be solidly based on objective evidence and, once implemented, measurable outcomes. Advancing the science base and the social place of pediatric dentistry demands that we each become proficient in weighing evidence and assessing our performance.

In each of our roles we are communicators. Whether shaping the behavioral environment of a child's dental experience, describing treatment alternatives to a parent, explaining our bill to a payer, negotiating a contract, promoting the specialty, or justifying action by government, we are constantly communicating our values and beliefs. Every opportunity to back up those convictions with evidence and outcomes is an opportunity to enhance clarity and gain our objective.

Dr. Edelstein is assistant clinical professor of Oral Health Policy and Epidemiology, Harvard School of Dental Medicine, Boston, Massachusetts and Director, Children's Dental Health Project in Washington, DC.

Oral health outcomes and evidence-based care

B. Alex White, DDS, DrPH

Rising costs have dramatically changed the organization, financing, and delivery of health care services in the US. The market for health care services through the early 1980s could be described as open checkbook, with open choice for patients and practitioners. Many third-party payers, including Medicare, reimbursed practitioners and health care institutions based on the provider-determined cost. A noncompetitive environment offered few incentives to control costs, because revenues might have decreased. Individuals could choose their own practitioner and the hospital of their choice. Practitioners could use the facility of their choice to care for patients. Financial incentives led to increased use of technology and procedures. As a result, health care costs skyrocketed.

In response to these rising costs, employers who provided health benefits to their employees and federal and state governments which provided insurance coverage for the elderly, the disabled, and the poor sought new ways to control costs and shift some or all of the financial risk to providers and patients. New models for reimbursement arose, such as preferred provider organizations (PPOs) and independent practitioner associations, and emerging for-profit companies began to promise to reduce health care costs. Medicare began reimbursing hospitals based on diagnostic resource groupings; hospitals received a predetermined reimbursement for an admission based on diagnosis. Individuals were given incentives to narrow their choice of practitioners, and practitioners began to share in the financial risk of providing care for their patients.

The focus was clearly on cost. These efforts to reduce costs have induced a backlash in the market. Health plans are pitted against practitioners, especially when practitioners believe that plans are dictating the care that practitioners can provide. Plans are pitted against patients, who often feel they are denied coverage. And worst of all, patients are pitted against practitioners.

In the 1990s, pressure from patients, practitioners, and third-party payers has begun to change the focus from cost to value. At some point, no excess cost will remain in the system. When health care costs do not differ, the focus will shift to value. Patients, employers, and other benefit purchasers increasingly request information about the value of their resources spent on health care. They would like to know, in short, if they're getting their money's worth. One way to determine the value of dollars spent for dental care is to measure the outcomes associated with such treatment. By comparing the outcomes associated with dental care to its cost, one can compare different types of dental treatment. This paper briefly describes dental care outcomes and identifies possible ways that outcomes might be used in answering the question as to whether patients and purchasers get their money's worth.

Oral health outcomes

Oral health outcomes have been defined as the elements of oral health status and quality of life that matter to patients and their families, and those clinical or physiologic measures that matter to health care professionals.[1] At least two perspectives are important: those of patients and their families and those of practitioners. In addition, outcomes have multiple dimensions including clinical and physiological elements, as well as quality-of-life elements.

Outcomes are important for several reasons; foremost is their role in setting public policy. In an era of budget deficits, constrained resources, and rising costs, public attention is focused more sharply on the health care system. Health policy makers, public health officials, employers, insurers, practitioners, and consumers seek to ensure that appropriate and cost-effective health care technologies and services are available. Much of this interest is driven by the widely held belief that too many resources are consumed for health care services without a commensurate improvement in overall health.[2,3] Although many health care services and technologies offer some benefit, not all are equally effective and their costs can vary significantly. Without appropriate outcomes, sound policy decisions cannot be made.

Outcomes also help determine what is effective and what is not. Outcomes allow us not only to assess how well we prevent or treat disease and restore function, but also to assess the impact of dental care on a patient's life. Just as important as determining what works, outcomes are important to help us determine what does not work. Many dental procedures and treatments have never been fully evaluated prior to being widely adopted. Finally, outcomes are important to help determine the relative effectiveness of alternative treatment strategies for the same condition. For example, without good measures of outcomes, we cannot compare surgical versus nonsurgical treatment of periodontal disease, or cast crown restorations versus large multisurface amalgam restorations on posterior teeth, or the removal of asymptomatic third molars versus watchful waiting to see if a problem develops. Many other examples could be cited for which we have little information about alternative treatment strategies.

Dimensions of oral health outcomes

Bader and Shugars[4] defined four outcome dimensions associated with dental care: the physical/physiological, psychosocial, longevity/survival, and economic. The physical/physiological dimension includes such things as the presence of pathology, dental caries, deep periodontal pockets, malocclusion, pain, and functional capability. Standard measures of oral health status have commonly been used to gauge this outcome dimension. Objective measures of pathology might be determined by clinical examinations and radiographs. Functional capability may be measured objectively or may be ascertained by asking patients, for example, how well they can chew or speak. The presence of pain must be determined by patient report.

The psychosocial outcomes dimension of dental care includes patients' perceived aesthetics, perceived level of oral health, satisfaction with their oral health status, self-concept, and interpersonal relations. For the most part, these measures must be subjectively assessed by asking patients about their experience. Patient values and preferences for differing treatments and health states are useful in assessing this dimension.

The longevity/survival outcomes dimension of dental care includes the longevity and survival of dental restorations, tooth vitality, tooth retention, and the like. For example, consider the survival of dental restorations. It includes such measures as time until restoration failure and need for treatment for the same condition, such as recurrent caries around a restoration originally placed for caries, or need for treatment due to a new condition, such as periodontal disease around an abutment tooth of a three-unit bridge. Another aspect incorporates tooth vitality and pulp death associated with restorative dental care. For example, what is the probability of pulp necrosis associated with preparing a tooth for a cast restoration? Is the probability greater than that for a large amalgam restoration? Yet another aspect concerns tooth loss, that is, whether and how dental treatment affects tooth retention. This overall dimension might also reflect the outcomes associated with tooth loss on overall oral and general health.

The final outcomes dimension is an economic dimension. This includes assessing the direct and indirect costs associated with dental treatment from the perspectives of the patient, practitioner, purchaser, and society. Because a large proportion of dental expenditures are out-of-pocket, even among those persons with private dental insurance, the cost of dental care can often be an important patient outcome. Balancing multiple dimensions of dental care outcomes, such as freedom from pain, aesthetics, positive self-image, function, and tooth longevity, against cost is a serious issue for most patients.

How outcomes might be used

The outcomes of dental care might be used in several ways. As noted above, outcomes could be used to assess the effectiveness of a treatment for a given clinical condition, or to compare the relative effectiveness of alternative treatment strategies. As more is learned about which treatments are effective, outcomes can be used as an aid in developing clinical practice guidelines. Guidelines are "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances".[5] Guidelines can help improve health care decision making, enhance ways to measure and improve quality of care, improve education for individual patients and the broader population about dental care for specific conditions, and guide resource allocation.[1] Shugars and Bader[6] have reviewed guidelines developed by a number of dental organizations, including the American Academy of Pediatric Dentistry (AAPD). In addition to assisting patients and practitioners in clinical decision making, outcomes measures and clinical guidelines can be used to establish reimbursement policies that affect practitioner or patient behavior. For example, practitioners who are able to prevent disease in a population may be rewarded with increased levels of reimbursement. Patients with poor home care or who demonstrate poor compliance may face increased levels of copayments for certain services.

Patients' satisfaction with their oral health status is an important oral health outcome. Purchasers and employers may be able to develop surveys to assess this dimension among their covered beneficiaries. Insurers who are developing networks, such as those developed under PPO arrangements, might use outcomes to assess which practitioners should be included in the network and which should not. Practitioners working

under capitated arrangement may use outcome measures to improve the efficiency of dental care and to maintain the quality of that care. Finally, outcome measures may be used to assess the performance of dental plans. Bader and coworkers[7] have described possible ways in which such measures could be used to assess performance, allowing comparisons across plans that otherwise could not be achieved.

Summary

The need for more and better information about dental treatment effectiveness has never been greater. Patients, practitioners, and purchasers are asking for evidence-based information to make more informed decisions about their dental care. A first step in obtaining this information is to develop oral health outcome measures. Using these measures, we can begin to collect outcome data and gather the information we need to assess and compare the effectiveness of an array of dental treatments. In gathering these data, we begin to develop a body of scientific evidence that can be used to develop clinical practice guidelines, establish reimbursement policies, and allocate limited public resources. The AAPD has already begun this process and should be encouraged to continue these efforts.[8] Becoming involved in this process is the best way to ensure that the focus remains on oral health and not just the bottom line.

Dr. White is senior investigator, Center for Health Research, Portland, Oregon.

References

1. Lohr KN: Guidelines for clinical practice: what they are and why they count. J Law Med Ethics 23:49–56, 1995.
2. Banta HD, Behney CJ: Policy formulation and technology assessment. Milbank Mem Fund Q Health Soc 59:445–79, 1981.
3. Fuchs VR: No pain, no gain. Perspectives on cost containment. JAMA 269:631–33, 1993.
4. Bader JD, Shugars DA: Variation, treatment outcomes, and practice guidelines in dental practice. J Dent Educ 59:61–95, 1995.
5. Field MJ, Lohr KN, eds.: Institute of Medicine. Guidelines for Clinical Practice: From Development to Use. Washington, DC: National Academy Press, 1992.
6. Shugars DA, Bader JD: Practice parameters in dentistry: where do we stand? J Am Dent Assoc 126:1134–43, 1995.
7. Bader JD, Shugars DA, Hayden WJ, White BA: A health plan report card for dentistry. J Am Coll Dent 63:29–38, 1996.
8. American Academy of Pediatric Dentistry: Guidelines. Pediatr Dent 19:28–85, 1997.

Outcomes and the scientific basis of clinical care

Peter S. Vig, BDS, PhD, FDS, D Orth (RCS) Ann L. Griffen, DDS, MS Kate WL Vig, BDS, MS, FDS, D Orth (RCS)

Health care is undergoing increasing scrutiny by consumers and other interested parties. The quality of treatments, services, and delivery systems, as well as their efficiency, are subjects for public discussion and political agendas. In order to systematically evaluate dental health to address these concerns, objective measures of benefits and costs associated with treatment are needed. Criteria are necessary to quantify costs, benefits, and risks, and thereby make judgments on how well providers are meeting the health needs of society. "Clinical outcomes" refer to the products or consequences of health interventions. They can be used to evaluate clinical performance on both a case-by-case basis or over a broader population level.

All treatments have multiple outcomes, even though the goal may be to address a single clinical sign or symptom, or a specific disease entity. To be useful, clinical outcomes need to address both the desired and the undesired sequelae of treatment, and must do so both for the short and long term. Unlike medicine, where survival or death are obvious alternate consequences of the management of certain conditions, there are as yet no universally accepted outcome measures for the majority of treatments provided in dentistry.

Examples of outcomes may be the survival of a tooth, the longevity of a restoration, or the absence of pain following a procedure. Cost, both the financial and the "burden" of care, are also outcomes, in this case with negative value to the patient. Given that both negative and positive attributes exist for any clinical intervention, outcomes assessment provides a means for estimating the tradeoffs that patients must make in establishing their preferences, thus providing informed consent.

The outcomes movement, which is closely tied to the evidence-based and patient-centered care profiled in the Institute of Medicine report,[1] is only just beginning to receive general attention within dentistry. As a step toward formulating useful outcome measures, we have recently adopted the following criteria at the Ohio State University College of Dentistry. An outcome measure should:

1. Be unambiguously definable and mutually exclusive with alternative outcomes
2. Be quantifiable
3. Have known reliability
4. Have clearly established validity
5. Be directly associated with a tangible benefit to the patient.