Reforming Dental Health Professions Education: A White Paper

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Abstract: The oral health education system is in need of major reform! This is especially apparent in university-based education for the health professions. So-called preclinical as well as clinical education simply has not kept pace with or been responsive enough to shifting patient demographics and patient/population desires and expectations, changing health system expectations, evolving interdisciplinary expertise and practice requirements, new scientific discoveries and scientific information, focus on quality improvement, and/or integration of emerging technologies. Moreover, university-based "dental education" is the most costly professional degree education within the entire university portfolio, and dental student accumulated debt is increasing each year well beyond national inflation estimates. Today, we have an enormous opportunity to explore major reforms in health professional education. Through the Santa Fe "process" of open and candid engagements and discussions (see www.santafegroup.org), we advance an argument as well as a national strategy that can enable major reforms in the oral health education system. We further suggest that major revisions can result in an outcome-based education system that prepares oral health professionals to meet both the needs of patients/families/communities and the requirements of a changing health system.

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This article is based closely on a white paper presented at the Santa Fe Conference on "Emerging Models for Dental Educational Reform" held August 29-30, 2004 at the University of the Pacific in San Francisco, California. This conference was attended by sixty opinion leaders from the dental education system including leadership from the American Dental Association, American Dental Education Association, American Dental Trade Association and National Dental Hygienists Association; other health care professions including medicine, nursing, and public health; the federal government (assistant U.S. surgeon general); and the dental industry (Brasseler USA, Colgate, Delta Dental Insurance, DENTSPLY International, GC America, Henry Schein, Patterson Dental Company, and Procter & Gamble).

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Education for the dental health professions is in need of major reform! This is especially apparent in the university-based component of health professions education.[1-44] So-called preclinical as well as clinical education simply has not kept pace with or been responsive enough to shifting patient demographics and patient/population desires and expectations, changing health system expectations, evolving interdisciplinary expertise and practice requirements, new scientific discoveries and scientific information, focus on quality improvement, and/or integration of emerging technologies.[4,15,21,22,25,26] Moreover, university-based dental education is the most costly professional degree within the entire university portfolio, and dental student accumulated debt is increasing each year well beyond national inflation estimates. Today, we have an enormous opportunity to explore major reforms in health professional education.

The Santa Fe Group (SFG) is a nonprofit, nonpartisan organization that fosters analyses and discussions that can initiate actions to improve the health and well-being of the public.[33] The SFG mission is accomplished by analyzing and disseminating health program and health policy information, creating networks of concerned citizens from all walks of life, and developing advocacy programs to promote change for improved health. SFG members include Michael Alfano, Richard D'Eustachio, Dominick DePaola, Arthur Dugoni, Raul Garcia, Steven Kess, Lawrence Meskin, Wendy Mouradian, Linda Niessen, and Harold Slavkin. Using the Santa Fe "process" of open and candid engagements and discussions, we plan to discover a strategy that will en-

able major reforms in dental education that can produce an outcome-based education system that prepares oral health professionals to meet both the needs of patients/families/communities and the requirements of a changing health system.

At the outset, it is important to note that this white paper is not designed to be an exhaustive nor comprehensive literature review of either dental or overall health professions education in America. Rather, it is designed to focus on stimulating thoughtful actions to advance major dental education system reforms that address the health care needs of a rapidly changing and diverse society. As William Osler, M.D., has said, "The future belongs to people who see possibilities before they become obvious."

A Perspective

The quality, purpose, education, and training, as well as the size and composition of the health professional workforce, have been an intermittent policy issue in the United States for more than 100 years.[4,21,25,26] A century ago, the policy debate focused on the proliferating graduates of proprietary medical and dental schools with dubious faculty, staff, facilities, and curricula. Experts of that time concluded that the nation had too many poorly educated and trained clinical practitioners in medicine and dentistry. Following the publication of the Abraham Flexner Report,[17] the fourth in a series of reports supported by the Carnegie Foundation for the Advancement of Teaching, many medical schools closed, and the quality of the remaining institutions improved. When the tenth of the series of Carnegie Reports was published in 1926, it focused on dental education. It was authored by William J. Gies, a Columbia University professor of biochemistry with a particular interest in dental education, science, and clinical applications. The so-called "Gies Report" took five years to prepare and consists of 250 pages of text plus more than 400 pages of appendices that include descriptions of each of the dental schools at the time in the United States.[19] A summary of Gies's findings and recommendations was included in the more recent *Dental Education at the Crossroads: Challenges and Change,* published by the National Academy Press,[16] and a 2002 *Journal of the American College of Dentistry* article by Chambers that focused on specific perspectives of Gies's findings as viewed by today's circumstances.[9] Essentially, the Gies Report provided five conclusions or recommendations:

1. Dental education and science must be comparable to medical education in quality and support.
2. Dental educators must perform in teaching and research comparable to the best of a good university.
3. The preparatory education/requirements for medicine and dentistry should be comparable.
4. The curriculum should be designed in depth and breadth to be completed within three years.
5. A fourth year (optional) should be available to provide education and training in clinic-based as well as hospital-based specializations.

The Flexner and Gies reports supported science-based health professional education that included basic sciences.[17,19] Whereas Flexner was able to mobilize enormous philanthropic financial support for medical education reform from the Rockefeller Foundation's General Education Board, the Gies Report never was fully actualized due to limited and fragmented financial resources across the nation. Both the Flexner and Gies reports were nongovernment inspired and realized. Both reports were significant "roadmaps" for health education reform, but both reports and related progress were limited by the advent of the Great Depression and World War II. The full throttle of the Flexner Report followed the rapid evolution of the modern National Institutes of Health (NIH), the Vannevar Bush science and technology in the national interest doctrine following World War II, the GI Bill following the same war, and the remarkable postwar expansion of the U.S. economy. Incorporation of the sciences into medical education was realized by the creation of many NIH institutes, centers, and offices; the concept and realization of academic health science centers; the Great Society legislation that established Graduate Medical Education (GME) support for hospital-based medical education and training; the science-based advances made in the pharmaceutical industries; and the emergence of 124 university-affiliated medical schools. These influences were also felt but to a much lesser extent by the nation's dental schools.[16,22]

Since the Gies Report, there have been many other treatises, reports, and recommendations on the status of dental education in the context of overall health professions education. In the last two decades, the Pew Center for the Health Professions, the Pew National Dental Education Program, the 1995 Institute of Medicine Report (*Dentistry at the Crossroads*), and the 2001 American Dental Association's Future of Dentistry Report are among notable publi-

cations that outlined problems and perspectives on dental education. Most importantly, in 2000, the Surgeon General of the United States issued the first report on Oral Health in America,[42] which was followed by the Surgeon General's 2003 National Call to Action.[44]

In our estimation, although all these abovementioned reports were very well done and were insightful, the single report that appears to have had the most impact on moving educators, practitioners, government agencies, funders of education, industry, insurers, and consumers toward a more proactive approach to improving the state of dental education and clinical practice is the surgeon general's report (SGR).[42] In essence, the SGR articulated and documented that the mouth is connected to the body, that oral and systemic diseases and disorders can be associated, that oral diseases and disorders can compromise health and well-being over the human lifespan, and that disparities exist in oral health and disease patterns. The SGR also provides an analysis of the factors that affect the professional workforce capacity necessary to meet the oral health needs of the public.

The SGR also emphasizes that there are numerous evidence-based preventions that could reduce the prevalence of many oral diseases. Labeling the oral diseases a "silent epidemic," the SGR has had a palpable impact on the dental profession and the public by identifying a crisis in access to dental care. The SGR, followed by myriad other local and state initiatives and commentaries, clearly articulated the apparent crisis and provided the social contractual underpinnings for taking action to address these oral health disparities. Moreover, the gap between scientific advancement and incorporation of scientific advances into education and clinical practice was also identified through this report.[37-40] Together, the "silent epidemic," the apparent inability of the public to benefit from scientific achievement, fueled by the astonishing advances in genomics, proteomics, and systems biology, the continuing problem with inequities in access to care, and the dearth of oral health workforce capacity can be considered powerful forces in moving toward real and sustained changes in dental education and in the oral health literacy of the public.[7,12]

Superimposed on these complex forces are the continuing increases in the cost of dental education and the resulting student debt burden, both of which have a strong impact on the supply of dental professionals.[3] The addition of three new dental schools has, in large part, enabled dental school enrollments to creep up to over 4,000 graduates per year. However, the limited number of dental school graduates is not keeping pace with population growth, resulting in a workforce of limited capacity which, in turn, contributes to the difficulty in accessing dental care that so many people face.[27] At the same time, the apparent inability and/or unwillingness of the profession to consider an alternative health care professional akin to the physician assistant or nurse practitioner has resulted in other health professionals taking on the burden of providing access to oral health care, particularly among the pediatric population. Witness the propagation of pediatricians providing limited but important oral health care to pediatric populations in North Carolina and Minnesota, to name but two examples. In California, the California Dental Association Foundation is presently directing a major effort to improve access and quality health care for infants, toddlers, and preschool children through new alliances among pediatric dentistry, pediatric medicine, dental hygiene, nursing, and education.

In addition, the dental education system infrastructure (including academic, clinical, and research space and technology) is not keeping pace with the need and the demand imposed by society's oral disease burden.[7,9,22,36] It is very important to consider that these issues are not solely relegated to the United States; rather when viewed on a global scale, the silent epidemic is not silent at all, but downright frightening. The World Health Organization's 2003 Oral Health Report provides significant data on the worldwide epidemic of oral disease. Interestingly, Formicola reports in the *Journal of the American College of Dentists* that changes in the education of dentists in Italy and Spain during the last two decades, moving from the stomatology model, where an M.D. degree was a prerequisite for a dental degree, to the more autonomous model, similar to that of the United States, was a direct consequence of placing the common goal of improving oral health of their citizens above professional concerns.[18] It is Formicola's belief, which we enthusiastically share, that lessons can be learned from the process of changing from one model of education to another and that the capacity exists within the profession to think through the relevant issues and take action!

Furthermore, and relevant to this notion, Slavkin asks whether or not we consider oral health an essential component of quality of life and well-

being and, if so, can we tolerate one-third of Americans without adequate access to oral health care as documented in the 2000 surgeon general's report?[39] Are we not failing to meet our social contract with America's citizens? And is this not a special moment where these issues, many of which revolve around the dental education process, are calling us to action? We believe the time is now and that the education, practitioner, and consumer communities are ready for real change to occur. Hence, the Santa Fe Group has strong interest and commitment to sparking action and solutions to these complex yet critical issues for the public health!

Edward O'Neil, in his capacity as director of the Center for the Health Professions, states that if dentistry chooses the status quo, it may very well find that it will have a waning influence in addressing the country's oral health care needs because other health care professionals are poised to provide this needed oral health care.[27,29] Furthermore, O'Neil believes that the dental profession can be a leader in demonstrating to other segments of the health professions how to respond to the changing conditions in existence today, simply because dentistry is facing these health care challenges sooner than other components of the health care system.[29] Thus, the increasing cost of care; the continuing plight of the uninsured; the demise of effective primary care; the growing concerns about patient safety; the continuing coalescence of oral health problems among the elderly, children, new immigrants, the poor, the uninsured, and individuals whose health-seeking behaviors are culturally distant from the mainstream; the increasing costs of education; the inability to apply the findings of contemporary biology to the public health, among others—all demand leadership and action now![29]

From the Status Quo to a Robust Oral Health Education System: A Call for Revision and Reform

As one reads the plethora of information available on the oral health needs of the public, several issues immediately surface. First, what is the relationship between oral health and overall health and quality of life? Second, how many Americans are without medical and dental health insurance, and how does the lack of insurance impact access to care? Third, can we conclude that numerous and sufficient reports (cited earlier) describe an array of individual, private sector, organizational, state, and federal initiatives to address oral health care access issues in selected communities and among specific populations cohorts? So, what is needed to advance the agenda to provide comprehensive oral health care to all Americans, especially infants and toddlers at one end and medically compromised elderly at the other end of the human lifespan?

The Santa Fe Group[33] is attempting to bring together a professionally and culturally diverse and enriching group of health professionals, educators, industry leaders, foundations, regulators, health insurers, and public health leaders to discuss and analyze the current dental education "system" and to then determine if and how major revisions can be realized. From a vigorous analysis of this system (a continuum that extends from undergraduate university education through professional school, specialty education and training, continuing education, and all of the licensure, certification, and recertification issues), we suggest that our community forge a strategic plan that provides general national desired outcomes coupled with local or regional strategies to attain these outcomes. Succinctly, we need to create a national as well as aligned local planning process focused on major dental education reform with performance outcomes that primarily serve society.

Although multiple models have been proposed to reform dental education, in truth, only a few significant innovations have occurred to date. In a recent survey of U.S. and Canadian dental schools, Kassebaum and Hendricson found that 77 percent remain organized by traditional disciplinary boundaries and only 7 percent have the entire curriculum organized around interrelated themes.[24] Indeed, the Kassebaum and Hendricson survey provided evidence that substantive curriculum change is selective. The most frequent innovations in the past three years were increased use of computers and web-based learning (84 percent), enhancement of competency evaluation methods (84 percent), creation of early patient care experiences, curriculum decompression (74 percent), and increased community-based care. In addition, while 75 percent of schools indicated that they are increasing evidence-based dentistry, only three schools have implemented widespread use of PBL although case-related teaching is increasing. Unfortunately, this survey also illustrates that efforts

to reform curriculum are not necessarily focusing on the task of making thoughtful decisions about curriculum focus and content, but rather are more concerned with reducing overall curriculum time. Thus, the problem remains of building a curriculum that meets the current and future health care needs of the public and the training of dentists to provide these health care services.[24] Pearson and Douglass[31] describe the ongoing educational trends that may help to address the perceived and real needs of education, clinical practice, and improved public health. These trends include:

- Community-based education,
- Replacement of traditional state licensure with mandatory PGY-1,
- Competency-based education and accreditation,
- Expanding teaching of evidence-based dental medicine,
- Renewed emphasis on prevention strategies including:
  —risk assessment,
  —behavioral interventions,
  —medical management,
- Establishment of interdisciplinary teams-clinical collaborations, and
- Virtual dental education and application of research to patient.

In spite of these trends, Bertolami points out the manner in which dental education is conducted does not support what is being taught.[7] He further suggests that when the form and content of dental education do not reinforce each other, inadequate learning and dissatisfied student results with the capacity of the dental curricula to change are compromised as well. Furthermore, Bertolami recognizes that while people learn at different rates and while curricula proposals may differ, all acknowledge a need for reform such that the curricula can respond to forces already in evidence as well as those that may come into play in the future. In other words, the reform must be future-oriented and not solely directed at addressing today's issues and challenges.[9,22,36]

So, how do we start? We suggest two imperatives: 1) Dental education must be aligned with the core values and central mission of major universities; and 2) Dental education must be aligned with and address the comprehensive health needs of the larger society.

According to James J. Duderstadt, "The most predictable feature of modern society is its unpredictability. We no longer believe that tomorrow will look much like today. Universities must find ways to sustain the most cherished aspects of their core values, while discovering new ways to respond vigorously to the opportunities of a rapidly evolving world. This is the principal challenge to higher education as we enter a new century."[15]

We believe that we must acknowledge and agree upon an idealized mission and vision for dental education. At the outset, we must assess dental education in a social, economic, and political context, and we need to determine the direction where dental education "could be" and what key elements must be a part of the effort for the "could be" to be realized.[5,6,8,34]

For example, we suggest that all of us should consider the following draft mission statement: "The mission of the oral health education system of the United States is to serve society by educating and training a diverse workforce capable of meeting the nation's need for oral health professionals engaged in the practice of clinical oral health care, public health practice, biomedical and health services research, education and administration; and oral health professions who can contribute to the fields of ethics, law, public policy, government, business, and journalism. The system will meet its unique responsibilities to educate and train highly competent clinical practitioners only by ensuring that they acquire and possess throughout their careers the knowledge, skills, attitudes, and values needed for practice within interdisciplinary health care teams and the ability to perform complex, integrative tasks required to provide high-quality health care for patients, families, and communities."

The following critical assumptions are suggested to guide the deliberations and process being initiated at the Santa Fe Group Planning Symposium (August 29-30, 2004):

Assumption 1. Reform of oral health professional education is critical to enhancing the quality of health and well-being for all people in the United States.

Assumption 2. Academic environments of most health professions education (dentistry, medicine, pharmacy, nursing, allied health sciences) all too often are not interdisciplinary, whereas health care clinical practice and clinical research often require explicit interdisciplinary efforts.[25,41]

Assumption 3. There is no one model of dental education that will suffice for all fifty-six dental schools to address all issues.

Assumption 4. There must be a unifying vision of what dental education could be and what a twenty-first century practitioner could be.

Assumption 5. There must be adequate resources aligned at realizing the vision of dental education.

Assumption 6. A common language and core competencies across health professions have not as yet been achieved.[21]

Assumption 7. The competencies for dental school graduates and practitioners for the twenty-first century must be well defined and renewed through a lifetime of professional activities.[7,14,22,32]

Assumption 8. The collaborative role of allied health professionals (dental assistants, dental hygienists, dental technologists) must be expanded to include a pediatric oral health therapist and beyond.

Assumption 9. Integrative biomedical, population, behavioral, social, and economic sciences must be incorporated into the curriculum at every level.[20,21,27,41]

Assumption 10. Evidence-based core competencies should be established across all health professions and integrated with clinical care service.

Assumption 11. Dental education must enable individuals to learn, to re-invent, and to attain contemporary competencies over a lifetime.[8]

Assumption 12. There must be appropriate assessment of curricula and pedagogical outcomes and ongoing documentation of clinical skills.

Assumption 13. Scientific discovery coupled with translating science and technology into clinical practice must be a core value of dental education.

Assumption 14. Critical thinking and problem-solving, information management, leadership and teamwork, and lifelong learning must be integral for all dental education models.

Assumption 15. Humanism, professionalism, and communication skills must underpin the education process.

Assumption 16. Innovation, creativity, and the nurturing of ideas must permeate dental education and clinical practice.[13]

Assumption 17. Any and all models of dental education must have appropriate evaluation components that enable both assessment of core competencies, as well as thoughtful continuing revisions, and related processes (accreditation, licensing, and certification).

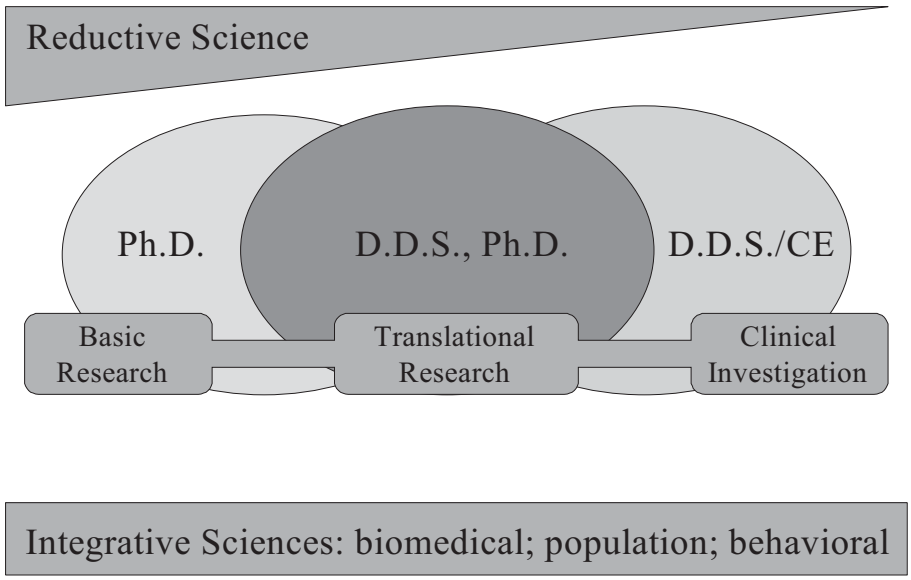
Assumption 18. It will take a village to reform dental education, including the educators, organized dentistry, industry, funders, insurers, patient advocates, the media, public health advocates and practitioners, regulators, the research and education leadership, state and national licensing boards, accreditation agencies, and the public.

Assumption 19. The planning process must be sustained and result in clear reforms, and the outcomes of those reforms must be defined and monitored in the coming year.

A Unifying Vision and Clinical Paradigm Shift

So, is there or can there be a unifying vision for dental education? Harvard's Malcolm Cox raised an intriguing and relevant point in "Medical Education in the New Millennium," presented at a recent Harvard Medical School forum.[11] His assessment drew attention to the need for an "educational continuum" in the health professions. His critique of contemporary educational models stems in part from the academic fragmentation or compartmentalization that characterizes most universities. The notion of "educational silos" is often invoked when referencing this phenomenon. Regardless of terminology, the impact remains: consciously or unconsciously, students develop tunnel vision, failing to make connections between, say, anatomy and physiology. At another level, within most dental schools, it can be argued that students fail to make appropriate connections between, for example, endodontics and periodontics. Indeed, the broader and perhaps the most important problem is that our students fail to make connections between dental medicine and physical diagnosis and pathophysiology. Equally significant is the duplication and redundancy that one finds in the health sciences. Doctoral students in physiology, for example, take one set of courses, dental students another, and students in D.D.S./Ph.D. programs a third. Not only do we squander increasingly scarce resources, but we compartmentalize students and inadvertently prevent what might be fruitful "cross fertilization" among practitioners, clinical researchers, and "scientific" research students.

A model that may be more productive is outlined in Figure 1, again adapted from Cox. This figure portrays an integration of the D.D.S., D.D.S./Ph.D., and Ph.D. science education programs. There is a broad spectrum of activities in which both students and educators engage. There is also a broad



Adapted from M. Cox, Harvard Medical School, 2003.

Figure 1. Dental science education preferred model

spectrum of research activities, in contrast to discrete islands of research. The implication is that, although Ph.D. students may conduct more reductive basic science research than physicians, clinical researchers, or dentists, there is no reason why a Ph.D. student could not be involved productively in clinical investigation. Moreover, there is no reason why different students cannot come together for certain classes rather than remaining in educational silos.

Finally, this figure also illustrates the central role of integrative biomedical, population, and behavioral sciences in the curriculum for all students, whether predoctoral, postdoctoral, graduate, or even continuing education students.[11]

The convergence of these educational experiences should occur at a clinical site, where a paradigm shift in clinical thinking must occur. The site could be a dental school, hospital, community center, or other site where a patient presents for diagnosis due to a chief complaint or for continuing care. At that time, a health care practitioner—either a physician, dentist, nurse, or expanded function allied health professional—triages the patient, making a tentative risk assessment and/or diagnosis. Treatment can be provided immediately at the site by an appropriate health care provider, or the patient can be referred to an alternative health care service site, including a dental service. Following completion of treatment, the patient is provided discharge orders that may include follow-up, ongoing preventive services, whatever is needed. In this idealized model, the distinctions between health care services are blurred. The patient's medical insurance does not discriminate a dental service from any other health service. It may even be possible in this paradigm for the patient to have only one comprehensive health record. In essence, this model of clinical care promotes an "umbilicus" to the dental school consistent with the necessity for medical practitioners to link to a hospital, medical school, community health center, or academic health center. It is our belief that the current lack of an "umbilicus" to the dental school, hospital, and/or academic health center is a major factor in the dentist's sense of professional isolation and the slow transfer of contemporary science to patient care! This schema is depicted in Figure 2.

This continuum-based perspective might well serve as a catalyst for moving oral health care away from its "solo cottage practice" model, allowing it to become integrated with the health care system in ways we've talked about but rarely seen, improving access and quality of care. This philosophical per-

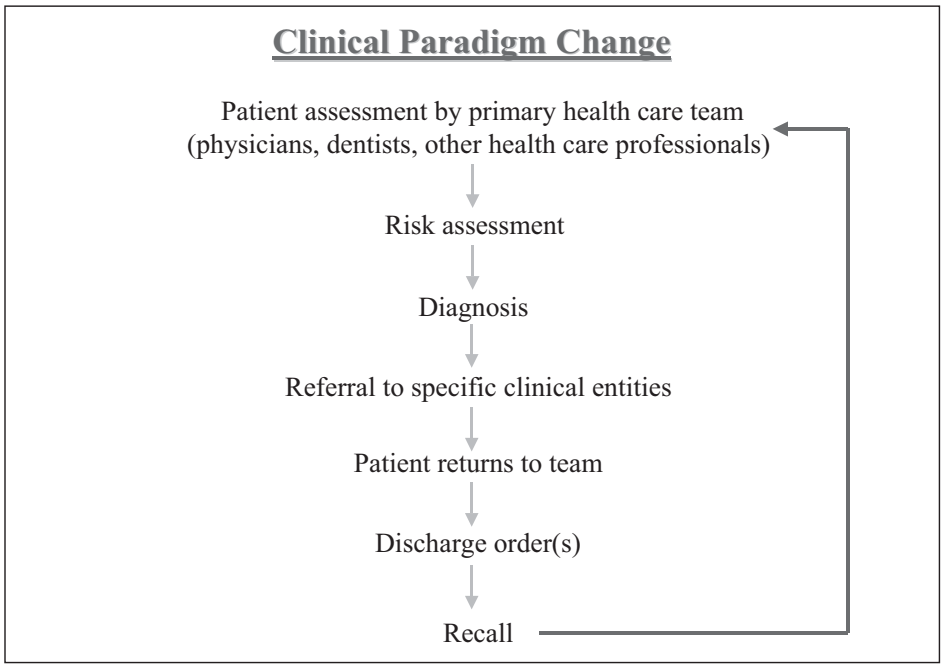


Figure 2. Clinical paradigm change

spective could also help ensure that contemporary advances in biomedical, behavioral, and population sciences are fully integrated into patient care and education at every level.

Philosophy aside, we also find many pragmatic reasons that support the continuum model. We note that students and practitioners alike have difficulty integrating scientific knowledge with clinical decision making and practice. Unfortunately, it appears that, for most practitioners, time away from dental school is inversely correlated with their desire to remain current with scientific advances. The same can be said, we suspect, for the sense of social responsibility we attempt to instill in young professionals. However well intentioned, educational innovations in dentistry have historically broken down when students are expected to integrate basic, behavioral, and population science knowledge with clinical decision making and patient care. For example, although it may be noble to have multiple community sites for the educational experience, if intellectual integration across disciplines and across health professional fields does not occur, the educational impact will be minimal, and it could be argued that we've done nothing more than move traditional dental education off-site. Ideally, we would expect that as students progress through the curriculum, the integration of knowledge will be paramount in their thinking.[35]

To the extent, then, that knowledge integration functions as a keystone for student and practitioner thinking, we will have achieved the goal of an educational continuum; perhaps we will have even realized a vision of dental education. That is to say, *Dental education is a continuum* that leads from predoctoral science and clinical education, moves into professional training in the clinical, biomedical, and behavioral sciences, and then extends on into lifelong learning in dentistry. The notion of an educational continuum is fundamental and profound. We must find a model for dental education that fosters critical, science-oriented thinking, a sense of social and professional responsibility, and awareness that oral health is a critical component of overall health. We must ensure that the next generation of dentists is engaged with the other health professions and with the larger society. Above all else, we must nurture curiosity in young minds.

Ultimately, we envision an evidence-based approach to clinical decision making that rests on a foundation of critical thinking and an integrative

understanding of basic and applied science. Professional practice must be informed by community-based educational experiences, ethical sensitivity, and recognition of dentistry's role and responsibility in our social fabric. This unifying vision squarely situates professional responsibility in an appropriate ethical and interdisciplinary framework, greatly increasing the likelihood that the next generation of dentists will be willing and able to meet the obligations of their social contract. It also will result in practitioners trained to meet the oral health needs of the population by providing them foundational knowledge, critical thinking, problem-solving, and teaching skills, and attitudes for success:

- A new generation of scientists trained to advance the oral health of the population;
- A new generation of adaptable dental educators who can respond to an ever-changing reality;
- Students and practitioners who value scientific knowledge and lifelong learning; and
- Enhanced clinical competence and performance in clinical decision making.

The SFG believes that, to reach the vision for dental education, there must also be agreement on the competencies required for the twenty-first century student and practitioner.[21-25] A recent conference supported by the Maternal and Child Health Bureau on "The Future of Maternal and Child Health Leadership," cochaired by Mouradian and Huebner,[28] considered competencies that are relevant across disciplines and recognize the complex skills needed to improve the health of the public. Four of the cross-cutting competencies for leaders in maternal and child health fields formulated at that conference identify qualities that we may seek in a student at entry; many other professional and leadership skills are based on these four primary competencies. The four primary competencies are:

- Communication skills,
- Ability for self-reflection,
- Critical thinking and problem-solving skills, and
- Ethics, professionalism, and social responsibility.

These primary competencies may partly reflect innate capacities or qualities that can flourish better in supportive environments. Some aspects of these primary competencies can be taught, practiced, or modeled, while others such as interpersonal sensitivity may be more of an innate ability.

The Pew Health Professions Commissions described a series of twenty-one competencies for the twenty-first century health care practitioner.[30] In addition, the Institute of Medicine (IOM) has articulated a series of core competencies for health professions education. The IOM core competencies include: providing patient-centered care; working in interdisciplinary teams; employing evidence-based practice; applying quality improvement; and utilizing informatics. When we review health professions education competencies developed by a variety of sources, it is clear that many of them are shared across disciplines. Hendricson and Cohen[22] suggest in their provocative paper in *Academic Medicine* that dental education must create an efficient pathway to link competencies to subject matter and learning experiences, which, in turn, are linked to evaluations that measure performance of these competencies.

It is the intent of the Santa Fe Group Planning Symposium to begin the process of identifying the competencies for the twenty-first century practitioner. This short commentary on primary competencies is only designed to enable the reader to think about the competencies necessary for the successful practitioner of the twenty-first century.

Principles and the Reform Agenda

In their monograph, Pearson and Douglass articulated a series of principles to address the need for reform of dental education and clinical practice.[31] It may be instructive for the reader to review those principles:

- More emphasis on science-based education relevant to clinical practice, e.g., pharmacology, immunology, physical diagnosis, risk assessment;
- Community health partnerships;
- Active collaboration with other health professionals;
- Outcomes assessment in clinical practice;
- Increased training of allied dental professionals;
- Revisiting licensure and scope of practice for efficient use of the workforce;
- Continuous evaluation of scientific evidence resulting in updating of clinical care;
- Expanded awareness of non-dental health professionals, policy makers, and the public about the importance of oral health; and
- Revisiting the reimbursement system.

Based on the assumptions outlined earlier, principles like those described by Pearson and Douglass, and the overwhelming need for substantive reform, Hendricson and Cohen described a reform agenda

that may be appropriate to consider at this time no matter what model or models are developed.[22] In their article, Hendricson and Cohen identified a series of initiatives that have been frequently advocated for reform of dental education:

- Competency-based assessment,
- Decompress the curriculum through elimination,
- Increase collaborations between dentistry and other health professions,
- Feature curricular emphasis on dental/medical interactions,
- Redirect basic sciences toward pathophysiology using PBL or other educational techniques,
- Expose students to patients from first through last days of the curriculum,
- Revitalize the science underlying clinical decision making via evidence-based approaches,
- Organize group practice teams to promote continuity and expand peer teaching,
- Increase community-based clinics as training sites,
- Include a clinical experience that replicates the comprehensive care environment of the general practitioner,
- Utilize web-based and computer-based technology for enriched learning, and
- Redirect dental school clinics to serve the oral health needs of the public rather than primarily viewing patients as educational material for students.

A Special Moment in Oral Health Education

The specific goal of this White Paper is to stimulate discussions and analyses that will lead to the development of a shared vision for a national strategic action plan designed to accomplish short- and long-term reforms in the oral health education system. An integral component of the process will be to explore innovative models for health education and take the first steps on a journey to carry these models, or any others that might arise, forward in a proactive manner. Two years ago, three major foundations pooled resources to initiate and support a major effort to enhance cultural diversity in the oral health professions coupled with "service learning" approaches to increase access to oral health care (Robert Wood Johnson Foundation, Kellogg Foundation, and California Endowment). More recently, the Josiah Macy Foundation announced that it has awarded a grant to Columbia University to explore new models for dental education.[2] In August 2004, the American Dental Association Foundation hosted a summit meeting in Chicago to advance a national effort to create a fund for National Innovations in Dental Education led by Drs. Arthur Dugoni and Greg Chadwick.

The rationale for change and reforms in the oral health system were articulated earlier in this article. A summary of the "why now" includes the following critical needs:

- Reduce costs of education;
- Integrate biology into the fabric of dental education and clinical practice;
- Resonate with the mission of the university and/or academic health center;
- Expand access to education and clinical care;
- Provide leadership and citizenship development;
- Integrate effective and efficient management, staffing, and clinical productivity;
- Address the problems in the current system of dental education, including
  - —inability to train practitioners to care for all patients, including the disadvantaged,
  - —inability to nurture the critical mass of critical thinkers and problem-solvers for research and academia;
- Train socially responsible practitioners;
- Increase diversity in students, educators, and practitioners;
- Enhance expertise in specific content areas; for example, pediatric oral health care, care for special populations, general health, cultural competency, experience with the underserved, social context with responsibility, and behavior and communication skills;
- Address the continuing focus on oral health and technical skills to the neglect of overall health and the social/behavioral focus needed to address disparities;
- Increase interdisciplinary perspective/practice; and
- Improve our students' ability to relate to and address the overall health of the patient.

In our vision, this is a special moment in oral health education. It is our belief that thoughtful stakeholders will be eager to advance an enterprise that serves the society while serving the learners and the professions. We believe, like Senge[34] and Hendricson and Cohen,[22] that dental schools should aspire to become "learning organizations," where there is a high capacity for implementing change and where faculty and administrators are comfortable with the process of innovation and discovery.

We are advocates for major reform, and we suggest that a national consensus towards what "could be" will soon be realized. Our expectation is that, over time, thoughtful participants or stakeholders ("the village") will complete a roadmap to the future complete with benchmarking and measurable outcomes coupled with rigorous assessments. We will be constantly mindful that the primary goal of dental education reform will be to improve the health of the public. We look forward to your response, your insight, your commitment, and your advocacy!

REFERENCES

1. Future of dentistry. Chicago: American Dental Association, Health Policy Resource Center, 2001.
2. Bailit H, Formicola A. Macy Foundation grant to explore new models for dental education, Columbia University Medical Center Press Release, July 26, 2004.
3. Bailit H, Weaver R, Haden K, Kotowicz W, Hovland E. Dental education summits: the challenges ahead. J Am Dent Assoc 2003;134:1109.
4. Boufford JI, Cassel CK, eds. The future of the public's health in the 21st century. Institute of Medicine. Washington, DC: National Academy of Science Press, 2003.
5. Bennis W. Managing the dream: reflections on leadership and change. Cambridge: Perseus Publishing, 2000.
6. Bennis WG, Biederman PW. Organizing genius: the secrets of creative collaborations. Cambridge: Perseus Books, 1997.
7. Bertolami CN. Rationalizing the dental curriculum in light of current disease prevalence and patient demand for treatment: form vs content. J Dent Educ 2001;65:725.
8. Bransford JD, Brown AL, Cocking RR, eds. How people learn: brain, mind, experience, and school. National Research Council. Washington, DC: National Academy Press, 2003.
9. Chambers DW. Gies Report redux: introduction. J Am Coll Dent 2002;69(2):4.
10. Kelley WN, Randolph MA, eds. Careers in clinical research: obstacles and opportunities. Washington, DC: National Academy Press, 1994.
11. Cox M. Medical education in the new millenium. Presentation to the Faculty of Medicine, Harvard Medical School, 2003.
12. DePaola DP. Higher education and health professions education: shared responsibilities in engaging societal issues and in developing the learned professional. J Am Coll Dent 1994;61(2):34.
13. DePaola DP. Nurturing a culture of innovation. J Dent Res 2004;84(6):446.
14. Dharamsi S, Clark DC, Boyd MA, Pratt DD, Craig B. Social constructs of curricular change. J Dent Educ 2000;64:603.
15. Duderstadt JJ. A university for the 21st century. Ann Arbor: University of Michigan Press, 2000.
16. Field MJ. Dental education at the crossroads: challenges and change. Institute of Medicine. Washington, DC: National Academy Press, 1995.
17. Flexner A. Medical education in the United States and Canada: a report to the Carnegie Foundation for the Advancement of Teaching. New York, 1910.
18. Formicola A. Dentistry and medicine, then and now. J Am Coll Dent 2002;69(2):30.
19. Gies WJ. Dental education in the United States and Canada: a report to the Carnegie Foundation for the Advancement of Teaching. New York, 1926.
20. Giddon DB. Of those providing health care, who should be called physicians? Unpublished manuscript.
21. Greiner AC, Knebel E, eds. Health professions education: a bridge to quality. Institute of Medicine. Washington, DC: National Academy Press, 2003.
22. Hendricson WD, Cohen PA. Oral health care in the 21st century: implications for dental and medical education. Acad Med 2001;76:1181.
23. Hesselbein F, Goldsnith M, Beckhard R, eds. Organization of the future. San Francisco: Jossey-Bass Publishers, 1997.
24. Kassebaum DK, Hendricson WD, Taft T, Haden NK. The dental curriculum at North American dental institutions in 2002-03: a survey of current structure, recent innovations, and planned changes. J Dent Educ 2004;68(9): 914-31.
25. Kohn LT, ed. Academic health centers: leading change in the 21st century. Institute of Medicine. Washington, DC: National Academy of Sciences Press, 2003.
26. Report of the Ad Hoc Committee of Deans. Educating doctors to provide high quality medical care: a vision for medical education in the United States. Washington, DC: Association of American Medical Colleges, 2004.
27. Mertz E, O'Neil E. The growing challenge for providing oral health care services to all Americans. Health Affairs 2002;21(5):65.
28. Mouradian W, Heubner C, cochairs, MCH Working Conference. The future of maternal and child health leadership. Seattle, April 19-20, 2004. At: depts.washington.edu/mchprog/leadershipconf/. Accessed: July 7, 2004.
29. O'Neil E. Centering on . . . dentistry as canary? The Center for Health Professions, website of director, 2004. At: www.futurehealth.ucsf.edu/from_the_director_1003.html. Accessed: August 1, 2004.
30. Recreating health professional practice for a new century: the fourth report of the Pew Health Professions Commissions, executive summary. San Francisco: Pew Health Professions Commissions, December 1998. At: www.futurehealth.ucsf.edu/pdf_files/rept4.pdf. Accessed: August 1, 2004.
31. Pearson J, Douglass CW. Open wide: integrating oral health and primary care. Arizona Health Futures, St. Luke's Health Initiatives. At: www.slhi.org. Accessed: June 2003.
32. Rossomondo EF. The national crisis is access to oral health care: a dental industry association responds. Compendium 2004;25(4):266.
33. Santa Fe Group (Drs. Michael Alfano, Richard D'Eustachio, Dominick DePaola, Arthur Dugoni, Raul Garcia, Steven Kess, Larry Meskin, Wendy Mouradian, Linda Niessen, and Harold Slavkin). For more information, visit www.santafegroup.org.

34. Senge PM. The fifth discipline: the art and practice of the learning organization. New York: Doubleday, 1990.
35. Shavelson RJ, Towne L, eds. Scientific research in education. National Research Council. Washington, DC: National Academy Press, 2002.
36. Shuler C. Keeping the curriculum current with research and problem-based learning. J Am Coll Dent 2001;68(3):20.
37. Slavkin HC. The human genome: implications for oral health and diseases and dental education. J Dent Educ 2001;65:463.
38. Slavkin HC. Expanding the boundaries: enhancing dentistry's contribution to overall health and well-being. J Dent Educ 2001;65:1323.
39. Slavkin HC. The surgeon general's report and special needs patient: a framework for action for children and their caregivers. Special Care in Dent 2001;21(3):88-94.
40. Slavkin HC. The failure of dentistry's social contract with America and California's search for legislative solutions. J Dent Educ 2003;67(10):1076.
41. Smedley BD, Syme SL, eds. Promoting health: intervention strategies from social and behavioral research. Institute of Medicine. Washington, DC: National Academy Press, 2000.
42. Oral health in America: a report of the surgeon general. NIH publication No. 00-4713. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.
43. The world oral health report, 2003. Geneva: World Health Organization, 2003.
44. National call to action to promote oral health. NIH publication No. 035303. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2003.