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HANDS

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

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- A. To urge the extension and improvement of measures for the control and prevention of oral disorders;
- B. To encourage qualified persons to consider a career in dentistry so that dental health services will be available to all, and to urge broad preparation for such a career at all educational levels;
- C. To encourage graduate studies and continuing educational efforts by dentists and auxiliaries;
- D. To encourage, stimulate and promote research;
- E. To improve the public understanding and appreciation of oral health service and its importance to the optimum health of the patient;
- F. To encourage the free exchange of ideas and experiences in the interest of better service to the patient;
- G. To cooperate with other groups for the advancement of interprofessional relationships in the interest of the public;
- H. To make visible to professional persons the extent of their responsibilities to the community as well as to the field of health service and to urge the acceptance of them;
- I. To encourage individuals to further these objectives, and to recognize meritorious achievements and the potential for contributions to dental science, art, education, literature, human relations or other areas which contribute to human welfare—by conferring Fellowship in the College on those persons properly selected for such honor.

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Correspondence relating to the *Journal* should be addressed to:

Managing Editor

Journal of the American College of Dentists

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Business office of the *Journal of the American College of Dentists*:

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Cover Photograph: The hand of Michelangelo's *David*.

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FROM THE EDITOR

THE HOVEY-BEARD EFFECT

Success is suspicious, or even intolerable, if it is not achieved by the correct means or by the right people.

Alex Bavelas is the father of marketing research. He invented the focus group and successfully launched instant coffee after its initial stillbirth. One of the companies Bavelas consulted for, or at least knew in detail, was Hovey and Beard, a small outfit in the rural South that manufactured wooden children's toys. The case study he developed became a staple in MBA programs. (I used it for years when I taught.)

Here is the general outline of the case. The company targeted its semi-automated painting function for improvement. Teams of about a dozen women worked in a shed where an endless-loop chain brought nearly finished toys along. The women removed a toy, spray painted it according to a predetermined pattern, and placed it back on the chain to be transported into the dryer. A team of quality control engineers studied the process and established an optimal chain speed. A pay incentive plan was put in place to reward the women for exceeding the target rate. [At this point in the case, as Bavelas wrote it, students are invited to discuss what they thought might happen next. You might want to try your own hand.]

The women grumbled quite a bit. Because the bonus was limited by the

speed of the chain, some wanted to be able to control it themselves. Their biggest gripe was about the heat in the shed, and they wanted some fans installed. Productivity dropped slightly and management regarded the grumbling, especially the part about fans, as a dodge. A foreman who had only nominal involvement in the painting function became a spokesman for the women. He requisitioned a few fans and conducted some experiments after hours to determine that a quicker pace could be maintained without a drop in quality. Armed with these data, the women and the foreman convinced management to allow a general experiment. A rheostat was installed that allowed the head lady to vary the speed of the chain. [Now, what do you think happened?]

The women varied the speed of the chain according to a schedule they established themselves. At the beginning of the morning and afternoon shifts, the chain ran "slow." Near breaks and at the end of the day it was set on the "normal" setting. The rest of the time it ran hot. Quality was not an issue; morale was high. Virtually all of the women qualified for the highest level of bonus established under the original plan and were actually making as much money as some of the men working in other operations at the company. The productivity from the operation put the Hovey and Beard Company in the black economically for the first time in years. [At this point a good teacher in an MBA course is able to

develop with his or her students many lessons about group incentive programs, work design, decentralization and worker control of processes, management responsiveness, and the importance of the work environment. Then, the question becomes what happened next. Here is what Bavalus reported.]

The foreman was summarily fired. The chain was reset to the original pace. All of the women quit over a period of a few weeks, and turnover remained high thereafter. Productivity lapsed to the level before any innovations were attempted, and Hovey-Beard continued to lose money until it folded in bankruptcy.

Success is suspicious, or even intolerable, if it is not achieved by the correct means or by the right people. That is the Hovey-Beard effect. When people say they would be happy if a groups of patients could be served, an amount of money raised, or a particular goal accomplished, watch for the unspoken condition that states, “as long as it’s done my way.”

Here is an example of how the Hovey-Beard effect works in dentistry. Some years ago an experiment was conducted in the clinic at the school where I teach. I believe, and I think most dentists do as well, that there is a benefit in having a small enough group that the dentist in charge feels responsible for patients. Size matters. Two groups of twelve students,

instead of forty, were randomly selected and, based on faculty nominations, the best teacher in school was assigned to one group and the worst teacher to the other. There was nothing else done to promote quality of care other than telling the two faculty members that they were responsible and that we would be measuring four outcomes: a) financial productivity, b) educational accomplishment, c) patient satisfaction, and d) improvements in patient health. Dental health was measured by a few quick indices such as number of untreated carious teeth, periodontal condition, number of unopposed teeth, etc.

After six months the results showed a great success: satisfaction and learning were up, with measured improvements in patient oral health. And 8% better clinical income compared to other students in the general clinic—and that was for the worst teacher’s group. The results among the best teacher’s students were about half again as good all around. [Now, in the spirit of an Alex Bavelas sequential case, can you guess what happened next?]

The results were greeted with scorn. They were labeled as “inaccurate examples of the ‘new math’” by a top administrator in a public memo. Following several meetings to review the data in detail, the administrator accepted the outcomes as valid, but no corrective memo was ever sent and the project has never surfaced again.

The Hovey-Beard effect is not about people who are dim or devious; there are very sound reasons why we must preserve our identity by discounting the success others achieve in pursuing our goals. Sometimes we try to scare others away, sometimes we work to establish monopolies without serving all who are required to seek only our care. That is just survival. But we need to be careful not to talk too loudly about seeking the best oral health outcomes if there are hidden rules for how these results can be obtained.



DENTISTRY—A SHOW OF HANDS, PLEASE!

Lance M. Rucker, DDS, FACD

ABSTRACT

Dentists have historically derived a distinctive part of their identity from the role of hand skills in practice. Dentistry is a surgical discipline, requiring a basic competency to perform what has been diagnosed and planned as being in the patients' best interests. Dental education has introduced magnification and computer-assisted technique instruction as the proportion of clock-hours devoted to laboratory practice has decreased. The threats posed by traumatic hand injury to practitioners are unknown, but may be small. By contrast, the strain of repetitive motion and injuries caused by postural problems are reported to be widespread in the profession and is generally accepted as characteristic and unavoidable. Ergonomic approaches to alleviating work strain have not been broadly embraced. As dentistry incorporates more biological alternatives and automated technology, the role of hands in practice may change.

By history and by practice realities, dentistry is a profession strongly based on manual skills. "Good hands" are the keys to a huge portion of what dentists do professionally. Hour by hour, minute by minute, the nature of the work and the optimal outcome for patients often depend upon dentists having "good hands." In professional circles, the acclaim of practitioners for one another's professional practice skill level may be couched in terms that reflect this bias fully. "She's got great hands!" "If you've got the hands for it, you can do anything." "Some people are just lucky and have good hands." "You have to know what you're doing, but most of all you have to have the hands." Even patients will comment in such terms, as one recent Web-based review by a patient proclaimed: "I have been going to my dentist for over twenty years. He is painless, has good hands, and discusses procedures well."

SURGICAL NATURE OF CURRENT PRACTICE

But then, what else would you expect? Dentistry is primarily a surgical profession. We have selectively attracted people into the field who enjoy expressing themselves creatively and productively with their manual skills. Folks with wariness about such professional focus, but with interest nonetheless in providing health care for others, would better be advised to move toward the practice of medicine instead, where (except in surgical specialties) the psychomotor requirements are quite modest.

Occasionally, in spite of our best attempts to screen carefully for well-informed applicants, someone finds a path into dental school and discovers that he or she does not particularly enjoy intensive manual skills work. Fortunately this is rare, and when it does occur, more often than not the individual can be encouraged to complete a lateral arabesque into medical school as soon as possible.

What exactly do we mean by "good hands?" It is a term often used in sports which involve special competence in catching and pitching projectiles. In application to the domain of fine motor skills, it is one of those terms that is never defined, but which everyone feels free to use as if everyone else already understood its meaning. The term suggests especially refined manual dexterity. It usually is attributed to someone who reliably demonstrates operating technique with special mastery, or who requires less time than average to produce a superior surgical result. It may be applied to someone who has mastered unique techniques which are especially successful related to operating strategy or armamentarium. Occasionally this



Dr. Rucker is Director of Clinical Simulation and Professor and Chairman, Division of Operative Dentistry, Faculty of Dentistry, The University of British Columbia; lrucker@interchange.ubc.ca.

term has been used synonymously with “clinical judgment” (another of those “wink-wink-nudge-nudge-everyone-knows-what-it-means” terms), but that seems a stretch. Is it certainly related to an expectation of consistency of production of successful surgical results (including restorations, general surgery, periodontal debridement, etc.)? Would it matter if a clinician were performing unnecessary procedures, but achieving end products worthy of emulation under other circumstances? Is that still “good hands?”

Not all dentists have to perform fine motor skills in their post-graduation practices. Each dentist must first become a clinician who has practiced and attained hand skills to pass through an accredited dental school curriculum to the level of competency of initial licensure certification. However, one can graduate from dental school and pursue further training for practice in an area where one’s professional knowledge base will be utilized in nonsurgical ways, where practitioners have little or no requirements for fine motor skills—oral radiology, oral medicine, public health administration, professional librarianships, and some domains of dental education come to mind.

Admittedly, some of these nonsurgical specialists can (and often do) continue to participate in general practice such that they exercise their manual skills, but it is one of our educational dilemmas that individuals in such nonsurgical specialty areas must first demonstrate successful general surgical practice

(including patient care) to the level required for completion of an accredited dental school curriculum, regardless of whether they ever intend or want to be directly involved with surgical patient care after completing their basic dental education. By contrast, in medicine one may license to nonsurgical areas without such requirement for surgical proficiency.

EDUCATION IN SURGICAL SKILLS

Historically, emphasis on the acquisition of good hand skills has been fundamental to dental education. At its best, dental education has always focused equally strongly on the basic knowledge upon which information gathering and diagnostic acumen are founded. In our current age of computer-based information technology, the information processing aspects of practice have taken on whole new dimensions, with information cross-referencing, online reference resources, computer-assisted diagnostic programs, etc. In recent years, our curriculum superintendents have occasionally yielded to the somewhat overreactive temptation to reduce (and even to belittle) the role of surgical intervention in favor of preventive and medical solutions to deal with oral health. Moreover, during recent years the undergraduate preclinical and simulation training programs have been allotted decreasing curriculum time. Corners have been cut in the psychomotor

There are technologies emerging (intraoral optical scanning devices) which may reduce yet further the amount of time required to gather and process this diagnostic information. To date, however, none of these tools reduces the requirement that dentists need to have good hands.

skills development by the elimination of anatomical dissections (replaced with pro-sections at many schools), the elimination of the performance by students of most of their dental laboratory functions (now replaced with commercial laboratory outsourcing), and the reduction of requirements for consistent refining surgical skills repetitions of tooth preparation and restoration exercises.

How has dental education tried to deal with this reduction? During the past several decades we have explored and begun to use improved high-fidelity clinical simulations (Boyd & Donaldson, 1983) and have improved our understanding of clinical ergonomics principles to better integrate the simulation of chairside production processes (real-space techniques) into the creation of the end-products of tooth preparation and restoration procedures (Rucker, 1987). Most of these products (and some of the processes) can now be measured and assessed by 3-D computer hardware and software in an attempt to further streamline and standardize the psychomotor skills learning process for undergraduate dental students (Buchanan, 2004; Jamal et al, 2006; Quinn, 2003).

Many of these strategies are genuinely and independently defensible on educational grounds, but when the corollary strategies include reduced opportunities for young professionals to develop and mature their skills to reliable consistency, the development of good hand skills becomes alarmingly problematic. In spite of the effects of ongoing technological changes upon many aspects of dental practice, dentistry remains a largely surgical profession

dependent upon a reliable level of psychomotor mastery.

We are the ministers of hand skills when these must be done and when no others can do exactly what we do. And that is the stuff of most hours of most days for most of the practitioners of dentistry. Other allied professionals can currently drive much of the preventive assessments and interventions (dental hygienists, CDAs, and other office personnel), and they can even gather at our direction some of the clinical information we rely upon to decide whether surgical interventions are required and to monitor progress of patients to determine the level of success of any of our interventions. There are technologies emerging (intraoral optical scanning devices) which may reduce yet further the amount of time required to gather and process this diagnostic information. To date, however, none of these tools reduces the requirement that dentists need to have good hands. At present, dentists still require refined perceptual skills (tactile and proprioceptive) and hand skills to diagnose intraorally and extraorally (Ito, 1991) and to provide appropriate clinical surgical interventions.

How refined are the hand skills requirements for the practice of clinical dentistry? What tolerances do we expect to be able to achieve? Most educators are happy to have dental students reliably achieve tolerances in the range of ± 0.3 mm in each of the three dimensions of space prior to their graduation, although we may or may not specify such tolerances to our students as we train them. These psychomotor control tolerances are about the same as might be expected for other microsurgeons and for jewelers. New technologies permit closer tracking and accountability of such accuracy than we have historically managed to achieve, and the proliferation of surgical magnification (loupes, telescopes, and microscopes) in our undergraduate

programs increases the ease by which we can assess and monitor our accuracy. But there is still no evidence that our control tolerances are much finer than the ± 0.3 mm envelope. The rapid and reliable achievement of small tolerances with the assistance of magnification probably depends less upon the clinicians' innate neurological and musculoskeletal factors than it does on the clinician coming to understand the ergonomics of stabilization, fulcrum use, and balance.

As a relevant aside, it is not unusual to find dentists pursuing a strong vein of collateral refined manual skills art forms assiduously and with excellence. These extra-professional activities include woodcraft, painting, weaving, jewelry-making, sculpture, metalwork, needlepoint, and other arts and crafts, the elegant products of which are often aptly and proudly showcased on the covers of dental magazines and journals. Dentists are likely to be wealthy enough to buy equipment and materials to pursue such hobbies, and most are able to take time for training seminars and courses to indulge these non-professional interests. This combination of opportunities is probably more likely in a profession which offers a combination of a relatively high level of control of non-working time and sufficient means allowing the clinicians to follow their desires and interests. It is certainly no coincidence that so many dentists who are adept in manual skills follow their desires and dreams to create masterpieces in many different domains which utilize a high level of psychomotor skills (Levitin, 2006).

Hand Injury

What happens when things go wrong? What happens when the health of the dental professional's hands is compro-

mised? What happens when a dentist loses some or all of the ability to use one or both hands? Acute trauma (from motor vehicle accidents and other accidents) can result in functional injury to the hands, loss of segments of fingers, whole fingers, or even the entire hand. Furthermore, because dentists are prone to using their hands for hobbies which have especially increased risks (e.g., woodworking and metalworking), their hands are sometimes put into further jeopardy. What then? What happens when a clinician faces compromises to the carefully trained, coordinated, and practiced use of his/her fingers or hands? Although the author has had experience with recovery and rehabilitation of two such practitioners during the past decade, no general data has been published for dentists with traumatic hand injuries.

However, when hand surgeon Paul Brown (1982 [reprinted in this issue]) surveyed 183 general and specialty surgeons who had lost parts of their hands, he discovered some very relevant and interesting things. Most of the surgeons commented that “acceptance, adaptation, and incentive were dominant factors in returning an injured or deficient hand to useful function.” The most significant conclusion of Brown’s work was that motivation of the professional is more important to hand function than is the actual number of digits or level of tissue damage (Brown, 1998).

Just as general surgeons return from truly extraordinary injuries and resections to find ways to practice their profession, there is no reason to doubt that dentists would have any different return-to-work statistics. Rather than give up the clinical surgical practice so fully interwoven into the fabric of the dental professional psyche, many injured practitioners will seek ways to adapt and modify their techniques and approaches

to their work so as to continue performing dental clinical treatment. Like the general surgeons studied by Brown, there are many cases of dentists who have recovered from seemingly catastrophic impairments such as injuries and amputations, and who have returned to full clinical practices. Dentists who have been injured are likely to find ways to carry on in their performance of manual skills unless they have entirely given up on their identity as dental professionals.

More important, dentists are likely to be so highly motivated that they will continue their work undaunted, even when they might intervene to prevent further injury to their bodies. This trait may be their undoing, because even more frequently than acute trauma, a far more insidious culprit threatens dentists’ hands. The culprit is a group of chronic injuries which are variously labeled as “repetitive strain injuries” (RSIs), “acute soft-tissue disorders” (ASTDs), and “cumulative trauma disorders” (CTDs). These are epidemic among dentists and dental hygienists (Shugars et al, 1987; Miller & Shugars, 1987; Chin & Jones, 2002). These chronic injuries can affect any of the musculoskeletal components of the clinician’s body, and this includes injury to the hands.

How many professionals actually experience chronic pain conditions of the very hands which must serve them (and their patients)? An extensive health and practice survey was completed in 2001 by 421 young dentists in western Canada (Rucker & Sunell, 2002). The study profiled various ergonomic aspects of the respondents work styles and equipment usage as well. If anything, the age of the practitioners (all of whom had graduated within the ten years

Fundamental ergonomics education is rarely integrated in dental schools anywhere in the world.

The combination of fluent mirror use with precision hand skills is probably the single most extraordinary aspect of what dentists do in the psychomotor domain.

previous to the survey date) would have suggested a fairly healthy study population, a suggestion supported by the respondents' subjective ratings (on a scale of 1 to 5) of their overall health: 87% claimed good to excellent overall health, 12% average overall health, and only 1% below average overall health. In spite of this overall positive bill of good health, in the section of the survey which addressed musculoskeletal health status by specific anatomical areas, two-thirds of the dentists identified a multitude of localized pains which they subjectively perceived as work related. In fact, only one in three dentists (33%) indicated that they had not experienced any work-related problems. This is consistent with an earlier study of the musculoskeletal health of U.S. dentists (Shugars et al, 1987).

So, what did the dentists do to relieve their musculoskeletal pains? During the previous five years, three out of five dentists (61%) had availed themselves of a broad range of strategies and therapies to try to seek relief from their musculoskeletal discomforts and pain. Their subjective appraisal of the effectiveness of the interventions they sought suggests they were able to achieve only a tiny percentage of short-term, partial relief from these interventions. Their long list of therapies and strategies included applications of heat and cold; physical therapy; massage therapy; chiropractic treatment; stress reduction programs; increased exercise; medication (both prescription and nonprescription); splints, braces, or corsets; bed rest; change in recreational activities; counseling; changes in clinical work habits and postures; increased use of four-handed dentistry; changes in the operating stool; traction; and surgery. In short, they tried everything! They reported that little seemed to help so long as they continued working in dentistry.

One in ten of the dentists in the

Canadian study experienced episodes of hand pain, which they perceived as work-related, on at least a weekly basis. (As a comparative note, a parallel study of young dental hygienists showed that one in three hygienists experienced episodes of hand pain, which they perceived as work-related, on at least a weekly basis.) Also noteworthy is that one in five dentists experienced decreased ability to perform recreational activities, and 14% showed decreased abilities to perform tasks and activities at home.

Not all of the reported symptoms were caused by the dentists' work, but most of the symptoms that affect the hands of the clinician are thereby work related, and most of these symptoms become work-impairing and some will eventually force the discontinuation of general clinical practice (Rucker, 2003). Of the dentists in pain, 34% attributed their musculoskeletal symptoms entirely to their clinical work. Another 54% attributed their symptoms partially to their clinical work, and only 7% felt that their symptoms were related solely to factors other than their clinical work. It is of interest to note that the strategies which were perceived to provide "permanent relief" for the greatest number of dentists were increased exercise (14%) and change in clinical work habits and postures (7%). Ultimately, three out of five respondents (60%) reported that they just "lived with the pain (tolerated it)."

As it turns out, most of these sacrifices are probably not necessary, and one study has made clear (Rucker & Sunell, 2002) what many physiotherapists and ergonomists have been declaring empirically for many years, that certain very controllable ergonomic and psychosocial factors in dental practices

are associated with a decrease and even elimination of musculoskeletal pains and discomfort. Non-dentists looking at the data might conclude that dentists are a profession of masochists. Dentists often respond to such comments with a shrug, saying, “That’s the way it is in dentistry. It’s hard work and you just have to accept the pain when you work inside peoples’ mouths all day.” And so the professional myth is propagated.

There is a predominant professional dictum that dentistry, by the very nature of the work, is likely to cause back, neck, shoulder, and hand pain. Restated, most clinicians have made the assumption that dental practice will force physiological compromise (rather than permit work in physiological harmony). When dentists consult with colleagues, or caregivers who try to sort out the musculoskeletal ravages of the professionals, they encounter stories which reinforce the dictum. Ask general dental practitioners at a CE course or conference and they will tell you that dentistry is a physically painstaking profession. “That’s why they pay us the big bucks,” they quip. The reinforcement of this myth is so strong that even the caregivers who care for the physical health of dentists and dental hygienists (i.e., physiatrists, chiropractors, physiotherapists, and massage therapists) will more likely than not confirm that if you are engaged in the practice of dentistry, you will likely suffer from back, neck, shoulder, or hand pain. And their conclusion is understandable, given their professional experience.

Some observers have proposed that our acceptance of personal hardship as part of our professional lot is selected for, and cultivated during, our professional training. Self-sacrifice is hailed as a good thing. Fundamental ergonomics education is rarely integrated in dental schools anywhere in the world. Most

U.S. dental schools report that they value ergonomic training, and claim it is included in their curriculum, but the actual scope of such training is usually limited to the school’s purchase and use of operatory equipment labeled “ergonomic” and to encouragement by most of the educators for the students to “sit up straight.”

The combination of fluent mirror use with precision hand skills is probably the single most extraordinary aspect of what dentists do in the psychomotor domain. Few other surgical disciplines make such demands. If dentists fail to fully integrate these skills in their undergraduate training, they are at even greater risk of musculoskeletal breakdown later.

FUTURE ROLE of HANDS

What would happen if dentistry ceased to be a profession which involved much specialized requirement for manual dexterity skills? The new biology promises to expand the role of diagnostics and even of tissue engineering. Look forward to the time when emerging CAD-CAM (computer-assisted design/computer assisted machining) technologies—such as currently available hardware and software for milling crowns at the chairside from optically scanned “impressions”—might be combined with computer-assisted chairside clinical robotics for all tooth preparations, restorations, and surgeries. The dentist would scan the intraoral status using 3-D optical and radiographic acquisition hardware and software. From this the dentist could plan, design (using input devices for computer assisted design), and approve needed medical and surgical interventions, including restorations, endodontics, implants, etc. All of this would require little or no time engaged

with intraoral hand skills, and (presuming that the software is very well designed and tested) little actual hand skills for computer input. You can likely guess that this scenario would reduce the actual percentage of practice time that involves manual skills.

This would be the dental equivalent of the decrease in surgical explorations during abdominal diagnosis which has accompanied the advent of CAT scans and other imaging technologies, combined with the decrease in surgical exposure (for both patients and surgeons) which has accompanied the expansion of minimally invasive surgical (MIS) procedures. True, there is still much need for ergonomic refinement for most of the current MIS instruments so that surgeons can operate in good balance from outside the abdominal cavity, but the progress and the trends continue.

If and when such dental tools are within our grasp (puns duly intended), how will dentistry be practiced? How will we be trained for it? What will become of our professional identities as skilled surgeons with “good hands?” When minimally invasive surgery comes to dentistry, will our recruitment change? Will an entirely different cadre of young aspirants be attracted into our profession? Will we maintain separate training facilities from our medical colleagues? On what basis would we be able to assert that we must do so?

There is little doubt that we will realize such integrated CAD-CAM robotics technologies for all phases of dentistry, but it will probably be another fifteen to

Most clinicians have made the assumption that dental practice will force physiological compromise (rather than permit work in physiological harmony).

twenty years before we are likely to have the technology to reduce significantly or replace the manual skills of the dentists of the world. And when the changes come, they will likely come gradually, over a decade or more, as the technology develops and is assimilated.

Meanwhile, we must appreciate that we are part of a profession in which we have daily opportunities to demonstrate our mastery of fine motor skills as well as our scientific and diagnostic acumen. For many more years, we will have to be psychomotor masters if patients are to be well cared for. All of this means we must take good care of our hands.

We continue to rely upon our hands as a key part of our abilities to deliver the best care that we can plan and envision. Dentistry continues to be a show of hands. ■

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HANDS ARE US

Robert E. Markison, MD

ABSTRACT

Hands play a distinctive role in establishing our identity, both as a tool-using species and as individuals with unique talents and self-awareness. The fit between hands and tools should be as natural (sensitive to the natural functioning of hands) as possible. Improper fit and use leads directly to injuries such as carpal-tunnel syndrome. It is also involved in injuries attributed to compensatory patterns and to unnecessary restrictions of career functioning. Injuries can be avoided or sometimes repaired by redesigning tools and work patterns rather than through surgical or medical means. The mass manufacture of one-size-fits-all tools violates existing individual differences in the hand and what is natural to it. The artist within us is repressed to the extent that we lose touch with the tools, media, and performance patterns of our work. This loss makes us less professional and places our hands at risk for damage.

His hands “became the piston rods of his machinery of expression.” So said Sherwood Anderson of Wing Biddlebaum in his depiction of Winesburg, Ohio. Anderson was writing in the chapter titled “hands” about the town he grew up in and a man all the town was proud of for picking a hundred and forty quarts of strawberries in a day. But Wings kept his hands hidden away because of the misunderstandings that surrounded them.

Hands, more than any other part of the body, define us—individually (as in Wing’s case) and as a species. The reason our ancestors started walking upright was to free them to use their hands in productive ways. Arguably, one of the greatest accomplishments in evolution was the opposable thumb. Simians, such as gorillas have a thumb that moves in a lateral plane across the palm, allowing them to grasp tools. In humans, the thumb moves throughout almost three hundred and sixty degrees, permitting manipulation of tools. That story about giving a team of monkeys typewriters and a lot of time and then expecting one of them to type a Shakespeare play is fatuous—they would have a difficult time with the spacebar that must be depressed in an awkward manner. They would not be capable of dental practice either. This evolutionary development, so important to our relationship with the world, is barely fifty thousand years old; it may rightly be called the “ultimate accomplishment in human evolution.”

The central role of hands in defining human nature can be found in our language as well as in paleontology museums. We call a person of significant usefulness “handy.” There are no similar complementary adjectives for shoulders, elbows, and feet. “Brainy,” “hairy,” and “leggy” are mixed compliments. “Mouthy” and “nosey” are not so nice.

Hands can be clearly identified in fetuses at forty-five days. They are the primary means the newborn has for interacting with the brave new world. The infant cannot speak and does not see the world as adults do. Touch (including being held) and putting things in the mouth are early means of exploration, both of which lose prominence, and that is excellent in one case. The hands are literally the instruments of identity, used by the infant to differentiate objects in the blooming, buzzing confusion of available stimuli—including their own body parts and their distinct person.

The role our hands play in defining who we are is both individual and literal. It is obvious that our hands are under neural control: they serve our wishes. But the relationship flows both ways. We



Dr. Markison is a hand surgeon and Fellow of the American College of Surgeons who practices in San Francisco.

It is unlikely that any of us will be the Darwinian innovation adapting a novel and unnatural hand operation for the benefit of mankind. The more likely outcome is that we will have early-onset arthritis, limit the effective range of procedures, or increase our chances of needle sticks.

caress, probe, and fondle. The word ‘touch’ has a rich meaning. Literally, it is physical contact. But there is also a sense of how the contact was made, as in “the dentist has a light touch.” There is also a sense in the same word for the effect of physical contact with the hands, as in “I was touched by my dentist’s caring manner.” Touch has therapeutic power. It also conveys the power of authority, as in the “laying on of hands” as a mark of religious succession and healing. These acts convey not only information, but emotions, satisfaction, and comfort as well. In the sensory-motor cortex at the top of the brain, the area connected with the hands is larger than the set of neural involvement for the feet, the mouth, our large limbs, or any other body part. Our hands teach our brains. Throughout life the habits of our hands build neural networks at the subcortical level that run off as subconscious, prearranged programs.

Hand and Tool Fit

Tools extend human physical and mental capacity for desirable purposes. Scalpels, cars, telephones, and computers are tools. So are musical instruments, clothes, furniture, and patient charts. The essential good of tools is their fit; this includes their suitability for accomplishing intended purposes, and their compatibility with the human system they are designed to complement. High-tech America seems to have placed greater emphasis recently on characteristics of tools themselves than on their fitness for use in human systems. Computers, cars, and CAD-CAM units are sold based on functionality that will never be used. Equipment investments

subtly manipulate the work we choose to do. Remember the saw about all problems looking like nails to the man who only has a hammer.

A more serious concern over fitness of tools involves the effects of tool choice on the user. The right tool can extend our effectiveness; the wrong choice can both limit or distort effectiveness and damage the user. We must avoid exploiting the modern, by which I mean being too deferential to the short-term, narrow focus on equipment and what it can do. We must understand the long view of human evolution and always honor the fundamental functionality of the human hand. Human evolution is a slow process; the process of generating new tools is rapid and not always rational. It is unlikely that any of us will be the Darwinian innovation adapting a novel and unnatural hand operation for the benefit of mankind. The more likely outcome is that we will have early-onset arthritis, limit the effective range of procedures, or increase our chances of needle sticks.

Consider the case of the computer keyboard. Debates over the QWERTY (standard—look at the third row up on the left) arrangement of keys versus more functional arrangements misses the point. All keyboarding, regardless of the arrangement of keys, involves the hand in repetitive and often unnatural movements that can be damaging. Sixty percent of work injuries in California involve hand or upper extremities, many from cumulative trauma. Alternative technologies, such as voice recognition software have been available for years and should be used, especially for functions such as chair-side charting where they offer additional advantages in terms of infection control. Hands-free cell phone use is becoming the law in most states. Cisco Systems President John Chambers may very well be right

when he predicts that the future of high tech is voice, not visual communication.

My goal as a hand surgeon is to spend less time in the operatory. And I assume the goal of dentists is to bill fewer reparative procedures while improving oral health. Repairing preventable damage, and doing so without any prospect of diminishing this kind of damage in the future, is not making professional progress. My practice philosophy includes creative collaborations with patients. Making sure they understand how their hand injury came about (including conditions that produce trauma) can be an effective adjunct to therapy. Changing what can be changed to mitigate the causal conditions is also important. Sometimes surgery can be avoided.

One of the most satisfying aspects of my work is with musicians. Because of my own love for the clarinet and other instruments, I have attracted many musical and other artistic patients. Our collaborations have opened up the range of practice for me far beyond the traditional bounds of hand surgery. When there is an accumulation of physical damage from an improper fit between the hand and its tools, there are two ways to fix the problem, and the most reasonable one is often to change the instrument. I have worked with professional violists to design asymmetrical instruments and augmented bows to avoid unnatural playing positions. The placement of keys in flutes and other wind instruments is another example. Analogues must certainly exist in dentistry.

Individual Differences

Part of the damage caused by bad fit between hands and their tools can be traced to the relatively recent economic shift to mass production. The notion that a single “best average” design for

tools can be manufactured (and shipped, sold, and serviced) more economically than customized tools makes sound business sense. But it ignores individual variation and forces some of us to use tools that are not well designed for us. Dentists would find it unacceptable to offer only a small range of prefabricated crown designs to their patients; but they seem to be willing to accept such a restriction on the tools they can choose for performing their own work.

The individual differences in our hands may be larger and of greater significance than we assume. Textbooks on hands identify a basic set of alternative innervations from the hand through the central nervous system. This set includes forty-eight primary types; and there are variations. The length of digits, overall width and span of hands, flexibility, and tendon independence show wide variation. Anatomically, there are important differences in bones, cartilage, blood supply, and their arrangement.

Try this little experiment. Place the index, middle, and ring fingers of your left hand under the edge of your desk; leave only the little finger free. Now curl your little finger as far as is comfortable toward your palm. A few people can touch or almost touch their palm; most cannot. Repeat the experiment with your right hand. Is there a difference? Now imagine that you make a living keyboarding, playing the piano or violin, or using any tool that requires flexibility or capacity to apply pressure with your smallest digit. There will be natural differences among performers.

The consequences of natural variations across individuals in hand structure and function include ruling out some activities or limiting functional effectiveness. Other consequences include physical damage, either direct damage from strain and overuse or indirect damage as a result of dysfunctional compensation. Occasionally the

Tips for Basic Hand Care

1. *Keep your hands warm.*
Circulation is improved by active use and by warmth, and circulation maintains health. Cold hands are more prone to injury because restricted movement caused by muscle constriction engages the hands in unnatural and possibly more accident-prone movement patterns.
2. *Avoid extreme or prolonged stress.*
The stress on the tip of the thumb is magnified ten times in terms of impact on the base of the thumb. The mechanisms that permit flexibility in the joints can be overworked, causing joints to lose their pliability.
3. *Use the right tools.*
Take an inventory of the tools you use most often. Is there a more effective or less effortful way of doing your most basic work? The most natural movements are the ones around which tool choice should be based.
4. *Become more ambidextrous.*
This is stroke insurance and may open new alternatives. The effort will certainly keep us from taking our hands for granted.
5. *Attend to any medical disorders that might compromise hand health.*
Diabetes, gout, and hypothyroidism can have negative consequences for hands.
6. *Most importantly—innovate.*
An understanding of the tools, medium, and systems of practice offers both heightened professional identity and increased respect for the role of hands.

The user of standardized tools becomes standardized and, in the process, loses individual identity and meaningful contact with work.

tragedies of a bad fit between hands and mass marketed tools produced for one-size-oughta-fit-all marketing, can be significantly displaced and disguised. Neckache or back problems can result from assuming unnatural postures to compensate for restricted range in hand movement. Errors, slips, and occupational injuries can be a consequence of awkward movement patterns forced by failure to honor the natural design of the hand. These restrictions can even extend to inappropriate choices in the care provided to patients, as in dentists who shy away from certain procedures because they find them uncomfortable.

LOSING TOUCH WITH THE ARTIST WITHIN

Mass manufacture (the phrase is actually an oxymoron if we recognize that manufacture means hand work) has a more insidious effect than forcing many of us to make unhealthy adaptations. Mass creation of standardized products separates the artist from his or her work. The user of standardized tools becomes standardized and in the process loses individual identity and meaningful contact with work. I can spot professionals who “go through the procedures” and do them well enough and often enough to be considered successful by customary standards. I find, for the most part, that these people are detached from their professions, vaguely dissatisfied, looking to other outlets for meaningful participation, and prone to early retirement (whether they actually leave practice or not). They have lost touch with what they do.

Men and women are by nature innovators. That does not mean a creature who is bored with the routine and seeks constant novelty; it means relentlessly searching for a full under-

standing of the work we do and continuously adapting the way we do it to our true nature. Michelangelo mixed paint and studied anatomy; Clementi built pianos; scientists set up labs before they perform experiments; racecar drivers customize cars. The full meaning of being a professional (and all professionals are to my way of thinking artists) includes a comprehensive understanding of their medium, including a feel for their tools. The insurance industry, the evidence-based dentistry researchers, and anyone else who thinks professional practice can be fully captured by counting standardized outcomes is mistaken. They are not professional practitioners and they do not know what it means to be one.

There is a reason why dental students still dissect in anatomy lab, why they wax up ideal teeth in dental anatomy, and why they study the properties of various dental materials. The reason is that all patients are not the same. Innovation is necessary to provide the highest level of care and that can only come from a thorough understanding of the full practice. The artist in each of us wants to understand and “work with” rather than accommodate to the medium of our profession. We can discover who we are in the fullest sense by finding what our hands are capable of doing. ■

RESEARCH ON HAND DEXTERITY AND THE PRACTICE OF DENTISTRY

REALITY AND MYTH

William P. Lundergan, DDS, MA, FACD
and Lucinda Lyon, DDS

ABSTRACT

A brief review of the literature finds that studies of digital dexterity fail to confirm that dental students or dentists possess aptitudes that are different from the general population or that those with higher aptitudes achieve superior levels of performance. It is suggested that the complex nature of modern dental practice requires such a broad range of skills that digital dexterity contributes only a small increment or that technical dental procedures are completely trainable in the course of dental education.

It is generally assumed that exceptional hand skills are required for the practice of dentistry. After all, the dentist is expected to work with small instruments in a confined space performing finite, intricate tasks. The Johnson O'Connor Research Foundation has been measuring aptitudes since 1922, and they have reported that several aptitudes are commonly associated with dentistry, including structural visualization, certain visual-memory abilities, and manual dexterity (Bethscheider, 1989). Dental schools, in their admission process, give value to the musician, the artist, and the student-athlete. The Associated American Dental Schools Application Service asks applicants to describe any activities requiring manual dexterity at which they are proficient. Is it a valid assumption that one must have exceptional hand skills to be a successful dental student or dentist?

Studies evaluating manual dexterity have not confirmed a high manual dexterity aptitude for dentists. Weinstein and colleagues evaluated practicing dentists and found a negative relationship between dexterity scores on the Johnson O'Connor Tweezer Dexterity Test #32022 and peer evaluations of restorative procedure quality (Weinstein et al, 1979). Simon and Chambers (1992) reported a mean score on tweezer dexterity for dentists that was not significantly different from the norm mean for the general population using the Johnson O'Connor Tweezer Dexterity Test #18. These authors also reported a finger dexterity score for dentists that fell significantly below the norm for the general population.

It has been speculated that dental training may affect the performance of

dental practitioners on dexterity tests requiring both speed and accuracy to achieve a high score. It may be that dentists sacrifice speed in favor of accuracy, with a net negative impact on their overall dexterity score. Had they taken these aptitude tests prior to their dental education, they may have scored above average on these dexterity measures. However, Lundergan and colleagues found that first year dental students demonstrate no significantly different tweezer dexterity from the general population taking the Johnson O'Connor Tweezer Dexterity tests (Lundergan et al, 2007). These authors also found that tweezer dexterity is not changed significantly by completing a dental curriculum, and the ability for an applicant to perform successfully in dental school will not be reliably predicted by tweezer dexterity scores. Other authors have similarly found that manual dexterity tests are not especially good predictors of dental school performance. A Chalk Carving Test was replaced by a Perceptual-motor Ability Test (PAT) on the Dental Admission Test in 1972. Validation studies by Graham comparing the Chalk Carving Test scores and the pencil-and-paper PAT scores with dental school performance in technique courses



Dr. Lundergan is chair, Department of Periodontics, and Dr. Lyon is chair, Department of Dental Practice, at the University of the Pacific, Arthur A. Dugoni School of Dentistry in San Francisco; wlunderg@pacific.edu.

There seems little to be gained from more analysis or new tests of manual dexterity as predictors of dental school performance.

showed that the PAT was an equally valid predictor of performance (Graham, 1972; 1974).

Gansky et al (2004) evaluated a two hour block-carving test and found that it did not significantly predict students in the bottom 10% of a group of preclinical laboratory courses. Oudshoorn (2003) found that the Canadian Dental Aptitude Test Carving Dexterity scores demonstrated no practical utility as a predictor of psychomotor performance. Ranney and colleagues (2005) concluded that there seems little to be gained from more analysis or new tests of manual dexterity as predictors of dental school performance.

The unexpected results suggesting that dental students and dentists have no more manual dexterity than the general population are consistent with the findings of Squire and colleagues (1989) in evaluating surgical residents. They used the Purdue Pegboard and Minnesota Manual Dexterity tests to assess manual dexterity in surgical and medical residents, and found no significant difference between the two groups. The authors concluded that the manual dexterity tests should not be used in assessing candidates for surgical residency training programs.

Dentistry is a dynamic and complex profession requiring aptitudes and skills that go far beyond simple hand-eye coordination. As Sprately (1990) observes, it is not clear exactly which manual skills are required for a dentist and the balance needed between manual and intellectual skills remains uncertain. Simon and Chambers (1992) propose that fine hand-eye coordination may be trainable in the majority of applicants to dental schools. Perhaps other characteristics such as interpersonal skills, perceptual or spatial ability, critical thinking, and continuous learning skills are more essential for success and satisfaction in the contemporary practice of dentistry.

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THE RIGHT HAND OF THE DAVID

AN ANALOGY USED IN OPERATIVE DENTISTRY

Karen Gardner, DMD, MEd

ABSTRACT

Educators must be able to guide students in their thinking, and analogies have emerged in the cognitive science literature as an effective tool in this domain because they allow students to relate new information to something they already understand. This gives relevance to what is being taught, allowing students to organize and conceptualize the new material for later retrieval by employing a student-centered approach to learning. This article presents an analogy used in the teaching of operative dentistry—the right hand of Michelangelo's *David*.

The combination of art and science in clinical dentistry is not new. Indeed, one of the most popular operative dentistry textbooks has this as its title. A problem in teaching operative dentistry is getting students to think of the teeth as functioning units in an arch which articulates with an opposing arch in an oral cavity. In the operative clinical simulation module at the University of British Columbia (UBC), a student-centered approach to learning uses the right hand of Michelangelo's *David* as a reference to draw an analogy between the sculpting of a statue and the preparation and placement of direct dental restorations. The purpose of this paper is to explain how the right hand of the *David* is used as an analogy to teach our dental students about proportion, perspective, and anatomy replication in carving dental restorations in an attempt to employ student-centered learning.

Analogies draw attention to the similarities of two concepts or objects, allowing subsequent comparisons between them (Fowler, 1996). Sandifer (2003) describes the analogy process as consisting of a familiar domain (base) and an unfamiliar domain (target) which is compared in the following four steps: a) establishing an analogy, b) instilling confidence in the analogy, c) understanding the analogy, and then d) applying it to other analogies.

An example of this approach is to teach the concept of electrical current (target) by comparing it to a river flowing downhill (base) whereby the student makes the connection between the familiar concept of water flowing

downhill with the unfamiliar concept of an electrical current. What is vital in using a teaching analogy is to establish a connection or a one-to-one comparison between the object and the issue being learned and to connect the appropriate differences between the two (Hutchinson & Padgett, 2007).

To introduce our students to the David analogy, on the first day of the operative simulation course a picture of The *David* is viewed in the PowerPoint® presentation during a review of the course syllabus. The story of David and Goliath is told emphasizing what seemed like insurmountable odds for David. Thus, the first analogy of apparently insurmountable odds for David and the completion of the module is established. The students are then asked what weapon David had to slay the giant. Of course the first reply is the sling but they are asked, "Is that all David had?" They reflected on the story but usually do not consider that David also had a brain, the most powerful weapon of all. The *David's* expression is then studied and it is decided to be one of confidence rather than arrogance or

Dr. Gardner is an Assistant Clinical Professor and teaches preclinical operative dentistry at the University of British Columbia, Canada; drkg@interchange.ubc.ca.



Analogies draw attention to the similarities of two concepts or objects, allowing subsequent comparisons between them.

fear. The second analogy of having the ability to think about and have confidence as you approach your task is established.

As we move through the course, an image of the *David* is displayed in the presentations as the flow of analogies become routine. We continue to draw analogies between operative dentistry and specific features of the *David*, finally analyzing the disproportionately large right hand on the *David* and the possible reasons for this.

In the case of the *David's* right hand, the four-step procedure was applied in the following manner:

1. Establishing an analogy—the comparison was made between carving anatomy out of marble (base) and carving anatomy out of amalgam (target).
2. Instilling confidence in the analogy—students studied the anatomy of the *David's* right hand and viewed their own hands to determine how such a replication could be achieved.
3. Understanding the analogy—students came to appreciate that we must use the right tools and how to work with the amalgam or composite in order to reproduce the anatomy of which we must have an intimate knowledge.
4. Applying findings—students carve anatomy into their restorations by trying to reproduce the human form emulating Michelangelo.

The *David's* right hand, although perfectly formed, is out-of-proportion with the rest of his body, and it is debatable why this is so. Some say it is because originally the statue was to be placed in an elevated position on a church facade where the proportions would appear true when viewed from beneath. Another view is that it is typical of the mannerist style of sculpting

whereby forms are elongated and not true to proportion. Still others say it represents strength. Whatever the reason, the use of this analogy illustrates to our dental students that there is anatomy, proportion, and harmony in the body (base), which enables them to connect with anatomy, harmony, and proportion in the dental arch form, occlusion, and teeth (target). The one-to-one connection of proportion in the *David's* body and proportion in the dental arch is established. In this manner we teach students about illusions and scotoma (a blind spot through which the brain can be tricked into perceiving an illusion to be real) to demonstrate how we can alter proportions to create the appearance of symmetry and balance through a direct-bond veneer. The analogy is made between the out-of-proportion right hand and creating an illusion.

To determine whether this analogy was successful in establishing a student-centered approach to learning, I gave students various topics to discuss in a research essay, one of which being selecting an artist or period of time to compare and contrast with an issue in operative dentistry. Four students selected this option and their analogies were very encouraging. One student considered the sketching of Albrecht Dürer and began her essay with these words:

Art and operative dentistry are intimately linked, with correlations both obvious and profound. Renowned artists of the late Gothic and Renaissance periods, namely Lucas Moser, Leonardo da Vinci, Albrecht Dürer, and Cornelisz van Pstannen, preceded documented medical descriptions of the surgical correction of cleft lip and palate with their artistic renderings of the repaired defects.

Thus this student made the direct analogy between anatomical drawings and the relevance of anatomy in surgery.

Another student drew an analogy between Islamic architecture and operative dentistry. Creatively, this student makes the analogy between architectural design for strength and esthetics with operative dentistry's desire for the same:

Although two very different and distinct fields, both Islamic architecture and operative dentistry share a few common links that make a comparison between the two enlightening. Both stress the importance of esthetic design and integrating within it functionality and structural integrity.

As Hutchinson and Padgett (2007) point out when students attempt to make analogies, if they truly do not understand the subject, their analogy will fall apart and thus allow the educator to help students with misconceptions they may have. In reading the essays, I felt these two students produced very relevant analogies confirming their learning.

Bryce and MacMillan (2005) state that evidence supports analogies as being more effective in helping students achieve conceptual changes for themselves. The four essays written on art analogy left no doubt that these students understood the issues of esthetics, symmetry, and structural integrity in operative dentistry. For example, in the paper on Islamic architecture the issues of symmetry in both the Taj Mahal and the dental arch were discussed. Furthermore, the student related structural designs used to maintain strength and integrity in both a complex restoration and the Taj Mahal. Likewise, the paper on the etchings of Dürer addressed the surface texture of the etchings, comparing this to the finishing of composite restorations to achieve effect through line angles and contouring. Further-

more, the student drew comparisons between the effect of lack of color in the etchings and the effect of shading and color in esthetic restorations. Finally, in year-end student evaluations, this comment was received "I loved how you articulated artistic philosophies into each topic," which implied the student understood comparison and contrast. I felt comfortable this student would continue to generate analogies as part of lifelong learning. When students create their own analogies, they reveal a deep level of understanding.

Sandifer, working with physics students, argued that spontaneously generated analogies are "a fundamental cognitive strategy that can improve students' understanding of physics concepts and problems" (2003, p. 98). This claim supports earlier work conducted by Wong (1993), Clement (1988), and Kaufman, Patel, and Magder (1996), which show that spontaneous analogies to be a powerful cognitive tool. I have seen such spontaneously generated analogies in my course. For example, one student compared the initial sensation experienced when preparing a simulated carious lesion to walking in snow. In this analogy, the student applied the familiar proprioceptive sensation of walking in snow (base) to the unfamiliar proprioceptive sensation of using a handpiece on something other than plastic (target). This analogy allowed the student to recognize that working in a new medium (simulated caries) requires an adjustment to proprioception when using the handpiece similar to walking in snow as opposed to walking on firm ground. The analogy allowed her brain to make the necessary adjustment to complete the preparation.

For those who have not witnessed analogies in teaching, using the right hand of the *David* would surely seem a different way to teach certain aspects of

operative dentistry. However, for students that are very spatial and artistic in their learning, it offers a comfortable teaching method. In addition, for visual learners, the analogy of a visual art form feeds their need for spatial instruction. As pointed out by Fielding (1995) visual learners must "see it." According to Fielding, visual learners are artistic, preferring diagrams to writing. If this sounds familiar it is because dental schools attempt to select for visual learners on the belief that this aids in clinical practice. Therefore, it would seem logical that as dental educators, we should be very visual in our presentation of information to our dental students. Using a visual art form such as the right hand of the *David* is one way we can assist visual learning as it combines the use of an analogy with a visual form to increase the student-centered effect.

Sommier and Sommier discuss the differences between visual and analytical learners (1995). They state that some students will be analytical and some will be visual, with most using both modes but having a preference. They contend that the ultimate goal of affective education should be for visual learners to be taught to the same level of effectiveness as analytical learners and vice-versa. They argue that effective lesson planning will include exercises that bring forth the subject matter addressing both types of learners. In this example, the *David's* right hand is presented for the visual learners and an analytical approach is also presented through the presentation of carving as an extension of the tooth anatomy remaining after the preparation

and a logical analysis of how this carving must be designed to fit into a functioning occlusion. In this manner, visual and analytical learners will learn how to carve amalgam and composite by addressing their learning preference and also by stimulating them to draw their own analogies in their future learning.

Another way of looking at this issue is expressed by Weiman (2007) who describes why the teacher-centered approach to scientific teaching does not work. He says experts have a foundational knowledge to draw on, thus when new information is presented to them they have the ability to analyze their thinking to determine if they understand. He states: "new ways of thinking are always built on the prior thinking of the individual, so if educational process is to be successful, it is essential to take that prior thinking into account" (Weiman, 2007 p. 12).

Therefore, in an effort to teach in a student-centered mode, the argument has been put forth for the use of an analogy between the right hand of the *David* and the carving of dental restorations. I believe this analogy has been developed to the point whereby educational research may now begin to determine its effectiveness. It has already

been established in the literature that some students will spontaneously generate their own analogies to help them learn. It has also been demonstrated that when used effectively, by establishing a base and a target and following the four steps of establishing an analogy, instilling confidence in the analogy, understanding the analogy, and applying the findings, the drawing of analogies can be an effective teaching tool. What needs to be done is to demonstrate specifically that drawing an analogy between the right hand of the *David* and carving dental restorations is an effective teaching analogy for operative dentistry.

As lifelong learning is crucial to our continual development as dentists, this issue is not trivial. Yes, this is a new approach to the teaching of carving dental restorations but analogies are not new in educational literature. Is it an effective analogy? That is the question we have to answer. It has been obvious to the course instructors that some students enjoy this approach and have been stimulated to create their own analogies for learning. Qualitative data have been produced and more is to come. However, one thing is certain, students learn through analogies and if the *David's* right hand proves to be an effective analogy then we have accomplished something and established yet another way hands help us in the practice of dentistry. ■

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FEWER THAN TEN—SURGEONS WITH AMPUTATED FINGERS

Paul W. Brown, MD

ABSTRACT

One hundred eighty-three surgeons who had lost parts of their hands were surveyed. Surgeons were chosen because they are highly motivated individuals, dependent on manual function for their livelihood. Loss ranged from a fingertip to an entire hand. Twenty-nine of those surveyed had lost significant parts of a thumb, and twenty-eight had multiple-digit loss. Half had sustained their loss after becoming surgeons. The most common cause of loss was trauma. Only three claimed any significant professional disability; all other continued to practice operative surgery. Some even claimed that their loss resulted in professional advantage. Most stressed that acceptance, adaptation, and incentive were dominant factors in returning an injured or deficient hand to useful function. The conclusion from their responses is that motivation is more important to hand function than the actual number of digits.

The idea for this study started at the Thirty-fourth Annual Meeting of the American Society for Surgery of the Hand, at which Sir Sidney Sunderland was the guest speaker. During a luncheon discussion about the importance of patient motivation in adjusting to physical impairment, I noticed that Sir Sidney was missing two-thirds of his right index finger. He seemed not at all self-conscious about it, handled his tableware with elegance and efficiency, and, to my query about his loss, replied, "Oh, it's nothing; I can do anything with my hand."

Sir Sidney's loss and his lack of impairment suggested that finger loss in highly motivated patients whose livelihood depended on manual dexterity might not be so serious as to mandate reattachment. I selected surgeons for this study as they are highly motivated to achieve, must use their hands well, and are trained to report objectively. With the help of Hand Society members, I have identified and queried 183 surgeons with some degree of tissue loss ranging from a fingertip to an entire hand. This survey showed 122 living, 25 dead, and 36 who could not be located.

Most surgical specialties are represented. There were 79 general surgeons; 35 orthopaedists; 14 gynecologists; nine ophthalmologists; eight hand surgeons; eight cardiothoracic surgeons; seven plastic surgeons; seven neurosurgeons; five vascular surgeons; five oral, head, and neck surgeons; two urologists; two veterinary surgeons; and two surgeons of undefined specialty. Slightly over half acquired their amputation before

becoming surgeons and the remainder subsequently. In four individuals, the amputation resulted in a change of career; three gave up surgery because of the amputation, and one person became a surgeon because of it.

AMPUTATIONS

CAUSES

Direct mechanical trauma accounted for 94 of the amputations, unspecified trauma for 39, and congenital defect for two. Power saws and planers accounted for 20, lawnmowers 11, gears four, bicycle sprockets two, ring avulsions two, and snowblowers two. Others included a fan belt, tractor pulley, hedge trimmer, chipper, punch press, boat hoist, car door, corn picker, and a washing machine wringer. One surgeon sustained his loss while water skiing, one from shark fishing, and one had his index finger bitten off by an orangutan. One of the two with a congenital defect was a pediatric orthopaedist with significant loss of eight digits due to congenital constricting ring syndrome.

Tumors accounted for seven of the amputations—two from radiation for

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Table 1. Level of 29 Thumb Amputations

	Dominant	Nondominant
Through metacarpal or metacarpophalangeal joint	13	2
Through proximal phalanx or interphalangeal joint	4	6
Through distal phalanx	3	1

carcinoma, three from post-irradiation “changes,” and one from a nail-bed carcinoma. One surgeon had a finger amputation because of an erroneous diagnosis of malignancy.

Gas gangrene, spina ventosa due to bovine tuberculosis, tuberculosis arthrosis, gangrenous erysipelas with osteomyelitis, and an infection resulting from a human bite were reported infectious causes in ten surgeons. Three lost their fingers to infections caused by operating on infected patients.

Frostbite caused the loss of five digits on the hands of a German surgeon at the Russian front in 1942. One surgeon lost a finger due to an electrical burn, and one hand surgeon lost parts of five digits on his right hand from a vascular accident, presumably embolization, following cardiac catheterization.

Eight hands were injured by gunshot or explosives, including several combat casualties, a homemade bomb, and a laboratory explosion.

Seven amputations were iatrogenic—two for recurrent Dupuytren’s contracture, two for congenital deformity, two from alcohol injection into injured fingers, and one case where both small fingers were electively amputated “to improve surgical dexterity.” (The old adage “Practice makes perfect” would seem to be more desirable than this drastic procedure.)

Types

There was a loss of a single digit or part of a digit in 122 of the hands, of which 29 were thumbs and 93 were other fingers. Eighty-one involved the dominant hand, and 41 were nondominant. Twenty-eight surgeons had multiple digit loss—23 involving one hand and five involving both hands. Exact data on the specific digit, the level of amputation, or which hand was involved could not be obtained on 33 surgeons; however, in these cases, a reporting surgeon was able to state that he had personally observed the surgeon and, in most cases, had seen him performing surgery.

EFFECT ON PROFESSIONAL ACTIVITIES

Of the 104 amputees with whom I personally communicated, three reported a noticeable loss of surgical, manual skills. Eight admitted to “some inconvenience” and added that following their amputations, modifications were made in grasping certain instruments and in knot-tying. Five had devised special instruments to compensate for missing digits, but none thought that these were essential to their surgical skills. Of those who lost fingers after completing their surgical training, only three abandoned their careers.

Of the three, two were ophthalmologists and one was a hand surgeon. One ophthalmologist lost his dominant index finger at forty-nine years of age and stated that he was totally disabled from performing any surgery because of the loss and persistent pain in the palm. Several large disability insurance policies specially insured him for loss of hand

function. The other ophthalmologist amputated his right hand with a power saw. The hand was reattached but has little function, and he does only an office practice. The hand surgeon lost the distal phalanx of the thumb, ring, and small fingers, as well as the distal two phalanges of the index finger, and the distal one and a half phalanges of the long finger of his dominant hand, following cardiac catheterization. This surgeon wrote that his hand was “unfunctional.”

Four respondents wrote that, at first, they used special surgical gloves, but two have returned to the use of regular gloves, and they simply tuck the empty finger(s) into the palm of the glove.

An ophthalmologist who had lost the distal phalanges of the nondominant index, long, and ring fingers in a power saw accident at 39 years of age wrote, “I performed my first major intraocular surgery exactly one month after the accident. I have no dysfunction or disability and handle all instruments well.” A general surgeon who had lost the distal phalanges of the dominant long, ring, and small fingers and the nondominant ring and small fingers responded, “As both thumbs and index fingers are okay, ...there are no difficulties in performing surgery.” A vascular surgeon missing his dominant thumb at the metacarpal phalangeal joint notes he “cannot do a one-hand tie with that hand but can handle all instruments by palming them.” A general surgeon who has been without a dominant index finger

TABLE 2. LEVEL of 93 SINGLE FINGER AMPUTATIONS

	Index		Middle		Ring		Small	
	Dominant	Nondominant	Dominant	Nondominant	Dominant	Nondominant	Dominant	Nondominant
Through metacarpal or metacarpophalangeal joint	12	7	8	3	5	1	4	6
Through proximal phalanx or proximal interphalangeal	7	3	4	—	1	1	1	—
Through mid phalanx or distal interphalangeal	7	4	3	1	2	—	2	—
Through distal phalanx or tip	3	3	1	2	1	1	—	—
<i>Subtotal</i>	29	17	16	6	9	3	7	6
<i>Total by finger</i>	46		22		12		13	

since 17 years of age revealed “I trained myself to do a one-handed tie faster than anyone else in my medical class.”

Twenty-nine surgeons reported specific professional advantages to their loss. Two orthopaedists, five general surgeons, one vascular surgeon, and two obstetricians felt that the missing finger(s) and the resultant narrowing of the hand improved the hand’s ability to reach into smaller spaces through shorter incisions and also improved their ability to do rectal, pelvic, and vaginal examinations. The vascular surgeon reported that the loss of his dominant thumb at the metacarpal phalangeal joint markedly facilitated his ability to palm surgical instruments without having to engage their locks. An obstetrician reported the ray amputation of his nondominant index finger was an asset because the removal of retained placentas, exploration of the uterine cavity, and manual rotation of malpositioned babies were more easily done with his narrower, nondominant hand.

Hamilton Bailey, the noted English surgeon and author of the classic text *Physical Signs in Clinical Surgery*, lost his nondominant index finger at the proximal interphalangeal joint to an infection

sustained in the operating room while he was a surgical registrar. He found the remaining stump such a nuisance that he eventually persuaded a colleague to amputate the finger through the index metacarpal. Guy Pulvertaft told me that “Bailey found this such a success that he was not aware of any disability and, in fact, it was an advantage for rectal examination as the long finger, without its neighbor, had a longer reach.” His left hand, minus the index finger, is pictured frequently in his famous textbook.

Eight surgeons specifically commented that their rehabilitation following the amputations and primary closure “consisted of going back to work.” Four noted that they had returned to their offices within a week and to the operating room within a month. None mentioned absence from the operating room for more than three months following their injuries.

Several surgeons claimed that their digital loss was professionally advantageous as it stimulated them to become ambidextrous, thus improving their surgical skills. Two surgeons who had small fingers amputated because of

recurrent Dupuytren’s contracture said that their hands were more useful without their deformed fingers and that donning of surgical gloves was noticeably facilitated. One of them, an orthopaedist, added “I wouldn’t hesitate to have the adjacent ring finger amputated if contracture recurs.”

Ten surgeons found their digital loss useful in reassuring patients who had had recent finger amputations and in explaining to them that finger loss need not result in disability.

EFFECT ON NONPROFESSIONAL ACTIVITIES

A loss in the level of playing musical instruments was most frequently mentioned in the effect that amputation had in performing nonprofessional activities. Seven of the amputees reported loss of grip strength, and five conversely noted that their digital loss inspired them to challenge the hand to acquire greater strength than it had before amputation. A general surgeon missing a small finger said that the loss caused him to abandon

Many surgeons commented that attitude, adaptability, acceptance, and motivation were the important elements in their adjustment to their loss, not the degree of digital loss per se.

“what unquestionably would have been a brilliant career on the five string banjo.” Yet, another general surgeon with loss of an index finger said “I play the five string banjo and type, and not with one finger, but the way we were taught.”

Four amputees said they could not reach an octave on a keyboard and that their previous ability at the piano or organ was impaired by their finger loss. Four others with comparable loss said they had no noticeable keyboard impairment. Only one reported that he had had to give up playing the piano as he had lost parts of two fingers on one hand and three on the other. A general surgeon said that the loss of the distal phalanx of his dominant ring finger was a “blessing in disguise” because it gave him an excuse to give up a career as a concert pianist, which his parents wanted, and allowed him to choose the career he wanted in medicine. One surgeon with loss of a nondominant index finger gave up playing the violin; one gave up the clarinet; and another the flute. However, a gynecologist who had lost the dominant long and ring fingers through their proximal phalanges later learned to play the guitar but had to string it upside down to do so. He added that he had not encountered anything that he could not do. Six surgeons with index finger or small finger loss said they had some difficulty with hammers and wrenches but an equal number with similar loss denied any difficulty in controlling these tools. Five complained of dropping coins and other small objects, particularly at toll booths, or in scooping up coins. Two could not wear wedding rings in the usual manner; three said that they

had some difficulty in buttoning the cuff of their opposite shirt sleeve. A plastic microsurgeon missing the distal segment of his dominant thumb said he has no professional difficulty but noted that pinch is difficult for very small items and “playing marbles is impossible.”

A general surgeon with complete loss of the dominant thumb says “I can do anything with my right hand except throw a football or bowling ball. I play tennis holding the racket in my right hand.” This 76-year-old physician still performs major surgery and states “There is no handicap.”

A 47-year-old plastic surgeon who lost one and a half phalanges from each of the dominant ring and small fingers while shark fishing notes that he has no professional dysfunction but has a slightly less efficient grip with nonsurgical tools and has had to reeducate his hand to hold his shirt or coat while dressing.

A 63-year-old general surgeon who lost the distal one and a half phalanges of his dominant index finger at age 59 admits to nonprofessional dysfunction. He observed that within six months of the amputation, the finger had assumed all of the functions of the missing index finger. He now does everything that he did before the amputation “including hunting, fishing, skeet shooting, playing tennis, and yard work.” A vascular surgeon with loss of the dominant thumb at the metacarpophalangeal joint did not feel that his work or activities of daily living were affected and stated that “ten million years and Darwin are proven wrong.”

Other than these specific comments, all responding surgeons simply stated that they noted no functional loss or only minimal loss in performing daily activities or avocations. Some, however, noted that they had given up wood-working and others reported that they were more cautious in using power tools or machinery.

PATIENT REACTION

Of these surgeons' patients only a few, who were mostly young children, remarked about the finger amputations. One surgeon said "most patients seemed to notice until I accommodated to my loss, and then no one did." The ophthalmologist who had lost the distal phalanges of his nondominant index, long, and ring fingers reported that in 23 years of practice only one patient, a child of ten years of age, noted the loss. He added, "My wife first noted the amputation after six months of courtship."

Many surgeons commented that the loss had caused no change in their practice and that no patient had expressed concern that the amputation(s) would compromise their treatment. Several said they were certain that they had never "lost" a patient to another surgeon because of their own loss. Some reported their patients believed them to be quite "ingenious" to operate with fewer than ten fingers, and others occasionally expressed sympathy if the loss had occurred recently. One surgeon sensed that his patients with similar loss had a feeling of satisfaction "that their doctor is as dumb as they are."

An orthopaedist with loss of the distal phalanx of the right index finger passed the naval officers physical examination during World War II "and the loss was not noted." Another surgeon, lacking the distal phalanx of the long finger said, "I occasionally wave my hand in front of a patient's face and then ask if he has noticed my loss. They rarely do, and I then point out to them how obscure the loss is." Another surgeon summed up the feeling of many others when he wrote, "The less self-conscious one is, the less others notice the defect."

SURGEONS' OVERALL ASSESSMENT

Many surgeons commented that attitude, adaptability, acceptance, and motivation were the important elements in their adjustment to their loss, not the degree of digital loss per se. James Becton, a hand surgeon who has lost his dominant index finger at the metacarpalphalangeal joint, says "often a well-healed stump is functionally, psychologically, and vocationally the best thing for many patients," rather than retention of a poorly functioning digit. He says his loss causes him no dysfunction, either professionally or in daily activities.

The noted neurosurgeon Sir Sidney Sunderland states that "regarding digital loss, excluding the thumb—which has a unique and irreplaceable role in manual dexterity—the elimination, partial or complete, of any one of the remaining digits results in little impairment of function, compensation for the loss occurring more rapidly and effectively the younger the patient. In my own case, the long finger has taken over the functions of the lost index finger as well as retaining its own, and the hand has lost none of its dexterity. This makes one question the desirability of replacing single fingers. Moreover, the long-term results of digital replantation remain to be evaluated.

"The loss of two or more fingers introduces a disability factor which increases with the number of fingers lost. If the thumb and at least one finger survive, however, the overall hand function can still be useful. Of course, in the female, the loss of digits always carries some cosmetic significance."

James Tucker, an ophthalmologist, lost his right hand above the wrist in a homemade bomb explosion at 17 years of age. Despite this, he successfully completed medical school and an ophthalmology residency. He has done

more than 100 cataract operations per year for the past 15 years. He operates using an APRL prosthetic hand covered by a surgical glove. In his 16 years of surgical practice, he has never been threatened by malpractice litigation. He has recently been promoted to the rank of brigadier general in the United States Air Force Reserve, making him the first one-handed American general since the Civil War. He reports that his hand loss gives no disability in his work or in daily activities. In his words, "Handicap is a state of mind, not a state of fact."

Liebe Diamond is a pediatric orthopaedist with the loss of parts of eight fingers due to congenital ring syndrome. She admits to no disability and requires no assistance in personal care or in the care of her home and family. She plays the trumpet, "as this is a three-digit instrument." She says she has no professional disability and selected pediatric orthopaedics as a career rather than general surgery or gynecology as her short fingers make knot-tying difficult in a deep hole. When operating, she usually wears custom-made gloves. However, when these are not available, she can manage with ordinary surgical gloves by folding the empty fingers into the glove. She has devised a special knot-tying technique and some special instruments, but can and does use all standard orthopaedic instruments and can use scissors and scalpel with either hand. She has a large number of patients with various congenital amputations who seek her care because they knew of her anomalies. She states, "The functional significance of digital loss also depends

on what has been preserved. If a thumb, an opposing finger, and broad palm for gripping are left, the function will be satisfactory regardless of appearance. This presupposes a hand with intact sensibility as the prime requirement."

George Macer, Jr., has recently completed an orthopaedic residency and is now a Hand Surgery Fellow. He sustained a metacarpal phalangeal disarticulation of his dominant thumb at 16 years of age. He notes no professional disability and comments, "Contrary to usual opinion, the loss of one's nondominant thumb seems more disabling than the dominant. The helping hand holds the nail or the screw, opposes the fabric or tissue in sewing, and holds tight the fragments in drilling or Kirschner wire insertion." His father, George Macer, Sr., is an obstetrician who lost the terminal phalanges of his dominant index, long, and ring fingers at 15 years of age and states that he has "hardly any functional loss in professional activities or those of dialing living." He says the loss has made him completely ambidextrous. Of his son, George, Sr. writes, "On his evaluation as an orthopaedic resident it was stated that he was more competent as a surgeon without this thumb than the other residents who had both thumbs."

Many surgeons observed that digital loss is insignificant in properly motivated patients. Typical comments were, "Incentive is the key," and the statement made by the general surgeon who lost parts of his dominant index, long, and

ring fingers at fifty years of age who said, "The important thing is what I have left and what I can do—not what I have lost and what I cannot do."

Discussion

Most of these surgeons are quite willing to describe their loss, its cause, and what effect it had had on their professional and private lives. With three exceptions they agreed that, though their loss may have inconvenienced them in some activities, it had had no major deleterious effect on their careers or their surgical proficiency. Many dealt with their loss in good humor and some even in a jocular tone. While three surgeons reported self-consciousness about the appearance of their hands, many reported that after a few months of adjustment they paid little or no attention.

Eighteen note a specific surgical advantage, mostly relating to the ability of a narrow hand to explore tight spaces. Two surgeons believe their amputations have favorably affected their careers—the gynecologist who stated flatly that his amputation was an asset and the general surgeon who believed that his loss caused him to be a surgeon rather than a pianist.

Surgeons with a one-digit loss reported that the particular digit, the level of the amputation, and the side (dominant or nondominant) were unimportant to their ability to adjust satisfactorily to activities. Many noted that a comfortable stump with good sensitivity was easy to accommodate to, but that a tender or insensitive stump was a significant impairment to good hand function. Those reporting this experience had had revisions and shortening of unsatisfactory finger stumps or elective ray resection.

Two surgeons had reattachment of severed parts. One was a gynecologist

who, at 41 years of age, sustained "an almost complete" amputation of the distal phalanx of the dominant index finger and lost the tip of the adjacent long finger. The index finger was reattached but failed to survive and was amputated at the distal interphalangeal joint six days later, with the stump covered with a cross-finger flap from the long finger. This surgeon states that his index finger stump has some useful sensation in it, but is a nuisance because of cold intolerance. The other surgeon is an ophthalmologist who had replantation of his nondominant hand through the proximal carpus from a chair saw at 45 years of age. The hand survived, and since then he has had many operations to improve function. He states that his hand has good circulation, gross sensibility, and limited motion (which is not very useful to him). He has returned to his office practice but does not operate. It is interesting that the 29 surgeons who had lost a thumb or part of a thumb reported little interference with their activities. One surgeon had an index finger pollicized and was disappointed with its appearance and function. Well-motivated patients adapted well to the loss of a thumb, which suggests that replacement of the amputated thumb may not be mandatory in motivated patients.

Conclusion

There are very few activities for which ten digits are needed. The ability to adjust to an amputation injury by being successful in one's pursuits depends on patient motivation as well as the specific injury. ■

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A PATIENT'S PERSPECTIVE ON MORAL ISSUES AND UNIVERSAL ORAL HEALTH CARE

Valerie Smith, MDiv

ABSTRACT

The author argues that, in addition to dentists and ethicists, a morally correct conversation about these issues ought to include people who require oral health care services. The author has experience as a health care consumer in four countries and on two continents and writes from a patient's perspective. Using narratives of personal experience she argues that holistic patient care, a dentist-patient partnership, and an excellent quality of care are fundamental aspects of ideal oral health care to which all people should have access. The best chance of improving access to quality oral health care is through a moral framework. Dental professionals, and others who are empowered, have a moral responsibility to work to create a culture in which care for people is the primary value, and the author offers several suggestions toward this end.



Ms. Smith teaches academic writing at the Canadian Mennonite University in Winnipeg, Manitoba; mikeandvalsmith@yahoo.ca. This paper was originally presented at the 7th Congress of the International Dental Ethics and Law Society (IDEALS), in Toronto, Canada, May 24-26, 2007.

Why do so many people worldwide lack access to adequate oral health care? Is making oral health care access a human right the key to improving access for vulnerable populations? And who is best able to answer these important and troubling questions? Beginning with the last question, an obvious answer is that dentists, and others involved in delivering oral health care, are well-positioned to address questions about access to care. Ethicists are valuable in formulating morally sound answers to these questions. But, I will argue, a morally correct conversation around these issues ought to include people who require oral health care services. Without the last group, an essential perspective on the successes and gaps in the oral health care system is missing. I commend the dental profession for each course, each conference, and each journal in which the voices of patients are included and considered, including the invitations to present my perspective on access to oral health care and human rights at the IDEALS Congress and in this journal.

I am writing, not as an expert in either dentistry or law, but as an oral health care consumer. As a consumer, I cannot contribute research results nor statistics to the issue of access to oral health care. Instead, I can offer stories and reflections on my experiences and the experiences of those around me. I have received health care in four countries and on two continents. I have received both excellent care and poor care, including a misdiagnosed brain

tumor. I have witnessed the benefits of early, preventive care, and I have observed the consequences of inadequate care. It is from this perspective as one health care consumer that I have considered questions of access to oral health care.

I am convinced that all people ought to have access to oral health care, though many people, particularly those from vulnerable populations, do not. While I do not disagree that such access should be a human right, I will argue that framing the issue in moral, rather than legal terms, allows the legal benefits of rights status to be supplemented by a range of changes which together work to provide quality, holistic care to the entire population. First, however, I would like to reflect briefly on the ideal toward which all oral health care should aim.

A PERSONAL CASE

I would like to begin with a case study which seems to me to encapsulate the ideal in oral health care and which points to the principles that undergird excellent oral health care. Moreover, unlike even the most compelling statistics, a case study emphasizes the people involved, and I believe that quality oral health care is fundamentally about caring for people.

I have two daughters. Laurel is two and Alayna is now four years old. Just after Alayna turned three, my father, who is a prosthodontist, noticed that Alayna had a functional crossbite. After consultation with my husband and me, my dad arranged for Alayna to be seen by a friend and orthodontist, Dr. Bob Baker. When we first met with Dr. Baker, he let us know that if Alayna was not comfortable enough to let him examine her mouth, then he would wait until the next visit, or the visit after that. He was friendly and patient and Alayna did

allow him to examine her bite. He felt she would benefit from an appliance to expand her upper jaw and correct the crossbite. Alayna was happy at the thought of getting something like the mouthguards my husband and I wear to reduce the effects of nocturnal bruxing. Over several visits, an impression was made and the appliance was fitted and adjusted. Alayna was allowed to choose the color of both the appliance and the case—both purple. Dr. Baker delayed the final occlusal adjustments rather than push Alayna past what she could tolerate in one sitting. Once the appliance was properly adjusted, Alayna never complained about it. She looked forward to her dental visits and said that Dr. Baker was funny. Several months later, the crossbite was corrected and the appliance was no longer needed. After the last appointment, we celebrated by going out for burgers and fries with Dr. Baker.

I realize that this case is an exception. The crossbite was detected early and the treatment was not painful. And burgers and fries are obviously not a standard part of treatment. Not everyone will have a dental experience that is so much fun.

Nonetheless, I think this narrative can usefully inform any conversation about access to quality oral health care. Dr. Baker provided holistic care, he worked in partnership with Alayna and with us, and he provided excellent dental care. It seems to me that each of these three aspects of care is essential to the provision of oral health care and is worth examining in a little more detail.

First of all, Dr. Baker cared for Alayna as a whole person. He considered her emotional needs as well as her dental needs. He worked to gain her trust and requested rather than required her compliance. This was not exceptional within Dr. Baker's practice. He began dental treatment only when each patient was comfortable, even when that required several office visits prior to any

dental work. It was obvious that, for Dr. Baker, oral health care is much more about caring for people than it is about fixing teeth or making money. I believe that this should be a fundamental principle of oral health care. It seems to me that, as questions of dental ethics are asked and as modifications to the oral health care system are considered, caring for people holistically ought to be the primary point of focus.

Oral health care focused on the whole person will not look the same in every case and requires attentive dialogue between the dentist and the patient. Whole patient care is not possible if a dentist simply adheres to a set of general principles or bases a treatment plan on the limitations of a particular insurance plan. When culture, emotions and personal priorities are taken into account, genuine need differs from person to person and these real needs—which are not merely whims or desires—ought to be considered. For example, one would logically conclude that one of the dentist's primary duties is to reduce a patient's pain as much as possible, through measures such as providing anesthetic for painful procedures. But following this principle does not always provide the patient with the best care. My grandmother prefers the pain involved in a root canal over the numbing sensation of anesthetic and she has no difficulty in cooperating with a dentist during a root canal without it. She is better cared for and has her needs more fully met when she is treated without anesthetic, despite the pain involved. But the only way this can happen is if her voice is heard and if her dentist is focused on caring for people. Age, culture, religion, employment, past experience, and health problems may all affect the needs, concerns and priorities of a patient. Treating people, and not

just their teeth, will require a certain amount of flexibility within whatever system is in place.

A second important aspect of Dr. Baker's care, and one that goes hand in hand with holistic care, is treating the dentist-patient relationship as a partnership. As much as was possible, Alayna was given the power to make decisions about her own oral health. She was able to decide about the color of both her appliance and her case, decisions which made her a partner in the process. Alayna's choices in this process were limited, but it is important to recognize that this was because of her age and not because she was a patient. At three, her ability to make decisions about her oral health care was limited, so it was appropriate for others to carefully make decisions on her behalf when those decisions were beyond her ability. However, for the vast majority of adult patients, this degree of paternalism is not appropriate.

In preparing this paper, I have had the opportunity to read a small portion of the literature surrounding these questions. The attitude of paternalism that seems to be present in the literature on access to care left me concerned. It is undoubtedly true that the patient needs the dentist, since the dentist has the knowledge and skills to care for the patient's oral tissues. The dentist also needs the patient in order to deliver quality care. For example, to correctly use my blood pressure in evaluating my health, it is important to know that, when I am well, my blood pressure is below the normal range. Talking to me and believing what I say is the simplest way for a health care provider to gain this crucial information about me. Only the patient can provide referencing for individual norms, which are as important to quality health care as population norms are. And health care professionals are especially dependent upon patients

when no external reference is available, as is the case with pain. The dentist-patient relationship ought to be one of partnership in which, in the absence of compelling evidence to believe otherwise, healthcare professionals enter into dialogue with the patient, believing in both the reliability and the value of the patient's comments.

Treating oral health care as a partnership requires more than simply soliciting information from the patient. It means putting information and decision making into the hands of the patient. Patients need access not only to treatment, but also to possibilities. Paternalism, often accompanied by good intentions, assumes that the oral healthcare professional knows what is best. But, as I have already argued, both the patient and the dentist bring essential information to the relationship. Patients know well their own emotions, experiences, priorities and context, all of which are relevant and significant factors when deliberating about oral health care. Oral healthcare professionals can analyze the patient's oral health, and are aware of preventative care possibilities, treatment options and the health risks and benefits of each course of action. When the dentist-patient relationship is a partnership, all of this information is shared. In the oral healthcare process, the oral healthcare professional faces legal and financial risks, but the greater portion of risk, financially and physically, is borne by the patient. The best decisions about quality oral health care are the result of conversation between the dentist and the patient, with accurate and complete information, and with the final decision, resting in the hands of the patient. Partnership, rather than paternalism, provides better and more holistic care.

A morally correct conversation around these issues ought to include people who require oral health care services.

I believe that it is more helpful to frame the question in moral, rather than legal terms.

A third aspect of Dr. Baker's care for Alayna which I would like to highlight is the high quality of the dentistry she received. Though I am certainly not an expert in the field of dentistry, my father's assessment and the range of dental care I have experienced give me confidence that the dental care which Alayna received was excellent.

In an effort to increase the number of people who have access to oral health care in a world of limited resources, it seems that there could be a temptation to cut corners—in training oral healthcare professionals, in providing equipment and supplies, and in the time and attention given to the needs of each patient. As problems with access are addressed, it is important to ensure that quality remains high. If we believe that all people should have access to oral health care, then we should make every effort to ensure that the oral health care they receive is excellent in quality. This is not to say that delivery systems and available treatments ought to be identical among all populations worldwide. Indeed, if the dentist-patient partnership is truly to be a partnership, quality care may look quite different among different populations. But, however the dentist-patient partnership configures the oral healthcare system, sloppiness and inattentiveness should not be more acceptable among vulnerable populations than they are among the empowered. We should not require the vulnerable among us to accept a lower standard of care than those empowered to access care on their own.

FRAMING THE PROBLEM CORRECTLY

These three elements, holistic patient care, a dentist-patient partnership, and an excellent quality of care, are, to me, fundamental aspects of ideal oral health care to which all people should have

access. I am also acutely aware that this type of care is not even a dream for far too many people in our world. Statistics presented throughout the literature on access to oral health care convincingly illustrate the lack of access to oral health care in the United States (Catalanotto, 2006; Crall, 2006; Smith, 2006). I add only that these devastating gaps in access are not just limited to the United States. My husband and I had the privilege of living and volunteering in Bosnia and Herzegovina from 2000 until 2003. Among the wonderful people we met there, we witnessed the pain and indignity many of these people suffered from lack of access to quality oral health care. The gap between the ideal of holistic, quality oral health care and the painful reality for many people around the globe is tragic and unacceptable. This massive gap needs to be closed so that all people have access to oral health care.

One possible approach to closing the gap in access would be to make access to oral health care a human right, which would give the option of legal recourse to those without access. In my view, systemic changes are necessary to correct this serious problem, but I believe that it is more helpful to frame the question in moral, rather than legal terms. Having a right to something means that one is entitled to make a claim, often through legal channels, for that right. But, those who lack the power to gain access to oral health care also lack the power to make a claim for themselves. Legislation, without empowerment, will not help the majority of people who lack access to oral health care. So, while I believe that legislation can be a valuable component of the systemic changes necessary to improve access to oral health care, I do not believe that legislation alone will be sufficient to bring about a substantial change in access. I also believe that, whether or not access to oral health care is a human right, the dental profession

has an obligation to provide at least some care to the underserved and that this obligation is shared by society as a whole. Those of us who are empowered have a responsibility to act so that all people have access to quality, holistic oral health care.

I also believe that this moral responsibility extends beyond basic questions of access to care and systems of payment. Problems with access to oral health care are connected to wider societal problems such as general healthcare access, employment, and insurance. I believe that access to oral health care is also affected negatively by issues such as poverty, military conflict, economic sanctions, and even the effect of our lifestyles upon climate change. Each of us who is empowered has a responsibility to ensure that our lifestyle, whether pursued individually or advanced through the policies of our governments, does not impoverish others. Cumulatively, the lifestyle choices we all make have an impact on quality of life for vulnerable populations. We have a responsibility to live in such a way that the vulnerable have the possibility of whole and healthy lives, including access to oral health care.

I believe that the best chance of improving access to oral health care is through a creative and multifaceted effort to change the culture of oral health care, and care more generally, for vulnerable populations. We need to work together to create a culture in which care for people is the primary value, whether those people are patients, dental assistants, or dental students. We need to create a culture where sharing—of time, information, and services—is a natural part of caring for the needs of society. Such a cultural shift will require time and creativity.

Here are a few changes which could contribute to a culture of care:

1. Classes in ethics that are required of dental students should not simply

cover formal ethics or questions of liability and other legal issues. These classes should remind students about holistic care and about treating the patient as a partner in the process. Furthermore, these ethics classes should also explore lifestyle issues such as transportation, housing, and investments and spending habits of healthcare professionals. Incidentally, during Dr. Baker's years as director of a graduate orthodontics program, an ethics course of this type was required.

2. All oral healthcare professionals could be expected to provide pro bono work. This could be encouraged through a simplified bureaucracy, through making volunteer work a condition of membership in dental associations, as a condition of licensure, or through programs in which volunteer hours would be used to calculate a credit towards reducing student loans.
3. The training of excellent oral healthcare professionals can be encouraged by lowering tuition costs and raising expectations of students. Students who have been held to a high standard in terms of both dental competence and in holistic care of patients, and who graduate without such an overwhelming debt load, will be more inclined to practice with a focus on people rather than on money.
4. Programs can be developed which establish international standards of excellence in oral health care. These programs should include resources to provide training, equipment and supplies to oral healthcare professionals in poorer countries, so that dentists worldwide are empowered to offer up-to-date, quality oral health care.
5. Universal health care, including oral health care could be a widely shared point of advocacy for oral healthcare

professionals. Universal care would be a significant step toward mitigating current barriers to access, such as poverty and the profit-driven design of insurance programs.

I laud all those within the dental profession who advocate on behalf of the vulnerable and unempowered within society, those working to eliminate gaps in access to oral health care and those listening to the voice of the patient. I hope that I have supported those efforts as I have suggested that holistic, quality, partnering care for all people ought to be the collective goal and that oral healthcare professionals and the empowered within society share a moral responsibility to work diligently toward this goal. From the naïve perspective of a health care consumer, I have offered some means by which this can be accomplished. I do not believe that the necessary changes will be quick or easy, but it is my hope that together we can change the culture of oral health care so that the story of Dr. Baker's care for Alayna is no longer an exception. ■

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DENTIST-PRESCRIBED DRUGS AND THE PATIENTS RECEIVING THEM

Thomas P. Wall, MA, MBA; L. Jackson Brown, DDS, PhD; Ronald R. Zentz, RPh, DDS; Richard J. Manski, DDS, MBA, PhD

ABSTRACT

Background: Outpatient prescription drugs continue to play an ever-increasing role in health care delivery in the United States. This paper focuses on the drugs prescribed by dentists and the patients who receive those drugs.

Methods: The authors analyzed data from the 2001 Medical Expenditure Panel Survey (MEPS) for the U.S. community-based population. They developed estimates of the total market for prescription drugs related to a dental visit in terms of total number of prescriptions, total expenditures, and sources of payment. Also included are breakdowns by the type of dentist and the therapeutic class of drug prescribed. They also present a model that identifies the patient characteristics that best predict the likelihood of receiving a dental visit related prescription drug.

Results: Dental patients who were 18 years and older, African American patients, patients whose education level was less than a college degree, patients whose dental visit frequency was less than twice a year, and patients without medical insurance were most likely to report a prescription drug.

Conclusion: Respondents' socioeconomic background and other demographic factors were related to the likelihood of receiving a prescription drug related to a dental visit. Patient age was related to the therapeutic class of the drug prescribed.

Practice Implications: Patients with fewer than two dental visits per year were more likely to report a dental prescription than patients with at least two visits per year.

Prescription medicines are a key health policy issue, as evidenced by concerns about the rising costs of prescriptions and the recent enactment of a Medicare drug benefit (www.kff.org/rxdrugs; www.washingtonpost.com/wp-dyn/articles/A9328-2005Feb8.html). In 2003, 64% of the 290.6 million people in the U.S. civilian, noninstitutionalized population had an outpatient prescription drug expense. This population purchased a total of 2.8 billion prescriptions, an average of almost ten prescriptions per person. It appears that outpatient prescription drugs will continue to play an ever-increasing role in healthcare delivery in the U.S. According to a recent government report, outpatient drug expenditures grew from \$65.3 billion in 1996 to \$177.7 billion in 2003, an increase of 172% (Stagnitti, 2003). Meanwhile, prescription medicine spending increased its share of overall healthcare spending from 12% in 1996 to 20% in 2003.

While it is common for dentists to prescribe drugs for the treatment of pain or infection, most studies of the prescription practices of dentists have been based on samples that are not nationally representative or report findings that are limited to a selected group of dentists (e.g., hospital dentists) (Ciancio et al, 1989; Rutkaukas, 1993). For example, a study of drug prescribing by dentists who practiced in the state of New York reported that although general practice dentists wrote more prescriptions than any specialty group, oral surgeons, endodontists and periodontists were more likely to prescribe medications on

a per dentist basis than general practitioners (Ciancio et al, 1989). The most frequently prescribed drug categories were antibiotics and analgesics. The study also reported that while some dentists recommended generic drugs, most recommended brand name products.

A study based on a nationally representative sample of oral and maxillofacial surgeons practicing in the U.S. found that following third molar extractions, ibuprofen was the peripherally acting analgesic prescribed most frequently, and a combination formulation of hydrocodone with acetaminophen was the most frequently prescribed, centrally acting analgesic (Moore et al, 2006).



Mr. Wall is Manager of Statistical Research, Dr. Brown is Associate Executive Director, and Dr. Zentz is Senior Director, Council on Scientific Affairs, American Dental Association, Chicago, Illinois. Dr. Manski is Professor and Director, Division of Health Services Research, Dental School, University of Maryland and Senior Scholar, Agency for Healthcare Research and Quality. Contact: Mr. Wall at wallt@ada.org.

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The authors also reported that the frequency with which oral and maxillo-facial surgeons administered antibiotics and corticosteroids varied widely based on perceived patient need and dentist expectations.

Since little has been reported in the literature about the patients receiving these drugs, the focus of the present study is dental patients who received a prescribed medicine as a result of a dental visit in 2001. The analysis is based on a nationally representative sample and therefore includes drugs prescribed by all types of dentists. The purpose of the analyses reported in this paper is to augment prior studies and further describe dentist prescribed drugs and the patients receiving them.

Method

The source of data for this study was the 2001 Medical Expenditure Panel Survey (MEPS) (Cohen, 1997). The MEPS is conducted annually to provide nationally representative estimates of healthcare use, expenditures, sources of payment, and insurance coverage for the U.S. civilian noninstitutionalized population. The MEPS is cosponsored by the Agency for Healthcare Research and Quality (AHRQ) and the National Center for Health Statistics (NCHS).

The Household Component (HC) uses an overlapping panel design in which data are collected through a preliminary contact followed by a series of five rounds of interviews over a two and a half year period. The combined response rate for the 2001 full-year file was 66.3%.

The estimates that appear in this study were drawn from analysis of public use files (2001 Full Year Consolidated File HC-060, 2001 Prescribed Medicines File HC-059a and the 2001 Dental Visits File-HC-059b). These public use datasets contains variables associated with 32,122 persons who participated in the MEPS Household Component of the Medical Expenditure Panel Survey in 2001.

During each round of the MEPS HC, all respondents were asked to supply the name of any prescribed medicine they or their family members purchased or otherwise obtained during that round. If the respondent with the prescription gave written permission to release his or her pharmacy records, pharmacy providers identified by the household were contacted by telephone for the pharmacy follow-back component. Only prescription drug medicines, not over-the-counter medicines, are included in this part of the study. It should also be noted that refills are included on this file. Drugs were assigned to therapeutic classes by linking HC-059a to the Multum Lexicon database, a product of Cerner Multum, Inc.

We used the SUDAAN statistical package (Version 8.0, Research Triangle Institute, Research Triangle Park, N.C.) to calculate standard errors and perform statistical tests since that program includes adjustments for the correlation introduced by the complex sample design used for the 2001 MEPS.

Anti-infectives were the most common dental prescription drug (40.2%), followed by analgesic products (32.8%). Together these two categories of drugs accounted for about three out of four dental prescriptions.

Table 1. NATIONAL ESTIMATES OF PRESCRIPTION DRUGS RELATED TO A DENTAL VISIT COMPARED TO TOTAL OUTPATIENT PRESCRIPTION DRUGS.

	Dental Drug Prescriptions	Total Outpatient Drug Prescriptions
Total expenditures	\$411 million	\$134 billion
Number of prescriptions	\$23.9 million	\$2.5 billion
Mean per capita expenditure*	\$30	\$730
Median annual expenditure	\$15	\$240
Mean number prescriptions*	1.8	13.5
Sources of payment:		
Out-of-pocket	60.1%	44.0%
Private insurance	32.6	37.0
Public & other	7.3	19.0
<i>Total</i>	100.0%	100.0%

* For those with prescriptions

Source: 2001 Medical Expenditure Panel Survey; Center for Financing, Access and Cost Trends; Agency for Healthcare Research and Quality.

Table 2. DENTAL PRESCRIPTION DRUGS BY THERAPEUTIC CATEGORY

Drug Category	Description	Estimated National Prescriptions	Proportion by type	Generic %
Anti-infectives	Antibiotics/antivirals	9,594,000	40.2%	88.7%
Analgesics	Narcotic, non-narcotic, combination medications	7,838,000	32.8	63.2
Topical agents	Antibiotic creams, mouth washes, chlorhexidine	3,518,000	14.7	61.3
Respiratory agents	Antitussive, antiasmatic, antihistamine, etc.	1,245,000	5.2	89.9
Supplements	fluoride & vitamin/mineral supplements	718,000	3.0	51.1
Other	miscellaneous	978,000	4.1	33.1
<i>Total</i>		23,891,000	100.0%	73.2%

Source: 2001 Medical Expenditure Panel Survey; Center for Financing, Access and Cost Trends; Agency for Healthcare Research and Quality.

The analysis reported in this paper is based on 2,539 dispensed prescriptions related to a dental visit reported by respondents to the 2001 MEPS. Specifically, national estimates are provided for the civilian, non-institutionalized population of the United States and include the likelihood of reporting a dental prescription for each of several socioeconomic and demographic categories of the population, and the therapeutic class of the drug prescribed by age of patient.

Results

The results of this study indicate that a total of \$411 million was spent on just under 24 million prescriptions related to a dental visit in 2001 (see Table 1). The average yearly expenditure per person with an expense was \$30, while the median expenditure was \$15. The average number of prescriptions, including refills, among those with at least one dental-related prescription in 2001, was 1.8. Sixty percent of these expenditures were out-of-pocket, about one-third were covered by private dental insurance, and 7.3% were covered by public programs. The market for dental prescription drugs is compared to the total market for outpatient prescription drugs in 2001 in Table 1.

DENTAL PRESCRIPTION DRUGS BY THERAPEUTIC CLASS

In Table 2 dental prescription drugs are categorized by therapeutic class. Anti-infectives were the most common dental prescription drug (40.2%), followed by analgesic products (32.8%). Together these two categories of drugs accounted for about three out of four dental prescriptions. Topical agents were 14.7% of dental prescriptions, respiratory agents were 5.2%, and supplements accounted for 3.0%.

Overall, the percent of dental prescriptions classified as generic was

TABLE 3. PERCENT OF PATIENTS WITH AT LEAST ONE DENTAL VISIT IN 2001 WHO REPORTED A DENTAL PRESCRIPTION AND POPULATION ESTIMATES OF NUMBER OF PATIENTS WITH A DENTAL PRESCRIPTION BY SELECTED PATIENT CHARACTERISTICS.

	Patient Characteristic	Percent with Prescription*	Standard Error	Patient Population Estimate	Odds Ratio	P-value
Age	0 to 17	4.7 %	.4	1,467,000	Ref	
	18 to 24	16.8 %	1.5	1,610,000	3.71	<.0001
	25 to 34	15.6 %	1.0	2,288,000	3.68	<.0001
	35 to 54	13.1 %	.6	5,034,000	3.09	<.0001
	55 to 64	12.1 %	.9	1,536,000	2.72	<.0001
	65 +	13.3 %	1.1	1,913,000	2.76	<.0001
Gender	Male	10.8 %	.5	5,842,000	Ref	
	Female	11.9 %	.4	8,013,000	1.04	.5811
Income level	Poor/near poor	15.7 %	1.1	1,833,000	1.18	.2101
	Low income	14.3 %	1.1	1,702,000	.96	.8161
	Middle income	11.7 %	.6	4,343,000	1.15	.1965
	High income	9.9 %	.5	5,977,000	Ref	
Race	White	11.0 %	.3	11,688,000	Ref	
	African American	17.3 %	1.2	1,706,000	1.56	<.0001
	Other	8.8 %	1.3	461,000	.74	.0888
	Hispanic:					
	Yes	13.3 %	1.0	1,358,000	1.03	.7945
No	11.3 %	.3	12,497,000	Ref		
Education	No degree	19.0 %	1.3	1,719,000	1.66	<.0001
	GED/H.S.	13.4 %	.5	7,483,000	1.44	<.0001
	Bachelors +	8.2 %	.4	4,621,000	Ref	
Dental visit frequency	< Once a year	24.8 %	1.5	2,449,000	2.21	<.0001
	Once a year	12.5 %	.8	3,551,000	1.22	.0248
	> Once a year	9.5 %	.4	7,799,000	Ref	
Dental Insurance	Yes	10.5 %	.4	7,797,000	1.02	.7853
	No	12.9 %	.5	6,058,000	Ref	
Medical Insurance	Any private	10.6 %	.3	10,694,000	Ref	
	Public only	14.4 %	1.1	1,896,000	1.21	.1220
	Uninsured	19.0 %	1.6	1,264,000	1.34	.0330
Metropolitan Statistical Area	Non-MSA	13.0 %	.9	2,703,000	Ref	
	MSA	11.1 %	.3	11,145,000	.86	.0926
Region	Northeast	11.2 %	.7	2,732,000	1.13	.2370
	Midwest	10.6 %	.7	3,267,000	Ref	
	South	12.3 %	.6	4,777,000	1.17	.1023
	West	11.5 %	.6	3,072,000	1.15	.1613
	Total	11.4 %	.3	13,855,000		

*For those with prescriptions

Income level was defined as follows: poor/near poor = 125% of poverty and below; low income = 125% to 200% of poverty; middle income = 200% to 400% percent of poverty; and high income = at least 400% of poverty. Highest degree completed, for people 20 years old and younger, refers to caregiver's (parent or guardian) education. Insurance: 1 = Any private (person had any private insurance coverage (including Tricare/Veteran's Administration) any time during 2001); 2 = Public only (person had only public insurance coverage during 2001); 3 = Uninsured (person was uninsured during all of 2001).

Source: 2001 Medical Expenditure Panel Survey; Center for Financing, Access and Cost Trends; Agency for Healthcare Research and Quality.

Outpatient prescription drugs continue to play an ever-increasing role in health care delivery in the U.S.

73.2% (see Table 2). The therapeutic class of drugs with the lowest percent of generic prescriptions was supplements (51.1%) and the classes of drugs with the highest percent of generic prescriptions were anti-infectives and respiratory agents (89.9% and 88.7% respectively).

CHARACTERISTICS OF PATIENTS RECEIVING A DENTAL PRESCRIPTION DRUG

Table 3 (page 35) shows the percent of patients with a prescription and population estimates of the total number of patients with a prescription by several patient socioeconomic characteristics. The left side of the table presents a series of relationships among pairs of variables. For example, the percent of patients reporting a dental prescription varied by the age of the patient (i.e., patients younger than 18 years old were less likely to report a dental prescription than were older patients).

We also constructed a multivariate logistic regression model to determine the respective influence of these variables on the likelihood of receiving a prescription drug. The odds ratios and p-values for the multivariate model appear on the right side of Table 3. The multivariate analysis indicates which variables were found to be statistically significant after controlling for all other variables in the model.

Adults in each age group were found to be 2.72 to 3.71 times more likely than children younger than 18 years old to report having had a prescription. African Americans were 1.56 times more likely than whites to receive a prescription. Those with no educational degree were 1.66 times more likely than those with a Bachelor's degree or higher to receive a prescription, and those whose highest degree was a high school diploma or GED were 1.44 times as likely as those with a bachelor's degree or higher to receive a prescription. Those who reported that they visit a dentist less than once a year

were 2.21 times more likely to receive a prescription than those reporting two or more visits per year. Those who said they visit a dentist once per year were 1.22 times more likely to receive a prescription than those reporting two or more visits per year. Those without medical insurance were 1.34 times as likely to receive a prescription as those with some private medical insurance.

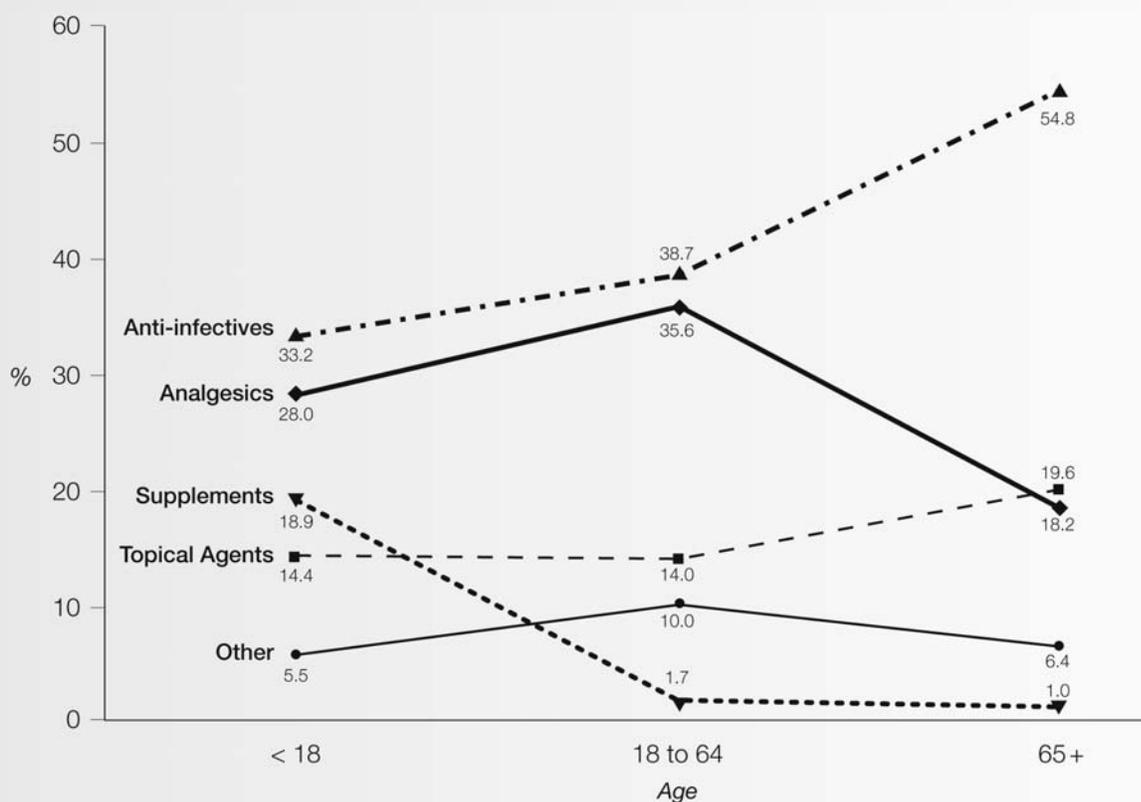
THERAPEUTIC CLASS OF DRUG BY PATIENT AGE

The unit of analysis in Figure 1 is prescriptions. Anti-infectives accounted for about one-third of the dental prescriptions for children. Analgesic products made up 28% of prescriptions for children, supplements made up 18.9%, and topical agents accounted for another 14.4%.

Among adults younger than 65 years old, 38.7% of dental prescriptions were anti-infectives and 35.6% were analgesic products. Analgesic products were the most common drug reported related to dental visits by patients 18 to 30 years of age—40.2% (not shown in Figure 1). Among all adults younger than 65 years old, topical agents were 14% of the total and supplements dropped to less than 2%. Among the elderly anti-infectives rose to just over half of the prescriptions reported (54.8%), analgesic products and topical agents each accounted for about one-fifth, and supplements only 1%.

The unit of analysis in Figure 2 is patients. This figure presents estimates of the percent of patients reporting anti-infective and analgesic dental prescriptions by patient age. Prescriptions for anti-infectives and analgesics among children were about equally likely, but relatively infrequent. Prescriptions for these types of drugs were higher among adults 18 to 64 years of age, and about equally likely. Among elderly adults a prescription for

FIGURE 1. PERCENT OF DENTAL PRESCRIPTION DRUGS by THERAPEUTIC CLASS by PATIENT AGE.



Source: 2001 Medical Expenditure Panel Survey; Center for Financing, Access and Cost Trends; Agency for Healthcare Research and Quality.

an anti-infective was three times as likely as a prescription for an analgesic. However, unlike the results reported in Figure 1, elderly adults were about as likely as younger adults to receive a prescription for an anti-infective.

Discussion

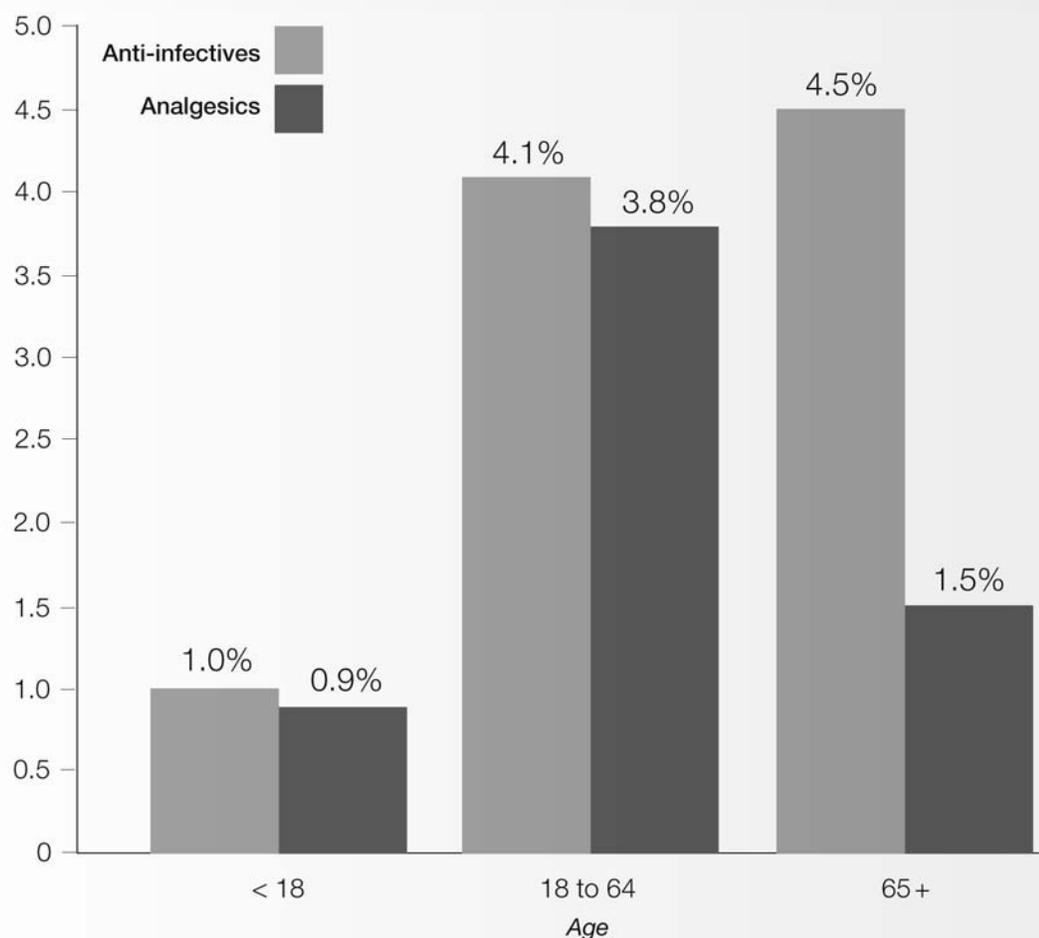
The 2001 MEPS data provide nationally representative estimates and include data elements that allow for an analysis of dental visits in terms of the patients seeking treatment and the dentists providing the dental services. Information about the patients who sought dental treatment is especially rich, and allows for the breakdowns presented in this paper by patient age, income level, education level, race and ethnicity.

While these data and analyses are useful, they do have possible limitations. The results of this study are based on self-reported data (i.e., by the patient),

and self-reported data are less accurate than data collection by observation or by dental record abstraction. A longitudinal cohort study reported that agreement between self-report dental visits and information abstracted from dental records ranged from 84% to 91%, but that agreement did not differ between key socio-demographic groups (Gilbert et al, 2002). As with all sample surveys, non-respondents could have different prescription patterns, compared to respondents. Also, since this study focused on prescription drugs related to a dental visit, drugs that may have been prescribed by MDs for dental conditions were not included.

As shown in Table 1, expenditures on prescription drugs related to a dental visit made up a tiny slice (.3%) of total expenditures on outpatient prescription

FIGURE 2. PERCENT OF PATIENTS REPORTING ANTI-INFECTION AND ANALGESIC DENTAL PRESCRIPTIONS BY PATIENT AGE.



Source: 2001 Medical Expenditure Panel Survey; Center for Financing, Access and Cost Trends; Agency for Healthcare Research and Quality

drugs in 2001. Expenditures on dental prescription drugs can also be compared to total dental expenditures. According to MEPS, total dental expenditures, not including dental prescription drugs, was \$59.5 billion dollars in 2001. The estimated \$411 million spent on dental prescription drugs was just .7% of total dental expenditures in 2001.

Most drugs prescribed by dentists are relatively inexpensive and can be purchased as generics. Conditions treated

by dentists that require prescription drugs are usually acute in nature and, unlike drugs prescribed by physicians, exclude high-cost maintenance drugs taken for chronic conditions. However, the fact that the mean annual expenditures per person were twice as high as the median expenditures means that the distribution of dental drug expenditures was skewed by some patients with relatively large expenses.

As for sources of payment, the percent paid out-of-pocket was higher for prescription drugs related to a dental

visit (60.1%) than for all outpatient prescription drugs (44.0%). This was primarily due to a corresponding difference in the percentage of expenditures covered by public sources which was 19.0% overall versus 7.3% for dental prescriptions. The portion of total outpatient prescription drug expenditures covered by public sources is expected to increase in the future due to the recent addition of a drug benefit to the Medicare program. The percentage of expenditures covered by private insurance was somewhat higher for all outpatient prescriptions (37.0%) than for dental prescriptions (32.6%).

Thus, a greater percentage of the total cost of dental prescriptions, compared to all outpatient prescriptions, is paid by patients. However, it is not possible to determine from these data whether that results from fewer patients with private dental insurance or larger co-payments among those with insurance, compared to all outpatient drug prescriptions.

Anti-infectives were the most common dental prescription drug (40.2%), followed by analgesic products (32.8%), and together accounted for about three out of four dental prescriptions. The relative importance of these two types of drugs was reported in an earlier study of the prescribing habits of dentists practicing in five counties located in western New York (Ciancio et al, 1989).

Although three out of every four dental prescriptions were for an anti-infective or an analgesic, dentists were found to prescribe a broad range of drugs. Ciancio and colleagues argued that in view of the wide variety of drugs prescribed, dental education in pharmacology should provide adequate knowledge of drug prescribing and in-depth knowledge of various categories of drugs, particularly antibiotics and analgesics (Ciancio et al, 1989). When prescribing drugs, dentists also should be aware of what other

drugs their patients are taking so that undesirable interactions and adverse events can be minimized.

Overall, about 73% of dental prescriptions were filled with generic drugs. This is significant since earlier research reported that while some dentists recommended generic drugs, most recommended brand name drug products (Ciancio et al, 1989). Another study looking at the costs of antibiotic and analgesic drugs commonly prescribed by dentists concluded that generic drugs were generally less expensive than pioneer (brand name) drugs (Alexander & Gage, 1992). The authors of the latter study stressed the need for greater clinical awareness of patient costs.

Unfortunately, based on the MEPS data it is impossible to say whether dentists alone were responsible for this finding since in most states pharmacists are permitted or required to substitute an equivalent generic drug for brand name. A study of dentists designed to collect information about drug prescribing behavior would shed further light on likelihood of a dentist to prescribe a generic drug.

One of the most interesting findings of this study was that the likelihood of receiving a dental-visit-related prescription drug was strongly related to dental visit frequency. Foregoing a pattern of regular dental visit and showing up at a dentist's office only "when it hurts" is the strategy that may result in a dental related prescription drug. Further research is warranted to determine if a pattern of regular dental visits is likely to minimize the need for dental related prescriptions.

The multiple logistic regression model showed that adults 18 years old

Most drugs prescribed by dentists are relatively inexpensive and can be purchased as generics.

Patients with fewer than two dental visits per year were more likely to report a dental prescription than patients with at least two visits per year.

and older were more likely to report a dental related prescription than children younger than 18. This finding emphasizes the fact that 18 is the threshold age related to a higher probability of a dental prescription, and may be related to extractions of third molars. A study focusing on third-molar extractions reported that the overwhelming majority of third molars were extracted from patients 15 to 25 years of age, and that extractions peaked at age 18 years (Eklund & Pittman, 2001).

Another study reported that the percent of the population reporting a dental visit during the past year in 1999 was 78.5% among those 5 to 17 years old, 59.6% among those 18 to 35 years old, and 67.1% among those 35 to 54 years old (Wall & Brown, 2003). This dip in the percent with a visit among young adults corresponds to an increase in the percent reporting a prescription drug in the current study. It could be that a loss of parental dental insurance coverage around age 18 leads to more episodic care.

Those with lower levels of education were more likely to report a prescription drug, even after controlling for income level and dental visit frequency. One possible explanation for this finding may relate to personal oral health preferences and behaviors. Andrews and colleagues reported that among a group of dental patients in Oregon, less-educated patients reported brushing and flossing less frequently than did those with more education (Andrews et al, 1998).

African Americans were more likely than whites to report a dental related prescription, even after controlling for income level, education, and dental visit frequency. One explanation could be that African Americans present with more acute dental conditions than whites. African Americans in the U.S. have been

shown to have more unmet dental needs than whites (Brown et al, 2002).

Oral anti-infectives were the most commonly prescribed drug reported by patients 65 years old and older. As a percentage of patients, however, anti-infective prescriptions among those 65 years and older were about as likely as among adults 18 to 64 years of age. The predominance of anti-infective prescriptions among elderly adults, measured as a percent of total prescriptions, was due to a decrease in the relative number of prescriptions for analgesic products, compared to the levels of these two types of prescriptions reported by adults 18 to 64 years of age. The reason for this decrease in prescriptions for analgesic products among the elderly is unknown. It is possible that a combination of factors is involved such as: fewer teeth in this age group; decreased sensitivity of teeth due to secondary dentin development; a higher percentage of teeth with existing root canal treatments; pre-existing short or long-term analgesic and anti-inflammatory therapy for non-oral acute or chronic pain management.

Conclusion

The estimated size of the U.S. market for prescription drugs related to a dental visit in 2001 was \$411 million. Although three-fourths of dental prescriptions were for an anti-infective or analgesic, dentists were found to prescribe a wide variety of drugs.

Overall, 11.4% of dental patients received a prescription drug in 2001. The likelihood of receiving a dental-related prescription drug varied by patient age, race, education, dental visit frequency, and medical insurance status. Oral anti-infectives and analgesic products were the most common categories prescription drugs related to a dental visit, and the therapeutic category of drug prescribed varied with patient age. ■

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TECHNICAL GLOSSARY

[provided by editor]

LOGISTIC REGRESSION

It would be nice to estimate the net income of general practice dentists and various types of specialists, if possible adjusted for part of the country, days worked per week, years of experience, and other background factors. Given a very large sample size, it is possible to make these comparisons using a sophisticated statistical technique known as logistic regression.

In this approach, the background factors are used to make statistical adjustments to “level the playing field” among the different categories of interests. In our example, geographic location, years of practice, etc. are statistically controlled to compare income across practice types. The variable of interest may have two categories or several. One of these is arbitrarily chosen as the reference category. The results of the logistic regression analysis include odds ratios that compare the ratio of each category group to the reference group. For example, if general practitioners are considered our reference group and public health dentists make exactly the same income (accounting for all other background factors), the ratio of their incomes is 1:1 or 1.00. If endodontists make about half as much as general practitioners, the ratio would be 1:0.5.

HEROES

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

ABSTRACT

Heroes are out of fashion today, and poorly understood. They are not the winners, idols, and momentary stars representing our preoccupation with success. Instead they are individuals who sense the slight imbalances in society and prepare themselves to help point us in the direction we are already tending toward. The hero engages in a quest that includes a call, a separation from society in which challenges are overcome, and finally a return with a boon. Properly understood, we can find examples of heroes in dentistry, even if they are not the ones that come naturally to mind.

The first line of Dickens' *David Copperfield* is so well known that it appeared as a question on the television show "Jeopardy." "Whether I shall turn out to be the hero of my own life or whether that station will be held by anybody else, these pages must show." That mattered greatly to Dickens because the book is deeply autobiographical. His sixteen and a half novels reflect a boy alienated from his indifferent childhood who grew to encounter the tyranny of belittling interpersonal relations, the bestial instincts of mob and criminal violence, and the dehumanized wreckage left by industrialization's success. That boy returns, in the form of the author, to hold a mirror to society. That makes Charles Dickens a hero.

Heroism isn't what it used to be. Modern society is uncongenial to its cultivation. In fact, we tend to be a bit unclear on the concept. Hero did appear in Greek mythology, but she was a priestess for Venus and not a conqueror or leader. Readers probably know several heroes in dentistry; the trick is to know what to look for.

Civilization changes; culture is in constant evolution; yesterday's dentistry is no longer good enough. Think of the giant tectonic plates that support the earth's surface and their continual drift, or global warming, or the relationship between men and women. It is a good idea to know where to stand. As the futurist John Naisbitt expressed it, "It is

easier to ride a horse if you are facing the direction the horse is going." Within any culture, society, or set of professional standards, most are able to keep their footing, a few are disoriented or catching up, and some win the prizes. These are the worldly men and women, in their full range of potential, who accept their world as given. Self-help books, leadership institutes, personal trainers, and hard work and being smart or courageous increase the number of winners; so does cheating. But heroes do not walk these paths of worldly success.

Heroes are especially sensitive to shifting conditions. They help society find new identities. That means that heroes are not successes by the standards of the world. Moses would be a good example. If he had remained an effective administrator for Pharaoh, he would have received a gold watch and, at most, an honorable mention in the footnotes of history. Instead, he committed manslaughter and fled to Goshen. He was personally inarticulate, with a speech impediment. He was not a natural leader, needing the help of his brother Aaron and the general Joshua. And ultimately he failed to enter the Promised Land himself. But Moses created one of the greatest nations in history because he was in touch with fundamental insights. He articulated what was happening at a deep level. He was a hero.

The life pattern of Dickens and Moses share the essential features of a hero's journey. They respond to a call, they confront challenges, and they return with a boon for society. After

describing the hero's quest, we will compare to worthy individuals who are not heroes and then look for modern heroes in dentistry.

THE QUEST

Today the most common use of the term heroic is in reference to brief acts of courage or talent. The firemen at the World Trade Center towers were heroes in this sense. The quarterback who marches his team sixty yards in forty seconds for a comeback upset win is a hero. The media has dramatically increased the number of this type of hero. It has also noticeably shortened the time their activities are in front of the public's consciousness and lessened the impact of what they accomplish. Without meaning to devalue these accomplishments, they are worldly achievements that do not redefine what is good, beautiful, or worthy. They are individuals who have worked their way to the front seats on the bus, but have not helped drive it or even commented on whether we are on the right path.

Heroism has a narrative, transformational, transcendent, personal nature that is ill-suited to television or Web formats. The most familiar current examples of heroes would likely be J.R.R. Tolkien's *The Lord of the Rings* or George Lucas' *Star Wars*. There is a clear pattern: The hero becomes increasingly separated from society because he or she recognizes growing signs of inauthenticity and is called to a quest. The hero's journey involves crossing

into a different world, challenges, and ultimately confrontation with one's self. If successful, the hero returns with a blessing for society, usually in the form of transformational insight, and although society may absorb this insight, this is at best semiconscious and almost never accompanied by rewards or tributes. There is little satisfaction and even less glory in being a hero.

THE CALL

Joseph Campbell has a wonderful line: "The wasteland is populated with people who have inherited their identities." What he means is that society has made us—our parents, our schools, the communities we live in, our professional colleagues, our organizations and associations; they have all told us who we are. They have also given us good rules for deciding what matters and who counts. If we are mature and virtuous, all of this will be automatic and unconscious. The only question is how hard we want to work to get the prizes that are given out at the front of the line or to think of something clever to shift the blame when we fall too far back. But the utility of these identities drift, and over time the pursuit of traditional dreams can lose its meaning. By the time we get to the front of the line, a different show may be the thing. Heroes are recruited from among those who notice the loose threads in the fabric of society; they sense that society is just slightly out of

Heroism is seeing deeply and sincerely enough into the nature of the world to inspire wonder in others.

balance; they are suspicious that being the lodge president may not be a completely fulfilling ambition.

Heroes had an advantage in the old days. The call was literally the voice of God, a sign from heaven, or a visiting messenger with awe-inspiring credentials. Today, we still speak of those in the serving professions as engaged in a calling. The U.S. Army is now running a recruiting ad aimed at the parents of young men and women who may want to enlist asking that they not contravene the “call.” But it is getting harder to hear the summons, partly because the material world has been running such catchy ads of its own. More importantly, the mysteries of the world are being crowded out by science and rational thought. Unlike martyrs, heroes do volunteer—or not. The call can be refused, and this generally leads to cynicism because the world is still recognized as being slightly cracked, but the potential hero declines to take action. Most often, the call is ignored because we are still interested in the rewards of the world or we think we can make a deal to go on the hero’s journal without having to actually give up anything. Those people who rent storage units are poor candidates for heroism. In some cases, the hero is actively pushed toward the quest by society. Dante was literally exiled from Florence and lived as an itinerant. Mohammed was banished.

Usually, there is a guide who supports the hero in his or her decision to enter on the quest. Yoda was Luke Skywalker’s guide; Gandalf was the guide for Frodo

Baggins. This is not a mentor; that category of advisor functions to draw the potential hero away from the quest to facilitate his or her success in the given society. The guide tests or validates the potential hero. Courage, intelligence, and strength are important, but the essential qualification for a hero is purity or virtue. This turns the standard view of morality on its head: the hero does not achieve virtue or ethical conduct as a result of study and social education—it is a basic prerequisite for becoming a hero. The guide also furnishes amulets and wisdom that will be of value on the quest, but does not accompany the hero. Almost always, the journey is a solo affair.

It often requires some time of preparation before the hero’s journey begins, but the unmistakable sign that the quest has started is crossing a threshold. The threshold is guarded and it cannot be passed without leaving one’s worldly self behind. The guards at the threshold are usually malformed—old crones, creatures with parts from several animals, combinations of familiar and unfamiliar places. The hero need not fight his or her way past the gatekeepers; the real struggle is internal. There may be strange questioning or intense, scrutinizing stares that frighten. The hero has to answer in his or her heart that the quest is now irrevocable. There is a death of the worldly former self.

In most societies, these passages still exist and are marks of moving from childhood to adult status. They may be as harsh as an eight-year-old going to the funeral of his father who was shot in a drug raid or as mild as a snipe hunt. The passage from the worldly society, with the help of a gatekeeper, exists in all cultures and it is required of everyone at some point, no exceptions. The ancient Greeks who had died paid the

boatman Charon to take them across the River Styx, today the Grim Reaper or the hospice attendant perform this function for most of us. This is the unavoidable end of all the self-improvement programs we embrace. Only the hero voluntarily makes the journey before it is obligatory; heroism is not committee work.

THE CHALLENGE

What happens after the hero crosses the threshold is a bit obscure. He or she enters a dreamlike, dangerous, and demanding world. There are battles, ordeals, mysteries, traps, temptations, and confrontations of huge magnitude. It is Christ’s temptation; Florence Nightingale’s Crimean War; Ebenezer Scrooge’s visit from the specters. It is the jail or broken marriage of an alcoholic; the lost election for a coveted office in organized dentistry; a disability or discovery that dentistry is not one’s true career.

The reason we know so little about the challenge of the hero is that we tend to disbelieve them when they come back and tell us it was never about defeating those enemies—real or imaginary. It was always about surrendering oneself. In our world success means conquering external obstacles. Confronting oneself and losing is a bit weird. In fact it is threatening: it cheapens the victory of the winners if some of the folks voluntarily withdraw from the race. In Egypt, Moses fought; in the desert, he surrendered. The heroism of Frodo Baggins was in renouncing the allure of the ring that would give him great power in the world. Paradoxically, Peace Corps veterans learn that their quest is not in liberating undeveloped countries but in recognizing their own common humanity. Many of us are too smarty-pants to use the PC incorrect term “rebirth,” but that is exactly what the hero experiences if he or she can face the challenge and accept their true identity instead of what society says they are not.

The second paradox of the challenge is that the hero “becomes” something of worth rather than “accomplishing” something of worth. The reward for the hero is insight rather than power. Thomas Carlyle, in his famous 1840 London lectures, defined the essence of heroism as “sincerity.” A strange term, but he used it to mean understanding that penetrates into the deep nature of things accompanied by an attitude of wonder. The appearance of things, what others have told us the world means (usually for their own benefit) falls away and the essence emerges. If you want to check the veracity of that claim, think back to the first time you realized you were in love. No one could reason you out of that completely arresting recognition of the part of you that you somehow knew had been missing to that point, and no worldly power could change it.

The hero received powers from his or her guide prior to crossing the threshold. What is gained by the challenge is not new powers in the worldly sense, but insight. Heroes who win their challenges get smart not strong. They are also granted (or sometimes they steal) a boon. This refers to a gift that can be shared with the natural world. The Titan Prometheus stole fire from the gods for mankind and suffered perpetual agony for his efforts. Peter the Great studied maritime activities in humbling apprenticeships in Holland and England long enough to make Russia a naval power. Buddha, and virtually all founders of world religions, emerged from the wilderness with enlightenment.

The hero who returns from the quest is not the same person who first crossed the threshold coming back with a new bag of tricks. In Joseph Campbell’s words, “Life is not a problem to be solved, but a mystery to be lived.” One way to talk about that mystery is to say

that the hero begins the journey as “me” and returns as “I.” I am an active and responsible agent; I create the world I live in. “Me” is the character defined by the social world; it is what everyone says about me, including all the conflicting judgments about correct behavior and whether one is good enough. It is about what one can get—entitlement—not what one can become. It is no accident that popular culture is called the “me” generation.

THE BOON

Roman generals returned from successful campaigns and staged immense parades featuring exotic animals, the elite of the conquered nations in chains, legions of the victorious army, rich treasures, and days of lavish entertaining. This spectacle was known as a “triumph.” It is as far from the return of the real hero as can be imagined. Most of the time, we did not even notice that the hero had slipped out on a quest, and if he or she has something to say upon returning it is as likely as not to be ignored. Where the boon, the hero’s gift, is accepted, this may only be done slowly and over years of time. Think of prophets as a particular type of hero. That is generally a dangerous occupation.

The hero’s contribution upon returning is that he or she represents what society only indistinctly senses it is becoming. Heroes embody the new type. Their boon is to point in the direction of the future. They do not bend history so much as disclose it. Thomas Carlyle is credited (or discredited) with having advanced a position something like “all of history is the biography of great men.” What he actually said is “All things that we see standing accomplished in the world are properly the outer material result, the practical realization and embodiment, of thought that dwelt in the great men sent into the world: the soul of the whole world’s history, it

Heroes had an advantage in the old days. The call was literally the voice of God, a sign from heaven, or a visiting messenger with awe-inspiring credentials.

Heroes forget who society says they are and go on a quest to become the person they really are for the ultimate benefit of society.

may justly be considered, were the history of these.” His idea of heroes included Martin Luther, Mohammed, Oliver Cromwell, and Shakespeare. Each took a position somewhat off center from society and because of their integrity or deep insight (or “sincerity,” to use Carlyle’s term) society moved in that direction. Heroes do not conquer; they invite us to become more fully what we are in the process of becoming. That is their boon. This sets the hero in contrast to the leader. The hero represents the future; the leader brings people along in that direction.

Not only are heroes likely to be ignored, they are almost never celebrated, rewarded, or memorialized (in their own time). The columnist Eric Sevareid, in a 1963 op-ed piece in the *Philadelphia Bulletin*, fantasized about the self-contradictory nature of giving awards to heroes. “Community bonfires in public parks will celebrate the end of the awards. But—if Yankee prudence sets in—all medals and plaques will be shipped to a central place and melted down. Then one monument, half a mile high, will be erect—the Award to All Americans for Existing.”

Ignac Semmelweis is a useful case study. Born in what is now Hungary, Semmelweis became an obstetrician about 1844. He noted that the rate of death from puerile fever was as high as 25% in hospitals attended by physicians and one-tenth that rate among women assisted by midwives. The cause, he discovered, was lack of proper infection control among his colleagues. His boon, publication of these insights and a call that physicians adopt professional hygiene standards, was unwelcome. The medical establishment “knew for certain” that they represented godlike healers and the self-confrontation required to alter this view was beyond

most. Semmelweis was vilified for almost thirty years, and then accepted in an almost matter-of-fact way.

WINNERS, IDOLS, SERVANTS, QUACKS, AND ANTI-HEROES

In common parlance, hero means anyone who is admired. Such faux heroes are the creation of society, a projection of some deeply felt need. Marshall Fishwick identifies fourteen specimens of the type, but cautions that America wears its heroes lightly. His catalogue includes: swashbuckler (John Paul Jones), squire (Thomas Jefferson), cavalier (Robert E. Lee), natural man (Daniel Boone), self-made man (Henry Ford), jolly giants (Paul Bunyan), smooth roughnecks (Buffalo Bill Cody), poor whites (The Dukes of Hazard), cool ones (Humphrey Bogart), celebrities (Hugh Hefner), off-brands (Woody Allen), noble savages (John Henry), synthetics (Mickey Mouse), and pop princes (Kennedy).

My own roster of those mistaken for heroes includes only five types:

Winners, leaders, champions, generals, and presidents are those crowned for achievement by currently prevailing values in society. They can be looked to to uphold the status quo because they have won, or think they are about to win, using the rules of the game. Winners tend to be suspicious of heroes; they instinctively sense that the hero is puttering around with the standards. This is the point of Jim Collins’ best seller *Good to Great* and Clayton Christensen’s *The Innovator’s Dilemma*—success puts a drag on progress.

We identify with idols. Winners have talent; idols have charisma—or good press agents. They embody our dreams; we load them with adulation and then vicariously project ourselves into their lives. They are celebrities, but they need not actually exist. They might be comic book heroes, day-time soap opera heroes, rock stars, or gang members.

They provide an alternative world, just as the hero does, but each of us knows that it is an escapist world.

America is a giving nation and dentists are among the most generous. This is especially true with regard to service to others. Mission trips, Donated Dental Services, Give Kids and Smile, local health screenings are well staffed with dentists who respond to manifest human need and are willing to share. Sometimes, these projects are the result of a personal quest and intended to alter the fundamental social structure. More often the motive is humanitarian.

Quacks are another matter entirely. You can count on them as having been on a quest, but it aborted. They are returning with a “boon” they believe in and very seriously offer to society. It is real, but false. Dentistry seems to have as many quacks today as European society did one hundred and sixty years ago when Carlyle developed this term for a false hero.

The anti-hero is represented by the rebel without a cause, the hippy, and the cocaine addict. They are smart enough to see that society is out of balance, they have heard the call, but they choose not to go because they feel it is useless. Their lives become self-absorbed cynicism and justified meaninglessness. They have dropped out of organized dentistry and can talk for hours about how the wheels have fallen off the wagon of society. It was fashionable in the period between the two world wars to idolize anti-heroes.

ARE THERE ANY HEROES TODAY?

Conventional wisdom has it that we live in a world that is unfriendly to heroes. Science has crowded out wonder and the media has sated our appetite for self-declared prophets of a better world. And besides, if we were really interested in a better world we would simply get a personal trainer or a little Botox. The

quest sounds a bit too demanding and vague for our tastes, so we are not so interested in anyone else who claims to have been on one.

I admit that the modern condition works against heroes on the titanic scale of former times, but I am not discouraged about our current supply of real local heroes.

My candidate for a prototype hero in dentistry on the grand scale would be William Gies. He is credited with creating the first formal training for dental hygienists, for placing a scientific foundation under dental education and driving the last shadows of proprietary ownership out of schools, for founding the International Association for Dental Research, and for serving as the founding editor of the *Journal of Dental Research*, as well as singeing the ears and conscience of those engaged in commercial dental journalism. Gies' call came in the form of a visit at the beginning of the twentieth century from the trustees of the First District Dental Society of New York who challenged him to conduct research into why teeth decay (and gave him, as an amulet, several thousand dollars of their own money to support that work). His journey included several years during which he visited every dental school in the U.S. and Canada and prepared the famous Carnegie Foundation Bulletin No. 19—now known simply as the *Gies Report*. His surrender of his former life to his new identity was almost too literal. In the 1930s he mortgaged his life insurance policy to keep the *Journal of Dental Research* in print. He was not rich and famous; he lived in an old boarding house in his declining years,

and while he served as secretary of the American College of Dentists, he was better known for disagreeing with others than for being an idol of the profession. (In fact he was not a dentist.) He did not collect distinctions during his life, but more than half a dozen dental organizations now annually give their highest awards in his name.

On a more approachable scale, dentistry has many heroes. At the top of my list are recovering alcoholics, dental educators, and practitioners who are engaged in continuous self-improvement. The journey of the addict is a clear match for the hero, including the boon the recovering addict brings to society in terms of wellbeing programs. Dental education is a calling that engages dentists in daily face-to-face encounters with how much of dentistry remains unknown. When they take up research or teaching these individuals bring a boon to the profession. They are quite predictably on the edge of the profession that is emerging. Ethical dentists, and there are a huge number of them, are also heroes. They exhibit the essential character of the hero: a moral foundation, the call to serve, the journey (usually a very long and expensive one) of participation in study clubs and continuum-based perpetual learning, and emergence as embodiments of where the profession is trending.

Heroes forget who society says they are and go on a quest to become the person they really are for the ultimate benefit of society. ■



Summaries are available for the recommended readings marked by asterisks. Each is about eight pages long and conveys both the tone and content of the original source through extensive quotations. These summaries are designed for busy readers who want the essence of these references in fifteen minutes rather than five hours. Summaries are available from the ACD Executive Offices in Gaithersburg. A donation to the ACD Foundation of \$15 is suggested for the set of summaries on friendly competition; a donation of \$50 would bring you summaries for all the 2007 leadership topics.

Campbell, Joseph (1949).
The Hero with a Thousand Faces.*
Princeton, NJ: Princeton University Press. ISBN 0-691-01784-0; 416 pages; about \$20.

The individual quest of the hero is described as leaving society in response to a call, passing a gatekeeper, engaging in a process of merging one's identity with the oneness of nature, and returning to society with a boon. In the second part of the book, Campbell describes the evolution of myth, the cosmogonic cycle, as the replacement over the centuries of

meaning in the world to myth as story with meaning in politics, science, and the worship of the individual.

Carlyle, Thomas (1993).
On Heroes, Hero-worship, & the Heroic in History.*
(Norman and Charlotte Strouse Edition, edited with notes by Michael K. Goldberg; originally published in 1841) Berkeley, CA: University of California Press. ISBN 0-520-07515-3; 519 pages; cost unknown.

Heroism is seeing deeply and sincerely enough into the nature of the world to inspire wonder in others. Carlyle presented his ideas in a series of six lectures in 1840 London. Great men crystallize the emergent forces in history rather than create them through their will, but not always successfully. The world is becoming a less welcoming place for heroes with the rise of materialism, science, pluralism, and skepticism. The six lectures feature the hero as divinity, prophet, poet, priest, writer, and king.

Cousineau, Phil (Ed) (1990).
The Hero's Journey: The World of Joseph Campbell.*
San Francisco, CA: Harper & Row. ISBN 0-06-250102-X; 255 pages; cost unknown.

This book is a collection of interviews with Campbell and others transcribed from Campbell's last national tour in 1986 which also resulted in a movie and book with Bill Moyer. Many pictures.

Fishwick, Marshall (1969).
The Hero, American Style.*
New York, NY: David McKay. No ISBN; 270 pages; Cost unknown.

Fourteen hero types are presented in roughly chronological order, including descriptions of early and current exemplars and their defining character-

istics and thoughts about prevailing conditions that led to their hero-worship. We discover myths and participate in them; heroes are mirrors of our times. Fishwick is a freelance scholar in the critic style of Proust. The perspective he achieved writing in the 1960s now seems dated.

O'Faolain, Sean (1956).
The Vanishing Hero: Studies in Novelists of the Twenties.*
Boston, MA: Little, Brown and Company. No ISBN; 204 pages; cost unknown.

The author is a master of the techniques of literary criticism, and uses these skills to draw out the deeper meanings in Huxley, Waugh, Graham Green, Faulkner, Hemmingway, Elizabeth Bowen, Woolf, and Joyce—all of whom wrote in the 1920s. The common theme seems to be an inability to make sense of the world following World War I and a retreat into subjectivity that is cynical and makes the self disappear in one form or other of self-absorbed, futile pre-occupation with meaningless reflections. From a set of six lectures given at Princeton in 1953.

San Juan, E., Jr. (1987).
Transcending the Hero—Reinventing the Heroic: An Essay on André Gide's Theater.*
Lanham, MD: University Press of America. ISBN 0-8191-6632-4; 69 pages; cost unknown.

Gide (1869-1951) was a French playwright who set his worlds primarily in ancient Greece. "Gide's theater is then the theater of the individual struggling to find his own identity. In this struggle he becomes heroic," but only through endless self-renunciation of answers offered by society.



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