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DEPARTMENTS

FEATURES

Lawrence E. Libuser, DDS

Africa: A Dentist's Charitable Experience of a Lifetime

The long arm of the gate slowly lifted up like the arm at a railroad crossing. The bus rumbled forward, rocking and bouncing over the rough, rutted road as we entered the camp for the first time. Through the dust in the air, a mass of ramshackle huts and thrown-together buildings appeared stretching as far as the eye could see. Most were no more than mud huts with corrugated metal or thatched stick roofs.

The bus continued rocking back and forth over the uneven, hard-packed, rich, red earth. After several hundred more yards, we stopped. I had arrived at Bududuram Refugee camp. Having traveled more than 12,000 miles, I was really there in the camp I had heard so much about.

I had come to fulfill a lifelong promise and belief. I believe we are so fortunate to live in the part of the world that we do. I believe it is our responsibility to help others who are not as fortunate. I was here to begin fulfilling that task.

The doors of the bus suddenly opened, letting in a burst of warm, moist air. It was heavy with all sorts of strange smells: of sweat, garbage, ripe and rotting foods, and of bubbling cooking pots. The smells of humanity were all mixed together with the dust of the earth. With a combination of excitement and apprehension, I moved to gather up my equipment and belongings to leave the bus. It had been a long two-and-a-half-hour ride to the camp and I was glad to stretch my legs.

Bududuram Refugee camp is in Ghana, a country in central West Africa, located slightly north of the equator. The camp was established by the United Nations some 14 years ago to provide for refugees from several war-torn African countries. The vast majority of people at the camp are from Liberia.

A nightmarish civil war has devastated the people of Liberia since 1989. Approximately 1 million of the 3.3 million people of Liberia have fled the country, most during the past year. In 2002, this camp held 16,000 inhabitants. It currently has more than 50,000. Refugees arrive daily, at a rate of about 200 a day.

While fighting and killing continues in Liberia, many of the people arrive here with little more than the clothes on their backs and blank looks on their faces mirroring their struggle for survival and the horrors they have witnessed. Almost every adult suffers from post-traumatic stress. Our group, Project Africa, came to help these people. Of the 23 doctors, nurses, teachers and support personnel, I was the only dentist on this trip. Fortunately, one of our doctors was a young psychiatrist from Santa Monica, who just completed her psychiatric residency. Her plans were to conduct group therapy sessions for as many people as possible to help them deal with this stress.

I came to provide oral surgical care. So many have never had professional dental care in their lives and have little knowledge

En route to Bududuram Refugee Camp, the bus broke down. Dr. Libuser and other health care workers took the opportunity to distribute gifts to local children.

Penny, Hope and Kaijsa Rinstad, a pharmacy student from Sweden, relax for a moment following the first long day at Bududuram.

This 102-year-old man from the remote village of Oyebe exhibits a common dental problem.

of oral hygiene. As a result, many have dental problems far worse than is generally seen in Southern California and most parts of the U.S.

I stepped out of the bus into a large open area where the ground is cut by rain run-off into a multitude of corrugated rivulets. The earth had the texture of a living being; I felt its heat beneath my feet. I walked toward a woman standing outside one of the low, pale-green cement block buildings. A handsome woman with a round face, she had large dark eyes, and hair done up in tight, intricate, jet-black braids. She smiled and extended her warm hand in greeting as I approached. That was the first time I met Penny. Penny was assigned to help run the dental clinic at the camp. Her soft, sweet voice had a bit of "Brit" in her accent. After working with her over several days, she shared her story with me.

This woman, whose dress indicated she was from northern Ghana, shops at a local market.

Penny is Liberian. At age 31, she has lived at Bududuram for the past 13 years. In 1990, she lived in a village outside of Monrovia, the capitol of Liberia, with her mother, father and older brother. Her father was a high-ranking officer in the Liberian army. One night, when Penny was only 18 years old, rebels broke into the family home. They shot and killed her father and brother. She and her mother survived by diving out a window in an adjacent room just as the gunmen entered looking to kill them as well. Penny and her mother escaped into the bush that night, making their way out of Liberia under the cover of darkness, never to return. She explained to me rebels always seek to kill the entire family when eliminating military personnel so there will be no reprisals later. She knew what was coming the moment she heard the first gun shot and saw blood coming from her father's chest.

Penny showed me the building that was to serve as the Licohwa Dental Clinic. The masonry structure consisted of three rooms: a waiting room, a surgical room and a "sterilization room." Everything looked covered in a layer of dust and dirt even after it was wiped clean. The floor covering was cracked and peeled. Every once in a while I tripped over the curled up edge when I did not step carefully.

The staff of the dental clinic consisted of six wonderful people from Liberia. Twenty-nine-year-old Hope was one of them and he became my right hand in more ways than one. He was my dental assistant while I performed oral surgery. He was especially helpful when we had a particularly difficult extraction to perform such as broken, carious, curved rooted teeth, deeply imbedded in the jaw. An excellent assistant, he would suggest which instrument would be best in a particular situation, much like a caddy in golf. But most of all, he was wonderfully encouraging to me and to the patients and thus enabled me to treat many more people over the short time I was in the camp.

The conditions at Bududuram were far from ideal. There was no electricity in

MASH-like conditions in the dental clinic at Bududuram where scores of patients tolerated surgical procedures without complaint.

Three Liberian orphans, who became buddies after meeting at the refugee camp, flash smiles as they greet a visitor.

the dental clinic just as there was none in the rest of the camp. Natural light came from an open window and from my small battery-operated headlamp. There also was no means of suctioning the surgical site. I subsequently taught myself a technique without suction by using hundreds of gauze sponges to clean the field so I could see what I was doing.

Running water and plumbing were noticeably absent in the camp. Water was carried in buckets from a nearby lake. The water was polluted but it was all we had to clean the instruments. "Sterilization" was carried out with the use of a small propane burner and a pressure cooker.

My first day in the camp I was able to see only 10 patients. I was trying to do everything as I would have back home in my Marina del Rey office. But after a while, I learned how to use the instruments more efficiently without suction and thus able to pick up speed. By Day 4, I was able to treat nearly 50 patients per day. Some required extracting only one tooth, but most required multiple extractions of root fragments and cysts. Some impacted third molars, and partially exposed teeth with fragments left in the bone were quite a challenge without the benefit of X-rays, especially when all I had was a battery-operated dental engine to cut bone, and various elevators and forceps to tease the fragments to the surface. The name of the game under these "MASH-like" conditions was "visualize your field," actually or at least in your mind, then use leverage and as little muscle as possible because you know your last patient of the day invariably will be your most difficult of all.

In the cramped quarters of the surgical room, patients laid on a flat, sloping board, their heads placed against the windowsill in order to maximize the light from the open window. I supplemented this natural light with a "Walkabout" headlamp donated by the Orascoptic Company. I attached this light to my magnifying lenses. Both of these instruments were a godsend, allowing me to see details I would not have otherwise been able to see. With them, I was able to treat many more patients in a much shorter time than I would have had I not had them. While standing next to the open window, I occasionally felt a cool breeze waft into the room, making us all comment on how wonderful it felt. We took a deep breath, relished the heavenly feeling of its cooling effect, and dug in once again.

The low, flat corrugated metal ceiling made the room feel like an oven most of the time. The heat became stifling as the day wore on, with temperatures well over 100 degrees and humid. At times I thought I was losing my sight when sweat dripped from my forehead onto my glasses. I did not want to touch my face or glasses with my contaminated hands, so Hope periodically wiped away the sweat so I could see better.

We had shipped ahead more than five tons of medical supplies and gifts with the thought we would "hit the ground running," but these vital items had not yet arrived as of Day 8. Fortunately, our leaders anticipated this problem and suggested we each bring carry-on suitcases on the plane dedicat-

This four-year-old boy in central Ghana lost a leg to Buruli ulcers. His bandaged left knee also is severely damaged.

Each day, refugees swarmed our bus parked adjacent to the medical clinic at Bududuram.

Hope and Dr. Libuser work on a patient in the camp clinic.

ed to the most vital supplies and equipment. On our first day in the refugee camp, we only brought enough to get the job done for one day.

Most troubling was not having the benefit of dental X-rays prior to doing surgery on these wonderful people. Yes, I did have local anesthetic for them, and yes, I prescribed analgesics and antibiotics for them afterward. But before our shipment of dental supplies arrived, I had to use multi-dose bottles of local anesthetic with disposable syringes borrowed from the medical clinic. I felt terrible having to use those huge 18-gauge needles. It was like using telephone poles to administer anesthetic. But it was better than not using anything.

Over the past year, Project Africa had accumulated medical supplies and gifts from many sources. Many different companies and individuals generously contributed to our humanitarian project, including several of my patients back in Marina del Rey. We brought these items to Ghana to help provide medical and dental care to the people of Bududuram and other remote villages. Federal Express was extremely generous in donating the cost of shipping the huge quantity of materials. It would have cost us $38,000 in shipping alone. The supplies included more than $1 million worth of prescription drugs and pharmaceuticals sorely needed by doctors to treat their patients in rural hospitals and clinics throughout the country.

Allen Rice, owner of Multi-Pure — a company that manufacturers water purifiers for homes and offices — was extremely generous with his donation of 1,000 portable water filters. The people of Bududuram and many of the remote villages for the first time now have water that is safe to drink.

At Bududuram, the medical clinic was located about 100 yards across the compound from the dental clinic. The low, horizontal building, with large over-hanging eaves, had a Frank Lloyd Wright prairie-style look. Mud stains extended up the walls about two feet from the ground. These stains were from the torrents of downpours that periodically flood the camp during the rainy season, which I coincidentally was able to experience first hand.

The days our group worked in the camp were extremely busy with several hundred people wanting to be seen and not enough time to get to them all.

Because our time and resources were limited, both the medical and dental staffs established a triage system to select the most seriously ill patients from the hundreds seeking our care. We would see them first. A priority system was established with numbered cards given to each person. This way, we hoped to avoid chaos that might erupt into hostility and physical violence. Our support personnel were very valuable in this regard. Three high school girls — Amber, Heather and Ali — from Yucaipa, Calif., proved to be up to the task. They helped one of our nurses, fellow Yucaipa resident Vicky Sullivan, identify those most seriously ill. The young ladies also helped dispense drugs in the pharmacy. Through it all, they had an adventure of a lifetime.

One day a group of small children asked Ali and Amber if they had parents back home in America. When they answered "Yes," the children then asked if they had "two parents" back home. Ali and Amber again answered "Yes." The children were in awe since none of them had parents, and they knew of no one who had "two parents" still alive.

Many of the people in the camp had been living here at Bududuram for years. They had been exposed to unthinkable horrors before arriving from Liberia. With that, many developed a "survival of the fittest" approach. Some would try to get more than their fair share of medications prescribed by our doctors. So the system we set up had to prevent "double dipping," when patients would come back a second or third time, claiming they had not received their meds when they really had.

One morning at Bududuram, a young pregnant woman went into

labor. Under these less than sterile conditions, Dr. Margaret Pettigrew delivered a healthy baby girl as an audience of about 20 looked on. The baby would have had a hard time surviving without Dr. Pettigrew's help since the cord was wrapped around her neck. At the end of the day, both mother and daughter were doing just fine.

After I had been in Ghana for 14 days, our shipment of supplies arrived safely in the capital city of Accra. But that was only the beginning of our problems. Getting it through customs without having to pay duty took several days and a huge amount of "red tape" had to be "cut through" to free the meds. Ghana Airlines carried the supplies on the last leg of the journey, from London to Accra. However, even after Federal Express paid the airlines $13,000 on our behalf, with instructions to deliver the items to our location at Valley View University outside the capitol, the airline demanded an additional $600 "ransom" to release the supplies to us at the airport.

We had no choice but to pay the money, and we finally got the shipment. With these valuable items in hand, we made return visits to Bududuram, St. Martins Hospital in the north, a village clinic at Amrahia in the south, and several other villages and hospitals. We distributed thousands of medications, water filters, clothing and many other gifts. Everywhere we went, the people were very appreciative.

In Jewish tradition, there is a word used to describe a meritorious deed, an act of kindness. It is called a mitzvah. Many would say my friends and I of Project Africa performed a mitzvah. But the truth is, the people of Liberia and Ghana in these many villages and camps performed a mitzvah for me. I was able to use my skills as a dentist in a way I had only dreamed of, without the limitations and encumbrances of modern bureaucracy. I was able to help people in great pain without regard for compensation. I was able to practice dentistry in a way that affirmed the reason I chose dentistry in the first place. And as I helped these wonderful people, they gave me sincere friendship beyond price. This experience reaffirmed my belief that it is the responsibility of all dental professionals to give back to communities less fortunate. The more we give, the more meaningful life becomes.

As we left Bududuram for the last time, it was a sad moment. Yet, I am determined to return, since there is so much more to be done. As we departed, I looked back at the waving hands and countless beautiful smiles, and I could tell how these wonderful people felt about our having been there. CDA

Initial Licensure Examinations

The true reason dentists are judged incompetent is a question of morals and ethics.

Russell Anders, DDS

Morals and Ethics

I read with interest Dr. Dugoni's commentary in the November *CDA Journal* regarding protecting the public with initial licensure examinations. In this commentary, Dr. Dugoni postulates that only continued competency testing will protect the public and that there is no real need for an initial licensure examination. Additionally, Dr. Dugoni feels that an initial examination cannot guarantee protection of the public for the lifetime of a dentist's practice.

Dr. Dugoni has contributed greatly to our profession but in this instance, he is misguided. I have testified before the State Board of Dental Examiners in the past regarding this issue and have heard all the arguments favoring continued competency testing. None of these arguments has ever touched upon the underlying issue that affects a dentist's competency. It is **not** that a dentist who receives a license to practice dentistry in California does not know how best to do a certain procedure. It is **not** a matter of whether the school attended by a dentist has received an evaluation by the Commission on Dental Accreditation. It is **not** a question of whether the dean or faculty of a dental school can correctly assess the talents of a student dentist. It is **not** whether a dentist has passed Part I and Part II of the National Boards. All of these have been postulated by Dr. Dugoni as reasons to discontinue an initial licensure examination and replace it with some sort of continued competency testing.

As evidenced by the disciplinary actions taken by the State Board of Dental Examiners over the past 10-20 years, the true reason dentists are judged incompetent is a question of **morals and ethics**. It is beyond comprehension how either a dental school faculty, an initial licensure examination, or continued competency testing can **ever** assess a dentist's **morals and ethics**. If a dentist exhibits a pattern of practice that indicates, for instance, crowns that are not clinically acceptable are we to blame this dentist's inability to properly prepare and deliver crowns on his/her having not enough knowledge? Or not being well enough trained in dental school?

I venture to say there is not one dentist licensed in California who does not have the ability to differentiate between clinically acceptable dentistry and poor quality, shoddy dentistry. I fail to see how the public will be protected by subjecting all the dentists in the state to a regimen of so-called continued competency. This would paint all of us with the brush of incompetence that only a tiny minority deserve.

Dr. Dugoni eschews the initial licensure examination deeming it "archaic and indefensible." What is indefensible is assuming that continued competency testing will solve the underlying **moral and ethical** problems of some in our profession. At least an initial licensure examination can assess minimum clinical ability and over the past 80 years has done this job reasonably well. Because a testing procedure has been done for so long does not necessarily relegate such procedure to the "archaic" bin. The examination has changed over the years to mirror the changes in the practice of dentistry. It is not a "finger in the dike" to change the tests from time to time. Rather it is a head-in-the-sand approach to assume that continued competency testing will resolve the **moral and ethics** issue.

Much was said in his commentary regarding the costs associated with initial licensure examinations. It is important to realize that continued competency would entail tremendous costs to the practicing dentists. Not only will the courses be expensive (more than CE classes now), in

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addition there would be considerable time lost from practices. These will not be one-day courses. Proposals at the Board of Dental Examiners included forcing dentists to take a week away from their practices for didactic and clinical training.

Dr. Dugoni asked, "Are deans and faculty members dishonest and fraudulent when they certify competency with a doctorate in dentistry at graduation?" The mere fact that the majority of dentists disciplined by the Board are more recent graduates seems to answer this question. This is by no means a condemnation of dental school faculties. There is no litmus test that can be given to determine a person's character. It is not time away from school that produces incompetence. It is patently clear that a dentist's **morals and ethics** more than anything else determines the quality of dentistry being delivered.

Unfortunately I do not have a solution to solve the dilemma of some dentist's **morals and ethics**. Every profession has its share of incompetent people who do not adhere to standards known by them to be correct. Peer-review programs at the component level have shown that we are all fallible. Peer review committees routinely refer those dentists who continue to practice poor quality dentistry to the Board of Dental Examiners for pattern of practice issues. We, as a profession, have been diligent in attempting to identify problem dentists while at the same time protecting the public we serve. Establishing a continued competency regimen would be an undue burden on our profession that is ill advised. Those in the teaching community who propose to foist this upon us need to re-think the true causes of competency, or lack thereof, among our profession.

Russell Anders, DDS

Protection of the Public

Thank you for taking the time to read and respond to my commentary on Dr. Jack Conley's editorial with respect to initial licensure. I still contend that initial licensure examinations do not fulfill the mandate of protection of the public. It was has been stated by the Dental Board of California representatives that, protection of the public is the primary goal of the people who administer the examination.

In my article, besides continued competency, I also stated that the funds utilized to conduct initial licensure examinations would be better utilized by the dental board for **enforcement** and identification of individuals who are **practicing** at an inappropriate standard of care, or are guilty of various infractions of the state dental practice act. My concerns for initial licensure reform do not in any way indict the dedication and efforts of state and regional board examiners. They work industriously to carry out the process. My opposition is to initial licensure as **the** means to protect the public.

I agree that continued competency certainly would entail a great deal of planning by the profession as well as the Dental Board of California. Would you fly in an aircraft with a pilot who had taken an examination only at the completion of initial flight training but **never** again had to prove competency? I believe there are ways that continued competency can be evaluated without jeopardizing the individual's right to practice or earn a living, but as you mentioned in your letter, you cannot solve the dilemma of dentists whose morals and ethics are inappropriate, and I do not have the answers either.

Is it really a fact that the majority of dentists disciplined by the board are the more recent graduates? And if that is true, does that really reflect upon the faculty or does it reflect upon society's core values and the family environment? Have our core values drastically changed? Is there a different "measuring stick" for ethics and morality in today's world as evidenced by the actions of former President Clinton, Gov. Arnold Schwarzenegger, Enron's principals, Kobe Bryant, Scott Peterson, etc.? I do not think the lack of ethics or morality of some dental school graduates is a reflection of their faculty. Will initial licensure examinations guarantee morals and ethics of our graduates? No! Will continued competency guarantee morals and ethical conduct by practitioners? No!

The initial licensure examination does not discriminate between the bottom of the class or the top of the class. If Barry Bonds were to be elected into the Hall of Fame based upon what he did in the last playoffs, he would never get into the Hall of Fame. One "snapshot" examination in time cannot evaluate the competence of a practitioner, but I contend that the faculty who have evaluated a student for four years does understand their level of competence. Would they graduate incompetent people? I do not believe so because decisions are not made by a **single** faculty member, but by the associate deans in concert with all of the department chairs and course directors, and then approved by the dean. They are men and women of principle. It takes five stages for a practitioner to go from novice to expert and even at the end of graduate programs; we only develop safe beginners at the minimal level of competence. Students and residents go through the cycle from novice to beginner, to minimal competence in dental school or in graduate programs. Proficiency, through experience, comes five years later and the expert level is attained by some but not by all practitioners.

Something is wrong with the current

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I still contend that initial licensure examinations do not fulfill the mandate of protection of the public.

Arthur A. Dugoni, DDS, MSD

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system and it needs fixing. I realize we need to crawl before we can walk. After more than 40 years of debate, licensure by credential was finally achieved in California, but now we need to remove the five-year restriction. The next step is to develop an alternate path to licensure for graduates of specialty programs and graduate programs in general dentistry. I believe the safeguards can be attained for an alternate pathway to licensure by developing language in the legislation which states that individuals will have to have graduated from an accredited dental school, passed Part I and Part II of the National Board examinations, and be certified as competent by the faculty and the dean of their dental schools. It is doable.

In the future, maybe we can eliminate initial licensure in its current configuration. However, I still stand on my premise that initial licensure by itself does not protect the public. Adequate enforcement would protect the public. If substantial dollars were used to enforce the Dental Practice Act for individuals who practice below the standard of care, are guilty of sexual or immoral acts with patients, are practicing under the influence of drugs, alcohol, etc.,— that would protect the public.

Do you believe that HIPAA authorities would accept the fact that we use live patients as guinea pigs for clinical examinations? What can a dental board learn from initial licensure examinations that a dental school has not evaluated over and over again during the last two years with mock boards and proficiency and competency evaluations? What can one "snapshot" in time do that the Commission on Dental Accreditation has not done by its evaluation of dental schools? What can the initial licensure examinations learn that was not already evaluated on the National Boards? Are the deans and faculty of commission-approved dental schools frauds, incompetent, or dishonest when they certify initial competence at graduation? They do not certify proficiency or expert at graduation.

Thankfully, we now have licensure by credential in 44 states. Heavens to Betsy if an oral and maxillofacial surgeon has to move to a state without licensure by credential. Should they be tested on what they do every day on a live patient — disarticulate the maxilla from the cranium, remove cancers off the lip and the tongue? But, in order to protect the public if they move to a state that will not accept licensure by credential, they probably will have to do a root canal, a denture set up, a scaling, and a Class II amalgam or a composite resin. Protection of the public?

Licensure examinations and evaluations are in need of a major reform. I applaud the California Dental Association for taking the leadership to establish a task force to examine the potential for licensure reform and alternative pathways to licensure. From this, we will progress and improve our role as educators, practitioners, and licensing agencies who serve to protect the public.

Arthur A. Dugoni, DDS, MSD, dean and professor of orthodontics at School of Dentistry, University of the Pacific.

Illustration: Matt Mullin

CDA Defines Evidence-Based Dentistry

Note: *In 2002, the CDA House of Delegates ratified a resolution establishing an evidence-based dentistry (EBD) action plan that included the formation of a task force to recommend to the Board of Trustees and then implement programs related to evidence-based dentistry. The task force — made up of a membership of James Freed, DDS; Emilio Garcia, Jr., DDS; Raymond Pedersen, DDS; Michael Perry, DDS; and chaired by Richard Kao, DDS, PhD — met last fall to establish a definition of evidence-based dentistry for CDA, establish recommendations to monitor EBD efforts within the Association, and to suggest elements of a communication effort on EBD among CDA's membership. This article, the first in a series, is a conversation with Dr. Kao on the nature and significance of the evidence-based dentistry definition adopted by the task force.*

Q. What is EBD?

A. The CDA Task Force on Evidence-Based Dentistry recommends a definition drawn from the "Oral Health in America" report by the U.S. Surgeon General, and which is philosophically consistent with EBD as defined by the American Dental Association.

Evidence-based dental practice is the integration of an individual practitioner's

In a dental practice that incorporates an evidence-based approach, the practitioner's expertise is first and foremost in deciding the course of treatment .

experience and expertise, with a critical appraisal of relevant best available external clinical evidence from systematic research, and with consideration of the patient's needs and preferences.

Q. Why does the definition of EBD adopted by the CDA task force include three elements — practioner's expertise, clinical evidence from systematic research, and the patient's needs and preferences?

A. The definition the task force adopted emphasizes the importance of a dentist's expertise and clinical judgment, relevant clinical evidence from research, and the informed patient's preference. In a dental practice that incorporates an evidence-based approach, the practitioner's expertise is first and foremost in deciding the course of treatment since it is the clinician's responsibility to consider all three components in defining the ideal evidence-based course of treatment. Evidence-based treatment can be characterized as the ideal intersection of these three elements.

Q. Why is it important for organized dentistry — in this case, CDA — to promote a definition of EBD?

A. EBD is a popular and frequently used phrase, but its use can be easily abused. The development of clinical practice guidelines is one of the intended outcomes of EBD. Unfortunately, the EBD approach to clinical dentistry is a relatively young discipline and overemphasizing certain aspects — notably the clinical research — can misrepresent an evidence-based approach to dentistry.

The profession has a voluminous amount of literature on a variety of treatment-related subjects, but it is often unclear what journal articles constitute good science or "junk" science. Giving priority solely to the research evidence while disavowing other elements can result in "warped" clinical guidelines.

Added to this problem is that many studies lack consideration of the long-termed outcome, an evaluation of patient satisfaction, and excludes the patient from making an informed decision.

This "tunnel vision" approach under the guise of EBD can easily happen in the marketing of dental products, and in third-party benefit assignment policies. Developers and marketers of new dental apparatus can use selected "research" to highlight their products while ignoring other research evidences. Dental benefit providers can favor "evidence" which justifies restricting payments for certain dental procedures.

To prevent potential abuses, it is important for CDA to promote the concept of EBD, since only the practitioner is capable of integrating valuable clinical expertise and the wishes of the patient with relevant research findings.

Q. Isn't the monitoring of dental research journals, the review of all relevant research, and implementation of current findings into one's practice rather problematic for the average dentist? Also, how is the integration of current science and procedures best accomplished by the practicing dentist?

A. As mentioned previously, there is a voluminous amount of dental research articles published each year. It is estimated that approximately 12,000 dental research articles were published in 2002, and that number will increase in the coming years. This is complicated by the fact that some journal articles are not peer-reviewed, are multiple versions of the same study, and may have flaws in both scientific research design and interpretations. Some published reviews may also be flawed by the manner in which the research studies are compared and filtered to the readership.

How can clinicians make sense out of the quagmire? CDA encourages its members to diligently seek out journals that provide reasonable reviews of the literature.

Dr. Richard Kao is a practicing periodontist in Cupertino, Calif., and is chair of the Council on Dental Research and Developments. *Dr. Kao acknowledges Drs. James Freed, Emilio Garcia, and Raymond Pedersen, and CDA staff Teresa Pichay and Greg Alterton for their assistance.*

Golden State Program Snuffing Cigarette Sales

California has been ranked among the top four states for effective tobacco-control programs in the country.

According to a study in last September's issue of *Journal of Health Economics*, states that spent more than the national average on comprehensive tobacco-control programs demonstrated a notable decline in cigarette sales compared to states with average program funding.

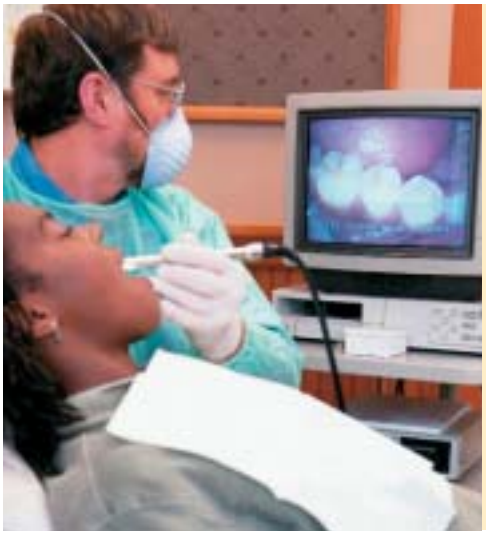
The first study to include cigarette sales data from all states, including excise taxes, found that California, Arizona, Oregon and Massachusetts, fell an average of 43 percent as opposed to 20 percent for the remaining states.

"Although we've seen improvements in preventing and controlling tobacco use, smoking remains the leading cause of preventable death and disease in our nation," said Julie Gerberding, MD, Centers for Disease Control and Prevention director. "This study provides our clearest evidence to date that tobacco control programs are an excellent investment in public health."

Effective state-based programs, according to the CDC's Best Practices for Comprehensive Tobacco Control Programs outline, include several components: cessation programs including telephone quitlines; community and school programs and policies; counter-marketing campaigns; program evaluation and monitoring; management and staffing.

While the CDC's minimum recommended average per capita funding for tobacco control was $5.98, the overall average was $1.22.

"States received unprecedented funds from the 1998 Master Settlement Agreement, but in many states these funds have been used for competing needs," said Terry Pechacek, PhD, the CDC's lead scientist for the study. "These new data show that robust tobacco control programs prevent and reduce tobacco use and protect people from exposure to second-hand smoke."



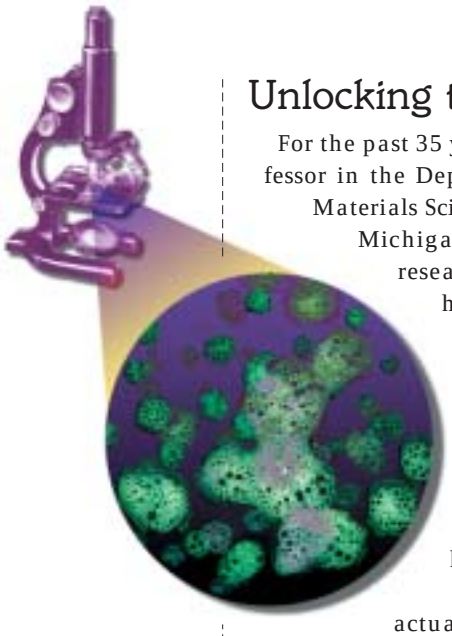
Cameras Can Assist in Case Presentations

The use of extra-oral cameras may help dentists better inform their patients during case presentations, resulting in higher acceptance rates among their patients.

In *Dental Practice Management*, published last summer, John Jameson said studies show that during the communications process only 11 percent is understood verbally by the patient. But when dentists used a monitor to show patients their conditions and proposed treatment, the rate of patient comprehension increased up to 83 percent.

According to Jameson, utilizing this technology makes significant strides in case acceptance, particularly when patients have a disease but downgrade the need for treatment because they currently are not feeling any discomfort.

Jameson also noted that the biggest change in technology related to dentistry has been the ability to use all available technologies and link them to patient records. Dentists interested in integrating this technology in their practice begin by investing in a quality extra-oral digital camera, and using the camera into the entire system of the practice. Jameson said the technology has to be a routine step for every new patient for a comprehensive oral examination or returning hygienic patient diagnosed but who has not yet completed treatment



Unlocking the Secret of Resistant Bacteria

For the past 35 years, Don Clewell, a professor in the Department of Biologic and Materials Sciences at the University of Michigan Dental School, has researched bacteria cells. He hopes to one day answer what causes them to resist and even emerge when an antibiotic is present. That answer may affect how pharmaceutical companies develop antibiotics and how patients are treated.

"Certain bacteria are actually producers of many antibiotics that are useful in fighting other bacteria that are present in the environment as part of the constant competition for nutrients," said Clewell in *DentalUM* published last spring.

An estimated 10,000 bacteria species can be found in one gram of soil, he said. Additionally, the human intestine alone can carry up to a thousand species, and Clewell said, the number of bacteria in and on the human body exceeds the number of human cells that make up an individual (more than 100 trillion).

The good news is most of these are harmless, Clewell said.

Clewell's research is focused on the bacteria known as *Enterococcus faecalis*, which typically is carried in the intestine but at times cause urinary tract and blood infections (bacteremia), and endocarditis. The bacteria also may dwell in the oral cavity and often are connected to root canal infections.

The bacteria patients and their dentists most encounter are primary components of dental plaque. At least five other bacterias are associated with periodontal disease, while similar species cause caries.

Clewell said bacteria "wars" have gone on for millions of years. "The emergence of resistance genes has paralleled the process, since they are necessary to protect the antibiotic producers from self-destruction."

The Role of Dentists in Treating Diabetic Patients

The complications of diabetes mellitus range from xerostomia (dry mouth); high susceptibility to bacterial, fungal and viral infections (oral candidiasis); increased incidence of caries, periodontal disease and gingivitis; taste impairment; burning mouth syndrome; periodontal disease; as well as poor wound healing.

This is why, Anthony T. Vernillo, DDS, PhD, said in *Global Health Nexus*, a dentist can play a major role in managing the diabetic patient. *Nexus* is a publication of New York University College of Dentistry.

The dentist, along with the patient's nutritionist and physician, can assist in controlling the patient's diabetes through prevention, Vernillo said. In addition to motivating the patient to carefully monitor one's blood sugar level — which is critical in potentially delaying or preventing the advancement of systemic complications —the dentist can purchase a glucometer for their practice, Vernillo recommended. Testing a patient's blood sugar, especially those who have a family history of the disease or those exhibiting signs of diabetes mellitus, is a public service.

Vernillo further suggested that dentists teach their diabetic patients about oral hygiene, ranging from proper flossing and brushing following every meal, to behavior modification such as discontinuing tobacco use. Smokers, Vernillo said, are five times more likely than their non-smoking counterparts to have gingivitis and therefore, dentists can recommend smoking cessation programs and provide follow-up and support.

Scorpion Venom May Hold Key to Stemming Bone Loss

A component in scorpion venom has been shown to stop bone loss in an advanced periodontal disease model. That's good news to more than the one-quarter of American residents over the age of 30 who have periodontal disease involving teeth or bone loss, the National Institute for Dental and Cranial Research said.

Additionally, an estimated 21 million people in the U.S. suffer from osteoarthritis and 2.1 million have rheumatoid arthritis, according to a 1998 study from the Arthritis Foundation. Scientists are encouraged that the component of scorpion venom, kaliotoxin, may help people afflicted with those inflammatory diseases.

"We are very excited because this is the first demonstration that this type of compound (called a potassium channel blocker) may be useful in treating periodontal disease," said Martin Taubman, DDS, PhD, chair of the Forsyth Institute's Department of Immunology lab where the study was conducted. "We hope that our findings will lead to success in alleviating the bone-ravaging effects of many other diseases."

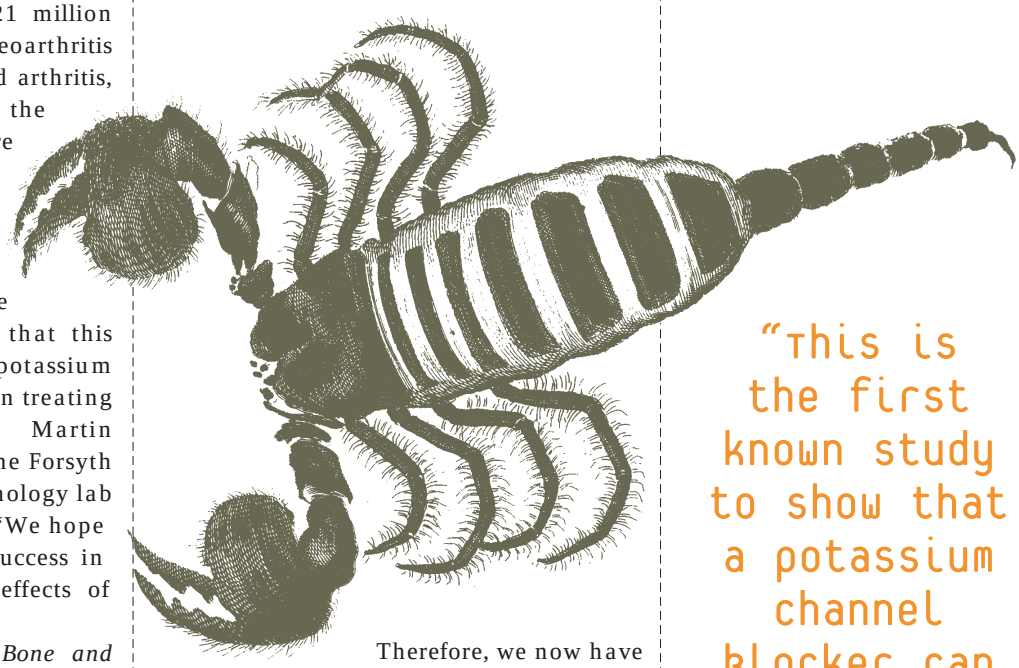
In the January *Journal of Bone and Mineral Research*, Forsyth scientists said they induced the bone loss component of periodontal disease in rats. They then injected one group of the rats with kaliotoxin. Ten days later, the injected rats exhibited 84 percent less alveolar bone loss than those rats that did not have the injection.

Paloma Valverde, PhD, principal investigator, said kaliotoxin modulates inflammatory bone resorption by blocking the protein Kv1.3, a potassium channel involved with inflammation.

"Kaliotoxin decreases the expression of RANKL, a protein expressed on the surface of memory/activated T cells, which are present at high levels in periodontal disease," said Valverde.

RANKL is prominent in inducing bone cells (called osteoclasts) to destroy bone. Therefore, potassium channel blockers or kaliotoxin targeting Kv1.3 could stem bone resorption.

"This is the first known study to show that a potassium channel blocker can decrease alveolar bone loss," said Valverde. "Furthermore, we observed no toxic effects.



Therefore, we now have a novel and apparently safe strategy to ameliorate bone destruction associated with periodontal disease. We expect that kaliotoxin and other Kv1.3 blockers can also be used to prevent bone destruction in other inflammatory bone resorptive disorders such as osteo- and rheumatoid arthritis."

The J.W. Hein Fellowship at The Forsyth Institute and the National Institute of Dental and Craniofacial Research funded the study. Currently, other scientists are studying other components of scorpion venom for potential uses in treating autoimmune diseases ranging from various cancers, heart disease, lupus, multiple sclerosis, and stroke.

> "This is the first known study to show that a potassium channel blocker can decrease alveolar bone loss."
>
> PALOMA VALVERDE, PhD

"To achieve this good balance, we need input from practicing dentists as the primary users of amalgam separator products."

DR. FREDERICK EICHMILLER

Volunteers Needed to Help ADA Standards Group

Practicing dentists are needed to assist the ADA Standards Committee on Dental Products in establishing an American National Standard for instruments that separate amalgam particles from dental wastewater.

"The consensus process must have representation from industry, government regulators, academia and the profession," said group chair Dr. Frederick Eichmiller, director of the ADA's Paffenbarger Research Center. "To achieve this good balance, we need input from practicing dentists as the primary users of amalgam separator products."

Whether an observer of the working group or as a participant, ADA member dentists will collaborate with other parties toward creating an ANSI/ADA standard by assessing the current international norms on amalgam separators (ISO 11143). Providing expertise on the standards process will be the ADA Council on Scientific Affairs.

For more information, contact Dr. Eichmiller, frederick.eichmiller@nist.gov, or Sharon Stanford, Standards Administration director, (800) 621-8099, ext. 2509.

Upcoming Meetings

2004

March 2-3	Academy of Laser Dentistry Certification Program, Standard Proficiency and Advanced Proficiency, Palm Springs, (954) 346-3776, www.laserdentistry.org.
March 3-6	Academy of Laser Dentistry 11th Annual Conference, Palm Springs, (954) 346-3776, www.laserdentistry.org.
March 5-8	Academy of Laser Dentistry 10th Anniversary Conference and Exhibition, Destin, Fla., (954) 346-3776, www.laserdentistry.org.
March 10-13	International Association for Dental Research's 83rd general session and exhibition (also 33rd annual meeting of the American Association for Dental Research and the 28th annual meeting of the Canadian Association for Dental Research), Honolulu, Hawaii, (703) 299-8094, www.dentalresearch.org.
April 15-18	CDA Spring Scientific Session, Anaheim, (866) CDA-MEMBER (232-6362).
April 27-May 2	American Academy of Cosmetic Dentistry's 20th annual Scientific Session, Vancouver, British Columbia, www.aacd.com.
June 24-26	ADA 18th annual New Dentist Conference, San Diego, (312) 440-2779, www.ada.org/goto/newdentconf
Sept. 8-11	International Federation of Endodontic Association's sixth Endodontic World Congress, Brisbane, Queensland, Australia, www.ifea2004.im.com.au.
Sept. 10-12	CDA Fall Scientific Session, San Francisco, (866) CDA-MEMBER (232-6362).
Sept. 30-Oct. 3	ADA Annual Session, Orlando, Fla., (312) 440-2500.

To have an event included on this list of nonprofit association meetings, please send the information to Upcoming Meetings, *CDA Journal,* P.O. Box 13749, Sacramento, CA 95853 or fax the information to (916) 554-5962.

Historians Par Excellence

Jack F. Conley, DDS

We have been extended a brief opportunity this month to gain insight into the accomplishments of a few individuals who have had a significant impact on this profession.

Once upon a time, the history of dentistry and the dental profession was an integral part of every dental curriculum. In many instances, such a course was 15 or more hours in length and occupied a semester during the freshman year.

Our purpose here is not to debate the void we feel exists as fewer young dentists have experienced the opportunity to spend time during their curriculum to review some of the significant events that have helped to shape the dental profession. However, we have been extended a brief opportunity this month to gain insight into the accomplishments of a few individuals who have had a significant impact on this profession.

This "opportunity" comes to us compliments of two very fine dental historians whose contributions have graced the pages of this journal before. Malvin Ring and Clifton Dummett have each contributed a great deal to the understanding of the history of our profession as a result of their untiring efforts to provide interesting and thought-provoking accounts of individuals who have played an important role in the development of the profession. Among the many outstanding contributions to the literature by Dr. Ring was his well-illustrated text entitled, *Dentistry: An Illustrated History*. Dr. Dummett has published many texts of note including *The Hillenbrand Era* and a history of his alma mater, Northwestern University. We have always considered it an honor to receive their contributions to this publication and it is with pride we present their most recent articles to the readership.

As he has done in some previous contributions, Malvin Ring researches and finds what to most of us is probably a little known and on the surface seemingly insignificant fact or person. When his book was published in the year 1521, Niccolo Tomeo, a Renaissance scholar, may have had only a remote connection to the development of dentistry. However, we found Ring's description of how Tomeo illustrated the fourth of Aristotle's rules of motion fascinating, to say the least.

Clifton Dummett on the other hand, does what he always does so well. He offers his insights into individuals and events that have influenced the development of the dental profession in the United States. Without asking him, we suspect that most, if not all of the Callahan Award honorees that Dr. Dummett profiles in his article, were personally known to him, making his comments particularly insightful.

These two dental authors are special. We thank them for keeping our link to dentistry's history alive. That is most important as dentistry is propelled with even greater speed into the changes and modifications it will experience in the 21st century.

And to Dr. Dummett, our colleague and past president of the Los Angeles Dental Society, who is the 2003 recipient of the Callahan Award, we extend our heartiest of congratulations! CDA

The First Picture of a Dental Forceps in a Printed Book

Malvin E. Ring, DDS, MLS, FACD

Abstract

Niccolo Leonico Tomeo authored numerous volumes on a variety of themes, and was principally responsible for reintroducing the works of Aristotle in the original Greek. In one of Tomeo's works, he included a picture of forceps holding an extracted tooth. This was the first time a forceps was pictured in a printed book.

The invention of printing in Europe, using movable type, is credited to Johann Gutenberg who published the first printed Bible in 1455. Just 70 years later, there appeared a book which contained the very first printed picture of a dental forceps. Surprisingly, it was not a book on dentistry! It was the work of the Renaissance scholar, philosopher and Aristotelian, Niccolo Leonico Tomeo, (**Figure 1**) and was published by Bernardinius Vitalis in Venice in February 1525. The author, since 1497 a professor of philosophy at Padua University, set out to explain some of the theories of the great Greek philosopher-cum-scientist, Aristotle.

Leonico Tomeo was born in 1456 or 1457 and died in March of either 1531 or 1533. He authored numerous volumes on a variety of themes, his last work *De Varia Historia, Libri Tres* published in Venice in 1531, shortly before his death. He was an author of extraordinary beauty and style, and was principally responsible for reintroducing the works of Aristotle in the original Greek. As a result of Tomeo's writings, new attention was paid to Aristotle and a whole era of academic study of his works was opened.

Tomeo's Work on Aristotle

Aristotle, (**Figure 2**) whose major writings date from about 350 B.C., is thought to have authored more than 150 philosophical treatises; only 30 of which have survived to our day. They cover an enormous field of philosophical problems, ranging from biology (he is called "The Father of Biology") to physics, morals, ethics, esthetics, and politics.

In the Middle Ages, leading scholars such as Pico della Mirandola and Francesco Piccolomini, as well as Tomeo — all of whom studied at Padua — enthusiastically endorsed Aristotle's theories. However, with the coming of the Renaissance, key scholars such as Francis Bacon, Erasmus, Thomas More, and Galileo challenged Aristotle's theories. Aristotle differed

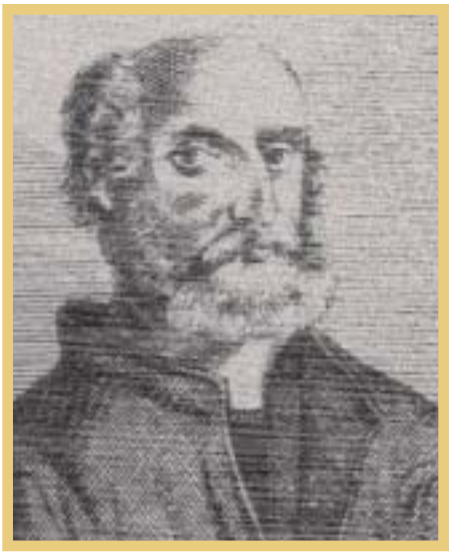


Figure 1. Niccolo Leonico Tomeo (1457-1533?)

Author / Malvin E. Ring, DDS, MLS, FACD, is the author of *Dentistry: An Illustrated History*. He practiced dentistry for more than 30 years in Batavia, NY

Acknowledgement / The author wishes to thank Howard M. Rootenberg of B. & L. Rootenberg Rare Books and Manuscripts, Sherman Oaks, Calif., for making available to me the Tomeo book for study.

from the more modern thinkers in his belief that the universe never had a beginning, would never change and would never end. To him it was finite. But to Isaac Newton, the cosmos was fundamentally different; it was open, differentiated and infinite. And when Copernicus brought forth his theory that the earth and planets circled the sun, Aristotle's universe was overthrown forever.

Tomeo's Elucidation of Aristotle's Theory of Motion

One of Aristotle's most well-known works was his treatise *Meteorology*. Today the word refers to the study of the weather, but Aristotle meant it in a broader sense, using it to discuss the nature of the earth. The book, which is the subject of this paper, is *Opuscula Nuper in Lucem Aedita*, (**Figure 3**) and whose title self-effacingly characterizes the book as only a "little work." Included in this work by Tomeo is one of the earliest printed commentaries on Plato's work, *Timaeus*, which dealt with his beliefs on the nature of phenomena including physiology, nutrition, disease and locomotion. Plato was Aristotle's teacher and thus many of the teacher's doctrines were further examined by the pupil.

Aristotle had an overriding interest in physics. He wrote extensively on various aspects of the field and dealt at length with what he regarded as the laws of motion. He enunciated four basic rules regarding motion:

- Motion which affects the substance of a thing
- Motion which brings about a change in the quality of a thing
- Motion which brings about changes in quantity
- Motion which brings about locomotion, or change of place

The last of the four he considered the most important. So Tomeo set out to clearly define what Aristotle was speaking of. And to illustrate the fourth of Aristotle's rules of motion — that which brings about change of place — used the example of a tooth being extracted from its bony socket. "Why can doctors more easily pull out teeth

Figure 2. Aristotle pictured on a modern Greek postage stamp.

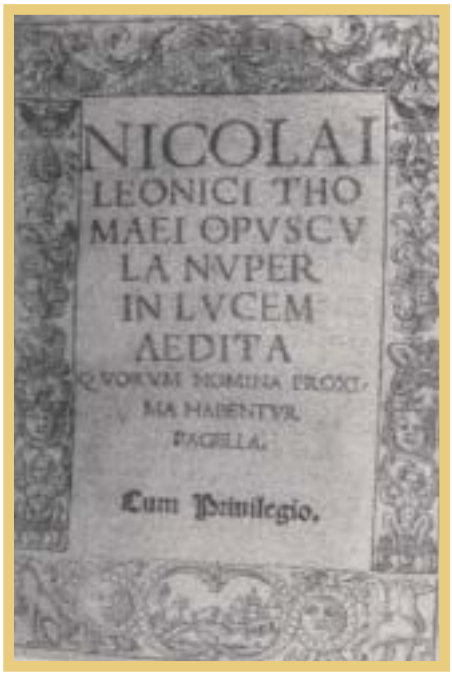

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Figure 3. Title page of Tomeo's work which he calls a "little work."

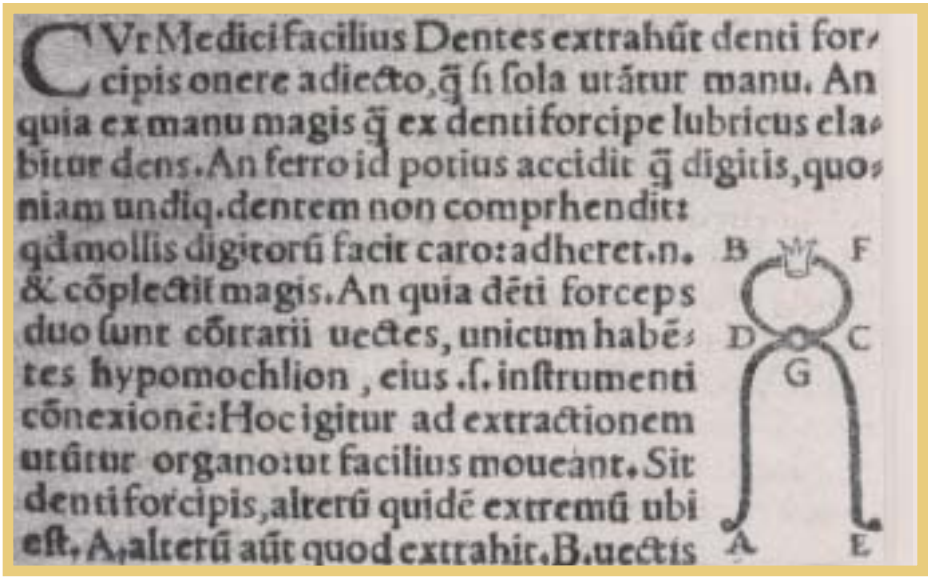
CVr Medici facilius Dentes extrahũt denti forcipis onere adiecto, q̃ si sola utãtur manu. An quia ex manu magis q̃ ex denti forcipe lubricus elabitur dens. An ferro id potius accidit q̃ digitis, quoniam undiq. dentem non comprhendit: qd mollis digitorũ facit caro: adheret. n. & cõplectit magis. An quia dẽti forceps duo sunt cõtrarii uectes, unicum habẽtes hypomochlion, eius .s. instrumenti cõnexionẽ: Hoc igitur ad extractionem utũtur organo: ut facilius moueant. Sit denti forcipis, alterũ quidẽ extremũ ubi est. A, alterũ aũt quod extrahit. B. uectis
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Figure 4. A portion of a page from Tomeo's book with the first printed picture of a dental forceps.

with forceps, than with the hand alone?" he asked and went on to discuss how the leverage action of the forceps added to the mechanical force needed to move the tooth.

To illustrate this he included in his treatise a picture of a forceps holding, in its beaks, an extracted tooth. (**Figure 4**) This is the very first time a forceps was pictured in a printed book. Paintings of forceps are ubiquitous, especially in the thousands of pictures of St. Apollonia, the patron saint of dentists and toothache sufferers. In the church of San Giacomo, near Spoleto, Italy, is a fresco of St. Apollonia, patroness of the church, by the artist G. Spagna. This however was painted a year after Tomeo's book was published. The great French miniaturist portrayed St. Apollonia — as the subject of a Miracle Play of the Middle Ages — in the beautiful manuscript *Book of Hours of Estienne Chevalier*, which was a highlight of the manuscript art of the 15th century. But as far as a picture in a printed book is concerned, a search has turned up none earlier than Tomeo's work. Even the *Artzney Buchlein*, the first book devoted entirely to dentistry, wasn't published till five years after Tomeo's work.

Thus a work dealing with a resurrected study of aspects of the universe by an ancient Greek philosopher who had lived two millennia before, serendipitously gives us the first printed picture of a tooth extraction forceps. CDA

To request a printed copy of this article, please contact / Malvin Ring, DDS, MLS, FACD, 2 Roby Drive, Rochester, N.Y., 14618.

In the Name of Dr. John Ross Callahan

Clifton O. Dummett, DDS

Abstract

A look back at the original National Dental Association, illustrious researcher Dr. John Ross Callahan and some of the distinguished award recipients who exemplified his dedicated spirit.

Sixty-five years ago, as a dental student at Northwestern University Dental School, I first learned about Dr. John Ross Callahan's work from my beloved teacher, Dr. Edward Howard Hatton, erudite medical professor of pathology and bacteriology. He was the Callahan honoree in 1941. Dr. Robert Phelps' notification about this Callahan Award on July 12, 2001, included a brief biography of Dr. Callahan and a list of distinguished recipients of the Callahan Award over the past 81 years. Parts of the Callahan history were familiar, and among the list of former awardees were many names that recalled cherished personal relationships.

The brief biography mentioned Dr. Callahan's researches in dental pulp diseases that included papers on chloropercha as an endodontic filling material. Also cited was his profound interest and membership in the Scientific Foundation and Research Commission of the National Dental Association.[1] Inasmuch as there have been two "National Dental Associations," this reference refers to the original organization formed more than 100 years ago in 1897, and it must be differentiated from the National Dental Association of today (NDA II). The evolution of this title and the social history embedded in it reveal an interesting facet of dental history.

NDA I and NDA II

In 1859, the American Dental Association was established. Ten years later, a smaller Southern Dental Association was formed in 1869. These two principal groups mirrored in dentistry the antagonisms emanating from the War Between the States. Eventually in 1897, a merger of the two formed an all-inclusive body called the National Dental Association. The amalgamation held fast until 1913 when internal reorganization occurred. Finally, in 1922, the name "National Dental Association" was discarded in favor of the title "American Dental Association" that initially had been the name of the larger group of dentists.

Neither the so-called "American" nor "National" dental associations of that time fully represented all American dentists, because the dental profession was held hostage to the prevailing customs throughout the nation regarding racial distinctions in membership acceptance. African American dentists were not welcomed into local and national organizations. Thus, to secure scientific, professional and social outlets, a number of small minority societies came into being.

Founded in 1913, the Interstate Dental Association[2] was, by 1922, the single multi-regional organization of African American dentists. It grew to respectable proportions with participants primarily from the southeastern states, and in 1932 the Interstate applied for the title "National Dental Association," a name vacated 10 years previously. The application was granted and a second National Dental Association was born to represent the nation's African American dentists, and it continues to serve the minority population.

Dentistry's Moses

Dr. Callahan was an active participant in the affairs of NDA I, the organization that founded the Research Institute of the National Dental Association.[3] Articles of Incorporation were signed on June 24, 1915, in Cleveland, Ohio. The

Author / Clifton O. Dummett, DDS, is a distinguished professor emeritus, University of Southern California School of Dentistry, Los Angeles. He received the Callahan Award of the Ohio State Dental Association in September 2003.

moving force behind the Institute was Cleveland's Dr. Weston Price who subsequently became the 1931 Callahan honoree. Dr. Price was ably supported by NDA President Dr. Thomas P. Hinman of Atlanta, Ga., serving together on the executive board of the commission as chairman and vice chairman.

In 1915, Drs. Callahan and Percy Howe of Boston were the only dental research investigators to receive special research grants from the Institute. (Dr. Howe became the Callahan honoree in 1926.) Firmly convinced of the value of scientific dental research, Callahan fully endorsed the concept and conduct of the Institute assessed thusly in an April 1917 editorial[4] in the *Journal NDA*:

> "The Moses that is to lead the dental profession out of the scientific wilderness and into the light of scientific truths was born with the inception of the Research Institute. However, if this Moses is to lead us out of Egypt and over the Red Sea of difficulties into the land of true scientific attainment, it must be thoroughly established on a permanent financial basis."

Dr. Callahan's death the following year in 1918 at age 65 occurred while he was still an active member of the Ohio State Dental Society Board of Directors, and was busily engaged in his researches with the NDA Research Institute.

Dissolution of the Research Institute in 1920 was a special moment in American dental history. Relations between the Institute and parent NDA were fragile, and NDA financial support was less than adequate.[5] General lack of appreciation regarding the importance of scientific research to dentistry's advancement as a credible health profession hastened the demise of the Research Institute. The National Dental Association acknowledged it did not possess the managerial instruments and finances required to adequately create, direct and maintain a Research Institute. Nevertheless, furrows in a complex landscape had been opened and seeds had been sown that would bode well for dentistry's future. Stepping into this void were *The Journal of Dental Research*, originated in 1919 and the International Association for Dental Research established in 1920.

Callahan Memorial Awards

In 1920, the Ohio State Dental Society decided to perpetuate the memory of its illustrious researcher by initiating the Callahan Memorial Award Commission.[6-8] This confluence of dental historical events culminated in an annual procession of dental luminaries befittingly memorialized as recipients of the prestigious decoration "In the Name of Dr. John Ross Callahan." Until 2003, all recipients were male, a situation that will be remedied with the first female honoree in 2004.

"If this Moses is to lead us out of Egypt and over the Red Sea of difficulties into the land of true scientific attainment, it must be thoroughly established on a permanent financial basis."

The roster of designees contains general practitioners, dental specialists, teachers, researchers, public healthers, administrators, journalists, authors, historians, editors, dental deans, university presidents, vice presidents for health and medical affairs, foundation presidents, and high-ranking officers of dental industrial and pharmaceutical institutions. Among this roster of distinguished Callahan honorees, I have selected seven over the last 35 years who exemplify the variety of disciplines represented in the list of awardees. They are individuals whose scientific contributions to dentistry's professional advancements would have received Dr. Callahan's full approval and gratitude.

During the mid-1900s, Ralph Wilbur Phillips,[9,10] of Indiana University, the 1968 Callahan honoree, was highly respected by dental researchers and educators. In addition to being among the profession's most admired dental pedagogues, he helped develop the physics of dental materials into a formidable scientific specialty. His abilities and devotion to dental research would have received Dr. Callahan's approbation.

Maynard Kiplinger Hine of Indianapolis was selected by the commission as the 1974 honoree, thereby again, adding luster to Indiana University. Always benevolent and approachable, Maynard Hine was one of the nation's most beloved dentists. During his lifetime, he received every outstanding award in American dentistry. It was, however, in academic administration that he excelled, becoming Indiana's dental dean at a young age, and eventually achieving the rare distinction of being chancellor of Indiana/Purdue Universities in Indianapolis.

David Walter Cohen, the 1993 Callahan honoree, was university professor, expert clinician, periodontal researcher and dental dean of the University of Pennsylvania.[11] A cultured gentleman, diplomat and brilliant administrator, Walter Cohen belongs to a select club of superior dental administrators who were elevated to the highest academic offices in the land. He became president of the Medical College of Pennsylvania and then, chancellor of Allegheny University of Health Sciences.

Paul M. Flory, manager of professional services at the world-renowned Procter & Gamble Company in Cincinnati, Ohio, was the 1994 recipient of the Callahan award. During his 22 years as an able administrator in the dental products industry, Paul Flory was highly effective in directing professional dental research affairs, and spreading the gospel

of caries control and prevention via Crest dentifrice. Included, as one of his dental consultants was chairman of the Callahan Awards Committee and ODA past president Jack Gottschalk who along with fellow consultants under Flory's expert tutelage learned about industrial promotion of public school dental health education and preventive oral habits, especially among America's impoverished children and adolescents.

The decade of the '70s closed with Joseph Francis Volker of Birmingham, Ala., as the 1979 Callahan awardee. One of modern dentistry's premier architects of interdisciplinary health professional education, he began his career as a dental researcher, was appointed dental dean of Tufts University, Boston, Mass., and later, founding dental dean of the University of Alabama. A competent and practical visionary, Joe Volker moved steadily up the administrative hierarchy. He was designated director of research and graduate studies; vice president for health affairs; executive vice president of the University of Alabama at Birmingham; president of the University of Alabama at Birmingham; and finally, chancellor of the University of Alabama system. His genius as educator, administrator, scientist and humanitarian rendered him effective in promoting policies, and precluding partisan polemics.[12,13] He was resolute in his dedication to fairness, honor and justice, a characteristic faithfully emulated by one of his highly esteemed students, the personable Charles A. MacCallum, MD, DMD, eminent oral and maxillo-facial surgeon, the 1990 Callahan recipient who succeeded Volker as dental dean and ultimately became University of Alabama president.

The 1969 Callahan honoree was the incomparable Harold Hillenbrand[14] of Chicago. No person in history has done more to engender genuine world respect for American dental education, research, practice and health administration. Hillenbrand's innumerable contributions are firmly etched in our collective memories, although experienced dental professionals may extol the magnificent ADA Building at 211 East Chicago Avenue as "Harold's building, his monument, his testimonial." All dentists are eternally beholden to him for the legacy of respect our profession enjoys as a reputable health services occupation. **CDA**

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The Case Against One-Shot Testing for Initial Dental Licensure

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ABSTRACT

High-stakes testing are expected to meet standards for cost-effectiveness, fairness, transparency, high reliability, and high validity. It is questionable whether initial licensure examinations in dentistry meet such standards. Decades of piecemeal adjustments in the system have resulted in limited improvement. The essential flaw in the system is reliance on a one-shot sample of a small segment of the skills, understanding, and supporting values needed for today's professional practice of dentistry. The "snapshot" approach to testing produces inherently substandard levels of reliability and validity. A three-step alternative is proposed: boards should (1) define the competencies required of beginning practitioners, (2) establish the psychometric standards needed to make defensible judgments about candidates, and (3) base licensure decisions only on portfolios of evidence that test for defined competencies at established levels of quality.

Much of the current licensing examination system is driven by tradition and efforts to keep it in operation have been piecemeal rather than grounded in a comprehensive understanding of its purpose or standards prevailing in other licensure communities. It is the result of a political process rather than based on psychometric or other rational principles.

Initial dental licensure examinations are examples of what is known in the assessment community as "high-stakes performance assessment."[1,2] For the public and the candidate, a great deal rides on a moment in time and a small sample of performance. Such testing is used regularly and effectively for the civil service, drivers' licenses, admission to college, and for professions such as medicine.[3-6]



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Table 1

Standards for High-Stakes Testing

Standard	Quality of Initial Licensure Examinations in Dentistry
Cost effectiveness *(Higher net contribution to society than alternatives)*	States lack resources, resources diverted from enforcement Potential high rate of false positives — incompetents licensed Unprofessional culture of hassle for recent graduates As much as a year's lost income for 15 percent of recent graduates
Fairness *(Decisions based only competence)*	Good record of objectivity and protection against bias Different standards applied to candidates and practioners
Transparency *(Information available to those who need to know)*	No published evidence that initial licensure protects public Partial and untimely reporting have prompted ADA intervention Psychometric data reported in peer-reviewed literature Incomplete disclosure of reliability and validity
Reliability *(Reduction of all sources random variation)*	Dental licensure r=.40 compared to standards of r=.80 Focus on inter-rater calibration which is trivial source of of error One-time testing cannot be improved to standard
Validity (*Decision based on all components of practice)*	No definitions of competency have been developed by boards Initial licensure samples very small subset of practice Patient management cannot be evaluated in one-shot format

As shown in **Table 1**, there are five standards traditionally applied to high-stakes testing. These include: (1) cost-effectiveness — the tests must have a higher return for investment than comparable alternatives; (2) fairness — licensure decisions should be influenced by no criteria other than competence; (3) transparency — those concerned should be able to receive timely, meaningful, and comprehensible information about how decisions are made; (4) reliable — all sources of randomness must be identified and reduced to an acceptable minimum; and (5) validity — the tests measure what practitioners do.

In this paper, we raise concerns that the traditional examination for initial dental licensure that was developed to meet conditions prevalent 80 years ago now fail to reach conventional standards for high-stakes examinations, especially in the areas of reliability and validity. In particular, the one-shot nature of initial licensure examinations makes it virtually impossible to satisfy the five necessary standards for such tests. "Tweaking" or outsourcing in a similar format are not viable options in anything other than a political sense. It is possible, however, to use the steps traditionally taken in developing high-stakes testing to create a satisfactory alternative.

Can We Meet the Standards With One-Shot Examinations?

Cost-effectiveness

Initial licensure examinations tend not to run smoothly. They can be characterized as cumbersome with regard to handling scoring and reporting and non-responsive in scheduling. Issues exist in the areas of the ethics of testing using live patients, difficulties for candidates to manage the logistics of testing, availability of remediation, and appropriate care for patients of those candidates who failed sections of the exams. The Dental Board of California is in a budget crisis. Staff shortages resulted in candidates from the spring 2003 testing being informed of their pass or fail status weeks after the announced date and after the deadline for candidates to apply for the next testing. A large backlog exists for the restorative technique (bench test) examination. The short written tests in areas such as endodontics have not been updated in years and are likely compromised.

Although virtually all graduates of the five California dental schools pass the initial licensure test within one year and the national average licensure rate is about 97 percent,[7] the cost in lost income due to delays normally exceed the entire cost of dental education for initially failing candidates. Dental services denied to the public are also significant, especially as concerns over access to care grow. The growing negative attitude in organized dentistry[8-24] and among recent graduates[25,26] regarding initial licensure must also be regarded as a cost.

It is appropriate to note the costs associated with licensing incompetent practitioners. The low reliability of one-shot exams (discussed later) actually means that it is more likely to make false-positive decisions (granting a license to an incompetent candidate) than false-negative decisions (requiring

that a failing candidate be retested). Dental malpractice among licensed dentists is a serious issue and, nationally, each year about the same number of dentists who have passed an initial licensure examination have their licenses disciplined as the number who do not pass a board within a year.[27-28] (See side bar article, *Why Some of the Best Graduates Fail the Boards and Why Incompetent Graduates are Licensed*.)

Fairness

States that manage their own initial licensure examinations and regional examining agencies have done a commendable job of removing opportunity for bias based on personal characteristics of candidates other than technical performance. Such "blind objectivity" is a welcome change from what is rumored to have occurred in the early days of testing. Such practices also tend to reduce judgments about competency to the same kind of "quality of product" appraisals used to authorize insurance claims. They impose constraints on validity.

Another side of fairness must also be weighed. Are candidates for licensure being held to the same standards that practitioners must observe? Would, for example, a practicing dentist lose his or her license for transposing numbers in a laboratory prescription, for getting a pulpal exposure, or for leaving an amalgam restoration too high? Typically, boards look at a pattern of incompetent performance in reaching decisions to discipline an existing license. To be fair, shouldn't boards also consider a pattern of performance in granting licenses in the first place?

Transparency

Transparent systems are open to review by those who need to know. Dental boards have traditionally grounded their mandate in a legislated charge to protect the public. The "California Business and Professions Code," popularly known as the "practice act," does not actually contain such language[29] and there is no published evidence that initial licensure examinations in dentistry have that effect. (It is traditional in other professions such as medicine to publish such data in peer-reviewed journals where it is subject to the scrutiny of experts. See[30-33] for a representative sample.) In California, results of initial board examinations are made available to dental schools in May of each year — approximately a year after such data would be useful for curricular review purposes. In the late 1990s, the House of Delegates of the American Dental Association called upon states and examining agencies to report their pass rate statistics on an annual basis. Some states have not been able to do this on a consistent basis and the report has not been published each year.[7] Although some examining agencies do report overall reliability results for inter-rater consistency, none report all sources of unreliability. It has been general practice in California that patients are not informed by the board that the care they received is inadequate and should be replaced or corrected when the candidate is given a failing score.

The current one-shot initial dental licensure system misclassifies at least 20 percent of candidates who must retake the tests, plus an unknown number of candidates who pass the tests by luck and should not have been granted a license.

Reliability

Standards have gradually emerged in high-stakes testing, such as licensure in various professions, admissions to advanced educational opportunities, or for highly selective jobs.[1-2] Reliability coefficients of .80 to .90 are usually expected, although, occasional r-values as low as .70 may be encountered.[34-37] With an anticipated high pass rate (as is the case in dental licensure examinations), a test system with reliability of .90 would fail about 1 percent of candidates who would pass if tested again immediately under the same circumstances. Even with reliability as low as r=.70, the error rate is still generally regarded as acceptable at about 3 percent. It is known that the National Board Dental Examinations have reliabilities above .90.[38]

Nationally, the reliability of initial licensure examinations in dentistry is lower than .40.[39-41] This number is calculated from the most recent available 1998 ADA data on all licensure jurisdictions[7] and includes all subtests taken in combination. It does not include an estimate of those candidates who pass the initial licensure tests but would not pass if given the identical test immediately (false positive results). This means that the current one-shot initial dental licensure system misclassifies at least 20 percent of candidates who must retake the tests, plus an unknown number of candidates who pass the tests by luck and should not have been granted a license. In California, the reliability is estimated to be slightly higher at r=.45 until this year. Preliminary reports indicate a sharp drop in reliability in the spring 2003 tests.

Validity

In 1990, in response to a request from the ADA, the licensure examination community conducted a systematic content analysis process to ensure that the tasks tested on one-shot licen-

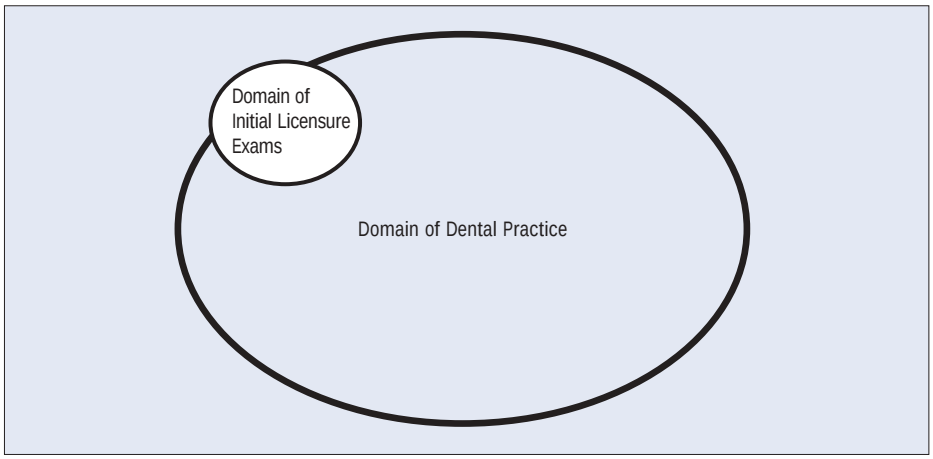

Figure 1. Schematic representation of overlap between skills, understanding, and supporting values required of beginning dental practitioners and those sampled in initial licensure examinations.

sure examinations were realistic representations of tasks performed by dentists.[42] Generally this was a well-conducted exercise, but it was a poorly conceived one. It failed to provide evidence that the tasks performed in dental offices were the same as those tested on the examinations. (A is part of B does not prove that B is part of A.) It was a "validation of the test" not a demonstration that the test is a valid measure of practice.[43] See **Figure 1**.

In particular, the one-shot evaluation format is limited to testing one-shot tasks. Increasingly, dentistry is about managing patients and their oral health over extended periods of time.[21] No matter how well designed, a test of one-shot performance will not be able to measure the large realm of dental practice behaviors that occur in context and over time.[39-48]

Can the One-Shot Model Be Saved Through Adjustment?

State dental boards are answerable to the public regarding the competency of those dentists whom they license.[29,49] Examining agencies or testing committees in states such as California that conduct their own initial licensure examinations, are answerable that the data they provide to the boards for making licensure decision are of high quality. Currently, dental boards in America accept a lower standard for such data than do boards in other professions or other who use high-stakes evaluation data. In fact, most dental boards do not actually have formal standards for what constitutes an acceptable level of evaluation evidence. The process is not transparent to the public whom boards serve.

Discussions about improving initial licensure examination in dentistry in recent decades have been about tweaking the system.[42,49-53] Sufficient data are now available to demonstrate that the one-shot system cannot be adjusted enough to reach conventional standards approximating r=.80.[5,39-41,48] The hard work and good intentions of "tweakers" should not be applauded. The situation resembles what happens when patients seek shortcuts through alternative medicine. Even when no harm can be directly attributed to the unproven therapies, they preclude or delay a proper remedy.

Four arguments are often advanced in favor of tweaking the one-shot approach to initial dental licensure. They will be analyzed.

Does Delegation to Examining Agencies Improve Decision-making?

Regional testing agencies[28] offer advantages such as centralization of expertise and staff resources; the need to accommodate state-to-state variations in standards — hence more generic criteria; relieving individual states of the cost of maintaining their own testing system; and larger data bases with their potential for deeper psychometric analysis. They also offer candidates the benefits of multiple test sites and dates. They are vulnerable, as is any monopolistic organization that must make its budget, to taking a defensive posture.[49-54]

The use of regional testing agencies moves the problems of low reliability and lack of accountability for testing standards; it does not solve them. The testing practices used by regional examining agencies are essentially the same as those used by states that do their own testing.[7,28,42] State boards can delegate information gathering, but they cannot delegate responsibility for making licensure decisions. When such delegation is made in business or public agencies, it is customary to require that suppliers demonstrate capacity to meet performance standards — in this case, measured in terms of predetermined criteria for reliability and validity.[55]

Is It Possible to Improve Individual Exams?

In the past 30 years, tremendous effort has gone into improving the selection of test situations, logistics of administering the examinations, selection and calibration of examiners, and scoring.[49] They embody high intentions. But effort alone is not enough to pass a candidate or qualify an examining group, and the reliability and validity of one-shot initial licensure examinations remains below acceptable levels despite half a century of numerous minor adjustments to the system.

In order to understand why asymptote has already been reached in the existing model of licensure testing, it is

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Why Some of the Best Graduates Fail the Boards and Why Incompetent Graduates are Licensed

If you were the worst tennis player at the club, would you want to play the pro "one-time, winner takes all" or "the best four out of seven?" Remember, the truth will come out — certainly given time. On any given day, people perform above or below their true ability level, but the more performances are averaged together, the closer they will be to the true performance capability.

This understanding can be applied to performance in dental school and in the one-shot initial licensure examination. Imagine that there is a scale from 0 to 100 and that a score of 75 is required to practice dentistry for the rest of one's life with no further demonstration of skill needed. We have two graduates, Star and Dud. Star's ability is estimated based on a series of test cases, faculty ratings, and other data to be 80; and Dud is thought to be 70. The confidence of these estimates is r=.80 based on review of the psychometric characteristics of the evaluation methods. Both graduates sit for a one-shot initial licensure examination with a known consistency of r=.40. The ability of both candidates remains the same from school to licensure examination and in subsequent licensure tests.

The results of this scenario are illustrated in **Figure 2**. The solid horizontal lines are 95 percent confidence intervals based on evaluation of performance in dental school. Ninety-five percent of the evaluations of Star's ability will place his or her true ability between 75.6 and 84.4. Similarly, 95 percent of the evaluations of Dud will have his or her ability below the 75 threshold. These conclusions apply only to sets of ratings such as those conducted in dental school where a large amount of information can be aggregated to generate highly consistent conclusions. When less consistent methods of evaluation are used, such as one-shot initial licensure examination, a wide berth must be reserved for estimating true ability — for any given true ability level. The dashed horizontal lines represent the 95 percent confidence intervals for the same candidates based on consistency typical of one-shot initial licensure situations. The range now extends almost 10 points on either side of the true ability. This follows simply from the reduced reliability of such examinations, but it can be estimated precisely using statistical methods.

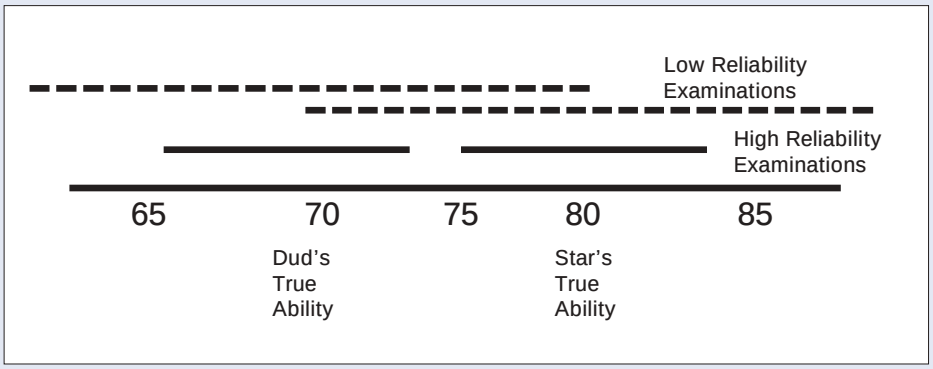

Figure 2. Ninety-five percent confidence intervals for performance of qualified and unqualified candidates under conditions of high and low reliability.

Candidate Star had almost no chance of failing a comprehensive evaluation (one with acceptable reliability), but he or she has about a 17 percent chance of being a false negative — a failure on the board who should not have failed. Candidate Dud has a similar 17 percent chance of being a false positive — a passing candidate who lacks true ability.

Boards have recognized the unfair conditions resulting from one-shot tests with low reliability, so they make provision for candidates to be tested up to three times without prejudice. In our case of Star, there is less than 1 percent likelihood that a candidate of this ability level will fail to pass in three tries. The obvious penalty to such candidates comes from lost income and negative attitudes toward the profession. The hidden cost of this system intended to compensate for a design flaw in one-shot initial licensure evaluation is the false positive decisions it creates. Candidate Dud, who certainly lacks ability, has a 70 percent chance of passing at least one in three of the tests at his or her level of competence.

The one-in-three rule raises some ethical issues. It is a means of lowering the standard of competence in the profession while appearing to hold to a high standard. No one would argue that a practicing dentist should be allowed to retain his or her license if only one out of every three crowns is functional or 33 percent of the diagnoses are correct. Arguing that this is the fault of the schools for sending forward unqualified candidates is an example of moral hazard. If only the boards or delegated examining agencies are qualified to determine who is competent and if schools and one-shot initial licensure tests often disagree, schools cannot be criticized for failing to do the board's work. (If the proposals outlined in the accompanying paper were in effect, boards could and would be expected to withdraw the delegated authority to present licensure data given to schools or examining agencies if they failed to meet standards for consistency established by the board.) CDA

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necessary to have more than a superficial understanding of evaluation theory.[2,34,44] The variation observed in test scores results from multiple sources, such as differences in true ability across candidates, examiner differences, testing circumstances, patient variability, instructions given to examiners and candidates at different sites and their physical layout, the "culture" of professional assistants and patients, and a myriad of other factors that can be lumped under the heading of random chance. Reliability is defined as the square root of the ratio of true differences in competency between candidates to all sources of variation taken together.[35,37]

Some readers who are familiar with licensure testing know that examiner calibration has been raised in some cases to r=.60 or even .70 (the exact numbers are not available because state boards do not require transparency in psychometric properties from testing agencies). It would be tempting to argue that the reliability of examinations must be higher than the r=.40 quoted earlier in this paper if the reliability for examiners is r=.60. Unfortunately, that is not sound reasoning. The "reliability of the examiners" is determined by dividing differences in candidates by differences in candidate plus differences in examiners. The "reliability of the test" is determined by dividing differences in candidates by all the differences, including examiners and all other sources of variation.

A reasonable question to ask would be, "is the variance in examiners very large compared to other sources?" If it is a major factor, examiner calibration is very important; if it is a small contributor, examiner calibration is nice but not a significant issue in establishing the credibility of initial licensure examinations. This question was explored by Chambers and Loos[48] in a simulation of initial licensure testing. It was found that examiners contribute less than 1 percent of the variance. Research in other fields report similar findings.[56-58] Because examiner calibration has already been improved to near its practical limit and because it makes so little difference anyway, hoping to improve one-shot initial licensure examination by working with examiners is a fruitless strategy (other than its obvious political value).

It might be argued that research on testing has not yet ruled out all opportunities for tweaking, even if examiners are not a viable alternative. Generalizability research, of the type described in the paragraph above allows for partitioning of variation into multiple categories, including a leftover category of unexplained error. It has been shown in several disciplines,[56-58] including dentistry,[48] that the single category of candidate-patient-trial is the largest source of variation. It is larger than differences between candidates, much larger than examiners, and larger than the leftover category that includes all the potential tweaking items. Variability for each candidate from occasion-to-occasion and patient-to-patient swamps all other considerations when trying to get an accurate read on competence. One-shot examination systems are by definition blind to the major (overwhelmingly major) source of error in data that lead to licensure decisions.

The only reasonable method to improve licensure examinations is by increasing the number of patients candidates are tested on. Tests were performed with the Chambers and Loos data and it was confirmed that there are no possible adjustments to factors such as examiners or test logistics that would have as beneficial effect in improving reliability as testing the candidates twice. This conclusion remains true even when it is assumed that the system is tweaked to perfection.

Would Simulation Be An Improvement?

The dental education community in particular has argued recently for the elimination of live patients from initial licensure examinations. Most often, this position is advanced on ethical grounds[10,11,15,18,20] — patients should not be treated by unlicensed practitioners or the logistics of testing create conditions of moral hazard. Others critics suggest that simulations (work performed on typodont teeth) would be preferable as a means of eliminating patient variability.[13,26] Simulation is an attractive hope for those who would like to maintain the one-shot initial licensure system by finding some acceptable adjustment.

Efforts to develop computer simulations[59] have been on going for 15 years and do not seem to be making progress. Data gathered by the Central Regional Testing Agency show that variance is actually larger on typodonts than on patients' teeth[52] — a finding contrary to the belief about standardization of task.

The only reasonable method to improve licensure examinations is by increasing the number of patients candidates are tested on.

Most importantly, reliability should not be purchased at the cost of validity.[3,39,43,47] Dentists do not restore plastic teeth in practice. All dental schools currently use typodont simulations such as those being proposed by some "tweakers" as a screening mechanism to determine which students should be allowed to enter the clinic. Valid licensure examination requires testing on patients under realistic circumstances.

Is the Current System A "Test of Minimal Competence?"

Some defenders of the current examination system agree that it may not be possible to make precise predictions of future competence, but they argue that a clinical failure is automatic evidence of inability to practice. "At least," they say, "the current test weeds out the grossly incompetent" or the "three percent who should not practice." (How that quota of incompetent candidates has been determined has yet to be explained.)

This argument confuses performance with ability, and while ability must always be inferred from performance, they are not the same. It would not be argued, for example, that all candidates who perform acceptably on one occasion should never have their ability questioned at any time in the future. Neither should it be argued that experienced practitioners should immediately turn in their licenses if they obtain one exposure. This would be one-shot licensure examination taken to the extreme.

What Needs to Be Done Instead

No endodontist would limit diagnosis to a single test to support a decision about the vitality of a tooth. Multiple tests are indicated, especially when the first results are equivocal. An initial finding of vitality would never be accepted as evidence that the tooth should never be tested at a later date.

There are two flaws in the current conception of initial licensure based on a one-shot approach to testing. The first misconception is to assume that the essence of dental practice can be observed in a few standardized tests. The second misconception is that single measures of performance are sufficiently reliable sources of data to support high-stakes decisions. Better one-shot test, or having someone else perform the one-shot tests have attractive advantages. Achieving standard for professional licensure decisions is not one of those advantages.

The fundamental issues — defining competence (realistically and comprehensively) and obtaining data to support decisions (reliably and validly) — can both be overcome. The three steps outlined below also hold promise of enhancing cost-effectiveness, fairness, and transparency.

Define Initial Competence

Currently, no dental board has defined what it means to be competent to begin the practice of dentistry. Competency statements describe the skills, understanding, and supporting values of those who are capable of treating a general population of patients and managing their own continued professional growth.[60,61] The American Dental Education Association has a general set of competencies for both beginning dental practitioners and beginning dental hygiene practitioners.[62,63] All U.S. dental schools have defined the competency of their graduates; it is an accreditation requirement.[64]

Examples of competency statements include: "Restore single teeth for therapeutic reasons"; "Determine differential, provisional, and definitive diagnoses"; "Administer and prescribe medications commonly used in dentistry, including local anesthesia, and manage their complications"; "Practice consistent with sound business principles and legal requirements and regulations"; "Diagnose and treat only within one's competence"; "Assume active responsibility for one's lifelong learning"; and "Participate in organized dentistry."

National Dental Board Examinations and "add on" tests used by some boards or examining agencies, including so-called "ethics" tests, measure only knowledge (not skill or values). One-shot clinical examinations are partial assessments of a few of the skill components of what it means to be a competent beginning practitioner. Many of the vital competencies of the profession are not amenable to testing in the one-shot format. For example, the management of patients' comprehensive oral health over an extended period of time, deciding when to refer, and prevention, can only be determined in a realistic context through observation over time.

Developing a set of competencies is typically an easy task.[65] Normally, two days of meetings, with appropriate background work are sufficient. There is usually a good deal of consensus in this process. In 1996, national representatives of the practicing community, registrars (boards), and educators developed a set of competencies that has guided all three groups in reasonable harmony for about a decade.[66]

The quality of any single test will normally be limited because of inherent variability.

Set Standards for Evidence

This step requires the assistance of a psychometrician and careful examination of the level of examination quality achieved in a variety of settings. The goal is to establish standards for the confidence required by boards in the sources of evidence they use to make licensure decisions.[67] Once determined, boards can allow any group who is able to demonstrate that they can meet the standards consistently to provide the evidence used by boards.

Currently no boards have ex ante standards for the quality of the evidence they use to make licensure decisions.

Obtain Sufficient Data to Support Sound Decisions

Fortunately, measurement precision is a function of both the consistency of measures and their number. Limited consistency can always be compensated for by increasing the number of observations.[34,36,47] Even more fortunate is the fact that this compensatory relationship is well understood by measurement practitioners. This is known as a "portfolio" approach to performance assessment.[39,68-71] It is governed by the Spearman-Brown formula[45] in restricted cases and Cronbach's generalizability theory[72,73] in general.

The quality of any single test will normally be limited because of inherent variability. The traditional solution — fix the amount of data to a single test and take whatever reliability results — seems like an indefensible choice. The alternative is to fix the desired level of decision-making confidence (say reliability of r=.80 over a representative or even exhaustive range of competencies) and vary the amount of data collected so as to guarantee that level of confidence.

It is unlikely that state boards or examining agencies could either create realistic testing conditions or gather sufficient replications of examinations to approach the requirements of valid and reliable initial licensure examination. By contrast, dental schools are very close to doing this currently. What would be required is a new partnership between boards and schools (something like the delegation of information gathering that exists now between boards and examining agencies). Boards would determine the competencies for beginning practice, the nature of testing conditions, and the level of confidence required in order to make a decision. Where schools can meet these standards, boards would accept the evidence and then make their own decision. Where the available evidence fails to meet the board's standards, there is always a fallback position of using the current approach.

At the very least, there would be many benefits in shared learning and cooperation if the boards and schools began discussions along these lines.

Conclusion

Dentistry is complex and highly dependent on responding to individual patient needs over extended periods of time. It would be surprising if examinations could capture the essence of dental competence in a single snapshot with consistency much greater than r=.40. In this paper it has been argued that one-shot initial licensure is indefensible. It has been attempted by well-meaning individuals and organizations for half a century and still remains conspicuously short of the standard achieved and expected by other professions. The critical limiting factor is inability to use data collected in realistic settings and to gather enough of this data to support necessary decisions.

An alternative — portfolio evaluation — has been developed in detail in a companion paper appearing in the *Journal of the American Dental Association*.[39] It is argued there that state boards of dentistry (not testing agencies) have a responsibility to define the set of competencies required to begin dental practice and the quality (reliability and validity standards) of the data needed to identify candidates who possess those competencies. If existing testing agencies can meet those standards they should provide the required data (and on-going evidence of meeting the psychometric standards). If dental schools can meet these standards, their services should be used. Perhaps a two-stage process would be most effective. CDA

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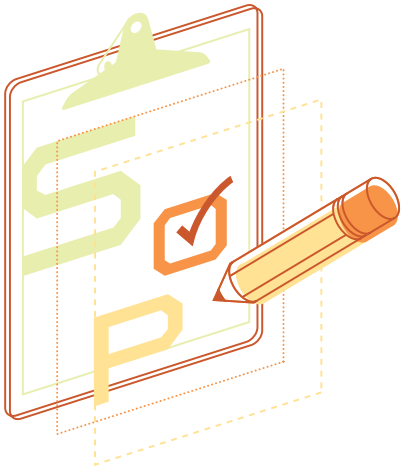
Maintaining Clinical Excellence Using SOPs



Marsha Freeman, MA

Abstract

Clinical excellence requires the consideration of many factors — the dentist's own level of expertise and the collaborative effort of the clinical team. The Standard Operating Procedures (SOPs) method of standardization can help a dentist move closer to that objective by allowing the completion of each task according to tested, successful protocols and can mean the difference between occasionally hitting the mark and consistently achieving greatness.

Maintaining consistent clinical excellence in dentistry is challenging for many reasons. Not only is it critical for dentists to maintain their own training and clinical expertise, it is imperative that dentists consistently collaborate, communicate and train chairside assistants to provide support in a caring, efficient and consistent manner. Two- and even four-handed dentistry is becoming archaic as complicated procedures and new materials require an orchestration of effort to consistently meet the highest standard of clinical care.

The word "consistently" is the key word in this discussion. Even within the same office, clinical excellence can vary dramatically depending upon the different skill levels of support staff. In certain locations, shortages of experienced applicants further complicate the make up of the ideal team necessitating more on-the-job-training.[1]

Without clear written guidelines, staff depends on verbal instructions and hurried training or updating of information in the chaos of a busy schedule. The mind works four times faster than the average speaking rate, therefore verbal communication competes with a multitude of other distractions bombarding the listener.[1] On the other hand, the written word with visual support exists forever to support the listener as often as needed, and at their own learning pace. When these written guidelines, called Standard Operating Procedures (SOPs), are assembled into an operations manual including job descriptions and task inventories, defined standards of care for each task are set with clear documentation of how to meet them.

As Michael Gerber in *E Myth Revisited* states, "Documentation says, 'This is how we do things here.' Without documentation, all routinized work turn into exceptions. Documentation provides your people with the structure they need and with a written account of how 'get the job done' in the most effective way. It communicates to the new employees, as well as to the old, that there is logic to the world in which they have chosen to work, that there is a technology by which results are produced. Documentation is an affirmation of order."[2]

For years, written standard operating procedures have been used in many different industries. We all know the stories of McDonald's or franchises like Mail Boxes Etc. In order for these companies

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to consistently provide similar experiences in service and quality, they had to develop a standardized method of replication, or the SOPs method. By analyzing how they made each unique hamburger or what steps it took to send a delicate package using Federal Express, these companies were able to repeat their processes over and over while attaining the same high quality result. When these same concepts are applied to clinical dentistry, the results can be amazing.

Simply stated, these SOPs outline in clear, concise, written directions how a procedure or task is done. A SOP has four parts:

- Clear task or procedure name
- Desired outcome
- Measurement
- Text

On a single sheet of paper, the name of a specific task whose guidelines can be described in one or two pages is written at the top of the page. The dentist, in collaboration with the staff member who performs the task, sets a standard or an expectation for each completed procedure called a "desired outcome." The "measurement" defines what method will be used to determine if the standard or expectation has been met. The text is written by the person who does the task in clear, concise, outline format describing exactly how the task is done to meet the desired outcome. In addition to this document, other ancillary material includes a correctly completed form, a photo of the tray set up, a sketch of the room set up or whatever else helps clarify how the task is done or what it look like upon completion.

Therefore, SOPs act as training and performance review guides that provide the essential information for not only training clinical support staff, but also holding them accountable for peak performance. SOP's help standardize solutions, providing documentation of successful processes that ensure repeatability and quality management for all systems at the task level. They provide guidelines for replicable success defined by the dentist and clinical team.

SOPs are also great problem-solving and conflict-resolution tools. Problems can be analyzed objectively without the inclusion of emotion and ego using a step-by-step guideline both to clarify what is currently happening and to agree on what changes need to be made to improve the outcome. The result is a collaborative commitment to improved patient care and higher clinical standards.

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With the incorporation of written SOPs in a dental practice, the dentist begins each treatment sequence with a set standard of care, service or performance that is expected. The level of quality is determined and agreed upon by the team. Without SOPs, a team works off of the assumption that all of the steps and processes will somehow occur as intended. It is left to chance that the end results will meet the expectations or standard. SOPs build "organizational intelligence" by auditing your systems at the task level and to document processes that meet organizational goals.[3]

The following is an example of a clinical SOP ready for editing from the book *Standard Operating Procedures for All Dentists*.

Composite Filling Without Matrix Band

This sample SOP is just that: a sample from one office. It is not meant to represent the only "right" way. Rather, it is meant to be edited by you and your team to represent how you complete this procedure using your particular bonding system.

Desired Outcome: Placement of quality composite filling with clinical ease and efficiency. The patient is comfortable and confident during the procedure and completely satisfied with the outcome.

Measurement: Feedback from the doctor, staff and patient. Visual inspection of the filling post-placement and observation of the patient's behavior. Efficiency measured by the number of times the assistant must leave the room to obtain supplies or instruments and the timely completion of the procedure.

Room Preparation

The following instruments and supplies are necessary for this procedure:

Art paper holder
Basic tray set up
Ball burnisher
Composite caddy
Cotton pliers
High-speed suction
Large condenser
Paddle plugger (black)
Patient bib
Plastic drape
Plastic instrument (black)
Saliva ejector

Procedure

- Professionally and warmly greet and seat the patient.
- Place the bib on the patient and put on the appropriate personal protective equipment.
- Review the day's scheduled treat-

ment and the health history form with the patient and make any necessary changes to the patient's chart.

■ Once the treatment area is numb, pass the doctor brush No. 1 for the etchant.

■ Etch the tooth for 10-15 seconds, rinse for 20 seconds, and dry only to a moistened state.

■ Place drops of bonding material in the white dappen-well No. 1.

■ Pass the doctor brush No. 2 for the material and dappen dish.

■ Hold the suction to help remove excess and keep the area dry.

■ Follow your system for light curing.

■ For the patient's comfort, place the bite block in the opposite quadrant.

■ Hand the doctor the explorer periodically in order to test the level of firmness of the material.

■ Give the doctor the composit in the correct position according to the tooth being treated.

■ Place the condenser in the remaining resin and pass it to the doctor.

■ Pass the curing light to the doctor, in the proper direction according to the tooth being cured.

■ Place the proper bur in the handpiece while the doctor is light curing the tooth. (For occlusal surfaces, use the football bur. For buccal or lingual surfaces, use the ET bur.)

■ Suction as needed and have articulation paper ready and pass it back and forth to the doctor until the bite is adjusted.

■ Check the contact with floss and adjust accordingly.

■ Wipe the carbon marks off the tooth surface with an alcohol swab, re-etch, and dry.

■ Etch the appropriate tooth or teeth, rinse, and dry the area.

■ Dab a small amount of the fortifier on the tooth with a mini-sponge, floss the contacts, and rinse.

■ Light cure and have the patient rinse in the sink.

■ Make the appropriate documentation in the patient's chart.

■ Escort the patient to the front desk and clearly indicate to the patient and the receptionist when and why the patient should make a return appointment.

■ Clean and prepare the room for the next patient. Refer to the appropriate corresponding SOP.

As you can see, the SOP takes the guesswork out of knowing exactly how the procedure should be accomplished. Imagine what dentists could experience if all of their procedures, from treatment protocols to ordering supplies were standardized. The dentist and clinical team would experience less chaos, less stress, more consistency, higher productivity, and most importantly, a higher level of clinical excellence. The same concept applied to all tasks done in the dental office, including the business department, also increases profitability and quality of service.

The dentist and clinical team would experience less chaos, less stress, more consistency, higher productivity, and most importantly, a higher level of clinical excellence.

Developing a SOP requires collaborative effort to ensure success. It is not the single responsibility of the dentist or the clinical staff. Rather the process should involve everyone and be a shared process. Initially written by the person who does the task, the doctor and the rest of the team give final approval. Each office has the beginnings of some SOPs stuck to a wall with a note, written on a spiral notebook in the lab, listed on loose pieces of paper, in office meeting notes or in a purchased prototype manual.

Gathering these important pieces of paper, copying them and placing them in a three-ring binder, and combining them with a comprehensive task list for the department, the SOPs manual begins to take shape. The next step is the E.D.I.T. process: **E**dit the page making whatever changes are needed, **D**elete the page if it is no longer relevant, **I**nsert new pages and information, and last but absolutely not least, **T**eam review to ensure collaborative agreement on how the task is done.

The creation of a SOPs manual does not take place overnight or between patients. Rather it is a time-consuming project that necessitates time set aside every week or month for six months or more. However the cost of the project should be financially spread over the life of the practice because its benefits are long lasting and will impact the practice on all levels for years to come.

Colin Powell provided further motivation for investing in such a project by saying "If you are going to achieve excellence in big things, you develop the habit in little matters. Excellence is not an exception, it is a prevailing attitude." He continued, "preparation and discipline are essential to leadership ... never neglect details."[4] Each SOP defines the dentist's prevailing standard for details at the task level.

Comprehensive systems for sterilization, periodontal maintenance, treatment presentation and service delivery are comprised of many individual finite tasks, infinite details that make up the whole. Well-done tasks that meet the dentist's standard ultimately determine the overall quality of the dentistry.

The results of a customized operations manual will also dramatically save on the expensive loss of a key employee who walks out of the door with literally all of that person's job knowledge in his or her head instead of documented for posterity. Also worth the investment is increased efficiency, consistent meeting of clinical excellence, decreased stress for the entire team and practice growth through improved word of mouth advertising. The practice will also have more equity upon sale as a "turn-key-operation" for the new dentist.[5]

The SOPs manual should go through a formal review process every year; however as George Patton Jr. wrote to his 3rd Army Unit Commanders in 1944, "Information is like eggs: the fresher the better."[6]

To ensure that standards are up to date, changes should be documented as they happen and announced at morning huddles and staff meetings. SOPs also provide feedback to individual staff members at formal performance reviews but are also there for daily feedback and guidance.

Summary

Clinical excellence requires the consideration of many factors — the dentist's own level of expertise and the collaborative effort of the clinical team. The SOPs method of standardization can help a dentist move closer to that objective by allowing the completion of each task according to tested, successful protocols and can mean the difference between occasionally hitting the mark and consistently achieving greatness. CDA

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The Natural Tooth Pontic; Simplified

Lambert J. Stumpel, III, DDS

Abstract

This paper's objective is to describe a simple, economical and fast method to replace a single tooth. Utilizing an indirectly fabricated composite resin framework reinforced with polyethylene fiber and the existing tooth as pontic. This tooth can be the natural tooth or the restorative crown. In addition, this particular design allows for exact repositioning of the coronal part of the extracted tooth in its original intra-oral 3-dimensional position. This chair-side technique does not require laboratory involvement.

Tooth loss in the anterior region is for most patients a deeply traumatic experience. Although an anterior tooth has mechanical functionality, it is the compromised facial esthetics associated with tooth loss that is the patient's primary concern. Immediate esthetic replacement of the missing tooth will be required. This replacement can be temporary, semi-temporary or permanent in nature. Depending on many clinical and economic factors, a course of treatment is decided upon by the patient and dentist. The start of the definitive treatment depends on many factors and thus may require short to long temporization times. Final restorations can vary between removable prosthesis, tooth-supported prosthesis and the increasingly popular implant-supported prosthesis. Irrespective of the final treatment, Plan 1 will have to temporarily restore the patient's esthetic appearance while functionally stabilizing the compromised arch.

A transitional prosthesis may vary between simple removable tissue supported dentures; temporary full coverage fixed partial dentures and bonded fixed partial dentures. When the definitive restoration does not require tooth preparation, tooth structure removal is contra-indicated for the provisional restoration. This is exampled by implant-supported prosthesis. Although interest is developing in the immediate loading of dental implants,[1] the current protocol requires a period of undisturbed osseo-integration. As the final prosthesis will be implant born, the neighboring teeth need no involvement. Temporization then can be fixed with a bonded prosthesis or tissue supported though care should be exercised to not load the under laying implant. Most patients desire a secure, fixed-tooth replacement prosthesis. The bonded prosthesis can be as simple as a singular tooth pontic[2-6] or a resin-bonded fixed partial denture.[7-9] The singular bonded tooth has been deemed short lived where the resin bonded FPD has a greatly improved prognosis.[10,11] The original Rochette Resin Bonded Partial Denture (RBPD) has a metal backing, requiring dental laboratory involvement.[12] Alternative designs utilize a plasma-treated woven polyethylene fiber (Ribbond, Ribbond Inc, Seattle, Wash.) to reinforce a resin-based framework.[13-16] The following technique utilizes the same fiber, in an indirect fabrication fashion. Additionally, wings are placed to allow precise repositioning.

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Figure 1. Initial positioning of the ribbond fibers wetted with bonding resin.

Figure 2. Build out to full contour of the framework.

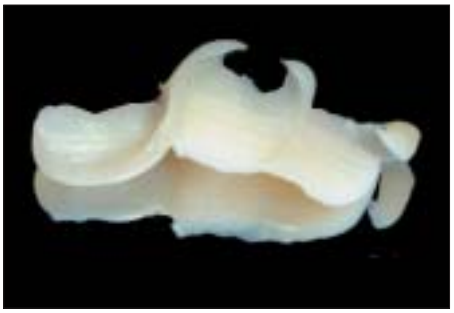

Figure 3. The intaglio of the framework. Note the retentive clasps.

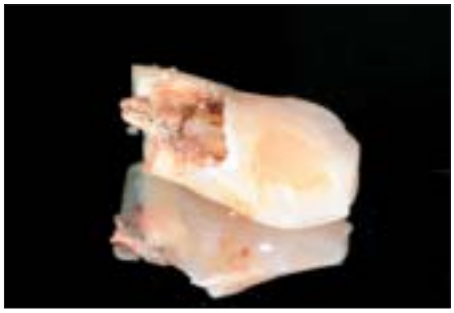

Figure 4. The coronal part of the extracted tooth.

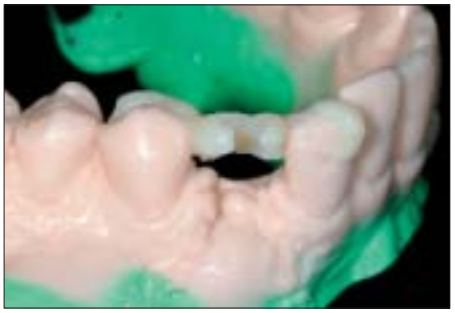

Figure 5. Framework repositioned on the post-operative cast depicting the available spacing for the pontic.

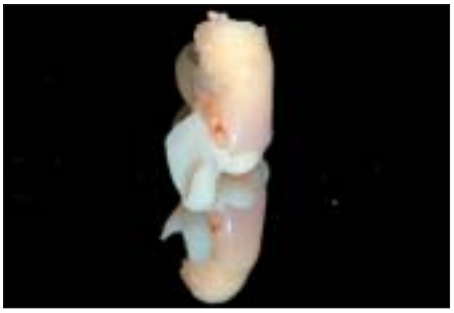

Figure 6. Snug fit of the tooth into retentive clasps.

Technique

■ Take a pre-operative reversible hydrocolloid impression (Jeltrate Plus, Dentsply Caulk Inc., Milford, Del.).

■ Cast with a dedicated poly vinyl siloxane material (Mach-2 Die Silicone, Parkell Bio-materials, Farmingdale, N.Y.) and create a base with a rigid poly vinyl siloxane material (Blu-Mousse, Parkell Bio-materials, Farmingdale, N.Y.).

■ Measure the length and width of the area to be covered and cut the corresponding section of plasma treated woven polyethylene fiber (Ribbond, Ribbond Inc., Seattle, Wash.).

■ Wet this section with a light polymerizing bonding agent (Optibond Fl, Kerr Corporation, Orange, Calif.) and place a small amount of a flowable light polymerizing micro-filled composite resin (Heliomolar flow, Ivoclar Vivadent Inc., Amherst, N.Y.) over the surface.

■ Place the wetted section in the required position on the poly vinyl siloxane cast and initiate polymerization with a visible light curing light. (Optilux 501, Kerr Corporation, Orange, Calif.) Add flowable composite to create bulk to the framework.

■ Place a small ribbon of flowable composite material originating from the just-created framework over the incisal edge of the abutment tooth and extend it approximately 3 mm onto the buccal part of the tooth. Place this wing over a smooth part of the tooth, as the smooth areas will be less prone to duplication errors. Repeat once for the other abutment tooth and place two wings over the future pontic site. These wings will create a very secure seat, first for the exact replacement of the tooth segment, and secondly for the accurate positioning of the RBPD.

■ Carefully extract the tooth as not to damage the coronal tooth segment. Place the dental implant, take an implant level impression if indicated and suture the site.

■ Take a post-operative reversible hydrocolloid impression (Jeltrate Plus, Dentsply Caulk Inc., Milford, Del.).

■ Cast with a dedicated poly vinyl siloxane material (Mach-2 Die Silicone, Parkell Bio-materials, Farmingdale, N.Y.) and create a base with a rigid poly vinyl

Figure 7. Prepared coronal tooth part before bonding into framework.

Figure 8. Fitting of the now RBPD on the post-operative cast. Depicting necessity of pontic shape adjustment

Figure 9. Final gingival contouring of pontic.

Figure 10. Airborne particle cleaning of abutment surface.

Figure 11. Conditioning of the enamel surface with 35 percent phosphoric acid. Note there is no conditioning of the clasp areas.

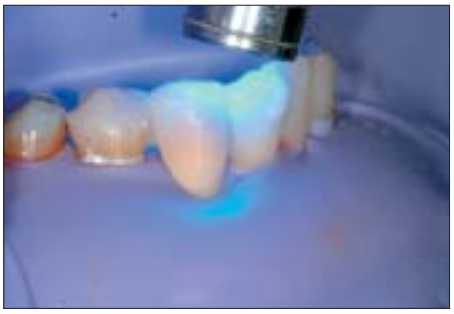

Figure 12. Initiation of the photo polymerization

siloxane material (Blu-Mousse, Parkell Bio-materials, Farmingdale, N.Y.).

■ Remove the most apical part of the tooth, shape, etch, bond and fill the remaining root canal space with flowable composite.

■ Airborne particle abrade the lingual tooth part that will mate with the pre-made framework, etch with a 35 percent phosphoric etchant (Ultra-Etch, Ultradent Products, Inc., South Jordan, Utah), dry, apply bonding resin and place flowable composite. Place bonding material on the corresponding part of the framework. Reposition the coronal part of the tooth into the mating part of the framework. Due to the polymerization shrinkages of the cast and the composite wings, this will be a very snug fit. Assure that no material contaminates the abutment areas of the framework. Initiate polymerization with the light curing light.

■ Reposition the newly created RBPD onto the post-operative cast. Adjust the apical part of the tooth so it will have the required shape and relationship with the edentulous site. The post-operative cast allows easy visualization of all aspects of the framework while preventing contamination.

■ Place dental dam isolation (Hygenic Dental Dam, Coltene/Whaledent Inc., Mahwah, N.J.). Air particle abrade the to-be covered parts of the abutment teeth. Carefully place 35 percent phosphoric etchant only on the areas to be covered by the framework. Do not place any etchant on the areas to be covered by the wings. This will facilitate finishing greatly as these wings should not be bonded to the tooth. Apply bonding resin, and a small quantity of flowable composite. Now position the RBPD in place, the wings will guide the framework exactly in place. Initiate polymerization with the light unit. Place additional composite as indicated and complete polymerization.

■ Remove the wings and finish all surfaces with rubber finishing points (Bownie, Shofu Dental Corporation, San Marcos, Calif.).

■ Remove the rubberdam. Adjust occlusal contacts on the framework and pontic to minimize stresses on the assembly.

Figure 13. Post-polymerization finishing with abrasive rubber point.

Figure 14. Occlusal relationship post-occlusal adjustment

Figure 15. Birds-eye lingual view of finished RBPD

Figure 16. Case 2. Framework on pre-operative cast.

Figure 17. Finished RBPD Case 2.

Figure 18. Case 3. Potential of RBPD; nine-year post-operative view of replacement of lower right cuspid

Summary

A technique is described to indirectly fabricate a fiber-reinforced framework. After securely repositioning and bonding the coronal part of the natural tooth, the Resin Bonded Fixed Bridge can be precisely repositioned and bonded to the abutment teeth.

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Robert E. Horseman, DDS

Scientists Espresso Their Glee over Caffeine Study

We'd like you to meet Dr. Allen Conney, professor of cancer and leukemia research at Rutgers University in Brunswick, New Jersey. He's over on Easton Avenue at the local Starbucks having a mocha frappuccino grande at the moment. "How much caffeine is in this stuff?" he asked the server. The kid doesn't know. "You have any mice here?" the professor persisted. "Well, we got one mouse that's over by the computer," the kid smirks with a typical teenage wise mouth. It's a dead end.

There has never been a reported case of skin cancer in mice that were left to their own resources.

Back to the lab. Conney is onto something, but he's not going to get much help from Starbucks. Instead, it may be coming from Dr. Darrell Rigell over at New York University. Rigell is a professor of dermatology there and is, in fact, spokesman for the American Academy of Dermatology. Dr. Rigell doesn't have any mice either, but he knows where he can get some. And mice are what these professors need. In fact, mice are in so much demand for medical research, we could do science a big favor if we all went out and rounded up all the mice we could find and airlift them in suitable containers with bits of sharp cheddar for in-flight snacks directly to Rutgers University. There are some important things happening there having to do with skin cancer and it involves mice and caffeine.

Ordinarily, your average mouse doesn't care a lot for caffeinated drinks, fancying instead 2 percent milk right out of the carton, or maybe a sip or two of hot chocolate if the weather's nippy. But that's beside the point. The point being that Drs. Conney and Rigell are hot on the discovery that caffeine, the chemical stimulant in coffee and tea, has been found to lower the risk of skin cancer in laboratory mice.

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You'd think the mice would be grateful for this advance in medical science, but the truth is that there has never been a reported case of skin cancer in mice that were left to their own resources. So it's the same old story with this twist: the mice have to be hairless in these experiments. A normal mouse is no beast of great beauty compared, say, to a Thompson's gazelle, but a hairless mouse is just pathetic. We suspect the only way the researchers are able to con 90 mice into participating in their big experiment is to promise them hair transplants after it is over. From past experience, this pledge carries the same weight as promising prisoners of war a shave, haircut and a Grand Slam breakfast at Denny's.

Rigell said that although hairless mice are commonly used for such research, "there is really no good animal model for skin cancer. The hairless mouse is the best of a bunch of bad choices." Very tactful, Doctor. You can imagine how the mice must feel, bald as billiard balls and now this. The fact is, Rigell confessed, "a lot of things that work in mice cannot be extrapolated to humans."

Conney said he doesn't care, the results of his work show that after exposing 90 mice to high levels of ultraviolet radiation twice a day for 20 days, he got some encouraging results. They uniformly got nice tans without any annoying white bra patterns. Next, some of the mice who were fruitlessly demanding applications of Solarcaine, got smeared with a solution of acetone and caffeine. Another group got lathered with acetone and EGCG (a chemical compound found in green tea) and the third bunch got acetone only. It has been reported that acetone, the stuff nail polish remover is made of, is soothing on the order of a cat o' nine tails.

After 18 weeks of this treatment during which the mice weren't allowed one phone call, let alone Miranda-ized, they were all killed. That's right — put 'em all down. Thanks, guys, you were great! The results of the experiment were considered a resounding success in terms of a 100 percent death rate — no, wait — the mice that received the caffeine all got malignant skin tumors and so did all the others.

They uniformly got nice tans without any annoying white bra patterns.

So far so good, but the caffeinated mice, wired to the whiskers on the stuff, received 72 percent fewer tumors per mouse. Those receiving the EGCG got 66 percent less than the poor devils that only got acetone. The wrap party was attended by members of the immediate families.

So what? Well, Drs. Conney and Rigell agree that there is a need for a "morning-after" treatment for skin cancer, a therapy that would reduce cancer risk after excessive sun exposure. Conney added, "This is not a sunscreening effect, it is a biological effect."

So that these 90 little cue ball mice will not have died in vain, we need volunteers for some massive doses of ultraviolet light such as can be found on any summer weekend on Florida and California beaches. For the most part these sol aficionados are essentially hairless and have comparable intelligence levels. Give them an unlimited expense account at Starbucks and let's see what happens after 18 weeks. CDA