FALL • 1984

JOURNAL

AMERICAN COLLEGE OF DENTISTS

DENTAL EDUCATION AND THE ACD

PREDICTION OF ACADEMIC SUCCESS

VARIATIONS IN PRACTICE AND MANPOWER

The 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, stimulate and promote research;

(d) Through sound public health education, to improve the public understanding and appreciation of oral health service and its importance to the optimum health of the patient;

(e) To encourage the free exchange of ideas and experiences in the interest of better service to the patient;

(f) To cooperate with other groups for the advancement of interprofessional relationships in the interest of the public; and

(g) To make visible to the professional man the extent of his responsibilities to the community as well as to the field of health service and to urge his acceptance of them;

(h) In order to give encouragement to individuals to further these objectives, and to recognize meritorious achievements and potentials for contributions in dental science, art, education, literature, human relations and other areas that contribute to the human welfare and the promotion of these objectives — by conferring Fellowship in the College on such persons properly selected to receive such honor.

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FROM THE EDITOR'S DESK

Dentistry's Public Image

It is important to our future

It is enlightening to occasionally pause to take a good look at ourselves as others see us. Our individual image as a dentist and our group image as a profession results from how people perceive us. That perception is our place in the real world and may be considerably different than the picture that the profession has of itself.

The dental profession has become more visible in recent years. More is being written about dentistry in magazines and in the public press. Radio and television talk shows discuss advances in treatment. People are more aware of dental topics and are eager to hear about current improvements.

Our image is very important. It is the national reputation of the profession, the general concept of dentistry that is held by the public. It is a consensus of "what is a dentist."

This image has changed greatly over the years, is currently changing and will change more in the future. We have gone from itinerant tooth puller to big city huckster to respected health professional. However, this image varies greatly in different parts of the country and according to the individual experiences of the patients. So much depends on the one-on-one personal relationship between doctor and patient, for dental care is a *personal service,* not a commodity. The image of dentistry rests on the collective shoulders of all of the dentists in the country.

Keith P. Blair

What we accomplish in our generation, and how we practice dentistry, is going to have a strong effect on the profession well into the next century. We have a responsibility to do what is best for the public, for that is also what is best for the dental profession.

Developments in recent years have perhaps somewhat dulled the image of dentistry: individual advertising has demeaned the profession, the oversupply of dentists has made business competitors out of former colleagues, applications for dental schools have declined by over 40%, government interference has stifled self-regulation by the professions, much confusion exists over what is illegal and what is unethical, alternate dental care delivery plans (discount plans) are being pushed by big business and government, health care cost-containment programs have unfairly linked all health costs to the soaring hospital costs, high production-low quality clinics have proliferated.

Yet, in spite of all this, as a profession we have been so successful at educating the public that, in some phases of dentistry, we have virtually put ourselves out of business.

Why not improve an already successful program? *We must keep educating the public at all levels.* Dentistry should develop and spearhead such a program but not necessarily take responsibility for its entire scope and expense. There are many agencies that could and should be involved in a program to improve dental care.

The program could result in a greater awareness by the public of the need for regular dental care, an increase in patient demand for care, an improvement in the quality of care and more people with their natural teeth for all of their lives.

History has proven that the greatest advances in our culture come at times of strain, conflict and change, a situation that certainly describes the present era. Perhaps this is the time when much can be accomplished through education to improve dental health for the next generation.

What a wonderful legacy we would make possible for dentistry's future public image.

Keith P. Blair

NEWS OF FELLOWS

Carl A. Gibbe of Fort Worth, Texas has been honored as Distinguished Alumnus of 1984 by the Baylor University Dental Alumni Association. The award is "In Recognition of Constant Devotion and Outstanding Contribution to the Art and Science of Dentistry." Dr. Gibbe limits his practice to restorative dentistry.

Carl A. Gibbe

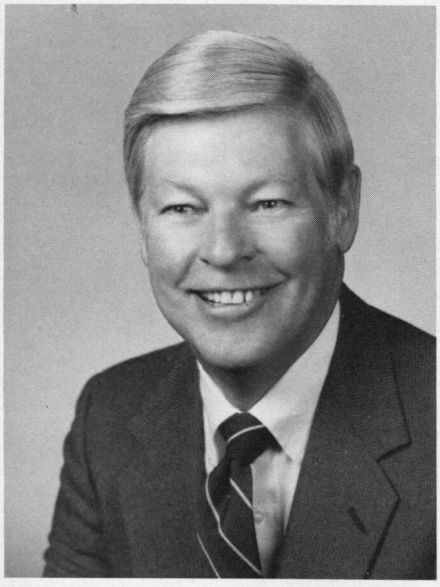
E. Jeff Justis, Sr. of Memphis, Tennessee has received the Dr. Jack Wells Memorial Dedication to Dentistry Award, the highest award for dentists in the state of Tennessee. The award recognizes service to dentistry and humanity, as well as contributions to dental education.

Sam W. Rogers, Houston, Texas has received the Outstanding Alumnus Award of the University of Texas Dental Branch at Houston from the University Alumni Association.

Herbert Schilder of Boston has received the Distinguished Alumni Award from his alma mater, New York University College of Dentistry. Dr. Schilder is the Chairman of the Department of Endodontics at the Goldman School of Graduate Dentistry at Boston University and is the President-Elect of the American Association of Endodontists.

Steven M. Goldman

Steven M. Goldman of Walnut Creek, California was recently installed as the President of the American Academy of Craniomandibular Disorders. Dr. Goldman is in private practice in Walnut Creek and is an instructor at the University of California at San Francisco.



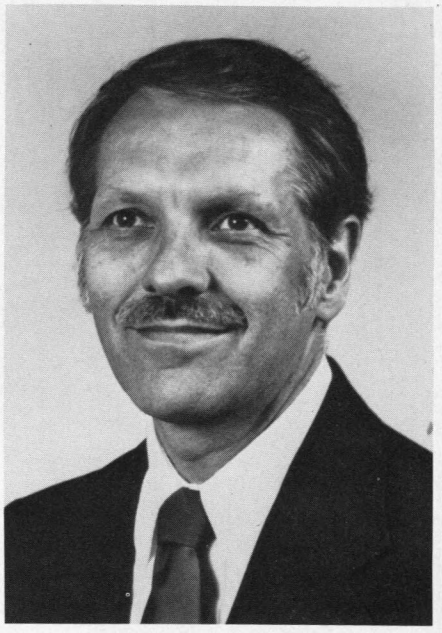
I. Rex Witherspoon

C. Rex Witherspoon of Springfield, Missouri has been named Missouri's 1984 Dentist of the Year. Dr. Witherspoon was recognized for his civic contributions, his service to the state dental association and for serving as editor of the state dental association publication for the past ten years. An oral surgeon, he is associated with an oral surgery group in Springfield.

I. Kenneth Adisman, New York City, has been named as the new director of the International Circuit Courses of the American Prosthodontic Society, succeeding the late Dr. Homer C. Vaughan. This program has gained world-wide recognition through its sponsorship of "Goodwill Ambassadors", dentists who teach prosthodontic techniques throughout the world.

I. Kenneth Adisman

John F. Nelson of Iowa City, Iowa has been appointed as professor and chairman of the Departments of Oral Diagnosis and Oral Radiology at Baylor College of Dentistry in Dallas, Texas. He has a background in teaching, laboratory studies and as an author.



John F. Nelson

SECTION ACTIVITIES

Oklahoma

The Section Meeting was held during the Oklahoma State Dental Association Session. Dignitaries included Dean William E. Brown of the University of Oklahoma College of Dentistry, Dean Robert G. Hansen of Oral Roberts University School of Dentistry and Lynn Ryan, ADA Trustee.

Section Chairman John Miles announced that again this year a plaque and a check for $100. will be awarded to the student from each of the Oklahoma Dental Schools who has the highest, four-year grade point average.

New England

The Section Meeting was held in conjunction with the Annual Session of the Connecticut Dental Association in Hartford. Section Chairman Maurice Martel introduced the distinguished guests including ADA President Donald Bentley, ADA Trustee William McKenna, former ADA President Robert Shira and ADA Trustee Abraham Kobren.

ACD Regent Sumner Willens reported on activities of the College and the ACD Foundation.

The main speaker was Dean James Kennedy of the University of Connecticut School of Dentistry. He urged a more active role for the College in dental education, curriculum development and dental ethics.

The Texas Section honored its Secretary-Treasurer, Robert E. Lamb. Dignitaries pictured at the head table are, left to right, Delmar J. Stauffer, James G. Price, Section Chairman Frank B. Trice, American College President Lynden M. Kennedy, ADA President Donald E. Bentley, former ADA President I. Lawrence Kerr and Dr. Lamb, seated.

Western New York

The Western New York Section joined with the faculty of the State University of New York at Buffalo (SUNY) School of Dentistry in honoring Richard A. Powell. Dr. Powell, the Associate Dean of the Dental School was retiring after 35 years in teaching dentistry.

Section Chairman Milton Jacobsen also presented awards to the Immediate Past Section Chairman, Bernard Tofany, to the outstanding senior student, John P. Lawrence, and to Amy Bryan, a dental student, who was presented with the first Summer Research Award.

A new idea for an ACD project: the Western New York Section presented funds for a new student summer research program at the State University of New York at Buffalo. Section Vice Chairman Roger Triftshauser, left, presents a check to Dental Dean William M. Feagans to sponsor the program.

SECTION REPRESENTATIVES TO MEET

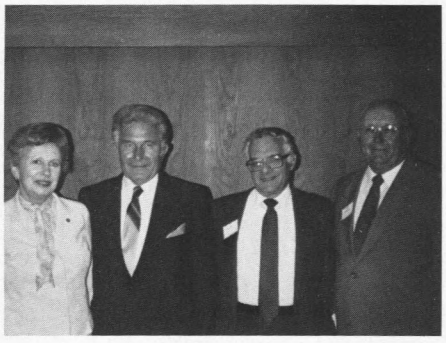
In recognition of the great importance of local Sections in the furtherance of the College's aims and objectives, there will be a Section Representatives meeting held on Friday, October 19th at 4:00 p.m. at the Hyatt Regency Atlanta Hotel, Atlanta, Georgia. In addition to the discussions with Officers and Regents, there will be a presentation

Continued on next page

The Western New York Section recently honored Dr. Richard Powell, retiring Associate Dean at the State University of New York (SUNY) at Buffalo School of Dentistry. Pictured, left to right, Immediate Past Chairman Bernard Tofany, Section Chairman Milton Jacobson, Dr. Powell; President of SUNY at Buffalo Steven B. Sample, Dental Dean William M. Feagans and Section Vice Chairman Roger Triftshauser.

The Western New York Section presented awards to outstanding students at the State University of New York at Buffalo School of Dentistry. Left to right are Dental Dean William M. Feagans, Amy Bryan, Senior Student John Lawrence and Section Chairman Milton Jacobson.

The Western Pennsylvania Section honored recently the outstanding student at the University of Pittsburgh School of Dental Medicine. Left to right is American College of Dentists President Lynden Kennedy, Awardee Betty Jo Lovik, Dental Dean James W. Smudski and ACD Executive Director Gordon H. Rovelstad.



Section officers for the Western Pennsylvania Section are pictured with American College of Dentists President Lynden M. Kennedy, right. From the left are Ruth S. Friedman, Vice Chairman; Joseph Adamchic, Section Chairman and Secretary-Treasurer Robert Runzo.

Section Representatives To Meet *(Continued from previous page)*

by Dr. Ralph Boelsche, Houston, Texas, former Regent of the College and a founder of the American College of Dentists Foundation. Dr. Boelsche's address will be focused on the objectives of the College and the role of the Foundation of the College in the future of dentistry.

Every Section is encouraged to identify and send one representative to attend this meeting. Opportunity for presenting specific proposals and recommendations from the Sections will be provided during this meeting.

Pictured is part of the head table for the Anaheim, California Meeting of the Southern California Section. Left to right is Section Chairman Richard B. Hancock, ACD Executive Director Gordon H. Rovelstad, Regent Leo E. Young, 2nd Vice Chairman Richard J. Geyer and Secretary-Treasurer John W. Berry.

Gies Editorial Winner for 1983

Truth or Consequences

Daniel M. Laskin:

Professional ethics is a subject that is frequently discussed, universally endorsed, but unfortunately sometimes forgotten in our everyday lives: Most of us have probably never bothered to read the Principles of Ethics of the American Dental Association or the Code of Professional Conduct of the AAOMS, even though we subscribed to these codes when we became members of the organizations. However, although everyone could benefit from a review of these documents, because they contain details about certain specific situations related to our profession with which we may be unfamiliar, one does not actually have to read them to be able to figure out the general principles involved. There have been many definitions and descriptions of ethical behavior, but eventually they all boil down to knowing the difference between right and wrong. This seems simple enough, and yet we can still find daily examples where some of us have difficulty in making this distinction. Is it because we do not understand the difference or because we disregard it? There are probably instances where both situations occur.

Although we may not condone such behavior, it is easy to understand that a person can know the principles of professional conduct and still violate them for various reasons. It is more difficult to comprehend how one cannot know what is and is not ethical. And yet, we constantly hear such rationalization as "no one is perfect," "it's a matter of opinion," or "it depends on the situation." There is no room for compromise on ethical principles. Once this occurs, the boundaries of justification become broader and broader. One should not have to think about ethical behavior—it should be a matter of habit.

Wrong as it may be, there is a tendency on the part of many of us to tolerate unethical conduct. Sometimes this is because we are too apathetic or because we do not have the courage to take the proper steps to discourage it. Other times, it is because we are content merely to comply with ethical standards ourselves, and we feel no obligation to be responsible for the conduct of others. Worst of all is the attitude that a little lying and cheating really doesn't hurt anyone and that most people do it. It has even been suggested that many people do not really consider such behavior dishonest, and that it can be condoned, particularly when it involves large businesses, like insurance companies, or the government. Such philosophies obviously carry rationalization to the nth degree.

You may ask, "why this sudden concern about professional ethics?" Is the situation any different than it has always been? Maybe not, although there is a tendency toward lower standards when the economy is depressed. What is different is the increasing concern of agencies outside of our profession about our ethical behavior. Hill has proposed the law of the seesaw—"as the weight of honesty and ethics goes down, the weight of centralized authority and coercive regulations goes up." Part of the definition of a profession is that its standards of ethical conduct are enforced by self-discipline rather than laws. It is fine to have a Code of Professional Conduct, but words without action are insufficient. If we do not regulate ourselves, others will.

It is difficult, if not impossible, to teach a grown person self-discipline, honesty, and responsibility. These characteristics are learned early in life. However, subsequent experiences can either reinforce or weaken them. It is our obligation to recognize such qualities in the students whom we accept into dentistry, in the trainees who enter our advanced educational programs, and in our professional colleagues, and to nurture them by encouragement and example. But when such methods fail, we must also have the courage to speak out against the misconduct of our peers and take strong action. We cannot permit criticism of our profession and loss of public trust to occur as a result of the activities of those few who attempt to adjust and manipulate ethical standards to meet their own selfish goals. Nor can we afford to let others outside the profession take the responsibility for the regulation that we ourselves must assume.

Daniel M. Laskin, DDS
Editor of the Journal of Oral and
Maxillofacial Surgery

*Winner—outstanding dental editorial, published in 1983.

DENTAL EDUCATION AND THE OBJECTIVES OF THE AMERICAN COLLEGE OF DENTISTS

James E. Kennedy*

The goals of the American College of Dentists, as stated in our bylaws, detail a commitment to promote the highest ideals of 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 of people. To accomplish these goals, the College has set down eight principles and objectives. While dental educators would subscribe to these goals, I doubt that many have consciously considered them in formulating current dental curricula. The relationships between current curricula and other activities of faculty, and the principles and objectives of the College most likely reflect a mutual commitment to and concern for the basic purpose of our profession.

The 1976 curricular study and the recent report of the American Dental Association Special Committee on the Future of Dentistry have provided an opportunity to focus attention on the current dental curriculum. At no time have we had available a more complete description of how dental curricula have progressed over the past 20 years. This enhanced understanding of the current dental curriculum, together with projections for the future, provide an opportunity to assess dental education from the perspective of the principles and objectives of the American College of Dentists. These two studies, together with activites of the American Association of Dental Schools and the American Dental Association Commission on Accreditation, have served as the resources for my remarks.

It is an opportune time for the American College of Dentists to reassess this objective which calls for an active role in the support of education and research

To Foster the Extension and Improvement of Measures of Prevention and Control of Oral Disorders

Between 1976 and 1981 the total clock hours of instruction in dentistry increased by approximately 16% to a point where the average dental curriculum represents 4,600 hours of instruction. Within this increase there has been a 21% increase in the hours of instruction devoted to the clinical sciences. The 1976 Survey of Dental Education documented a substantial increase in the number of hours of instruction devoted to the general area of the prevention of oral diseases. This emphasis continued through 1981 and appears to be expanding to incorporate the concept of wellness. Thus, from the curricular viewpoint dental education has changed in a way consistent with this first objective of the College. In addition, research undertaken by dental faculty, while both basic and applied, has, in recent years, increased its emphasis on the transfer of basic knowledge to the clinical problems, especially in the area of prevention. The National Caries Program and the establishment of clinical centers for periodontal disease research are good examples of movement in this direction. The increased emphasis being placed on enhancing cooperative agreements between industry and dental researchers to bring about the development of ethical (proprietary) means of enhancing our ability to prevent caries and periodontal disease is another example. Increased emphasis and support for longitudinal clinical trials should in the near future not only increase our understanding of the pathogenesis of the diseases we treat, but offer the potential for more realistic and widely applicable methods of prevention.

Thus, dental education through both evolution of curricula and research are clearly engaged in activities which would foster this first objective of the College.

James E. Kennedy, D.D.S., M.S.,* Dean, University of Connecticut, School of Dental Medicine.

Presented at the meeting of the New England Section of the American College of Dentists.

To Take Whatever Action is Possible to Improve Oral Health Care

While there are many examples of initiatives which would address this second objective, perhaps the most promising is the substantial increase in curriculum time now devoted to the general area of quality assurance. In many schools students acquire in-depth knowledge of the methods of quality assessment and actively participate in quality assurance programs designed to augment the quality of care provided in the school's outpatient clinics. The accreditation process of predoctoral dental education programs has encouraged educational programs to enhance their efforts in the area of quality assurance or, if necessary, to require implementation of a quality assurance system. This change should bode well for the future as more and more practitioners become familiar with this concept and devote more attention to one of the essential characteristics of a health profession, that is, the willingness to self monitor the quality of care delivered. Through funding from the American Fund for Dental Health, practitioners are now participating in a project designed to develop an office site visit to assess quality of care. While such a process raises questions regarding the ethical use of the results of such reviews, the concept is worth pursuing.

To Take an Active Role in the Support of Dental Education and Research

While relationships between this objective of the College and dental education, because of the very nature of the objective, preclude specifics, it is important to note some current issues facing dental education which have a clear relationship to this objective. Because of funding constraints some schools have begun to question the traditional expectations of dental faculty in the areas of teaching, service and research. Increasingly, we hear of academic appointments in which the faculty members are expected, through private patient care, to generate substantial portions of their support. Individuals in such positions have little or no expectation for augmenting the knowledge base essential to dentistry through research. Institutions taking this approach run the risk of creating two classes of faculty and at the same time decreasing the available research manpower pool. Only recently have initiatives at the National Institute of Dental Research begun to resurrect and expand support for those interested in preparing for a career in academic dentistry to include viable research training.

We are dealing with a generation of students, soon to be practitioners, who are acutely aware of their obligations to society as members of the health profession.

Thus, it is an opportune time for the American College of Dentists to reassess this objective which calls for an active role in the support of dental education and research and determine how the College might join with dental educators to ensure that as we approach the end of this century we will have maintained and hopefully enhanced the numbers of individuals committed to generating the knowledge needed to answer questions essential to improving oral health care.

To Encourage Qualified Persons to Enter the Profession of Dentistry

All of you are acutely aware of the decline in the applicant pool since 1975. Along with this decline in numbers there is reason to believe that the academic qualifications of those admitted to schools of dentistry in 1983 are, at least at some institutions, less than they were in 1979 despite a substantial reduction in the number of first year positions. The American Association of Dental Schools, in cooperation with the American Dental Association, in response to specific recommendations contained in the Future of Dentistry report and subsequently approved by the ADA House of Delegates, have undertaken a national recruitment pro-

gram. These efforts on the part of organized dentistry will hopefully result in adequate numbers of qualified applicants. At this point in time, I can think of no other area in which the active pursuit of an objective of the College has greater potential for a positive impact on dental education. The leadership of the College should sieze this opportunity and be willing to expend resources and effort so that the objectives of the national recruitment program are achieved.

To Encourage Graduate Education and Improve Continuing Educational Efforts by Dentists and Auxiliaries

Efforts within dental education to encourage graduate education are somewhat mixed. Based on the establishment of new, advanced dental education programs, it would appear that schools of dentistry have embraced the recommendation contained in the study "Advanced Dental Education in the United States" that dentistry should remain a profession of predominantly general practitioners and have limited, in fact reduced, numbers of first year positions in the recognized dental specialties. On the other hand, the development of a school based alternative to the hospital based general practice residency program gives clear evidence of the commitment to expand the numbers of opportunities for those seeking general practice residencies. Dental education, through the American Association of Dental Schools and the Washington office of the ADA, has consistently and successfully supported the earmarking of federal funds for support of these programs.

We must be mindful that a generation of future practitioners are looking at today's leadership.

There are two projects which are just beginning which should have major impact on both graduate and continuing education. Over the next three years the Council on Dental Education, in response to recommendations promoted by the American Association of Dental Schools and contained in the "Future of Dentistry Report", will undertake a revision in the requirements and guidelines for predoctoral dental education. As part of this activity, funding is being sought to assess the competencies necessary for the general practice of dentistry today and in the foreseeable future.

This assessment of competencies, as a component to a revision in requirements and guidelines, will establish a new baseline for predoctoral education and, in turn, play a significant role in determining the future direction of graduate education. Parenthetically, there is also being undertaken a review of the purpose and scope of the currently recognized dental specialties. Add to this equation the emerging concept of the assessment of continued competency and the relationship of continued competency to the licensure process. The net result of these separate, but clearly interrelated, activites will be the guidelines for the evolution of dental education through the rest of this decade. One could imagine, as an outcome, a description of competencies essential to general practice whose scope is greater than we currently see, resulting in the establishment of standards for predoctoral dental education programs. With this as a basis, the necessity for a mandatory general practice residency or extending curriculum time could be rationally determined.

At the same time the issue of needing to continue to recognize all the current dental specialties or to establish new specialties could be assessed. In addition, given this definition of competencies for the general practice of dentistry, schools could begin designing continuing education efforts directed at the maintenance and enhancement of competencies. In time it might be feasible to redirect the efforts of licensure boards to evaluating continued competency, in addition to *or* instead of evaluating recent graduates. When the opportunity presents to become involved in this process of defining competencies, the College should stand ready to put forth a concerted

effort, thereby enhancing the accomplishment of its objectives.

To Encourage the Free Exchange of Ideas and Experiences in the Interest of Better Service to the Patient

It is probably not necessary to discuss, in conjunction with this objective, the participation of dental faculty in various meetings and the encouragement they receive to publish the results of their research. My concern in regard to this objective relates to issues previously discussed relating to an active role in support of dental education and research. If private patient care by faculty is increasingly seen as the vehicle through which our educational programs are supported, then the time necessary to commit one's ideas and experiences to writing, to present them at national meetings and to serve the dental profession as a synthesizer of information could be severely limited.

To Promote Within the Dental Profession the Highest Ethical Standards

In his recent presidential address, Dr. Robert Biddington introduced resolutions to the American Association of Dental Schools House of Delegates which called for increasing emphasis in instruction devoted to ethics and the development of curricular guidelines for the teaching of ethics. The American Fund for Dental Health has funded a project which saw the interaction of faculty, practitioners and students in discussion of ethics in dentistry and produced instructional material which can serve as a vehicle to enhancing curricular offerings in the area of ethics.

The College's objective dealing with ethics goes further and encourages the professional person to recognize his responsibility to participate in affairs of the community. Recently projects undertaken by students were submitted to the American Association of Dental Schools as part of an annual competition to recognize student achievement. Based on the scope and quality of these projects, one can reasonably conclude that schools of dentistry, and more importantly, their students, are actively engaged in activities which promote service to the community. This generation of students has been described by some as the "me" generation. I would suggest that there is a substantial body of evidence to the contrary and that, in fact, we are dealing with a generation of students, soon to be practitioners, who are acutely aware of their obligations to society as members of the health profession.

I should share with you another anecdote about students. At at least four schools of dentistry I have seen bulletin boards outside student laboratories where the newspaper advertisements of dentists have been posted. Students recognize distasteful advertising and ask "How do you let this happen?" The 1984 ADA House of Delegates will consider a marketing campaign and an associated dues increase. We must be mindful that a generation of future practitioners are looking at today's leadership. They will critically assess our motives and ask that the difference between advertisement as a vehicle of patient education and what some individuals are engaged in be clearly explained.

To Confer Fellowship in the College on Individuals in Recognition of Meritorious Achievement

Time will tell whether the generation of students graduated from our schools of dentistry in the 1980's have been provided with the background essential for future contributions to the art and science of dentistry and human welfare. Conversely, the future may well provide a real test of the resolve of the College to maintain and actively pursue our own stated principles and objectives so that these future generations of practitioners will have the opportunity and desire to embrace the goals of the College. △

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PREDICTION OF ACADEMIC SUCCESS

A Study with Dental Students Using Noncognitive and Cognitive Variables

Charles H. Boozer*
Mickey M. Lee**
Jack Rayson***
Roger Weinberg****

A problem central to the admission process is identifying predictor variables which are valid for the particular institute in which they are being employed.[1] Numerous studies have concentrated on cognitive variables as their sole or primary predictors.[2-9] These studies, however, have generally produced mixed results.[10] Recently, several researchers have cited the need to expand investigations to include noncognitive measures such as attitudes, interests, and beliefs.[11-13]

Continual re-examination of both new and existing prediction variables is important to each school employing them.[1] This continual re-examination allows schools to improve predictive abilities by adding new variables and/or deleting old ones and, continual monitoring of the applicant pool.[14]

Hence, the purpose of this study was to examine several noncognitive variables in conjunction with several traditionally employed cognitive variables in an attempt to increase the ability to predict success at the Louisiana State University School of Dentistry.

*Charles H. Boozer, D.D.S., M.A., Professor and Head, Oral Diagnosis/Medicine/Radiology.

**Mickey M. Lee, Ph.D., Associate Professor, Instructional Services.

***Jack Rayson, D.D.S., M.A., Professor & Dean, Louisiana State University, School of Dentistry.

****Roger Weinberg, Ph.D., Professor, Department of Biometry.

Method

The sample consisted of all students attending Louisiana State University School of Dentistry (N = 348) between 1979 and 1983. The sample included 92 freshmen, 85 sophomores, 86 juniors, and 85 seniors.

The predictor variables included all 16 subtests of the 16 Personality Factor Questionnaire (16 PF), all 29 themes and scores of the Strong-Campbell Interest Inventory (SCII), all 7 scores of the Nelson-Denny Reading Test (NDRT), total entering grade point average (EGPA), Entering science grade point average (ESGPA), the dental aptitude academic test score (DATAC), and the dental aptitude perceptual motor test score (DATPM). The 16PF, SCII, and the NDRT scores were obtained from all students during their first week of orientation as freshmen. The EGPA, SGPA, DATAC, and DATPM scores were obtained from admission records. The total of all predictor variables was 56.

The 16 PF was chosen because previous research had indicated that it was successful in indicating personality changes in dental students. These changes seemed to be important areas which might be employed to help predict success in dental school.[15,16]

The SCII was likewise chosen because of previous research indicating interests to be useful in predicting success in dental school.[17] Both the above instruments assess very different noncognitive areas (i.e., personality and interests respectively) and were perceived to be very important in contributing to the prediction of success in dental school.

The NDRT was also chosen because of a pilot study indicating that poorer students may have reading problems.[18]

The remaining variables (EGPA, ESGPA, DATAC, and the DATPM) were all chosen because of their current importance in the selection process of dental students at LSUSD and other dental schools.

The criterion variables selected for this study were basic science, clinical, and total grade point averages for each class and have been

traditionally employed as determinants of success in dental school programs.

Stepwise multiple regression analysis tested the effectiveness of the individual predictor variables in estimating the criterion variables employed in this study. The analysis was conducted using the *Statistical Package for the Social Sciences* program Multiple Regression.[19]

Results

Tables 1 through 10 indicate the variables selected by stepwise multiple regression for predicting basic science, clinical, and total grade point averages for each class analyzed (freshman, sophomore, junior, and senior). Only those variables that were significant at the .05 level or lower appear in the tables.

The range of variance (R^2) accounted for in each of the tables fluctuated from a low of .13 for predicting the 81–82 sophomore clinical grade point averages to a high of .61 for predicting the 79–80 junior clinical grade point average. The mean variance accounted for in all 28 regressions was .41.

Table 1 indicates the variables selected to predict final basic sci-

Table 1. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Four Years of Freshman Basic Science Grade Point Averages (N = 92)

Year							
1979–80		80–81		81–82		82–83	
Variable	R^2	Variable	R^2	Variable	R^2	Variable	R^2
ESGPA	.24	ESGPA	.27	EGPA	.30	DATAC	.23
NDVGE	.29	DATAC	.38	NDCGE	.38	EGPA	.41
PF 12	.31	SC 9	.44	DATPM	.41	NDRR	.44
				DATAC	.45		

Legend

ESGPA = Entering Science Grade Point Average
NDVGE = Nelson-Denny Vocabulary Grade Equivalent
PF 12 = 16 Personality Questionnaire Self-Assuredness/Apprehensive Scale
DATAC = Dental Aptitude Academic Test Score
SC 9 = Strong-Campbell Adventure Scale
EGPA = Entering Grade Point Average
NDCGE = Nelson-Denny Comprehension Grade Equivalent
DATPM = Dental Aptitude Test Perceptual Motor
NDRR = Nelson-Denny Reading Rate

Table 2. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Four Years of Freshman Clinical Grade Point Averages (N = 92)

Year							
1979–80		80–81		81–82		82–83	
Variable	R^2	Variable	R^2	Variable	R^2	Variable	R^2
SC 11	.14	ESGPA	.28	EGPA	.16	DATAC	.25
ESGPA	.25	DATPM	.40	DATPM	.21	SC 15	.31
PF 2	.34	DATAC	.46			SC 2	.39
PF 6	.42	SC 9	.49			PF 1	.43
DATPM	.46	PF 4	.51			SC 4	.48
NDCGE	.50					NDTGE	.52

Legend

SC 11 = Strong-Campbell Mechanical Activities Scale
ESGPA = Entering Science Grade Point Average
PF 2 = 16 Personality Questionnaire Dull/Bright Scale
PF 6 = 16 Personality Questionnaire Expedient/Conscientious Scale
DATPM = Dental Aptitude Perceptual Motor Test
NDCGE = Nelson-Denny Comprehensive Grade Equivalent
DATAC = Dental Aptitude Academic Test Score
SC 9 = Strong-Campbell Adventure Scale
PF 4 = 16 Personality Questionnaire Humble/Assertive Scale
EGPA = Entering Grade Point Average
SC 15 = Strong-Campbell Medical Services Scale
SC 2 = Strong-Campbell Investigative Theme
PF 1 = 16 Personality Questionnaire Reserved/Outgoing Scale
SC 4 = Strong-Campbell Social Theme
NDTGE = Nelson-Denny Total Grade Equivalent

Table 3. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Four Years of Freshman Total Grade Point Averages (N = 92)

Year							
1979–80		80–81		81–82		82–83	
Variable	R^2	Variable	R^2	Variable	R^2	Variable	R^2
ESGPA	.13	ESGPA	.32	EGPA	.28	DATAC	.29
SC 11	.25	DATAC	.44	NDVGE	.33	ESGPA	.39
PF 2	.34	DATPM	.50			NDRR	.43
PF 6	.40	SC 9	.54			SC 4	.47
DATPM	.43	NDCGE	.56			SC 2	.52
						SC 15	.57
						SC 12	.60

Legend

ESGPA = Entering Science Grade Point Average
SC 11 = Strong-Campbell Mechanical Activities Scale
PF 2 = 16 Personality Questionnaire Dull/Bright Scale
PF 6 = 16 Personality Questionnaire Expedient/Conscientious Scale
DATPM = Dental Aptitude Perceptual Motor Test
DATAC = Dental Aptitude Academic Test Score
SC 9 = Strong-Campbell Adventure Score
NDCGE = Nelson-Denny Comprehension Grade Equivalent
EGPA = Entering Grade Point Average
NDVGE = Nelson-Denny Vocabulary Grade Equivalent
NDRR = Nelson-Denny Reading Rate
SC 4 = Strong-Campbell Social Theme
SC 2 = Strong-Campbell Investigative Theme
SC 15 = Strong-Campbell Medical Service Score
SC 12 = Strong-Campbell Science Score

ence grades for each freshman class for each year. Basic science grades for all freshman classes were predicted most consistently from the Dental Aptitude Academic Test Score (DATAC). However, this score was only significant for three of the four years (80–81, 81–82, and 82–83), and contributed an average of only 29% of the total variance explained by the variables in Table 1 for those three years. Two other variables proved significant for two years each. They included Entering Science Grade Point Average (ESGPA) which was valid for 79–80 and 80–81 and accounted for an average of 69% of the variance explained for those 2 years, and Entering Grade Point Average (EGPA) which was valid for 81–82 and 82–83 and contributed an average of 54% of the variance explained for those 2 years. No other variables were consistent for more than one year when an attempt was made to predict freshman basic science grades.

Table 2 indicates those variables selected which significantly help predict freshman clinical science grade point average. The most consistent predictor of clinical grades was the Dental Aptitude Perceptual Motor Test (DATPM), which was significant at the .05 level for 79–80, 80–81, and 81–82. It contributed an average of 18% of the variance explained for those three years. Two other variables proved significant for two years each: the Entering Science Grade Point Average (ESGPA) which was significant for 79–80 and 80–81 and accounted for an average of 38% of the total variance explained for those years and the Dental Aptitude Academic Test and accounted for 30% of the explained variance for those two years. Each of the other variables was significant for only one year.

Table 3 indicates those variables selected which significantly predicted freshman total grade point average. Of the fifteen different variables selected, only Entering Science Grade Point Average (ESGPA) helped predict total grade point average for three of the four years. These years were 79–80, 80–81, and 82–83. It contributed 35% of the variance explained for those three years. The Dental Aptitude Perceptual Motor Test (DATPM) and the Dental Aptitude Academic Test score (DATAC) each contributed to the ability to predict a student's total grade point average for two years. These years were 79–80 and 80–81 for the DATPM and 80–81 and 82–83 for the DATAC. The DATPM contributed 9% of the variance explained and the DATAC 35% for those two years. All of the remaining 12 variables were only significant for one year.

Table 4 depicts those variables selected which help predict sophomore basic science grade point average. Only Entering Science Grade Point Average (ESGPA) helped predict a student's basic science grade for more than one year. ESGPA was successful for years 79–80 and 80–81 and contributed 38% of the variance explained for those 2 years. All remaining variables were significant for only one year.

Table 5 depicts those variables which helped select sophomore clinical grade point averages. Of the twelve cognitive and noncognitive variables selected, only Entering Science Grade Point Average (ESGPA) was successful in predicting more than one year's work. This occurred for years 79–80 and 80–81 and accounted for 40% of the variance explained for those two years.

Table 6 indicates the 13 variables selected which helped predict sophomore total grade point average. Entering Science Grade Point Average (ESGPA) was the only variable which was successful in contributing to the prediction of sophomore total grade point average for more than one year. The years were 79–80 and 80–81 and it accounted for 41% of the variance explained. All other variables were only significant for one year.

Table 7 depicts the four different variables selected for the two junior years analyzed. As indicated in the table, Entering Science Grade Point Average (ESGPA) helped to predict

Table 4. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Three Years of Sophomore Basic Science Grade Point Averages (N = 85)

Year					
1979–80		80–81		81–82	
Variable	R^2	Variable	R^2	Variable	R^2
SC 12	.15	ESGPA	.22	EGPA	.19
ESGPA	.23	DATAC	.34	NDCGE	.29
NDVGE	.30	SC 16	.38	PF 5	.34
		SC 14	.42	SC 2	.38
		SC 24	.45		

Legend

SC 12	= Strong-Campbell Science Score
ESGPA	= Entering Science Grade Point Average
NDVGE	= Nelson-Denny Vocabulary Grade Equivalent
DATAC	= Dental Aptitude Academic Test Score
SC 16	= Strong-Campbell Music/Drama Score
SC 14	= Strong-Campbell Medical Science Score
SC 24	= Strong-Campbell Public Speaking Score
EGPA	= Entering Grade Point Average
NDCGE	= Nelson-Denny Comprehension Grade Equivalent
PF 5	= 16 Personality Questionnaire Sober/Happy-Go-Lucky Scale
SC 2	= Strong-Campbell Investigative Theme

Table 5. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Three Years of Sophomore Clinical Grade Point Averages (N = 85)

Year					
1979–80		80–81		81–82	
Variable	R^2	Variable	R^2	Variable	R^2
SC 11	.12	ESGPA	.29	SC 8	.09
ESGPA	.19	SC 16	.34	DATPM	.13
SC 18	.25	PF 10	.38		
PF 2	.32	SC 5	.42		
PF 6	.35	SC 24	.45		
		PF 8	.48		

Legend

SC 11 = Strong-Campbell Mechanical Activities Score
ESGPA = Entering Science Grade Point Average
SC 18 = Strong-Campbell Writing Score
PF 2 = 16 Personality Questionnaire Dull/Bright Scale
PF 6 = 16 Personality Questionnaire Expedient/Conscientious Scale
SC 16 = Strong-Campbell Music/Drama Score
PF 10 = 16 Personality Questionnaire Practical/Imaginative
SC 5 = Strong-Campbell Enterprising Scale
SC 24 = Strong-Campbell Public Speaking
PF 8 = 16 Personality Questionnaire Toughminded/Tenderminded Scale
SC 8 = Strong-Campbell Nature Score
DATPM = Dental Aptitude Perceptual Motor Test

Table 6. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Three Years of Sophomore Total Grade Point Averages (N = 85)

Year					
1979–80		80–81		81–82	
Variable	R^2	Variable	R^2	Variable	R^2
SC 12	.15	ESGPA	.31	EGPA	.09
ESGPA	.23	SC 16	.37	SC 8	.18
SC 18	.29	DATAC	.42		
NDVGE	.35	PF 10	.45		
SC 5	.38	PF 9	.48		
PF 2	.41				
NDRR	.44				

Legend

SC 12 = Strong-Campbell Science Score
ESGPA = Entering Science Grade Point Average
SC 18 = Strong-Campbell Writing Score
NDVGE = Nelson-Denny Vocabulary Grade Equivalent
SC 5 = Strong-Campbell Enterprising Theme
PF 2 = 16 Personality Questionnaire Dull/Bright Score
NDRR = Nelson-Denny Reading Rate
SC 16 = Strong-Campbell Music/Drama Score
DATAC = Dental Aptitude Academic Test Score
PF 10 = 16 Personality Questionnaire Practical/Imaginative
PF 9 = 16 Personality Questionnaire Trusting/Suspicions
EGPA = Entering Grade Point Average
SC 8 = Strong-Campbell Nature Score

the juniors basic science grade point average for both years and contributed 67% of the variance accounted for in those two years. The remaining three variables did not contribute to the prediction of the basic science grades for more than one year.

Table 8 indicates the variables selected which helped predict junior clinical grade point average. Only Entering Science Grade Point Average (ESGPA) helped predict clinical grades for both years and contributed 30% of the explained variance. The remaining 12 variables only helped predict individual years.

Table 9 depicts the 12 variables which contributed to predicting junior total grade point average. As in tables 7 and 8, only Entering Science Grade Point Average (ESGPA) helped predict total grade point average for both years. It accounted for 34% of the variance accounted for those two years.

Table 10 depicts those variables which helped predict senior clinical grade point average. The Dental Aptitude Academic Test score accounted for the largest score of explained variance (35%).

Discussion

The identification of all variables required to perfectly predict basic science, clinical, and total grade point averages would help solve admissions problems. However, even the more notable attempts at predicting academic success have been notoriously inconsistent.

In relationship to the specific analysis, freshman basic science grades were predicted most consistently from year to year by the Dental Aptitude Academic Test Score (DATAC), Entering Science Grade Point Average (ESGPA), and Entering Grade Point Average (EGPA). Sophomore basic science grades were predicted most consistently by Entering Science Grade Point Average (ESGPA). Basic science grades for juniors were predicted most consistently by Entering Sci-

ence Grade Point Average (ESGPA). For freshmen through juniors, the total variance accounted for by those variables ranged from a low of 2% to a high of 31%. The mean was 17.7%.

However, none of these variables was consistent in predicting basic science grades every year of every class (except in the junior class, where only two years were analyzed). In addition, 19 other variables were partially responsible for some portion of the total variance accounted for in each class. These additional 19 variables were both noncognitive and cognitive ones.

In relationship to clinical grades a similarity inconsistent pattern emerges. For the freshman year, clinical grades were most consistently predicted by the Dental Aptitude Perceptual Motor Test (DATPM), Entering Science Grade Point Average (ESGPA) and the Dental Aptitude Academic Test Score (DATAC). For the sophomore year, Entering Science Grade Point Average (ESGPA) predicts clinical grade point average most consistently. For the junior year, Entering Science Grade Point Averages (ESGPA) also predicted most consistently. For the senior year, the Dental Aptitude Academic Test Score emerges as the primary prediction variable. However, as in the prediction of basic science grade point averages, many additional noncognitive and cognitive variables were included as predictors in all classes.

Finally, predicting the total grade point reveals a similarly inconsistent pattern of predictor variables. For freshmen, Entering Science Grade Point Average (ESGPA), the Dental Aptitude Perceptual Motor Test Score (DATPM) and the Dental Aptitude Academic Test Score (DATAC) proved most consistent. For the sophomores, Entering Science Grade Point Average (ESGPA) was most consistent in predicting total grade point average. For the juniors, Entering Science Grade Point Average (ESGPA) also proved most consistent. However, just as

Table 7. Variable Selected by Stepwise Multiple Regression Analysis that Help Predict Two Years of Junior Basic Science Grade Point Averages (N = 86)

Year			
1979–80		80–81	
Variable	R^2	Variable	R^2
ESGPA	.12	ESGPA	.31
PF 4	.23	SC 16	.36
		DATAC	.38

Legend

ESGPA = Entering Science Grade Point Average
PF 4 = 16 Personality Questionnaire Humble/Assertive Scale
SC 16 = Strong-Campbell Music/Drama Score
DATAC = Dental Aptitude Academic Test Score

Table 8. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Two Years of Junior Clinical Grade Point Averages (N = 86)

Year			
1979–80		80–81	
Variable	R^2	Variable	R^2
PF 2	.11	ESGPA	.21
SC 16	.18	DATPM	.32
SC 11	.28	SC 6	.36
NDVGE	.34	SC 24	.41
ESGPA	.41	PF 14	.44
NDCGE	.47		
PF 4	.53		
PF 6	.57		
NDCRS	.61		

Legend

PF 2 = 16 Personality Questionnaire Dull/Bright Side
SC 16 = Strong-Campbell Music/Drama Score
SC 11 = Strong-Campbell Mechanical Abilities Score
NDVGE = Nelson-Denny Vocabulary Grade Equivalent
ESGPA = Entering Science Grade Point Average
NDCGE = Nelson-Denny Comprehension Grade Equivalent
PF 4 = 16 Personality Questionnaire Humble/Assertive Scale
PF 6 = 16 Personality Questionnaire Expedient/Conscientious Scale
NDCRS = Nelson-Denny Comprehension Raw Score
DATPM = Dental Aptitude Perceptual Motor Test
SC 6 = Strong-Campbell Conventional Theme
SC 24 = Strong-Campbell Public Speaking Score
PF 14 = 16 Personality Questionnaire Group—Oriented/Self-sufficient

Table 9. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict Two Years of Junior Total Grade Point Averages (N = 86)

Year			
1979–80		80–81	
Variable	R^2	Variable	R^2
PF 2	.11	ESGPA	.23
ESGPA	.21	DATPM	.36
NDVGE	.29	SC 6	.39
SC 18	.36	SC 24	.45
SC 11	.42	PF 14	.47
PF 4	.46		
NDCGE	.51		
NDCRS	.54		

Legend

PF 2 = 16 Personality Questionnaire Dull/Bright Scale
ESGPA = Entering Science Grade Point Average
NDVGE = Nelson-Denny Vocabulary Grade Equivalent
SC 18 = Strong-Campbell Writing Score
SC 11 = Strong-Campbell Mechanical Activities Score
PF 4 = 16 Personality Questionnaire Humble/Assertive Scale
NDCGE = Nelson-Denny Comprehension Grade Equivalent
NDCRS = Nelson-Denny Comprehension Raw Score
DATPM = Dental Aptitude Academic Test Score
SC 6 = Strong-Campbell Conventional Theme
SC 24 = Strong-Campbell Public Speaking Score
PF 14 = 16 Personality Questionnaire Group-Oriented/Self-Sufficient Scale

Table 10. Variables Selected by Stepwise Multiple Regression Analysis that Help Predict One Year of Senior Clinical Grade Point Averages (N = 85)

Year	
1979–80	
Variable	R^2
DATAC	.14
SC 28	.20
SC 17	.28
PF 6	.32
EGPA	.35
PF 11	.40

Legend

DATAC = Dental Aptitude Academic Test Score
SC 28 = Strong-Campbell Business Management Score
SC 17 = Strong-Campbell Art Score
PF 6 = 16 Personality Questionnaire Expedient/Conscientious Scale
EGPA = Entering Grade Point Average
PF 11 = 16 Personality Questionnaire Forthright/Astute Scale

for basic science and clinical grade point averages, total grade point average regressions included numerous additional noncognitive and cognitive variables.

From the above discussion it appears that in predicting basic science, clinical, and total grade point averages, a single variable or group of variables which is consistent from year to year does not exist. The longer the variables are examined the more obvious this becomes: the variables change, sometimes dramatically, with each new class.

Conclusions

Based upon the results of this study, the following conclusions can be made:

1. As the number of years or classes of students analyzed increased, the number of predictor variables that remained consistent decreased.
2. Entering Science Grade Point Average (ESGPA) is the most consistent single predictor of all three criterion variables for all classes of students.
3. Of the cognitive variables, ESGPA appeared in 19 of the 28 regressions; DATAC appeared 11 times; DATPM 9 times; and EGPA 7 times.
4. Of the noncognitive variables, SC II and SC 16 each appeared 5 times while PF 2 appeared 6 times in the 28 regressions.
5. Although noncognitive variables contributed a significant proportion of the variance, different ones appeared on different predictor lists and cannot be considered reliable.

Recommendations

In summary, numerous noncognitive variables in conjunction with several traditionally employed cognitive ones failed to consistently predict success in dental school. How-

ever, admissions committees are forced to employ standardized criteria which will help them select students. Within this given mandate, the following recommendations are made:

1. That dental schools continually re-examine the variables they use for admission purposes based upon multiple regression analysis.
2. That the regression weights of each prediction variable, along with the raw score of the obtained variable for the last two consecutive years be used in the selection process. For example, for predicting freshman basic science grade point average, the years 1981–82 and 1982–83 provide the most current information. The regression equations take the general form of $Y' = A + B_1 X_1 = B_2 X_2 + ... + B_k X_k$, where Y' represents the predicted average; A is the regression constant; B_1 through B_k the regression weights for each predictor variable; and X_1 through X_k the raw score values of the predictor variables. The specific values which would be employed for this area would be the five different variables which appear in Table 1 (i.e., EGPA, NDCGE, DATPM, DATAC, and NDRR). Y' of all individuals would then be ranked and only the highest scoring students would be admitted.
3. That dental schools start expanding the types of variables collected from students who apply to dental school. The data should include measures of personality, values, and interests as well as expanded measures of cognitive skills. In addition, tests of psychomotor performance may prove useful. △

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A TREASURY OF DENTISTRY

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Royal Extractions

Peter the Great, Tsar of Russia (1689–1725), was a colorful, powerful and highly intelligent ruler. He was a Tsar of many accomplishments that gained for him a reputation as one of the world's greatest sovereigns. It was he who first brought his country into expansive relations with the leading countries of Western Europe. During his long rule Peter founded the Russian navy, reformed the army, and built the capital city of St. Petersburg.

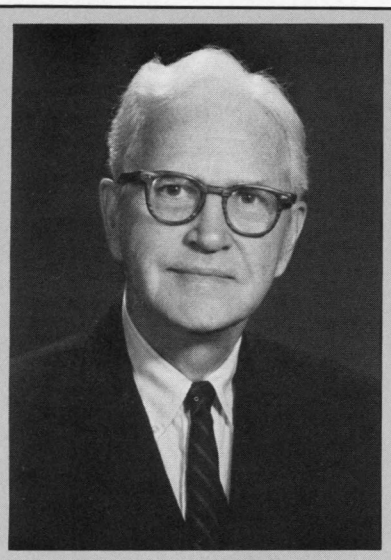
Realizing his country's vital needs for improvement, he visited England and Holland, primarily to learn the techniques of ship-building. However, urged by an insatiable curiosity, he visited factories, botanical gardens, theaters, and hospitals, inquiring about everything he saw. In Leyden he gained the friendship of Boerhave, and in Delft he studied the microscope under Leeuwenhoek.

While in Delft Peter went daily to the Botermarket, where he mingled with the people and observed their trades. Fascinated by the operations of a traveling dentist, he took lessons from him. He experimented on his servants and members of his suite until he became, for his time, a capable dentist. On his return to Russia, he used his knowledge of dentistry to the benefit of his court and subjects. He habitually carried elevators and forceps in his pockets. If anyone within his observation was suffering from toothache or had any diseased teeth, he demonstrated his skill by extracting the offending tooth or teeth. So enthusiastic did he become in his fondness for the extraction procedure that he removed the diseased teeth from the mouths of criminals who had been condemned to death. If there occurred a scarcity of "patients" he would, in the course of a walk, enter into any private house and order its occupants to come before him. If he found diseased teeth, the victim was required to sit on the floor with his head placed between the Tsar's knees, who then operated at his will. In the case of a patient who voiced his sensibility to pain, the imperial operator castigated him for his timidity until the patient decided that docility was an obligatory choice. As a dentist Peter the Great undoubtedly performed many necessary services to relieve the pain of his patients, both voluntary and involuntary. Also it may be concluded that many of them felt honored to be treated by their great ruler and treasured the extracted tooth as a family heirloom.

James IV, king of Scots, who was killed in the Battle of Flodden (1513), was another ruler who manifested a strong interest in the extraction of teeth. For the practice of his hobby he charged no fee but frequently rewarded his patient for the privilege of operating on him. A contemporary writer described him as "ane guid Chirurgione." The book of the royal expenses reveals many curious entries that certify the king's dental activities: "Ane fellow because the King pullit furtht his teith, XVIII shillings;" "To Kynnard, ye barbour, for twa teith drawn furtht of his hed be the King, XVIII sh." Without evidence as to the victims' reactions to the King's operations, one may wonder about the fee offered in exchange for the exercise of the ruler's avocation since the Scot shilling equalled an English penny.

King John of England (1199–1216) was the worst of the English monarchs, described by Dickens as "this miserable brute." John was not, like Peter of Russia and James IV of Scotland, a hobbyist of tooth extraction; but he was a ruthless dictator of involuntary extractions of teeth in order to achieve his purposes by that revolting form of punishment. Because of their unfortunate status as persons who were in England by the King's permission and were forced to depend on him for protection, the Jewish money lenders were the chief victims of John's torture by extraction. In a most unlikely source—Charles Dickens' *A Child's History of England*—I discovered this passage: "King John spared no means of getting money. He set on foot the oppressing and torturing of the unhappy Jews and invented a new punishment for one wealthy Jew of Bristol. Until such time as that Jew should produce a certain large sum of money, the King sentenced him to be imprisoned, and, every day, to have one tooth violently wrenched out of his head—beginning with the double teeth. For seven days, the

oppressed man bore the daily pain and lost the daily tooth; but, on the eighth, he paid the money." The outcome of this ghastly method of pressure was that the victim lost not only seven teeth but also the amount of the "loan."



Gardner P. H. Foley

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Noah Webster

It will undoubtedly surprise the reader of this note on dental history that Noah Webster (1758–1843) merits our attention for his comparatively brief but nevertheless valuable citations of dental information in his two famous works. Webster achieved enduring fame as a lexicographer, philologist, editor, lecturer, journalist, and pamphleteer. Besides his dictionary and speller he wrote on economics, science and medicine. His "History of Epidemics and Pestilential Diseases" (1799) was described by Osler as "The most important medical work in this country by a layman." He has been described by scholars as "the father of American Epidemiology" and "schoolmaster to America."

In 1828 Webster published *The American Dictionary of the English Language,* the first to deal with the American use of English. The dictionary contains three definitions that reflect the status of dentistry at the time of its publication.

> Dentist—One whose occupation is to clean and extract teeth, or repair the loss of them.
>
> Tooth-drawer—One whose business is to extract teeth with instruments.
>
> Tooth-drawing—The art of extracting a tooth; the practice of extracting teeth.

There is no definition of *dentistry,* a significant omission.

The first edition of Webster's *The American Spelling Book* was published in 1783. In 1829 the title was changed to *Webster's Elementary Spelling Book.* A million copies of the book were sold annually and it became the most popular book of the early Republic. The "old blueback" *Speller* was sold in stores throughout the country and, besides its use in schools, was a prized possession in thousands of homes. To add to the cultural importance of the spelling instruction, Webster placed on each page of the various editions a maxim or quotation that became familiar to readers by repetitive reference. Although I have been able to discover only two maxims of a dental nature, I feel that they had an important influence on the readers, both juvenile and adult, because they would have received such oral care information from no other source.

> Keep your mouth clean and save your teeth.
>
> A tooth brush is good to brush your teeth.

VARIATIONS IN THE PRACTICE OF DENTISTRY AND THE SUPPLY OF DENTISTS

H. Barry Waldman*
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The evolving practice of dentistry requires a re-evaluation of the traditional use of dentist-to-population ratios for comparisons of the availability of dental personnel. A review of one of the factors that impacts on practitioner productivity—percent of practitioners in full and part-time practice—is considered in terms of dentist-population ratios.

It has become axiomatic in the 1980's to speak of regional, if not nationwide, oversupply of dental practitioners. The efforts made by the federal government during the 1970's to increase graduates from schools of dentistry have borne consequences beyond most expectations. Repeated survey findings of decreasing dental caries and practice busyness, coupled with diminished expectations for some form of national health insurance program for dentistry, have fueled efforts to reduce dental school class sizes and indeed, the very number of schools of dentistry.

But as the profession attempts to come to terms with the changing arena for the delivery of dental services, traditional approaches for determining the adequacy of personnel must also be reconsidered. It is obvious to even the casual observer that the profession has long passed the era when virtually all dentists were men, who practiced in one or two operatories with (or even without) the aid of some minimally trained auxiliaries. The variations and assortments of practice arrangements in today's world often defy efforts to systematically record their activities.

For example, The ADA 1982 Survey of Dental Practice[1], in addition to the usual specialty-generalist listings, includes solo and independent practitioners, partners, shareholders in corporate arrangements and employees who function in retail and drug store locations, health maintenance organizations, professional buildings and homes, supported by a seemingly endless arrangement of auxiliaries.

The 1982 ADA Membership/Distribution of Dentists Survey[2] continues this effort to describe the changing patterns of practice by reporting the number of dentists in each state and region in terms of generalists and specialists, private practitioners, government, school and hospital employees, gender, full and part-time activities and practice ownership.

In the past, dentist-to-population ratios have been used as major tools for planning purposes. For example, the 1967 Task Force on Health Manpower of the National Commission on Community Health Sciences documented a decline in the dentist-to-population ratio from 57.2 dentists per 100,000 population in 1950 to 56.1 dentists in 1964. During this same period, the number of active non-federal dentists per 100,000 civilians dropped from 49.9 to 44.8.[3] The outcome of the concern over these changes was the major federal support for the construction program for dental schools in the 1970's.

However, because of the variations in practice configurations, efforts must be made to use the changing modalities of practice in reporting dentist-to-population ratios. The following presentation will explore the impact of one of these variables—differing full and part-time private practitioner activities—on the standard dentist-to-population ratios. While the frame of reference for this review will be on dentist-population ratios, it will not address directly the varying productivity of dentists. For example, beyond those factors considered in the following material, are variations in the use of traditional and expanded function auxiliaries (including supervised denturists) permitted in some states.

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Table I. Mean hours per week for solo and independent dentists spent in practice activities: 1981[1]

	Solo dentists			Independent dentists		
	All	Gen. pract.	Special.	All	Gen. pract.	Special.
Treating patients	32.0	32.1	31.3	32.3	32.4	31.7
Lab procedures	2.3	2.5	1.3	2.2	2.4	1.2
Filing prepayment forms	0.9	0.9	0.6	0.9	0.9	0.7
Bookkeeping	0.9	1.0	1.0	1.0	1.0	1.1
Professional reading	2.1	2.1	2.4	2.2	2.1	2.5
Personal time	3.7	3.6	4.1	3.6	3.6	4.1
Other activities	1.1	0.9	1.9	1.2	1.0	2.0
Total	**42.8**	**42.9**	**42.4**	**42.9**	**42.9**	**42.9**

Dentist equivalents

In 1981, solo dentists* spent an average of 42.8 hours in private practice activities. Thirty-two of these hours were for direct treatment of patients. Similarly, independent dentists** spent an average of 32.3 hours per week treating patients and 42.9 hours per week in overall practice activities.[1] (Table I) Throughout this paper, a dentist equivalent shall equal one dentist working 42.8 hours per week.

However, in 1982, 14.2 percent of active United States private practitioners spent less than 30 hours in practice activities (a range of 27.4 percent by dentists in the District of Columbia and 8.1 percent by dentists in the State of Delaware).[2] The wide disparity in part-time activities could be translated into different overall practitioner availability for dental services to the general population of the particular political jurisdiction.

Almost 75% of the nation's private practicing dentists were working in a practice with no other dentists; while 16% were working with one dentist and 9% were working with more than one other practitioner.[1]

An independent dentist is an owner (sole proprietor, partner, or shareholder in an incorporated practice) or partial owner of a private practice. Independent dentists include, dentists working in offices with one or more other dentists (owners and/or non-owners).[1]

For example, if we assume that *all* 504 active private practice dentists in the District of Columbia spent the 42.8 national average hours in practice activities, 21,571 practice hours would be available on a weekly basis. On the other hand, if we assume that the 72.6 percent of the District of Columbia dentists in full-time practice spent 48 hours per week in practice activities and the 27.4 percent in part-time practice spent 11.3 hours per week in dental practice activities,* then, 19,127 practice hours (or 2,444 less hours) would be available on a weekly basis. Using the 42.8

Since the ADA data do not provide the distribution of full and part-time hours (only numbers of practitioners who work above and below 30 hours), no combination of actual average hours for full and part-time practice can be made. Therefore, for purposes of developing dentist equivalents, a variety of combinations of averages for full and part-time practice hours may be assumed, provided the combination for all states and the District of Columbia reflects the national 42.8 hour average spent in practice activities.

$$(\text{hours worked per week for full-time practice}) \times (\text{percent of U.S. active private dentists in full-time practice}) +$$

$$(\text{hours worked per week for part-time practice}) \times (\text{percent of U.S. active private dentists in part-time practice}) = \textit{National Average}$$

For example:

$$(48 \text{ hours}) \times (85.8\%) +$$
$$(11.3 \text{ hours}) \times (14.5\%) = \textit{42.8 hours}$$

Table II. Number of active private practitioners, theoretical average hours per week, dentist equivalents per dentist, dentists per 100,000 population and adjusted number of dentists per population by state: 1982[2]

	No. active private practitioners	Theoretical aver. hours per week	Dentist equivalents per dentist	Actual dentists per 100,000 population	Adjusted no. dentists per population
New England					
Connecticut	2,177	43.6	1.02	69.0	70.4
Maine	464	43.8	1.02	40.9	41.7
Massachusetts	3,713	40.6	.95	64.2	60.9
New Hampshire	484	44.5	1.04	50.9	52.9
Rhode Island	500	42.1	.98	52.2	51.1
Vermont	267	44.4	1.04	51.7	53.8
Middle Atlantic					
New Jersey	4,594	42.6	.99	61.8	61.2
New York	12,097	41.5	.97	68.5	66.4
Pennsylvania	6,327	42.2	.99	53.3	52.8
South Atlantic					
Delaware	246	45.0	1.05	40.9	42.9
Dist. of Col.	504	37.9	.89	79.8	71.0
Florida	4,419	43.9	1.03	42.4	41.2
Georgia	2,039	44.0	1.03	36.1	37.1
Maryland	2,261	42.2	.99	53.0	52.5
North Carolina	2,061	43.9	1.03	34.2	35.2
South Carolina	1,052	44.3	1.04	32.8	34.1
Virginia	2,445	43.1	1.01	44.5	44.9
West Virginia	704	44.8	1.05	36.1	37.9
East South Central					
Alabama	1,309	44.3	1.04	33.2	34.5
Kentucky	1,516	43.3	1.01	41.3	41.8
Mississippi	769	43.1	1.01	30.1	30.4
Tennessee	2,022	43.9	1.03	43.5	44.8
East North Central					
Illinois	5,994	42.0	.98	52.4	51.3
Indiana	2,250	43.2	1.01	41.1	41.5
Michigan	4,837	42.6	.99	53.1	52.5
Ohio	5,106	43.2	1.01	47.3	47.8
Wisconsin	2,765	43.8	1.02	58.0	59.2
West North Central					
Iowa	1,385	44.3	1.04	46.7	47.5
Kansas	1,043	44.5	1.04	43.3	45.0
Minnesota	2,414	43.4	1.01	58.4	58.9
Missouri	2,212	42.9	1.00	44.8	44.8

Table II Continued

Nebraska	887	41.9	.99	55.9	55.4
North Dakota	286	43.4	1.01	42.7	43.1
South Dakota	293	44.9	1.05	42.4	44.5
West South Central					
Arkansas	791	44.1	1.03	34.5	35.5
Louisiana	1,638	42.7	.99	37.6	37.2
Oklahoma	1,226	42.9	1.00	38.6	38.6
Texas	5,831	43.7	1.02	38.2	38.9
Mountain					
Arizona	1,258	44.1	1.03	43.9	45.2
Colorado	1,770	43.6	1.02	58.1	59.2
Idaho	480	42.9	1.00	49.7	49.7
Montana	458	43.6	1.02	57.2	58.3
Nevada	380	43.5	1.02	43.1	43.9
New Mexico	502	44.6	1.04	36.9	38.4
Utah	940	44.4	1.04	60.5	62.9
Wyoming	240	43.6	1.02	47.8	48.8
Pacific					
Alaska	198	43.7	1.02	45.2	46.1
California	14,011	41.5	.97	56.7	54.9
Hawaii	626	44.1	1.03	62.9	64.8
Oregon	1,709	42.6	.99	64.5	63.9
Washington	2,689	41.9	.98	63.3	62.0
United States					
Total	**116,208**	**42.8**	—	**50.2**	—

hour per week average national practice activity figure, an additional 57 dentist equivalents (or an increase of 11.3 percent over the 504 District of Columbia dentists) would be available, if all part-time District of Columbia dentists were available on a full-time basis (2,444 ÷ 42.8 = 57.1).

Adjusted dentist per population ratios

In a similar manner, the overall available practice hours were calculated for each state by using both the ADA data for the number of full and part-time dentists in the respective states and the 48-11.3 hour differential for full and part-time practitioners. The calculated hours were divided by the number of actual active private practitioners to determine the theoretical average work week.

The adjusted number of dentists per population was developed by dividing the theoretical average work week by the national average of 42.8 hours to determine the dentist equivalents per dentist for each state. In turn, the number of equivalents was multi-

plied by the ADA dentist-to-population data for each state. (Table II)

which may effect significantly the number of hours of practice activity.[4] (Table X)

$$\frac{\text{Theoretical average hours per week}}{42.8 \text{ hours}} = \text{Dentist equivalents per dentist} \times \text{Actual dentists per population} = \text{Adjusted number dentists per population}$$

Comparisons of the supply of dentists

Maldistributions of dentists often are expressed in terms of whether particular states have a greater or lesser number of providers than some neighboring jurisdiction or particular areas with schools of dentistry, more favorable economic or weather conditions. However, comparative ratios of the number of practitioners from one state to another can vary markedly when the data are considered in terms of dentist equivalents.

For example, the variations can exist for the relationships of states with differing:

1. overall dentist-to-population ratios (Table III)
2. percent full and part-time practitioners (Table IV)
3. practitioner average ages (Table V)
4. percent of practitioners over age 54 (Table VI)
5. generalist to specialist ratios (Table VII)
6. percent of dentists who own their own practices (Table VIII)
7. percent of female practitioners. (Table IX)

These differences take on added meaning when they are considered in terms of the increasing numbers of young men and women entering the dental profession with different expectations for their futures from those of previous generations of dentists. For example, progressively fewer recent graduates anticipate solo or partnership entrepreneural arrangements. More than one third of 1983 graduates anticipate an employed position in private practice,

Commentary

Adjusted dentist-to-population ratios may appear to have limited value for the 34.5 percent of solo dentists who reported in the 1982 ADA Survey of Dental Practice that, their practice was "not busy enough."[1] There is little need to verify with some added calculations "something they already know." Nevertheless, as additional factors are taken into consideration, health planners and educators can better fine-tune personnel availability during these changing times for the practice of dentistry.

For example, jurisdictions like the District of Columbia and the States of New York and Rhode Island, with their populations of dentists well above the average national age, could anticipate relatively less overall productivity from the numbers of dentists in their respective jurisdictions (not considering other factors, e.g. varying use of auxiliary personnel). (Tables V and VI) On the other hand, the States of Delaware and South Dakota, with their percent of full-time practitioners far greater than the national average, could anticipate relatively greater productivity from their cadre of dentists. (Table IV)

Finally, while this entire presentation has been made in terms of the supply side of practitioner availability, commentary is necessary in terms of population demand for services. Although the very availability of dental personnel can have an influence on the demand for services, for the most part, demand for care is a function of economics, third party coverage, patient cultural and fear patterns and many other factors documented throughout the literature.

The need then is to better understand dentist-to-population ratios as we attempt to readjust dental schools and class sizes to meet the changing patterns for the delivery of dental care in each state and the United States in general. △

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Table III. Political jurisdictions with the lowest and highest number of active private practitioners per 100,000 population, the adjusted number of practitioners per population by political jurisdiction; and ratio of actual and adjusted number of practitioners to the jurisdiction with the highest number of practitioners per population: 1982.[2]

	Number of active dentists per 100,000 population		Ratio	
	Actual	Adjusted	Actual	Adjusted
Mississippi	30.1	30.4	.38	.43
South Carolina	32.8	34.1	.41	.48
Connecticut	69.0	70.4	.87	.99
Dist. of Columbia	79.8	71.0	1.00	1.00
United States	50.2			

Table IV. Political jurisdiction with the lowest and highest percent of active private practitioners in full-time practice (>30 hours per week), the number and adjusted number of active private practitioners per 100,000 population by political jurisdiction; and ratio of actual and adjusted number of practitioners to the jurisdiction with the highest percent of full-time practitioners: 1982[2]

	Percent full-time	Number of active dentists per 100,000 population		Ratio	
		Actual	Adjusted	Actual	Adjusted
Dist. of Columbia	72.6%	79.8	71.0	1.95	1.66
New York	82.1	68.5	66.4	1.68	1.55
South Dakota	91.5	42.4	44.5	1.04	1.04
Delaware	91.9	40.9	42.9	1.00	1.00
United States	85.8				

Table V. Political jurisdictions with the lowest and highest mean age of active private practitioners, the number and adjusted number of active private practitioners per 100,000 population by political jurisdiction; and ratio of actual and adjusted number of practitioners to the jurisdiction with the highest mean age: 1982[2]

	Mean age years	Number of active dentists per 100,000 population		Ratio	
		Actual	Adjusted	Actual	Adjusted
Alaska	40.7	45.2	46.1	.87	.90
South Carolina	42.8	32.8	34.1	.63	.67
Dist. of Columbia	48.7	79.8	71.0	1.53	1.39
New York	48.7	68.5	66.4	1.31	1.30
Rhode Island	49.2	52.2	51.0	1.00	1.00
United States	45.7				

Table VI. Political jurisdiction with the lowest and highest percent of active private practitioners over age 54, the number and adjusted number of active private practitioners per 100,000 population by political jurisdiction; and ratio of actual and adjusted number of practitioners to the jurisdiction with the highest percent over age 54: 1982[2]

	Percent over age 54	Number of active dentists per 100,000 population		Ratio	
		Actual	Adjusted	Actual	Adjusted
Alaska	6.6%	45.2	46.1	.87	.90
Nevada	16.1	43.1	43.9	.83	.86
New York	36.8	68.5	66.4	1.31	1.30
Dist. of Columbia	37.9	79.8	71.0	1.53	1.39
Rhode Island	39.0	52.2	51.0	1.00	1.00
United States	26.5				

Table VII. States with the lowest and highest ratio of general practitioners to specialists among professionally active dentists, the number and adjusted number of active private practitioners per 100,000 population by state; and ratio of actual and adjusted number of practitioners to the state with the highest general to specialist practitioner ratio: 1982[2]

	Ratio of generalists to specialists	Number of active dentists per 100,000 population		Ratio	
		Actual	Adjusted	Actual	Adjusted
Georgia	2/7	36.1	37.1	.76	.76
Massachusetts	2/7	64.2	60.9	1.34	1.25
Florida	2/9	42.4	41.2	.89	.84
South Dakota	8/2	42.4	44.5	.89	.91
Wyoming	8/3	47.8	48.8	1.00	1.00
United States	3/8				

Table VIII. States with the lowest and highest percent of active private practitioners who own their practice, the number and adjusted number of active private practitioners per 100,000 population by state; and ratio of actual and adjusted number of practitioners to the state with the highest percentage of owner practitioners: 1982[2]

	Percent practice owners	Number of active dentists per 100,000 population		Ratio	
		Actual	Adjusted	Actual	Adjusted
Alaska	85.0%	45.2	46.1	1.50	1.51
Hawaii	86.9	62.9	64.8	2.08	2.13
New Hampshire	94.3	50.9	52.9	1.69	1.74
Mississippi	96.3	30.1	30.4	1.00	1.00
United States	91.4				

Table IX. Political jurisdictions with the lowest and highest percent of professionally active female dentists, the number and adjusted number of active private practitioners per 100,000 population by political jurisdiction; and ratio of actual and adjusted number of practitioners to the jurisdiction with the highest percent of female dentists: 1982[2]

	Percent female dentists	Number of active dentists per 100,000 population		Ratio	
		Actual	Adjusted	Actual	Adjusted
Idaho	0.0%	49.7	49.7	.62	.70
Kansas	0.9	43.3	45.0	.54	.63
Utah	0.9	60.5	62.9	.76	.89
Illinois	4.0	52.4	51.3	.66	.72
Dist. of Columbia	5.7	79.8	71.0	1.00	1.00
United States	2.6				

Table X. Senior dental student postgraduation plans: selected years 1978–1983[4]

	1978	1980	1983
Solo private practice	21.5%	17.3%	13.2%
Partnership or group private practice	17.9	9.8	12.1
Private practice employed by others	19.1	29.9	34.5
Advanced education	19.5	18.3	20.8
Teaching, research, or administration	1.1	1.3	0.8
Government service	19.7	14.5	10.7
Undecided	na	8.9	7.7

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