

“The Best of Times and the Worst of Times”

WALTER J. LOESCHE, AADR President-elect

School of Dentistry, The University of Michigan, 3204 Dental Building, Ann Arbor, Michigan 48109

J Dent Res 66(7):1210-1212, July, 1987

“It was the best of times; it was the worst of times.” And with these words, Charles Dickens began his novel “The Tale of Two Cities”. It is the best of times for dental research; it is the worst of times for dental schools. And in this context, I want to address the scientific revolution that is occurring in clinical dentistry and how this revolution will establish dentistry as a premier health profession.

Dentistry for many years has been more artful than scientific in coming to grips with the two great diseases of the teeth, dental decay and periodontal disease. This was because the complexity of the bacterial communities residing on the teeth was such that the 19th century investigators such as W.D. Miller and G.V. Black, among others, were unable to discern the specific, albeit chronic, nature of these dental infections, and instead erected a scientific scaffold based upon plaque control and “extension for prevention”. This was too weak a foundation for the control and prevention of dental infections, and left the clinician to cope with the symptoms and ravages of these infections, more or less on his own artistic terms.

Accordingly, the clinician sought his professional rewards in art, in the aesthetic and functional restoration of the missing tooth structure, and of the missing teeth. When the pedestal supporting the art crumbled because of new decay at the junction of the restoration with the enamel, one could rebuild, using even more magnificent materials and more exacting techniques. But good art does not usually survive in a polluted environment and eventually was lost, as witnessed by the terrible toll of edentulousness among the elderly. This tooth-by-tooth capitulation had to be frustrating for the clinician.

These “good old days” are gone, and that is good news. Where edentulousness used to be about 60 to 70% among people over 65, we learn that in 1985 it was 40%, and will be even lower in the future, perhaps even approaching zero percent. Where only 20 to 25 years ago it would be rare to find a caries-free adult, we now have 40% of the 17-year-old population that is caries-free. This dramatic and sudden change could only occur if some essential component(s) in the multifactorial etiology of dental decay had been neutralized or eliminated.

The factors that contribute to human dental decay are the anatomy and surface chemistry of the enamel surface; the levels of *S. mutans* and lactobacilli in the plaque, the length of the bioavailability of fermentable substrates to the plaque flora; the inability of the saliva to remineralize the early lesion, and other more minor factors. Of these, there is no evidence that salivary or dietary factors or the minor factors have contributed to the reduction in decay. Thus, we conclude that events that have affected the anatomy and surface chemistry of the enamel and the levels of *S. mutans* and lactobacilli in the plaque are mainly, if not exclusively, responsible for the decline in dental decay.

Among these events are those which I shall call the first-generation treatment modalities, since they were employed in the absence of any identification of risk factors or bacterial diagnosis. These modalities include fluoride delivered both in drinking water and in dentifrices; sealants which were deliv-

ered by the dentist; and possibly systemic antibiotics as used by the physician to treat medically important infections.

The dentist was a minor player in these events, since only the placement of sealants was something which he personally performed. The majority of the fluoride was delivered outside the dental office, and most of the credit belongs with the public health authorities and with the decision-makers in industry, albeit with the advice and consent of the dental profession. The contribution of the physician to the decline is difficult to quantitate but follows logically from the fact that *S. mutans* is sensitive to most medically important antibiotics. *S. mutans* is the most important cariogen on human teeth, and pediatricians extensively prescribe antibiotics to children during their caries-prone years. Thus, the decline in decay that occurred did not primarily involve active participation by the dentist, and this is why it came as a great surprise to the clinician.

However, the finding that most forms of decay are *S. mutans* and lactobacilli infections can restore to the dentist operational control over the caries experience of his patients, for it allows him to diagnose these infections and to focus treatment primarily on those individuals who, as a result of this diagnosis, can be considered to be at high risk for developing decay. Restorations can be placed with the expectation that they will survive for many years, if not a lifetime. In the Scandinavian countries, individuals who have been diagnosed as being at risk for decay, because of high salivary *S. mutans* and/or lactobacilli levels, have been treated with fluorides, chlorhexidine, and sealants with outstanding results. And the process, once initiated, soon becomes cost-efficient as fewer restorations are placed, and those which are, last longer.

Recent advances have enabled the dentist to perform tests in his office that can identify individuals with high salivary levels of *S. mutans*, and this information can guide him in his choice of treatments and duration of therapy. Several agents are available, such as stannous fluoride, chlorhexidine, and xylitol, among others, that can reduce *S. mutans* levels in the plaque and saliva. I say “reduced” because until recently no one has reported the elimination of *S. mutans* from the saliva, but this may change with the development and deployment of slow-release vehicles which release antimicrobial agents into the saliva for days and weeks instead of hours. This ability to identify high-risk individuals and to treat them in a pre-emptive manner is an advantage that the dentist has never before possessed and one which should allow him to dictate the future dental health of his patients.

We heard today, during the presentation of the NIDR adult dental survey, that the prevalence of periodontal disease is low among adult Americans, since less than 8% of the population between 18 and 65 years of age have one site with greater than 5 mm attachment loss. This finding catches us again by surprise, because it is not apparent how this came about, although improvements in oral hygiene rightfully deserve some credit. Clearly, the decline in decay is contributory, particularly among younger adults, since fewer dental restorations (with their all-too-common amalgam overhangs) and fewer tooth extractions would reduce periodontal pocketing. But if periodontal disease is also caused by specific bacteria, then it is possible that the levels of these periodontopathogens have also been reduced

through the medical usage of antibiotics and through improved oral hygiene. This conjecture is supported by the virtual absence of ANUG cases in recent years.

This decline in periodontal disease also seems to be gratuitous since, by and large, the general dentist does not treat periodontal disease. Indeed, as recently as 1976, the general dentist reported that less than 1% of his income was derived from the treatment of periodontal disease. This will not continue to be so, since more clinicians are, and will begin, diagnosing and aggressively treating the several different bacterial infections that may comprise the majority of the clinical conditions collectively referred to as periodontal disease.

The most dramatic example of the success that can be achieved relates to the condition known as localized juvenile periodontitis. When diagnosed as periodontosis and considered as a systemic "black box" syndrome, the prognosis was bleak, and most involved teeth were extracted. Now that it is diagnosed as a *Hemophilus actinomycetemcomitans* infection, the prognosis is excellent, and the involved teeth presumably can be retained for a lifetime. I suspect similar transformations will occur in other forms of periodontitis as etiologic agents such as *B. gingivalis*, *T. denticola*, and *B. forsythus*, among others, are identified in the plaque and then either reduced or eliminated by the purposeful usage of debridement and antimicrobial agents by the clinician.

This then is the gift of knowledge that dental research has made available to the clinician: the ability to diagnose and successfully treat most forms of dental decay and periodontal disease. This does not mean the end of these dental infections, but rather that the control of these infections can be placed into the hands and mind of the clinician. This has profound but very satisfying implications for our profession, for it will convert dentistry from an artisan profession to a profession where art is solidly based upon scientific findings. We will go from a surgical profession to one in which surgery and medicine are skillfully blended — from a profession dominated by procedures and techniques to one in which the procedures are combined with cognitive services — from one of monotony, where only a single procedure is performed, to one of diversified procedures — from one constantly responding to symptoms and the "call in the night", to one in which the dentist has operational control of the infections in his patients.

This is indeed good news and why it is the best of times for dentistry. We will be smaller but better.

But our host institutions, the dental schools where most of us reside, are not benefiting from this success. Our schools, fueled by projections of dental needs that were based on the older irrelevant science that dominated clinical dentistry up to the Sixties, and by governmental largesse, greatly expanded in the 1970's. Enrollment quickly increased from about 4000 students in the entering class of 1970 to over 6000 in the class of 1980. Then came a series of reports from the U.S., from Scandinavia, from the United Kingdom, Ireland, New Zealand, and elsewhere, that showed that between 1965 and 1980, a remarkable reduction in caries prevalence had occurred. This information was widely disseminated in the lay press and by dentists concerned with market-place economics. The result was a precipitous decline in enrollments to the extent that in 1986 we have returned to pre-1970 levels, and we are projected to stabilize somewhere at about 3000 students in the early 1990's.

This rapid correction reflected the adverse publicity that young individuals heard concerning the economic viability of a career in dentistry, and so they stopped applying to dental school. In 1975, there were 2.7 applicants for each position in dental schools, whereas in 1987, after the total number of positions had been reduced by about 30%, there were only 1.2 applicants

for each position. If this reduction were confined strictly to the number of students, we might somehow accept it as a necessary adjustment to the new and lower treatment needs of the public.

But the shortfall in the quantity of applicants is accompanied by a more disconcerting shortfall in the quality of the applicants. In 1978, when we had our peak enrollments, the grade point average (GPA) for the entering class was about 3.3. The GPA for students going to private schools was slightly better than that for the public schools. In 1983, when there were fewer students, the GPA had declined to about 3.16, and the public schools were clearly getting the better students.

If we look at this phenomenon more closely using my school, the University of Michigan, and more recent data, we can see this trend developing in a more ominous way. Michigan has consistently been above the national average with regard to GPA and DAT scores. In 1978, when we had 151 entering students, we had our peak GPA of 3.48. In 1985, when we had reduced our class size to 112 students, the GPA was 3.26. Not an encouraging trend. The real shocker, however, occurred with the 1986 class, in which we enrolled only 95 students, who had a GPA of 3.08. This was the largest single-year fall-off in GPA that we have experienced. The magnitude of this fall-off can be better appreciated if we look at the top 95 students that enrolled in 1978. These top 95 students had a GPA of 3.6, which puts them one-half grade point above the top 95 students who comprised our entire class in 1986. It is apparent that smaller is not better, and that this is the worst of times for our dental schools.

We in the research community need to get involved. We probably see, better than others in our profession, the paradoxical situation that at the very point in time when dentistry has matured as a health science, when the dentist can have operational control of the dental needs of his patients, when he can expand his domain to include all aspects of oral health, the profession does not appear attractive to qualified applicants. Clearly, there is a miscommunication somewhere: We do not want fewer applicants, we want better students.

What can we do to improve the situation? We have a vested interest since the schools are our workplace, and the students are our future. The schools, as never before, are having to justify their place in the larger intellectual community of the University. We belong in this community, but there comes a limit where, if the quality of our students cannot be maintained, academic and economic considerations will force the closure of some of our schools. We should strive to prevent this, and I would suggest the following approaches:

First would be our own personal involvement. We can provide guidance and encouragement to enter dentistry to those undergraduate students with whom we have contact. Also, we should invest some time with our clinical colleagues, advising them of the positive influences that are shaping the future of dental practice. Dentistry has long been a dynastic profession, in that relatives of dentists have constituted a major segment of the student population at any given time. Dentists are discouraging their children, their relatives, and the children of their friends from entering dentistry. We need to educate these dentists about the positive aspects of our scientific revolution and re-open that vital dynastic pipeline.

We also need to get into the lay press the changes that are making modern dentistry so effective and attractive. This coming year, the NIDR is planning to celebrate its 40th anniversary as part of the larger NIH Centennial celebration. The Board of Directors of the AADR is encouraging local Sections to recognize this anniversary by supporting symposia throughout our country. These symposia can be occasions to report in the local press some of the clinical breakthroughs that will allow

the modern dentist to maintain the teeth of his or her patients effectively for a lifetime. NIDR plans to produce a scientific program that will be aired on the NOVA series entitled "The Mouth as a Mirror". This could be an occasion for local talk shows, which could expand on the subjects discussed in the NOVA programs.

The AADR can help promote dental enrollments by using its Science Information Committee as a means of communicating research findings of clinical interest to the public and to the clinician. These releases could be written in order to present dentistry as a health profession with a challenging and rewarding future oriented toward a wellness concept. The goal of clinical dentistry can be portrayed as the preservation of the teeth for a lifetime.

These issues — the size of the applicant pool and the academic quality of the entering dental student — have, as you would expect, been recognized by the ADA and the AADS for several years. These organizations have responded by establishing the SELECT program, which seeks to attract highly qualified individuals to careers in dentistry by creating a national network of dentists who will be recruitment partners with the dental school admissions officers. This strategy recognizes

the practicing dentist as the most influential individual in the entire chain of circumstances which leads a young man or woman to choose dentistry.

We in the research community should assist in the SELECT program in our respective schools. We know the implications of our research findings and can communicate the aspects of these findings to the faculty recruiter, the recruitment partners in private practice, and the applicant himself. We should seek to serve on Admissions Committees, and it is hoped that the Admissions Officer would see the contributions that we can make to his cause.

These, then, are the suggestions as to how we can contribute to the restoration of quality applicants to our dental schools — how we may share our knowledge so that some of the brightest young individuals will see dentistry as the one health profession where you *can* have it all — from the precise skills of surgery to the satisfying challenges of prevention — from being a healer to being a preserver. This is indeed good news. When future generations look back at the 1980's, they will see that these were the crucial years in which dentistry became both an art and a science, and that this was the beginning of the best of times for dentistry.



A—Outgoing President John C. Greene (r) accepts a commemorative bowl from his successor, Walter J. Loesche.



B—Winners of the first Gies Award, Drs. H. Margolis and E.C. Moreno (c), pose with Award Committee Chairman J. Greenspan (far left) and AADR President J. C. Greene (far right).



C—1987-88 AADR Officers: (l-r) Drs. Gray, Taubman, Greenspan, Loesche, Greene, Dawes, and Hein.