claims to be returned for correction; claims from patients or unknown parties will not be returned for correction)
Indirect Cause	Any necessary step in a chain of cause and effect events that leads from the root cause to the result. An indirect cause does not trigger the chain of events
	Insurance clerks examine claims and detect a coding error
Immediate Cause	The final indirect cause before the result of interest; not the root cause
	The insurance clerk decides to return the claim for correction
Deterministic Cause	A cause that results in the effect every time
	Necessary signatures or identifying information is omitted from the claim
Stochastic Cause	A cause that results in the effect with some degree of probability
	The radiograph provides inconclusive support for the treatment

produce (or the outcome it is not producing in the case of some system failure). Now work backwards from the outcome. Draw boxes and label them for each of the steps that lead up to the outcome. Connect these boxes with arrows showing which ones influence which others. There are manuals showing very detailed and sophisticated ways of constructing such flow diagrams, but any reasonable person who understands the process he or she is involved with will be able to get this task 90% correct on the first try. The 10 % that still seems uncertain may provide invaluable clues to solving the problem. If there is a part of the process that is vague or if different people involved in the process have different interpretations at a certain point, it is extremely likely that the root cause of problems will be found in that area. Sometimes the root cause is one of the boxes in the flow chart that seems to be causing problems for several people. Sometimes the root cause is a missing step, a box that is not shown but should be in the flow chart.

Another technique that helps us understand problems is to collect critical incidents. This approach requires a little more effort and should be reserved for problems where the outcomes matter dramatically or where earlier attempts to identify root causes have been only partially successful. Recording critical incidents is simply a method of systematically gathering information about system problems. In the dental office this might be accomplished by asking the staff to identify three situations each over the past month where a problem has occurred in a particular area. Each person is to write down the incident with enough specificity so that it can be uniquely identified and discussed with others. The specific circumstances, time, other activities going on at the time or just before the incident, etc. should be identified for each incident. Specific, factual, concrete observations are essential and speculations about what might have caused the event are strictly forbidden. The incidents are shared among those who produced them and through discussion and analysis, a clearer understanding of the problem begins to emerge. Sometimes, problem identification, flow charts, and critical incidents together can very clearly identify a probable root cause. When it is not obvious what the root cause might be, we must precede to the second step in the process.

Identifying Possible Causes. Depending on the severity and intractability of the problem, it is helpful to invest in identifying a list of several potential causes. This is also a politically smart move, particularly where the person with ultimate responsibility is tempted to play the omniscient problem solver role in situations that depend on teamwork for effective implementation.

Brainstorming is a wonderful technique to use at this point. The trick that makes brainstorming effective is to enforce the rule that participants are not allowed to evaluate others' suggestions while the ideas are being generated. If the associate in your practice doesn't agree with the hygienist about a suggestion that late appointments are the result of the front desk failing to establish expectations the associate should reserve judgment and suggest what seems to be the real alternative issue. The goal of brainstorming is a long list of creative potential causes, not a short list of edited ones.

There are elaborations of the basic concept of brainstorming. One is to conduct the process entirely in written format (brain writing) or to use a combination of brainstorming, ranking, and brief explanations of alternatives known as the Nominal Group Technique.

A method I have found helpful in connecting potential causes to a true understanding of the process is to make a large schematic of the flow diagram on butcher paper or a large board that can be written on. The potential causes of failure at each stage in the process should be identified with arrows pointing into the process and a brief phrase describing the potential causes. This method works well when individuals work independently for a few minutes creating their own problem maps and then began to share them and to discuss and add new potential causes.

Cause Analysis. The second phase in root cause analysis was to identify a list of potential root causes. The third phase is to identify the ones that are the best candidates, and ultimately narrow this list to a single root cause. The range of techniques for this phase is enormous. Voting based on hunches often works just as well as computer simulation models and design of experiments. There are literally dozens of techniques in between. The right approach is to match the technique for analyzing potential

Table 2. Alternative Approaches to Risk Management With Regard to Infection.

Eliminate hazard	Disinfect operatory
Reduce hazard	Not allowing infectious patients or staff in office
Separation in time and space	Clean any dirty areas
Isolate hazard	Instrument sterilization cassettes
Strengthen target	Inoculations
Mitigate effects	Predetermined needle stick protocol
Physical barriers	Sharps containers
Administrative	Rules and education

causes to the nature of the problem and it's significance. Most of the time, a little structured intuition will be good enough. If the problem is complex and it is throwing off a large number of damaging outcomes or if the potential correction is expensive, getting a little help from an expert in this field may be appropriate. This is the stage in the process of root cause analysis that is most likely to involve gathering actual data. I will list three very simple quantitative techniques as examples.

If a critical incident approach was used for understanding the nature of the problem, you already have expert opinion that can be quantified. Read the first critical incident and write down each detail that was mentioned. Put a single tic mark in front of each item as you encounter examples of them. Read the second critical incident and add to the list, putting a tic mark for each new item and an additional tic mark for items that are repeated from one incident report to another. Continue this process until all critical incidents have been coded. The one or two elements that have the most tally marks are your best candidates for the root cause.

If you performed brainstorming or used the technique of identifying causes for failure on your flow chart, you also have valuable expert opinion available for use. After your panel of experts has made its list or drawn its picture of where the process might have problems, ask them to vote. Ask each person to pick the top four to six candidates for the root cause and then vote. Again, the item with the largest number of votes is likely to be the root cause.

There is another simple method of using data to guide the hunt for useful root causes. This technique works well for frequent low-grade problems. Using the ideas generated through possible root cause identification, give everyone involved a checklist of the top candidates. Their job, over a period of weeks or months is to tally the number of times each of the potential causes and the problem occur together. They are recording positive coincidence between cause and effect. When the lists are combined from the various sources, it can be converted to a histogram with the incidents arranged from the most frequently occurring to the least. Such a graph is called a Pareto graph. It is named after Italian economist who invented the 80:20 rule and it is a nice graphic display of the fact that most problems are caused by a few factors, and these vital few are the ones you want to work on first.

As a means of managing risk, typically policy isn't worth the paper it usually isn't written on.

Improvement Verification. In most organizations, there would be a step here about planning and implementing changes to account for root causes. This is largely unnecessary in the dental office where the dentist has complete authority and control over resources. If the dentist wants to make the change, and it is legal to do so, the change will occur.

The operation that is so often missing is the one of verifying that the change actually made a difference. There is no approach to root cause analysis that is so effective it will guarantee success in every case. That is why verification is necessary.

It is easy to be fooled on this point. The placebo effect can be as misleading to the professional as it is for the patient. There are many sophisticated techniques that could be used to ensure that a change really does make a difference. One very simple one also provides quantitative results. It is called the B&A technique, standing for Before and After.

Following our example of the office with high error rate on insurance claims prepared on Fridays, the dentist already has an abundance of Before data measuring error rate. Let's assume that a simple change is made whereby the billing of the work done previously on Fridays is simply held until Monday. Data on error rates are collected for a few weeks using the After practice configuration. The B&A technique requires only that the results be arranged in order (number of errors), beginning with the best outcome and proceeding to the worst (ties are discarded). Count the As (presumed best) encountered until you reach the first B; then start at the other end and count the number of Bs before encountering the first A. If the total of these two counts is at least four, there is a 67% chance that the new technique is truly better; if the total is six, there is a 95% chance that the switch was an improvement; eight or more means a 99% chance of improvement. The same approach could be used to compare new impression materials or one lab against another. It would be necessary to "blind" the rater to the source of the results, however.

Risk Management

Risk management is a special case of root cause analysis. Instead of looking for improvement in some outcome such as productivity or quality of restorations, risk management is concerned with preventing the occurrence of unwanted, and often dangerous outcomes. Needle sticks, malpractice suits, and employee turnover are examples where risk management is useful.

All the techniques in root cause analysis that have been presented so far are useful in the risk management settings. The goal is to find the potentially most likely and damaging causes of accidents and to manage them. There are however, some special circumstances in risk management that deserve attention. First, risk management situations universally contain four common elements. First, there is a target or host, such as the office team and the patients who must be protected. Second, there is a hazard that is potentially damaging to the host. The third element, often but not always present, is some barrier between the haz-

ard and the host which is intended to provide protection. The fourth element is the general environment. The paradigmatic case of failure in risk management is a barrier failure. A sharp perforates a latex glove or the standard of care is not followed in the patient treatment. But there are many other ways of managing risk besides multiplying and strengthening barriers. Some of the most common are listed in Table 2. Examples include strengthening the host as in inoculation, removing hazards from the environments as in patient case selection, or diluting the hazard as in shorter work periods.

As a general rule, physical and passive barriers are more effective than administrative ones. Physical barriers might include safety needles or those asymmetrical prongs on electrical cords that prevent you from connecting electrical equipment in the wrong fashion. Administrative barriers include educating people and creating rules or policies. As a means of managing risk, typically policy isn't worth the paper it usually isn't written on.

Another feature of risk management that makes it a special case in root cause analysis is the value of near misses. Experts in the field of risk management distinguish between "events" and "incidents." An event is a dangerous situation that converts to an unfortunate negative consequence. The patient aspirating a crown or the dentist's back giving out because of poor posture are examples of events. An incident is a dangerous situation that could convert to an unfortunate outcome under normal circumstances although it has not done so yet. An unexposed syringe on the tray, glasses without side shields, or risky procedures without proper informed consent are all incidents waiting to convert to events.

The advantage of distinguishing between incidents and events is important in how dentists manage risk. It is sometimes mistakenly assumed that the goal of risk management is to identify and establish systems that prevent untoward events. But it is difficult to manage things that never, or in theory rarely occur. The true goal of risk management is to control incidents. By keeping them manageably small, the likelihood of anyone of them converting to an event is reduced. Smart practices choose one or two signal incidents to monitor on a regular basis. Foolish practices assume that they have good risk management systems because no negative events have occurred yet.

Foolish practices assume that they have good risk management systems because no negative events have occurred yet.

Risk management is not risk prevention. Causes are always a matter of probability. Further, in some cases, specific risks may not warrant extensive control while others, if they are likely or damaging, justify more attention. That is why it is called risk "management" rather than risk "prevention." In well-designed risk management systems, the potential for failure always exists. System failures often occur because factors that are innocuous in their own right interact in unpredictable and dangerous ways or because of a chaining effect where small wobble in one factor exaggerates wobble in the next and so forth. Probably most cases of gross malpractice are a result of this chaining process rather than onetime decisions on practitioners' parts to be intentionally unprofessional.

Root Cause Politics

There is a popular cliché today that says, "Good managers do not fix blame, they fix the problem." But management problems in America have not vanished in the face of such clichés. Root cause analysis is a way of finding problems in areas such as dental practice, but it is not a panacea. It would be hard to gather the data to make such a claim, but it is probably true that most dentists are aware of the problems in their practices and choose not to identify the causes behind them. There is no reason for going to all this effort and raising issues of risk and inadequacy if there is no intention to do anything about it. Any dentist who lays it out as an explicit or covert criteria for solving a problem that he or she must have thought of the solution will tend to avoid root cause analysis. In other cases, we have become co-dependant on our problems and we prefer the ones we are familiar with to the unknown ones that may surface upon analysis and probing. If there is no wisdom at least there is comfort in the thought that dental practices can never be made safe from problems so why embrace the annoyance of looking for them.

Most dentists are aware of the problems in their practices and choose not to identify the causes behind them.

An example of this occurred in a dental school where I did some consulting. An unacceptable number of patients presenting for initial screenings failed to become patients of record. An MBA student was assigned to do the root cause analysis and he created a computer model based on data collected at the school over many months of observation. His analysis showed that the root

cause of the problem was failure to take radiographs on the day of initial screening. When patients had radiographs taken on their first visit they were about 40% more likely to become patients than when they were given an appointment to return later for radiographs. When the MBA student presented the results of his root cause analysis, the individual responsible for this portion of the clinical operation dismissed it out of hand, saying, "That analysis isn't correct. I know the system better than that." The project died instantly and was not resurrected until approximately three years later. At that time, the individual who had rejected the project was promoted to a position with oversight for the entire performance of the clinic and someone else was in charge of patient flow. The new boss immediately called for a copy of the report and challenged his replacement in the clinic to explain ***why*** the current clinic practices in the face of the root cause analysis.

Root cause analysis is a tool that can make dental practices more effective and safer for those who choose to use it. Those who prefer not to use it do not need to learn techniques for maintaining the status quo.

Recommended Reading

* Andersen, Bjørn & Fagerhaug, Tom (2000). *Root Cause Analysis: Simplified Tools and Techniques*. Milwaukee, WI: ASQ Quality Press. ISBN 0-87389-466-9; 155 pages; about $30.

Eliminating symptoms will not prevent the recurrence of problems, nor will addressing indirect causes. Only by identifying the most fundamental cause can problems be solved or prevented. This book provides an introduction to some of the many analytical tools that can be used to understand the relationships between causes and problems. This is a simplified manual, probably intended for use by line employees or supervisors. The authors are Norwegian academics with consulting experience.

* Barrentine, Larry B. (1999). *An Introduction to Design of Experiments: A Simplified Approach*. Milwaukee, WI: ASQ Quality Press. ISBN 0-87389-444-8; 114 pages (workbook format); about $25.

Considers situations where there is interest in optimizing (maximizing or minimizing) an outcome variable but there is no direct control over the outcome because there are multiple factors that have some cause and effect relationship and the strength of these factors is not well understood. DOE is a set of special cases of analysis of variance statistics that helps identify the most important causative factors. Many examples and problems worked with annotations and problem sets with answers in the back, a glossary. The author is an independent consultant with previous experience as a teacher.

Chambers, D. W. (2001). Outcomes-Based Practice. *Dental Economics*.

A series of twelve articles developing the context and techniques for an analytical approach to dental practice. The September issue works out the hypothetical problem of high billing errors on Friday and the December issue discusses the B&A technique.

Crouch, E. A. C. & Wilson, R. (1982). *Risk/Benefit Analysis*. Cambridge, MA: Ballinger Publishing.

Standard text on risk analkysis theory.

Hertz, D. B. & Thomas, H. (1983). *Risk Analysis and Its Application*. New York, NY: John Wiley and Sons.

Standard text on risk management theory.

Kahneman, D., Slovic, P., & Tversky, A. (eds.) (1982). *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge: Cambridge University Press.

A heavy collection of research papers that explores the way intelligent people actually use information to answer questions about why events occur. The general conclusion of the research is that even the scientists who use meticulously rigorous methods to gather and analyze data are prone to regular and predictable shortcomings in applying the data or drawing conclusions from it.

* Wilson, Paul F., Dell, Larry D., & Anderson, Gaylord F. (1993). *Root Cause Analysis: A Tool for Total Quality Management*. Milwaukee, WI: ASQ Quality Press. ISBN 0-87389-163-5; 216 pages; about $30.

Most of this book discusses the conditions for root cause analysis. There is only a light touch on the actual techniques and only a small number of examples. The focus of root cause analysis is on identifying the most obvious opportunities for improvement and preventing faults from being introduced in the system in the first place. Nothing is known of the authors.

Editor's Note

Summaries are available of the three readings preceding by an asterisk (*). Each is about four pagers long and conveys both the tone and content of the book through extensive quotations. These summaries are designed for busy readers who want the essence of these references in fifteen minutes rather than five hours. Summaries are available from the ACD Executive Office in Gaithersburg. A donation to the ACD Foundation of $15 is suggested for the set of summaries on root cause analysis; a donation of $50 would bring you summaries of all the 2002 leadership topics.

American College of Dentists
839J Quince Orchard Boulevard,
Gaithersburg, MD 20878-1614

Periodicals Postage
PAID
at Gaithersburg, MD