DENTISTRY FOR THE AGES:
Part II
Susan Hyde, DDS, MPH, PhD, FAGD, and Dick Gregory, DDS
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Compiled by Susan Hyde, DDS, MPH, PhD, FACD
Many Native American cultures teach that caring for elders is a blessing path in which the whole community should participate. Like many of us with aging parents, I have provided a lot of care to my parents, and oral health issues always arose. My experiences dealing with my father’s care-resistant behaviors as he battled Alzheimer’s and difficulties in obtaining dental treatment for my stepmother, who was paralyzed and unable to speak as the result of a stroke, contributed greatly to my decision to specialize in geriatric dentistry. Thanks to the geriatric training I received, when my mother moved into a long-term care facility, I immediately put her on a three-month schedule for home visits with a dental hygienist. Similarly, when my father-in-law’s face ballooned because of multiple periapical abscesses, I was able to raise the awareness of his family, endocrinologist and orthopedic surgeon that the needed dental treatment wasn’t elective but rather critical to the resolution of his poor wound-healing from a recent diabetic amputation. My experiences are by no means unique. Homebound and institutionalized older adults lack access to dental care and endure a great deal of untreated oral disease, which affects their abilities to eat and socialize, resulting in further compromised overall health and function.

Beginning with the Surgeon General’s Report on Oral Health in America, through 15 years of compelling research publications and two seminal Institute of Medicine reports on oral health, dentistry has achieved national recognition that oral health is necessary for overall health. For the first time, access to dental care is one of the Leading Health Indicators for Healthy People 2020. Additionally, oral health disparities in older adults are now recognized to extend beyond edentulism, as reflected by the new Healthy People 2020 objectives to reduce untreated coronal and root caries in older adults, and decrease the prevalence of moderate or severe periodontal disease. Therefore, primary care providers must obtain training in oral health screening and referral, consider oral health in disease management and collaborate with the dental community to develop home-based programs for older adults in order to achieve patient-centered, value-based care.

An article in the October 2014 issue of the Journal of the California Dental Association described the National Interprofessional Initiative on Oral Health (NIIOH), established in 2008 to launch a new standard of care for patient oral health. The initiative espoused primary care providers becoming skilled at addressing the oral health needs of their patients and effectively referring to dentists. The traditional head, ears, eyes, nose and throat (HEENT) physical assessment performed by primary care providers excludes examination of the oral cavity and omits consideration of oral-systemic linkages to overall health. Incorporating the oral cavity into a revised HEENT examination affirms that oral health is an important population health issue for primary care providers. New York University has successfully integrated HEENT in the comprehensive history and physical examinations for nursing and medical student clinics and faculty practices. Inclusion of oral-systemic health data in risk assessment and disease management plans have resulted in improved collaboration and referrals between dental-primary care providers.

Dentists and dental hygienists also need to participate in the cycle of interprofessional collaborative practice. Healthy People 2020 objectives promote collaborative practice with two new oral health goals for increasing the proportion of adults who receive tobacco cessation information and who are tested or referred for glycemic control by a dentist or dental hygienist. Although previous studies indicated both dentists and patients are receptive to screening and managing medical conditions in the dental setting, a survey of North Carolina dentists expressed reservations for taking a more active role in the management of patients’ systemic conditions through risk behavior counseling, referral for laboratory testing or in-office diagnostic screening for medical conditions.

REFERENCES

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Impressions

Autonomy and Agency

David W. Chambers, EdM, MBA, PhD

Yogi Berra had it right: “If the people don’t want to come, nothing can stop them.” They are autonomous, in the literal sense of the term “self-governing.” Dentistry is one of the professions that has made quite a bit out of this principle. Patients get to choose … even if the choices are limited for their own good.

Bioethicists ground informed consent in the norm of respect for autonomy. Sometimes informed consent is mistaken for a legal process. Sometimes it means little more than making certain patients have a generally favorable idea what is going to happen to them.

Respect for autonomy is an ethical pillar in most professions. It just makes sense that when the professional sets up the ground rules, patients should be allowed the opportunity to opt out.

But this is only half the story. What if we looked at it from the perspective of potential patients? It is plausible, if a bit uncomfortable, for others to set their own conditions on whether or how they will participate (or not) in health care. This is a free choice and involves no necessary prejudice against the professional, even if it means a hit to prestige, income, lost time and a ding on the self-concept of serving the public. Others show “respect for autonomy” by not forcing conformity. Respect for autonomy loses some of its nobility unless we accept that it works both ways.

Agency is a sturdier moral concept. Agents have the capacity and responsibility to affect others by their actions. Both dentists and patients are agents. Patients are agents when they refuse radiographs, choose less-than-ideal treatment to remain within the limits of their insurance coverage or decide not to go to the dentist at all.

Each dentist choice affects both the patient and the dentist; each patient choice affects both the dentist and the patient. Dentists and patients are (potentially) reciprocal moral agents. The challenge is to find a common way forward that neither party would have any reason to change.

In the traditional approach to ethics, dentists consider only what they understand to be in patients’ best interests and claim the moral high ground by reluctantly allowing them to elect less than ideal care. The dentist’s interests have been screened off from consideration as not belonging to the sphere of professional ethics. Not so, of course, for patients who judge their own and the dentist’s advantage.

Morality requires more than one person deciding whether he or she has done right by private standards. Professionals justify their standards by roughly conforming to what their colleagues are doing. Morality requires that agents recognize the valid claim of other moral agents to affect them.

The nub:
1. Respect for autonomy is nice, but a bit paternalistic because either party alone can make that determination.
2. Dentists and adult patients and nonpatients are agents, with the capacity to affect each other.
3. Morality requires that the same moral status as agents be accorded all concerned.

David W. Chambers, EdM, MBA, PhD, is professor of dental education at the University of the Pacific, Arthur A. Dugoni School of Dentistry, San Francisco, and editor of the Journal of the American College of Dentists.
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**Oral Surgery and Anticoagulant Therapy**

Researchers recently assessed the incidence of postoperative bleeding in patients who were highly anticoagulated and in patients who underwent extensive oral surgical procedures and who continued using oral anticoagulant therapy. Published in *The Journal of the American Dental Association*, the study found that, in patients who are highly or therapeutically anticoagulated, dental extractions as well as more extensive oral surgical procedures can be performed safely without interruption or modification of the therapy.

According to a summary of the research, the authors divided 125 patients receiving anticoagulant therapy into three groups. Group A consisted of 54 patients who were highly anticoagulated (international normalized ratio (INR) ≥ 3.5) and who had three teeth extracted. For Group B, the authors stated that this group consisted of "60 patients with INR 2.0 to less than 3.5 in whom higher-risk dentoalveolar surgery (extraction of more than three teeth or other oral surgery procedure involving raising a mucoperiosteal flap, osteotomy or biopsy) was performed." Lastly, Group C consisted of 11 patients whose INR values were 3.5 or higher and who required higher-risk dentoalveolar surgery, and 85 healthy participants who underwent surgical procedures similar to those performed in Group A and Group B made up the control group.

The authors reported that 3.7 percent of Group A, 5 percent of Group B and 18.2 percent of Group C experienced postoperative bleeding, while a single bleeding event (1.2 percent) occurred in the control group. They concluded that dental extractions in patients who are highly or therapeutically anticoagulated could be performed safely without interruption or modification of the therapy.

"Tooth extractions and even more extensive surgical procedures can be performed safely in patients who continue using anticoagulant therapy if proper local hemostatic measures are used and if no other coagulopathies are present," the authors wrote.

For more details and specific breakdowns within each category, see the full report published online ahead of print in the journal *JAMA Internal Medicine*, June 15, 2015.

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**Cigarettes Linked to Half of Oral Cancer Deaths**

In 2011, there were more than 8,500 deaths in the U.S. from cancers of the oral cavity and pharynx. A recent study, published in *JAMA Internal Medicine*, estimated the number of deaths attributable to cigarette smoking for 12 smoking-related cancers and found that, among U.S. adults 35 years and older in 2011, almost half (47 percent) of the deaths caused by cancers of the oral cavity and pharynx were attributable to cigarette smoking.

Additionally, in the multi-institution research letter, the authors report that the overall number of deaths from 12 smoking-related cancers was nearly 346,000. Of those, 48.5 percent were attributable to cigarette smoking. Specifically, the researchers linked smoking with 80.2 percent of lung, bronchus and trachea cancer deaths, as well as 76.6 percent of deaths from cancer of the larynx. Secondhand smoke exposure, which was estimated by the 2014 U.S. Surgeon General’s report to cause an additional 5 percent of lung cancer deaths, was not included in the analysis.

In the research letter, the authors stated that 44.8 percent of bladder cancer deaths, 19.6 percent of stomach cancer deaths and 22.2 percent of cervical cancer deaths were linked to smoking.

For more details and specific breakdowns within each category, see the full report published online ahead of print in the journal *JAMA Internal Medicine*, June 15, 2015.
Nanostructures in Dentin Make Teeth Crack Resistant

A team of international researchers recently analyzed the complex structure of dentin and discovered that the mineral particles are precompressed. The internal stress works against crack propagation and increases resistance of the biostructure.

According to the study, published in the journal Nano Letters, the researchers used in-situ stress experiments and examined the local orientation of the mineral nanoparticles. They discovered that when the tiny collagen fibers shrink, the attached mineral particles become increasingly compressed.

“Our group was able to use changes in humidity to demonstrate how stress appears in the mineral in the collagen fibers,” said Paul Zaslansky, Dr. med. dent., PhD, a researcher at Charité Berlin, in the news release. “The compressed state helps to prevent cracks from developing and we found that compression takes place in such a way that cracks cannot easily reach the tooth inner parts, which could damage the sensitive pulp.”

The scientists also analyzed what happens if the tight mineral-protein link is destroyed by heating. They found that, in that case, dentin in teeth becomes much weaker.

“We therefore believe that the balance of stresses between the particles and the protein is important for the extended survival of teeth in the mouth,” said scientist Jean-Baptiste Forien. According to the authors, their findings may help explain why artificial tooth replacements usually do not work as well as healthy teeth do — they are simply too passive, lacking the mechanisms found in the natural tooth structures, and consequently fillings cannot sustain the stresses in the mouth as well as teeth do.

“Our results might inspire the development of tougher ceramic structures for tooth repair or replacement,” Zaslansky said.

For more information, see the study published in the journal Nano Letters, May 2015, vol. 15:6, pp. 3729-373.

Four Out of 10 Pregnant Women Not Seeing Dentist During Pregnancy

While the importance of oral health during pregnancy has been shown, a new survey out recently has found that 42.5 percent of expecting mothers in the United States aren’t visiting a dentist during their pregnancy.

According to a news release about a recent dental insurance survey, visiting the dentist during pregnancy is a crucial step and can help identify key health issues appearing specifically during pregnancy. Additionally, the California Dental Association says improving oral health during pregnancy can prevent complications associated with dental diseases, may reduce preterm and low birth weight deliveries and has the potential to prevent early childhood cavities in infants.

It is important for women who are pregnant or planning to become pregnant to visit a dentist for routine examination, cleanings and guidance about specific oral health issues that may occur during pregnancy.

For more information, see the June and September 2010 issues of the Journal, available at cda.org/journal.
Families of Orofacial Clefting, No Higher Risk for Dental Anomalies

Children with oral clefts show a wide range of dental anomalies, adding complexity to understanding the phenotypic spectrum of orofacial clefting. In a recent study, researchers characterized the spectrum of cleft-related dental anomalies and evaluated whether families with clefting have a significantly higher risk for such anomalies compared to the general population. They found that families of orofacial clefting are not at higher risk for dental anomalies.

Published in the Journal of Dental Research, the study included 3,811 individuals — 660 cases with clefts, 1,922 unaffected relatives and 1,229 controls. Researchers identified dental anomalies from in-person dental exams or intraoral photographs and case-control differences were tested. This is the largest international cohort to date of children with nonsyndromic clefts, their relatives and controls, according to a new release. The authors report that cases had higher rates of dental anomalies in the maxillary arch than controls for primary and permanent dentitions but not in the mandible. They also reported finding dental anomalies were more prevalent in cleft lip with cleft palate than other cleft types and that more anomalies were seen on the same side of the cleft.

Dental Implants in Osteoporotic Women

With age, postmenopausal women with osteoporosis are at greater risk of losing their teeth. In a new study, researchers from Case Western Reserve University School of Dental Medicine suggest dental implants may provide postmenopausal women with osteoporosis with the highest degree of satisfaction in their work and social lives.

“This investigation was initiated to incorporate oral health into women’s health promotion and to examine psychosocial outcomes associated with dental implant supported rehabilitation,” the authors wrote.

In the study, researchers surveyed 237 osteoporotic women with one or more adjacent teeth missing. The survey consisted of 23 questions rating their satisfaction with replacement teeth and how it improved their lives at work and in social situations — specifically in regards to the work, health, emotional and sexual aspects of their lives. Of the 237 participants, 64 had implant retained prosthetic restorations, 60 had traditional fixed partial dentures, 47 had removable partial denture and 66 had no restoration to restore missing teeth. No significant difference in age exists between groups, according to the study.

The authors found that women with dental implants reported a higher overall satisfaction with their lives, according to lead researcher Christine DeBaz, who personally interviewed each participant. Fixed dentures scored next highest in satisfaction, followed by false teeth and then women with no restoration work.

“In order to make decisions about the most appropriate treatment option in rehabilitation a dentist must understand not only the prosthetic therapeutic specifics such as chewing function and orofacial esthetics but also the patient-centered specifics of psychosocial and overall well-being,” the authors wrote.

For more, see the study in the International Journal of Dentistry, vol. 2015, article ID 451923, 6 pages.
Weight-Related Risk Factor for Periodontitis

According to the Centers for Disease Control and Prevention, more than 90 percent of adults aged 20-64 have experienced tooth decay and one in every three adults is obese. In a recent systematic review, authors indicate that obesity may be one of a number of weight-related risk factors for development of periodontitis.

In the new study, the authors note that “previous reviews were primarily based on cross-sectional studies, with only a few longitudinal or intervention studies included.” For their study, the researchers examined the “time-dependent association” between obesity and periodontitis and how changes in weight may affect the development and progression of periodontitis in the general population. Searching studies with overweight or obesity as exposure and periodontitis as outcome, the authors reviewed eight longitudinal and five intervention studies that assessed the association among overweight, obesity, weight gain, waist circumference and periodontitis.

Two of the longitudinal studies found a direct association between degree of overweight at baseline and subsequent risk of developing periodontitis, and a further three studies found a direct association between obesity and development of periodontitis among adults,” the authors summarized. Additionally, they found that two of the reviewed intervention studies on the influence of obesity on periodontal treatment effects showed that the response to nonsurgical periodontal treatment was better among lean than obese patients while the remaining three studies did not report treatment differences between obese and lean patients.

In conclusion, the authors stated that their systematic review suggests overweight, obesity, weight gain and increased waist circumference may be risk factors for development of periodontitis or worsening of periodontal measures.

For more, see the study in the Journal of Periodontology, June 2015, vol. 86, no. 6, pp. 766-776.

Porcine Collagen Barrier Aids Bone Regrowth

Researchers examined a new type of barrier membrane, called porcine collagen, to find out how quickly a bone graft can develop with this material placed over the grafted tooth socket. While they found bone regeneration varied, the authors reported that porcine collagen showed potential for promoting new bone growth.

The study, which was published in the Journal of Oral Implantology, included 14 patients with a diagnosis of one or more unsalvageable teeth and a treatment plan to replace them with implant-supported single crown restorations. After the teeth were removed, the sockets were filled with particulate allograft bone and covered with a layer of porcine collagen. According to the study, the porcine collagen membranes were cut to overlap the facial and lingual (or palatal) socket rim by at least 5 mm (or more if necessary) to cover bony wall fenestration or dehiscence defects. Sixteen weeks later, researchers checked the sites and dental implants were placed.

The formation of new bone in the treated sites averaged 11.2 percent, with a range of 1.8 percent to 43 percent, in bone biopsies trephined from the center of the grafted socket sites, the authors explained in the report.

The authors concluded that “The resulting new bone regeneration varied widely, but the barrier membranes showed potential for promoting significant bone regeneration.” They suggest a larger sample of treated cases is needed to support their conclusion.

For more on this study, see the Journal of Oral Implantology, June 2015, vol. 41, no. 3, pp. 293–297.
In this second of two issues dedicated to the oral health of older adults, the Journal presents possible resources for general dentists to consider when caring for older adults. Iain A. Pretty, BDS, MSC, MPH, PhD, FDSRCS(ED), writes about the Seattle Care Pathway, which takes into account the continuum of clinical presentation of older adults, with the resultant need for dentists to provide oral health anticipatory guidance for patients, and if appropriate, their caregivers, as well as increased communication with primary care providers when developing care plans. Mark Ryder, DMD, reviews the roles of systemic disease, pharmacological management, immune response and functional capacity in the development and progression of periodontal disease that supports a collaborative practice approach to treatment decisions. Guest editors Dick Gregory, DDS, and Susan Hyde, DDS, MPH, PhD, FACD, present alternative treatments for root caries that could be delivered bedside, such as silver diamine fluoride cariostasis, partial caries removal and glass ionomer restorations. Deborah Jacobi, RDH, MA, and Michael J. Helgeson, DDS, write about Apple Tree Dental, a community collaborative practice model, that will soon be providing comprehensive care to vulnerable populations in the Bay Area and may become a statewide model for delivering on-site dental services within long-term care facilities. Finally, the contributing authors to the July and August issues of the Journal have provided a national resource section of organizations and websites dedicated to the care of older adults.
You are the reason people stand tall in front of the class, grin widely for the camera and never cover their mouths in shame. You are the champion of the smile and all the possibility it represents. The confidence you instill in your patients is one reason why CDA supports and protects your profession. Because the world is a better place when people are smiling, and that’s thanks to you.
The Seattle Care Pathway: Defining Dental Care for Older Adults

Iain A. Pretty, BDS, MSC, MPH, PhD, FDSRCS(ED)

ABSTRACT It is well-recognized that the demographic shift in the population will result in a larger proportion of older adults and those adults will live longer than ever before. There is, therefore, a need to ensure dental services recognize this transition and plan for the management of older adults in primary care dental practices. This article describes the evidence for, and the details of, the Seattle Care Pathway to ensure older adults receive optimum dental care.

AUTHOR Iain Pretty, BDS, MSC, MPH, PhD, FDSRCS(ED), is a professor of public health dentistry at the University of Manchester School of Dentistry and co-director of Colgate Palmolive’s Dental Health Unit, a 45-year collaboration between the company and the university. Dr. Pretty is working on caries management programs for older people and, with international colleagues, developed the Seattle Care Pathway, an evidence-based approach to assessing and planning the oral care of older people.

ACKNOWLEDGEMENT The author would like to recognize and thank the original authors of the pathway and their contribution to the Seattle conference: Roger P. Ellwood, BDS, MSc, MDS, PhD; Edward C. M. Lo, BDS, MDS, PhD; Michael I. MacEntee, LDS(I), Dip. Prosth., PhD;Frauke Müller, Prof. Dr med dent; Eric Rooney, BDS, MSc, DDPH RCS; William Murray Thomson, BSc, BDS, MA, MComDent, PhD; Gert-Jan Van der Putten, PhD; Elisa M. Ghezzi, DDS, PhD; Angus Wals, BDS, PhD; and Mark S. Wolff, DDS.

In 2013, a group of interested academicians, clinicians and practitioners gathered in Seattle to discuss the issues surrounding the dental care of older adults. Many recognized that while research was available, it was difficult to consume and there was little advice for dental practitioners on how to manage this increasing proportion of their population. In an effort to provide such guidance, the Seattle Care Pathway for Securing Oral Health in Older Patients was produced. Readers can access all 12 papers, including the pathway document itself, free of charge from the Gerodontology website — simply search for “Seattle Care Pathway Gerodontology” online. The purpose of this article is to summarize the key findings of the conference in a single source that is accessible and relevant to general dental practitioners.

The Shift

There is no doubt Western countries are all experiencing a demographic shift — a change in the population profile that will see a greater proportion of older adults who will be living longer than ever before.²,³ Such a shift has a profound impact on many aspects of society, not least the financial considerations, but perhaps, one of the biggest concerns is maintaining the health and well-being of an aging population in an economically viable manner that does not destabilize health care systems.⁴

Many could argue the shift is a perfect storm — older individuals with greater and more complex health care needs but no workplace medical insurance will strain health care systems while at the same time the proportion of working-age, tax-contributing individuals reduces. The obvious solution to these issues would seem to be that prevention
is key. If individuals can be helped to keep healthy for longer, and if chronic, debilitating diseases can be prevented, then the burden on health and social care systems can be reduced, quality of life increased and the system maintained.

Such an approach requires a different contextual framework for the delivery of health care services and resources. The FIGURE demonstrates a life course model of health care.

We can consider this model for any aspect of health care, and dentistry is no exception. The three lines in the model represent three hypothetical individuals or populations:

**Population 1.** The first population is our ideal, the life course we hope for our families and ourselves. It is an individual born above a line of vulnerability, who leads a long and healthy life and, toward the end of life, suffers some loss of function but remains vital and with a good sense of well-being.

**Population 2.** The second line is a worst-case scenario and perhaps seen today in those individuals born with life-threatening and altering conditions that cause severe disability and require constant medical attention and assistance. Such patients are likely to be managed by specialists in secondary care facilities.

**Population 3.** The third line is perhaps the most reflective of the Western population experience. We are born and are vulnerable for a period of time, and then, fortunately, spend the majority of our lives fit and well, but with an end of life that may be affected by chronic conditions, loss of cognitive ability and other factors that impact quality of life and make us increasingly dependent and vulnerable.

What we know from dental and medical attendance and resource allocation research is the vast majority of resource is spent on the “middle”
section of this life course with some (increasing) emphasis on young children (those younger than age 3) and very little on end-of-life care.  

It should be noted that the life course makes no reference to an individual’s age. While it is clear individuals are aging, placing artificial and arbitrary chronological metrics is not helpful. We all know the 95-year-old man who we see out jogging and we all, sadly, know of the 55-year-old man who has suffered a stroke and is unable to walk. We must consider our patients as individuals and plan their care appropriately.  

Dentistry and Vulnerability  
The FIGURE also defines the current position of dental services, resources and research. While this is a generalization, it is largely applicable to all Western health care models. For young children, there is a wealth of services, strong clinical trial evidence upon which to base such services and, generally, the political, social and professional will to see oral health care improve. This is not to assert there is no longer an issue in children’s oral health, but the environment for change is present.  

Looking at the older population, we are not in the presence of such clarity. The reasons for poor oral health are more complex, more interlinked and not as well understood. There is little robust clinical trial evidence that has examined these populations in detail and it is often necessary to extrapolate from studies undertaken on adolescents or children. Services are poorly defined, difficult to access and often restricted, for example, to older adults living in residential care. It is important to remember that while the media will often depict or report
on the elderly living in nursing homes — less than 5 percent of older adults in Western populations are in such housing — the vast majority is community dwelling, living either with caregivers (often partners) or on their own.

Speaking to older people, their partners and caregivers, and third-sector organizations, the medical terms surrounding aging are often found to be pejorative, for example, frailty. Instead, the concept of dependency, or indeed independency, was recognized as a more acceptable means of defining individuals as they age. This is important for dentistry where we have the means of implementing prevention at an early stage to ensure that disease processes can be arrested or even reversed. In the context of the older adult, plans for this approach need to be undertaken early in a time best described as “predependent.”

Dental Challenges of Older Adults

These are well-described in a multitude of publications and were summarized by Thompson in his Seattle conference presentation and shown in Table 1. The major dental issues faced by older people are broadly the same as those of younger individuals. Many dentists are surprised, however, to learn the caries increment in older adults is the same as in younger children, about one surface increment per year, and, often surprising, too, is that this is mainly in coronal surfaces. Root caries, often thought of as the major challenge of the elderly, is a disease entity largely confined to those in residential and nursing care.

Tooth loss is typically an incremental process that tends to occur throughout life and is more common than edentulism. Predicting it can be complex, and its impact on the remaining dentition, the provision of prosthesis and its effect on quality of life can be substantial.

Periodontal disease is complex from an epidemiological position, not least because of the multitude of definitions, indices and reporting mechanisms. Aging was traditionally considered a risk factor for periodontal disease, but the research evidence is not clear. Longitudinal studies suggest there is both a progression and remission of the disease process over time and in older adults, attachment loss is often the result of gingival recession rather than increases in periodontal pocket depth. Nonetheless, plaque control and the presence of florid, plaque-related marginal gingivitis is often seen in older adults, especially those with cognitive or motor impairments. There is a concept of “healthy survivors,” i.e., those teeth present in older adults may be, for a variety of reasons, less susceptible to the disease and hence the overall risk of progression is reduced. Those teeth that were susceptible will have been lost through incremental extraction.

Dry mouth is often cited as a consequence of age that is exacerbated by polypharmacy and other disease processes. Remembering that xerostomia is the subjective feeling of dry mouth, whereas salivary gland hypofunction results in low salivary flow rate, both can be a threat to oral health and quality of life. Those with low salivary flow rates have reduced salivary buffering and remineralization abilities and those with xerostomia will often seek to reduce symptoms by sucking on sour candies or something similar that provides a source of fermentable carbohydrates and, therefore, increased caries risk.

Oral precancer and cancer is also a disease associated with older adults with catastrophic consequences for those affected. The ability to detect precancerous lesions early, confirm diagnosis and commence treatment (including risk factor reduction) is key to positive outcomes.

Meeting the Challenges: A Pathway Approach

Pathways were originally developed in industry, particularly Japanese automobile production lines, where there was a focus on clearly defined steps that resulted in a consistent and predictable outcome. The adoption of care pathways in medicine has been rapid over recent years and they aim to collate best evidence and present this to clinicians.

<table>
<thead>
<tr>
<th>Definitions of Dependency Used in the Seattle Care Pathway</th>
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<tbody>
<tr>
<td><strong>No dependency</strong></td>
</tr>
<tr>
<td>Fit, robust people who exercise regularly and are in the most fit group for their age.</td>
</tr>
<tr>
<td><strong>Predependency</strong></td>
</tr>
<tr>
<td>People with chronic systemic conditions, which could impact on oral health that, at point of the presentation, are not currently impacting on oral health. A comorbidity whose symptoms are well-controlled.</td>
</tr>
<tr>
<td><strong>Low dependency</strong></td>
</tr>
<tr>
<td>People with identified chronic conditions that are affecting oral health but who currently receive or do not require help to access dental services or maintain oral health. These patients are not frankly dependent, but their disease symptoms are affecting them.</td>
</tr>
<tr>
<td><strong>Medium dependency</strong></td>
</tr>
<tr>
<td>People with an identified chronic system condition that currently impacts on oral health and who receive or do not require help to access dental services or maintain oral health. This category would include patients who demand to be seen at home or who do not have transport to a dental clinic.</td>
</tr>
<tr>
<td><strong>High dependency</strong></td>
</tr>
<tr>
<td>People with complex medical problems preventing them from going to receive dental care at a dental clinic. They differ from patients categorized in medium dependency because they cannot be moved and must be seen at home.</td>
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</tbody>
</table>
in a supportive way so practitioners have a more efficient and predictable means of treating patients. The care pathway represents a journey — one that may be paused, for example, while specialist tests are conducted or a caregiver is consulted, or one that may be deviated from if clinical experience dictates it. It is a journey that can be modified based on local, regional and nationally available guidance and resources.13 Pathways should therefore be viewed as enablers — documents or processes that assist in clinical decision making and, if followed correctly, can result in a predictable outcome as well as providing support for a clinician’s approach to a particular patient presentation. The full Seattle Care Pathway considered individuals, populations, treatments, prevention and communication issues for varying levels of dependency ranging from no dependency through high dependency. The dependency categories were described as shown in Table 2 and the care pathway in full in Table 3. These dependency categories were developed to ensure critical elements within the life course could be captured. They were also felt to be “tipping points” when approaches to care would change. All but the highest level of dependency may represent patients seen in community dental practice. As the definitions were discussed, many in the group could identify these with their own patients or family members. Once the categories of patients were determined, the evidence base around their prevention and treatment options could be collated. The pathway document was presented in tabular form with the main supporting evidence provided.1

Throughout the development of the guidance, the authors worked on the basis of dependency rather than a particular chronological age. However, it was clear that the implicit rationale behind the work was the care pathway in full in chronological age. However, it was clear of dependency rather than a particular guidance, the authors worked on the basis that were described as shown in dependency. The dependency categories from no dependency through high dependency may represent patients likely to present. These patients present with a chronic systemic condition with potential impact on oral health, which at point of presentation, is well controlled. An example of this type of patient might be the following: “Arnold is a 75-year-old who lives at home with his wife and three dogs. He exercises regularly and is actively involved in dog training for new dog owners in his community. He attends six-month recalls at your practice and three-month cleanings with your hygienist. When you review his chart, the last treatment you provided was a replacement restoration two years ago. He is on a statin for cholesterol but otherwise is on no medication.”

One of the comments raised in the conference was that this group was commonly seen in general practice, but often “fell off the radar,” meaning they began to fail to attend and before long were lost to the practice. This was recognized as an important place to start considering the impact of aging. For this group, the importance is to start the conversation about what may happen in the future. How can we keep in touch in case things change? It was agreed that complex treatment plans in this group were not contraindicated but a conversation about implications on the maintenance of such treatments should things change was important. These groups need, as all patients do, a good home-care/self-care plan with an emphasis on prevention. The concept of “protecting the investment” was raised. These patients have spent considerable financial and time resources on their oral health. As risk factors may increase with age, we should provide them with information and guidance to help them maintain this. Frequently reviewing medical history and medicine will be important.

**Predependency**

These patients present with a chronic systemic condition with potential impact on oral health, which at point of presentation, is well controlled. An example of this type of patient might be the following: “Sarah is 66 years old and is a widow living alone. She is active in her community and attends church regularly where she has an extensive social network. She sometimes uses a walking stick when she feels a little dizzy, and is taking medications for diabetes and high blood pressure but both are well controlled. She recently had an...
# Table 3

## The Seattle Care Pathway

<table>
<thead>
<tr>
<th>Dependency Level</th>
<th>Assessment</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use of dependency checklist.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessment of long-term viability of oral health.*</td>
<td></td>
</tr>
<tr>
<td><strong>Predependency</strong></td>
<td>Condition identified and risk assessment undertaken to inform any potential increased frequency of contact.¹⁸</td>
<td>Based on assessment consider the following:</td>
</tr>
<tr>
<td></td>
<td>Consideration of additional diagnostics (for example salivary flow rate). ¹⁹</td>
<td>Caries: High-fluoride toothpaste, varnishes, gels and mouth rinses.²²</td>
</tr>
<tr>
<td></td>
<td>Oral health care plan — Strategy — Treatment plan.²⁰</td>
<td>Perio: Antibacterial toothpaste, professional cleaning, chlorhexidine (not long-term use), oral hygiene instruction.</td>
</tr>
<tr>
<td></td>
<td>Recognition that risk may be greater as result of increasing dependency.</td>
<td>Oral cancer: Risk modification and education.¹¹</td>
</tr>
<tr>
<td></td>
<td>Assessment of long-term viability of oral health.</td>
<td>Tooth service loss: Risk modification, sensitivity products as indicating.²³</td>
</tr>
<tr>
<td></td>
<td>Consideration of use of skill mix.²¹</td>
<td>Production of daily oral care plan (home care).</td>
</tr>
<tr>
<td><strong>Low Dependency</strong></td>
<td>Manifestation identified and risk assessment undertaken and increased frequency of contact unless compelling reasons to maintain current frequency.¹⁸</td>
<td>Assessment of the reason behind the impact — prevention based on mitigation of factors.²⁸</td>
</tr>
<tr>
<td></td>
<td>Recognition that risk may be greater as result of increasing dependency.</td>
<td>Definitive move to evidence-based prevention products.²⁴</td>
</tr>
<tr>
<td></td>
<td>Assessment of long-term viability of oral health.</td>
<td>Consideration of how these can be delivered — for example high-fluoride²⁵ toothpaste now combined with electric toothbrush or modified brush.²⁵,²⁶</td>
</tr>
<tr>
<td></td>
<td>Oral health care plan — Strategy — Treatment plan.²⁰**</td>
<td>Consider medication issues²⁷ both in terms of systemic impact and sugar free.²⁸</td>
</tr>
<tr>
<td></td>
<td>Consideration of use of skill mix.²¹</td>
<td>Consider recommending gum chewing and/or salivary substitutes if indicated.²⁹</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Production of daily oral care plan.</td>
</tr>
<tr>
<td><strong>Medium Dependency</strong></td>
<td>Usage of support identified and risk assessment undertaken and increased frequency of contact unless compelling reasons to maintain current frequency.¹⁸</td>
<td>Ensure that the prevention routine is both adequate — i.e., move from high- to very-high fluoride toothpaste; that routine can be delivered by others if required.²³</td>
</tr>
<tr>
<td></td>
<td>Recognition that risk may be greater as result of increasing dependency.</td>
<td>Education of caregivers in delivery of prevention.</td>
</tr>
<tr>
<td></td>
<td>Assessment of long-term viability of oral health.</td>
<td>Consider increased use of professional applied products — utilization of increased patient contacts, i.e., nurse-applied varnishes.²⁰</td>
</tr>
<tr>
<td></td>
<td>Oral health care plan — Strategy — Treatment plan.²⁰</td>
<td>Consider recommending gum chewing and/or salivary substitutes if indicated.²⁹</td>
</tr>
<tr>
<td></td>
<td>Consideration of use of skill mix.²¹</td>
<td>Production of daily oral care plan.</td>
</tr>
<tr>
<td><strong>High Dependency</strong></td>
<td>Inability to receive care elsewhere identified and risk assessment undertaken and increased frequency of contact unless compelling reasons to maintain current frequency.¹⁸</td>
<td>Focusing prevention on easily deliverable products and therapies, emphasis on pain and infection management.¹⁴</td>
</tr>
<tr>
<td></td>
<td>Recognition that risk may be greater as result of increasing dependency.</td>
<td>Further move to professional products, including varnishes and gels.</td>
</tr>
<tr>
<td></td>
<td>Assessment of long-term viability of oral health.</td>
<td>Consideration of prevention of disease complications — i.e., chlorhexidine use to prevent respiratory infections.²⁰</td>
</tr>
<tr>
<td></td>
<td>Consideration of use of skill mix.²¹</td>
<td></td>
</tr>
</tbody>
</table>

* Consideration of the long-term success, impact and maintenance of current restorative condition, oral health and prevention.

** Development or modification of this plan.

¹ Contact is defined as an activity involving contact between patient and the wider dental team.
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on an assessment of patient need to secure oral health.</td>
<td>Speak to patient about long-term oral health issues especially when considering complex treatment modalities that require replacement and/or maintenance.</td>
</tr>
<tr>
<td>Based on patient needs but with greater consideration of long-term viability of treatments given assessment of likely dependency in the future and impact on oral care.</td>
<td>Identification of the condition and its likely future impact on oral care — education of patient. Communication with general care physician re: conditions.</td>
</tr>
<tr>
<td>Consideration of the strategic importance of retaining teeth.(^{31})</td>
<td>discussion around care plans, caregivers, social circumstances as appropriate. Need for strategic approach to retaining functional occlusal contacts. Link in with wider health care team — around medication management (sugar in medicines).</td>
</tr>
<tr>
<td>Shortened dental arch, and longevity and maintenance of more complex procedures.(^{32})</td>
<td></td>
</tr>
<tr>
<td>Provision of implant support dentures where indicated.(^{31})</td>
<td></td>
</tr>
<tr>
<td>Based on maintaining function and freedom from infection and pain — plan for failure.</td>
<td></td>
</tr>
<tr>
<td>Further consideration of strategic importance, repair rather than replace, glass ionomer cement for fluoride release in dry mouth, adhesive bridgework.</td>
<td>Establish link with source of support to ensure that daily oral health plan can be delivered and that prevention modalities are appropriately implemented.</td>
</tr>
<tr>
<td>Minimal intervention to preserve health but consideration of long-term viability which may lead to more complex treatments being recommended, for example implants to support lower denture.(^{31})</td>
<td></td>
</tr>
<tr>
<td>Use of simple restorative techniques such as atraumatic restorative technique.(^{33})</td>
<td></td>
</tr>
<tr>
<td>Change attachment types on implant or tooth supported overdentures.(^{34})</td>
<td></td>
</tr>
<tr>
<td>Palliative treatment based on patient demand ensuring freedom from pain or infection, and esthetics where required.(^{14})</td>
<td>Ensure that the patient is at the center of discussions to ensure that what is being delivered is what is needed.</td>
</tr>
</tbody>
</table>
antior tooth extracted following a persistent periapical infection and this was added to her partial denture. She finds the additional tooth uncomfortable and wants to know what can be done.”

Sarah is considered predependant as her diabetes and high blood pressure could, if they became unstable, adversely affect her oral health. She is struggling with her adapted denture, which may be affecting her ability to socialize or eat. The care pathway for predependant individuals advocates a candid approach to communicating with the patient. It is important to articulate the risks of poor disease management with the patient, in this case the polypharmacy, and this should impact on the recall interval for Sarah. Prevention should be the centerpiece of a detailed home-care plan and consideration should be given to the inclusion of high-fluoride dentifrices, gels or mouth rinses. In terms of the treatment offered to Sarah, this must be considered in the context of her potentially increasing dependency and therefore should be easy to maintain but may need adaptation over time. Efforts should be made to ensure that, within her care record, the contact details for her family, or perhaps someone in her church group, are recorded so they may be contacted if Sarah fails to attend her recall appointments.

**Medium Dependency**

These are patients with an identified chronic systemic condition that is currently impacting oral health and who receive or require support in managing access to dental services or maintaining oral health. This category would include patients who demand to be seen at home or who cannot get transportation to a dental clinic. An example of this type of patient might be the following:

“John is living in residential care in the same town as your dental practice. With assistance, he can attend the practice, but these appointments need to be scheduled carefully and his caregiver must accompany him. John has mild dementia and can consent to his treatment but has poor short-term memory and often repeats his questions. He is on a range of medications that have caused salivary hypofunction and he complains of a dry mouth. John consumes a large number of candies in an attempt to stimulate saliva and he has an extensively restored dentition in which there is evidence of new carious lesions and failing extracoronal restorations. He doesn’t report any pain at present.”

John is a patient who is on the “tipping point.” His medications are having a direct impact on his oral health and he requires an immediate and aggressive preventive approach. Given his cognitive difficulties, these need to be coordinated with his caregiver and should include high-fluoride products, for example, 5000 ppm toothpaste. Plaque control measures should be discussed with him and his caregiver, and his physician should be contacted to see if it is possible to alter his medication regime to reduce the dry mouth symptoms. Professional prevention, for example, the application of fluoride varnish, should be commenced with frequent recalls that should be facilitated between the dental office and the residential home. Restorative treatment should be designed with easy maintenance in mind and it may be inappropriate to consider complex work that may become increasingly difficult to clean in the future. Consideration could be given to treatments that might be adapted in the future, for example, fixed implant work that might be changed to removable.14,15

Patients in the medium dependency group, when questioned in focus groups, placed access to care as their top priority, followed by a pain-free, functional dentition. They fear their loss of independence will prevent them from going to the dentist to receive the care they need, therefore, assuring them of continued access and facilitating this are key. The importance of oral hygiene measures should be made clear to care personnel and a written plan is essential. The full care pathway document provides further examples of the management of patients with increasing dependency and should be consulted by those practitioners who serve such populations.1

**Cultural/Generalizability**

Care pathways, such as the Seattle Pathway, are designed to be generalizable to a range of populations, health service organizations and cultures. They should be consistent with, or enable the incorporation of, local, regional and national guidance and regulations. They should be operable in insurance and state-funded systems. It is therefore a requirement of practitioners to assess the guidance and consider its implementation within their practice population.

The impact of culture should not be ignored when considering the needs of patients in this group. Lo described
the differences between cultural attitudes toward tooth loss, aging and dental treatment. For example, in a given culture, the ability to eat and socialize may be more important than preservation of individual teeth, whereas for others the loss of teeth, and any commensurate perceived esthetic impact, would be considered unwanted.16

The conference also considered the skill of the current dental workforce in managing the increasing needs of older dental patients.17 The pathway advocates that much can be done for dependent patients without the need to refer to specialist services. However, research suggests many dentists are concerned with providing treatment to patients with complex medical histories or those with cognitive impairments. There is, therefore, a need to ensure graduate dental education and continuing professional education courses address these concerns.17

Summary

The purpose of this article has been to present and describe the rationale behind the Seattle Care Pathway. The authors recognize the pathway may be a first step to providing an evidence-based approach to the management of this increasingly complex group of patients who are destined to become an ever-greater proportion of our practice populations. The overarching advice is that prevention, both self care and professional, is key for these patients and the practitioners should be vigilant about changes in the health and social circumstances of their older adult patients.

While products and therapies exist for this cohort of patients, there is a need for robust clinical trials in this population, as well as further consideration of how dental service funding, either public or private, can be leveraged to support the implementation of effective prevention.

REFERENCES

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Root Caries in Older Adults
Dick Gregory, DDS, and Susan Hyde, DDS, MPH, PhD, FACD

ABSTRACT Older adults are retaining an increasing number of natural teeth, and nearly half of all individuals aged 75 and older have experienced root caries. Root caries is a major cause of tooth loss in older adults, and tooth loss is the most significant negative impact on oral health-related quality of life for the elderly. The need for improved preventive efforts and treatment strategies for this population is acute.

Dental caries is a transmissible infection caused by specific bacteria (Streptococcus mutans, Streptococcus sobrinus, Lactobacilli and others) that colonize tooth surfaces, feed on carbohydrates and produce acids as waste products. These acids dissolve the mineral content of the tooth, and if not halted or reversed, a carious lesion is formed.1

The risk for dental caries persists throughout life. A dynamic balance exists between pathological factors that promote caries and protective factors that inhibit it. Pathological factors include acid-producing bacteria, frequent consumption of fermentable carbohydrates, poor oral hygiene, as well as subnormal salivary flow and composition. Protective factors include normal salivary function, fluoride, daily thorough oral hygiene, casein phosphopeptide-amorphous calcium phosphate paste (GC's Tooth Mousse, MI Paste and Recaldent) and extrinsic topical antibacterial substances.1

Caries lesions are termed either primary (new lesions on previously unrestored surfaces) or secondary (new caries around existing restorations). They occur on the crowns of teeth and exposed root surfaces. Periodontal disease results in loss of gingival attachment and exposure of the tooth’s root surface. Root surface cementum and dentin are more susceptible to cavitation because they are less mineralized than enamel and begin to demineralize at a higher salivary pH.

Older adults are retaining an increasing number of natural teeth, and nearly half of all individuals aged 75 and older have experienced root caries. Root caries is a major cause of tooth loss in older adults, and tooth loss is the most significant negative impact on oral health-related quality of life for the elderly.2

A false perception exists among dental professionals and policy makers that dental caries is, for the most part, only active in younger people. Several of the clinical, social and behavioral changes common to aging predispose older adults to the highest...
rates of decay are discussed below. The need for improved preventive efforts and treatment strategies for this population is acute. Better clinical surveillance by public health agencies will drive decisions about oral health policy and education.\(^3,5\)

**Prevalence and Risk Factors**

The prevalence of untreated root caries is 12 percent for adults aged 65-74 and 17 percent for those aged 75 and older.\(^7\) African Americans and Mexican Americans experience more oral health problems, including dental caries, throughout the life course. Lower educational attainment is also strongly associated with increased oral health problems at all ages and across all races (FIGURE 1).

Aging is often associated with changes in oral morphology, chronic systemic disease such as diabetes and decreasing dexterity, making personal oral hygiene more difficult, particularly for the oldest and most frail individuals. The pain of arthritis and neuropathies make it difficult to grasp or manipulate a manual toothbrush. Patients with dementia experience a higher prevalence of caries than those without dementia, and the rates are related to dementia type and severity. Individuals needing assistance with oral hygiene and whose caregivers have difficulties providing effective oral care experience the highest rates.\(^6\)

Another risk factor that often accompanies aging is patients taking multiple medications. More than 500 medications have the potential to decrease salivary flow, which leads to xerostomia and subsequently dental caries. Other social and behavioral factors that contribute to the higher frequency of root caries in older adults include lack of a perceived need for dental treatment and a history of smoking and alcohol consumption.\(^7,8,9\)

Good oral hygiene is also compromised by existing dental restorations and the presence of oral prostheses and appliances. Wearing a removable partial denture is associated with higher rates of dental caries. It is unclear whether this is due to the initial high caries rate which resulted in tooth loss or if the denture has a role in causing caries due to increased root surface exposure on the abutment teeth, food impaction and plaque accumulation.\(^4\)

**Caries Risk Assessment**

Understanding factors and behaviors that directly or indirectly impact caries pathogenesis offers opportunities to reduce the caries burden of the aging population. Caries management by risk assessment (CAMBRA) is a conservative and effective approach to prevention and treatment of the disease across the life course.\(^9\) Caries pathogenesis is recognized as a balance between protective factors (fluoride, calcium phosphate paste, sufficient saliva and antibacterial agents) and pathological factors (cariogenic bacteria, inadequate salivary function, poor oral hygiene and dietary habits — especially frequent ingestion of fermentable carbohydrates).\(^9\) Correctly assessing caries risk can identify a therapeutic treatment regimen for effectively managing the disease by reducing pathological factors and enhancing protective factors, resulting in fewer carious lesions.\(^9\) With accurate risk assessment, noninvasive care modalities (chlorhexidine and fluoride rinse or varnish) can be used proactively to prevent carious lesions and therapeutically to remineralize early carious lesions. Restorative procedures for more advanced lesions can be conservative, preserving tooth structure and benefiting patient oral health.\(^9\)

CAMBRA has proven to be a practical caries risk assessment methodology and a systematic and effective approach to caries management. Targeted antibacterial and fluoride therapy based on salivary microbial and fluoride levels has been shown to favorably alter the balance between pathological and protective caries risk factors. Caries risk assessment with aggressive preventive measures and conservative restoration has been shown to result in a reduced two-year caries increment compared to traditional, nonrisk-based dental treatment. Altering the caries balance by reducing pathological factors and enhancing protective factors, namely antimicrobial and fluoride rinses, reduced caries risk and resulted in fewer carious lesions. Readers are encouraged to further familiarize themselves with this research and CAMBRA methodology.\(^1\)

For the older adult population the etiology and pathogenesis of dental caries are known to be multifactorial, but the interplay between intrinsic and extrinsic factors is still not fully understood. Caries research commonly tests an intervention for a single pathological factor; however, it is observed that effective caries control requires a comprehensive and coordinated approach. The predictors of root caries most frequently reported in the literature are caries history, number of teeth and plaque index.\(^10\) In addition to the pathological factors mentioned in the introduction to this chapter, patients with one or more existing carious lesions are at risk for additional new carious lesions.
in the future. Simply restoring a single lesion does not reduce the bacterial loads in the rest of the mouth (FIGURE 2). Dental plaque is a complex biofilm constantly forming and maturing. It consists of microorganisms and extracellular matrix including cariogenic acid-producing bacteria. In high caries risk individuals the bacterial challenge must be lowered to favorably alter the caries balance. Patients with moderate to high levels of mutans streptococci and lactobacilli require targeted antibacterial treatment and fluoride to combat growth and remineralize tooth surfaces.1 Recommended regimens are described in the next paragraph.

Evidence-based clinical recommendations generally favor fluoride-containing caries preventive agents, however, chlorhexidine-thymol varnish has also been shown to be effective in the treatment of root caries.13 A 38% solution of silver diamine fluoride (SDF) applied annually (Saforide, Bee Brand Medico Dental, Toyko), or 5% sodium fluoride varnish applied every three months,11 or 1% chlorhexidine varnish applied every three months,12 have all been found more effective in preventing new root caries than giving oral hygiene instruction alone.13 Recent recommendations for the prevention of primary root caries called for the professional application of 38% SDF solution annually and 22,500 ppm sodium fluoride varnish applications every three months to prevent secondary root caries.14

There is questionable evidence that xylitol and sorbitol gum can be used as an adjunct for caries prevention.15 Cariogenic bacteria prefer six-carbon sugars or disaccharides and are not able to ferment xylitol, depriving them of an energy source and interfering with growth and reproduction. Systematic reviews of clinical trials have not provided conclusive evidence that xylitol is superior to other polyols such as sorbitol 16 or equal to that of topical fluoride in its anticaries effect.15

Pathological Factors Versus Protective Factors Diet
A lifetime of caries and/or periodontal disease frequently results in tooth loss. In addition to the reduced masticatory function accompanying tooth loss, it is also common for older adults to experience a diminished ability to taste food. The resultant dietary shift from complex to simple sugars promotes caries. Cariogenic bacteria metabolize sucrose, glucose, fructose and cooked starches to produce organic acids that dissolve the mineral content of enamel and dentin. The amount, consistency and frequency of consumption determine the rate and degree of demineralization. Some medications and dietary supplements containing glucose, fructose or sucrose also contribute to caries risk.15

Genetic Susceptibility
There appears to be variation in individual susceptibility to caries. Intrinsic host factors related to the structure of enamel, immunologic response to cariogenic bacteria and the composition of saliva play key roles in modulating the initiation and progression of the disease. Genetic variation of the host factors may contribute to an increased risk for dental caries. However, the evidence supporting an inherited susceptibility to caries is limited. Utilizing the human genome sequence to improve understanding of a genetic contribution to caries pathogenesis will provide a foundation for future research.16

Saliva
Saliva contains many important caries-protective components, such as calcium, phosphate and fluoride, which are essential to tooth surface remineralization. Salivary proteins and lipids form a protective pellicle on the tooth surface, while other proteins bind calcium, maintaining saliva as a supersaturated mineral solution. Bicarbonate, phosphate and peptides in saliva provide a critical pH-buffering function. With age, the amount of saliva remains stable, however, saliva becomes thicker due to a reduction in serous flow relative to the mucous component, resulting in decreased lubrication or perceived decreased moistness.

Fluoride
Other than the pre-eruptive mineralization of the developing dentition, systemic benefits of fluoride are minimal. The anticaries effects of fluoride are primarily topical in adults. The topical effect is described as a constant supply of low levels of fluoride at the biofilm/saliva/dental interface being the most beneficial in preventing dental caries. Therapeutic levels of fluoride can be achieved from drinking fluoridated water and the use of fluoride products (toothpaste, rinse, gel, varnish). Fluoride can inhibit plaque bacterial growth, but more significantly, fluoride inhibits demineralization and enhances remineralization of the tooth surface.1

The most widely used forms of fluoride delivery have been the subject of several systematic reviews, providing strong evidence supporting the use of dentifrices, gels, varnishes and mouth rinses for the

FIGURE 2. Tooth No. 11 shows secondary caries apical to a root carious lesion previously restored with amalgam.
control of caries progression. Dentifrices with fluoride concentrations 1,000 ppm and higher have been shown to be clinically effective in caries prevention when compared to a placebo treatment. More evidence is needed to determine the benefits of the combined use of two modalities of fluoride application as compared to a single modality. Considering the currently available evidence and risk-benefit aspects, brushing twice daily with a dentifrice containing fluoride is one of the most effective ways to control caries. However, brushing alone does not overcome a high bacterial challenge, and additional fluoride therapy should be targeted toward individuals at high caries risk. Frequent topical application of fluoride appears to be a successful treatment for incipient root caries lesions by remineralizing decalcified structure, irrespective of the type of fluoride treatment used.

**Chlorhexidine**

The use of chlorhexidine for caries prevention has been a controversial topic among dental educators and clinicians. Chlorhexidine rinses, gels and varnishes or combinations of these items with fluoride have variable effects in caries prevention, and the evidence is regarded as “suggestive but incomplete.” The most persistent reductions of mutans streptococci have been achieved, in order of more effective to less effective, by chlorhexidine varnish followed by gels and, lastly, mouth rinses. While chlorhexidine had been widely used in Europe before gaining FDA approval, the only chlorhexidine-containing products currently marketed in the United States are 0.12% chlorhexidine mouth rinses. The preferred dosage regimen for rinsing is once a day with 5 cc of a 0.12% chlorhexidine gluconate solution for one week every month for a year. Patients should be informed of the likelihood of dark staining of their teeth during chlorhexidine use, and that the staining is easily removed during a dental prophylaxis. Bacterial testing should be used to monitor the clinical success of chlorhexidine therapy. Better antibacterial therapies for high caries risk individuals are needed, and they must be combined with remineralization by fluoride.

Chlorhexidine is effective at reducing the bacterial challenge in high caries risk individuals even when compliance is problematic. In the absence of regular professional tooth cleaning and oral hygiene instruction, chlorhexidine varnish may provide a beneficial effect for frail elders and patients with xerostomia. Cervitec Plus (Ivoclar Vivadent Inc., Amherst, N.Y.), a chlorhexidine-thymol varnish, may help to control established root lesions and reduce the incidence of new root caries among institutionalized elderly. It is the only nonfluoride caries agent to receive a favorable recommendation from a panel for caries prevention.

**Silver Diamine Fluoride**

Recent interest in the antimicrobial use of silver compounds suggest that silver nitrate (SN) and silver diamine fluoride (SDF) are more effective at arresting active carious lesions and preventing new caries than fluoride varnish, and may be a valuable caries-preventive intervention. Possible mechanisms for SDF’s clinical success include its antimicrobial activity against a cariogenic biofilm of S. mutans or A. naeslundii formed on dentin surfaces and slowing down the demineralization of dentin. While SDF is available from international chemists online and has been shown to be as safe as fluoride varnish, effective for treating carious lesions and is widely used in other countries, it does not currently have FDA approval.

**Clinical Decision Making**

Diagnosis of a carious lesion on a root surface raises ethical and practical questions. Can the lesion be remineralized with fluoride therapy or does it require a restoration? Is it an active or arrested carious lesion? Is the root caries causing or likely to cause pain? How do the risks and benefits to the patient of not treating a carious lesion compare to those associated with restoring it? Does the patient have access to follow-up care?

If the lesion is to be restored, what technique and material will result in the best outcome for the patient? What is the patient’s ability to maintain the restoration and what is the future caries risk? Systemic disease burden, xerogenic medications, diet quality, salivary function, manual dexterity, cognitive ability, the need for caregiver assistance and access to care all contribute to caries risk.

The literature suggests that there is a fair agreement between visual/tactile appearance of caries and the severity/depth of the lesion. No single clinical predictor is able to reliably assess the activity of a carious lesion. However, a combination of predictors increases the accuracy of lesion activity prediction for both primary coronal and root lesions. Three surrogate methods have been used...
for evaluating lesion activity (construct validity); all have disadvantages. If construct validity is accepted as a “gold standard,” it is possible to assess the activity of primary coronal and root lesions reliably and accurately at one examination by using the combined information obtained from a range of indicators, such as visual appearance, location of the lesion, tactile sensation during probing and gingival health.10

Treating root caries can be technically challenging. The location of the root caries may be difficult to access. It often may extend below the gingival margin, making it necessary to retract the gingiva with a clamp, pack retraction cord to expose the cervical margin of the lesion, or utilize laser or electrosurgery to recontour the gingiva and obtain access to the lesion. One important and relevant diagnostic consideration is, “What is the clinician’s ability to successfully restore a particular carious lesion?” The location of the carious lesion on the tooth, the tooth’s location in the mouth and the patient’s ability to cooperate all contribute to the challenge of placing a successful restoration. How extensive and close to the pulp is the carious lesion? How likely is a pulp exposure and the subsequent need for root canal therapy? Will the operator be able to achieve a dry field and have adequate visualization and access with a handpiece and/or instruments? Will conservative caries removal result in a better outcome for the patient than aggressive treatment?

Caries Removal

Partial caries removal has been found to greatly reduce the risk of pulp exposure.22 For asymptomatic teeth, partial caries removal generally results in no detriment to the patient from increased pulpal symptoms, decay progression under restorations or premature loss of restorations.22 When pulpal exposure is a concern in treating deep lesions, partial caries removal is the preferred approach.22

In the absence of clinical symptoms of pulpal involvement, stepwise caries excavation to stained but firm dentin followed by the placement a thin liner of calcium hydroxide or antimicrobials such as chlorhexidine-thymol varnish or polycarboxylate cement combined with a tannin-fluoride preparation, are all effective in reducing bacteria and promoting remineralization of any carious dentin that remains after the stepwise excavation.23

There is limited scientific evidence for laser treatment being as effective as a rotary bur for removing carious tissue. However, treatment time with lasers is prolonged compared to using a traditional handpiece, and to date no conclusions can be drawn regarding biological or technical complications or the cost-effectiveness of the method.24

Restorative Materials: Amalgam, Composite and Glass Ionomer

The longevity (failure rate, median survival time, median age) of silver amalgam fillings has been compared to direct composite fillings in permanent teeth. Amalgam fillings have been shown to have greater longevity than composite fillings. However, composites and their adhesives are frequently replaced by the next generation of materials with improved properties, making periodic revisions of these conclusions necessary.25 Economic analyses report lower costs for amalgam fillings because of the higher complexity of and time needed to place composite fillings. Resin bonding to dentin or enamel requires adequate isolation and saliva contamination control. This is time consuming and often difficult to achieve in restoring root caries lesions at or near the gingival margin where most occur. Self-etching adhesives provide decreased clinical application time and reduce the risk of saliva contamination.23

A 2009 Statement on Dental Amalgam released by the American Dental Association Council on Scientific Affairs remains consistent with a more recent review of the international literature on amalgam toxicity. Various anecdotal complaints of systemic toxicity because of mercury release from dental amalgam do not justify the discontinuation of amalgam use from dental practice or the replacement of serviceable amalgam fillings with alternative restorative dental materials.26 Available scientific data show that the mercury released from dental amalgam restorations does not contribute to systemic disease or systemic toxicological effects. No significant effects on the immune system have been demonstrated with the amounts of mercury released from dental amalgam restorations, and only very rarely, have there been reported allergic reactions to mercury from amalgam restorations.26

Glass ionomer, resin-modified glass ionomer and composite resin have been compared in high caries risk patients. Both glass ionomer and resin-modified glass ionomer restorations contain fluoride and release it into the saliva and adjacent tooth structure. While no significant difference in caries prevention between the two materials has been observed, reduction in new caries formation for glass ionomer and resin-modified glass ionomer restorations was more than 80 percent greater than for composite resin restorations.
in the treatment of cervical caries for head and neck radiation patients with xerostomia who did not adhere to a caries-preventive fluoride rinse protocol.\(^{26,27}\)

Glass ionomer is particularly suitable for restoring root carious lesions. It has good esthetic and anticariogenic properties, allows for chemical bonding to teeth and has gained wide acceptance in restoring carious lesions on the accessible buccal and lingual root surfaces. Minimally invasive techniques for restoring more difficult to access interproximal root surfaces with glass ionomer have been developed demonstrating a survival rate of 77.4 percent at 80 months. Caries removal, complete filling of the resulting cavity preparation and marginal integrity as demonstrated by radiographic quality is the single most important predictor for restoration survival.\(^{23,28}\) When compared to amalgam, significantly less secondary caries has been observed at the margins of single-surface glass ionomer restorations in permanent teeth after six years.\(^{29}\)

Atraumatic Restorative Treatment
Atraumatic restorative treatment (ART) is an essential caries management technique for improving access to oral care. The approach, initiated 25 years ago in Tanzania, has evolved into a caries management concept for improving quality and access to oral care globally. Local anesthesia is seldom needed and only hand instruments are used to remove caries.\(^{30}\) ART uses a high-viscosity glass ionomer restoration to restore single-surface lesions in permanent posterior teeth, including root carious lesions. There appears to be no difference in the survival of single-surface, high-viscosity glass-ionomer ART restorations and amalgam restorations in permanent posterior teeth including Class V root surface lesions.\(^{30}\)

Clinical Scenario
The director of nursing in a local residential care facility requests a consultation with a dentist for Mrs. Switzer, who is 86 years old and has a fractured maxillary left lateral incisor. Mrs. Switzer was admitted to the facility three weeks previously with moderate Alzheimer's disease, depression and severe hypertension. Mrs. Switzer attended her dentist one month before entering the facility but did not follow the dentist’s recommendations for periodontal debridement, intracoronal restorations and a fixed partial denture. Before this appointment, Mrs. Switzer had not been to the dentist in two years, although she claimed to have visited her dentist frequently over the years before then. Consequently, she is referred to the care facility’s dentist for further assessment and treatment of the fractured tooth. The dentist examines Mrs. Switzer to confirm that the maxillary left canine has an asymptomatic but complete coronal fracture due to root caries (FIGURES 3A–C). He notes also that there is copious plaque and food debris throughout the teeth and mouth.
On questioning, Mrs. Switzer reveals that she drinks tea sweetened with sugar constantly “for energy” and to be sociable in the facility, and she takes multiple medications for blood pressure, depression and occasional memory loss. The dentist requests the radiographs be taken before she enters the facility to determine the extent of the carious lesions (Figure 4).

A diagnosis of extensive root caries involving all previously restored teeth is made. A treatment plan of extraction of the fractured maxillary left lateral incisor and replacement using an acrylic removable partial denture is made. The carious lesions are scheduled for restoration using resin-modified glass ionomer material. The patient’s daughter is warned that excavation of the root caries might result in tooth fracture. If this occurs, then the fractured teeth would require extraction, denture teeth could be added to the acrylic removable partial denture in the maxilla and/or an additional prosthesis would be needed for the mandible.

Personalized diet and daily mouth care counseling is provided to the patient, daughter and nursing staff. Daily use of 0.2% neutral sodium fluoride is prescribed for prevention of root caries.

Future Directions

ART is expected to play a significant part in essential caries management for the frail elderly, especially as additional scopes of practice are more widely included in an expanded clinical care team. One of the indications for the appropriate use of the ART approach is for the elderly who are homebound or living in institutions. More studies are needed to investigate the potential of ART in providing essential caries management in this population. However, field trials report two-year survival rates of 90 percent with no significant difference between ART restorations using high-viscosity glass ionomer and those produced through the traditional approach of complete caries removal using rotary instruments, resulting in a higher risk of pulp exposure.31 Anecdotal clinical reports of dentists and expanded function hygienists and assistants providing on-site care for nonambulatory older adults provide support from the field for this clinical approach. More research is needed in a clinical randomized-controlled trial environment to provide systematic evidence for this approach.

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In the U.S. and most of the developed and developing world, there is an increased proportion of the population that is considered elderly. Numerous factors, including declining birth rates and longer life spans because of improved treatment and prevention measures, have played a major role in this demographic shift. Along with this demographic shift there has been a physiological, psychological and philosophical shift among practitioners and the public with the perception of what is considered “old age.” Such changes are apparent in the emergence of concepts of “healthy aging” and the goal of “adding life to years” rather than “years to life.” Part of these new attitudes in improving the quality of the life for the elderly is the maintenance of a healthy and functional natural dentition. Maintenance of a healthy dentition requires an understanding of the causes, diagnosis, risk assessment and timely treatment of the two primary causes of tooth loss, periodontal disease and caries. This paper presents the current state of knowledge and opinion on approaches to periodontal diseases and periodontal treatment in the elderly with an emphasis on consensus, conclusions and future directions for dental practitioners.

The central question in addressing the role of aging in periodontal disease is whether aging itself is a risk factor for the incidence, severity and progression of periodontal disease. In other words,
is periodontal disease a “risk factor” for periodontal disease initiation and/or disease progression? By risk factor we mean a condition or factor that is associated with the disease after adjusting for other contributing factors, such as tobacco use, plaque levels and systemic conditions, and has been demonstrated in longitudinal studies. While it has been demonstrated from large epidemiological surveys that the elderly have a higher prevalence and severity of periodontal diseases, particularly among African-Americans and Hispanics, as measured by level of loss of periodontal support when compared to a younger cohort, these observations need to be interpreted with caution. Firstly, employing levels of loss of support of alveolar bone, clinical attachment loss, recession, etc. for determining the incidence and/or severity of periodontal disease at a single observational time point does not indicate the presence of active periodontal breakdown, or the rate of periodontal breakdown itself. Determination of active disease or rate of breakdown would be the most accurate measures of the presence of periodontal disease itself. Rather, these measures from surveys of larger general populations at a single time point reflect the long-term cumulative effects of past periodontal inflammation from bacterial plaque, as well as the cumulative effects of physiological and nonphysiological occlusal forces, psychological stress, oral habits and hygiene techniques, tobacco use, medications, compensation for occlusal wear, continued tooth eruption and gingival recession. Secondly, the attitudes toward the importance of oral hygiene and importance of both maintenance by the patient and regular maintenance by the dental practitioner have improved over successive generations of patients. Therefore evidence of loss of periodontal support among the elderly may reflect in large part these differences in attitudes in their younger years with an accumulated effect toward their current condition. Thus, the prevailing opinion among the periodontal research community is that age alone is not a major risk factor for the incidence of new destructive periodontal disease or in its rate of progression. In a periodontally healthy elderly patient some gingival recession and slight horizontal bone loss may be observed as part of the normal aging process. However, the susceptibility of an individual elderly patient to periodontal breakdown from inflammatory periodontal diseases is more dependent on that individual patient’s biological, behavioral, medical and pharmacological considerations that accompany aging. Specifically, the dental practitioner should consider four broad areas when assessing periodontal risks in the elderly patient:

- The effects of aging on the integrity and function of the periodontal tissues themselves.
- The effects of aging on the local and systemic response to periodontal plaque biofilm and how this may manifest in clinical signs of disease.
- The effects of systemic conditions and medication associated with aging on the incidence, severity and progression of periodontal diseases.
- The effects of aging on motor function, cognitive function and behavioral changes that could affect the ability to remove bacterial plaque deposits.

Aging and the periodontal tissues. It is well-known that with aging, the ability of tissues in the body to regenerate and repair diminishes over time. This is due in part to the reduced ability of cells to divide, leading to a reduction in the number of cells in the full range of tissues in the body. These changes have been observed in periodontal tissues including the gingival epithelium, connective tissues and bone that form the periodontal complex. In particular, the reduction of numbers of fibroblasts to maintain and repair both gingival connective tissues and periodontal ligament may lead to an increase rigidity and/or loss of elasticity in these tissues. This loss of elasticity could lead to a reduced ability of the periodontal tissues in general and the periodontal ligament complex in particular to absorb both natural and nonphysiological occlusal forces. In addition, the natural longer-term exposure of collagen in periodontal connective tissues to free radicals could lead to damage, reduced function and/or death of epithelial cells and to fibroblasts, osteoblasts and cementoblasts of the periodontal tissues, as well as cross linking of collagen fibers with reduced elasticity in the periodontal ligament support. These normal aging changes may contribute to a small and gradual reduction in the periodontal support in the elderly, even in the absence of a history of periodontal inflammation due to plaque inflammation.

Aging and host response in periodontal diseases. As with other tissues of the body, periodontal tissues require a fully functional host defense in general,
and immune response in particular, to defend against microbial pathogens. A reduction in these host defenses, or immunosenescence, has received considerable attention over the past several decades. The rapid first line of defense against bacterial plaque known as the innate immunity system, which includes the epithelial barrier and normal function of neutrophils to migrate, engulf and break down bacteria, as well as the adaptive immune system, which includes a variety of T and B lymphocyte responses with production of antibodies, cytokines and chemokines, are reduced in the aging process itself. However, it remains unresolved as to whether diminished function in these two immune systems and other protective host responses in a medically healthy elderly patient leads to more severe forms of periodontal disease. In addition, there are conflicting reports as to whether older patients have an altered gingival inflammatory response in experimental gingivitis studies when compared to a younger population.

Systemic diseases, conditions and medications in the elderly and implications for periodontal diseases. When considering that the prevalence of chronic conditions and diseases in the elderly are higher and that most of these conditions and diseases require treatment by medication, it is understandable that many of these conditions are associated with a higher prevalence and severity of periodontal diseases in this population. While a complete discussion of these associations would be beyond the scope of this review, several examples can be discussed to demonstrate the full range of these associations.

For example, with increasing age, the prevalence of type II diabetes increases. It is now well-established that less than optimal glycemic control with these patients is associated with a higher incidence and prevalence of periodontal disease. Hormonal changes in elderly, postmenopausal women increase the incidence of osteoporosis, which has also been observed in the alveolar supporting bone. It is associated with an increased loss of alveolar bone support while other studies found no such association in this population. Medications taken for a variety of chronic conditions and diseases are associated with reduced salivary flow and increased susceptibility to plaque accumulation. Older patients may also exhibit the accumulative effects of stress, which are associated with an increased loss of alveolar bone support and reduced immune function. In addition, the increased prevalence of depression in the elderly may be associated with both reduced immune function and poorer plaque control.

Motor function, dementia and periodontal disease. With the increase of the proportion of very elderly in the general population, the prevalence of impaired mental and motor functions can lead to both impaired physical and mental abilities to practice effective plaque control measures. In addition to these objective declines in motor and cognitive abilities in some elderly, the more subjective “self-efficacy” of the individual aging patient should be taken into consideration. Self-efficacy is defined as the self-perception of the individual patient to control and modify his or her respective behaviors to treat and prevent his or her respective conditions and diseases. For periodontal diseases, these include following plaque control regimens, seeking dental care on a regular basis and following through on proposed treatments from the dental practitioner.

Several considerations should be kept in mind when considering changes in prevention and therapy of periodontal diseases for the elderly. Perhaps the most important of these is that the chronological age of the elderly patient may not reflect the actual overall physical health, cognitive function and motor functions of that particular patient. Some clinical thought leaders have proposed a multiple-tiered system of the elderly patient, such as young-old aged, middle-old aged and old-old aged patient, based on specific age brackets and/or specific quality of life and quality of function measures. It is important to keep in mind from the previous discussion of other factors associated with aging, particularly medical and pharmacological considerations, that these should be addressed in any periodontal treatment plan for the elderly patient.

Among these considerations are maintaining adequate dietary and nutrient intake to prevent premature loss of alveolar bone density and support through recommended dietary intake of calcium or calcium supplements and vitamin D. In addition, for postmenopausal women, there is sufficient evidence that an estrogen supplement has beneficial preventive effects for alveolar bone loss. However, because of the risk of reported adverse
side effects and events for estrogen, estrogen supplementation should be determined for such patients at risk by their physicians. In addition, chronic medical conditions that increase in prevalence with aging and are associated with increased periodontal disease and loss of support should also be controlled in collaboration with the elderly patient’s physician. When considering the strong association of poor glycemic control with type II diabetes with periodontal disease, appropriate measures should be taken to assure this condition is under control.

As the prevalence of one or more chronic conditions requiring medication becomes increasingly common in this population, the dental practitioner should be aware of potential adverse effects some of these medications have on the oral cavity in general and the periodontal tissues in particular. These include the range of medications that result in a reduced salivary flow, which would make the patient more susceptible to both periodontal diseases, and coupled with the increased prevalence of gingival recession, root caries. High-fluoride rinses, dentifrices and topical application of fluorides may have beneficial preventive effects for both root caries and periodontal diseases. If the patient is taking a medication such as some classes of calcium channel blockers that are associated with the gingival enlargement, the dentist should also consult with the physician to explore alternative medications with the same systemic beneficial effect but with less adverse effects on the periodontal tissues.

A second major consideration for treatment decisions for the elderly patient is the actual treatment approach itself. Several practitioners have proposed the concept that the principal goal of periodontal therapy in the elderly patient should focus on maintaining a functional dentition as opposed to restoring all teeth to full periodontal health. This treatment philosophy implies that given a young and an old periodontal patient with the same clinical levels of loss of periodontal support, the treatment approach of frequent debridement and frequent maintenance would be the preferred approach for the elderly patient as opposed to debridement followed by some form of periodontal surgery for the younger patient. However, this philosophy should be tempered by the fact that a healthy elderly patient may have several more decades of a high quality of life. Furthermore, consensus opinion from studies comparing the healing response to periodontal surgical procedures between older and younger patients is that the healing responses are comparable. Therefore age itself should not be a contraindication for performing surgery, placement of implants, etc.

Nevertheless, medications, oral habits, systemic factors associated with the incidence and severity of periodontal disease in general, and the ability of the patient to perform regular and effective mechanical plaque control regimens still need to be taken into consideration for treatment decisions. These include the elderly patient’s motor ability to maintain such a plaque control regimen.

It is widely accepted that the success of any form of nonsurgical and surgical treatment is primarily dependent on a patient’s plaque control regimen. Use of antimicrobial rinses with demonstrated antiplaque and antigingivitis activity can be valuable adjuncts for elderly patients, particularly those with reduced motor and/or cognitive function.

Another major consideration for the decision to perform periodontal surgery on an elderly patient is whether that patient is currently taking or has taken some form of bisphosphonates to protect against fractures associated with loss of bone mineral density. Such patients may be at risk for postoperative osteonecrosis of the jaw. As most periodontal surgical procedures are elective, special considerations and precautions should be taken in consultation with the patients’ physicians for those patients on intravenous bisphosphonates or for those patients who are currently taking or have taken bisphosphonates intravenously, have taken oral bisphosphonates over a three year period or longer, have a history of diabetes or an immunosuppressive condition or who are taking or have taken corticosteroids or other immunosuppressive medications.

In conclusion, the diagnosis, treatment planning and treatment decision for the elderly patient should take into consideration the known risk factors for periodontal disease that are prevalent with higher frequency in the elderly patient. At present, the prevailing view is that age itself in a medically healthy and functional elderly patient may be of minimal significance in the treatment of periodontal diseases. While the American Academy of Periodontology (AAP) has published statements and/or position papers on periodontal considerations in the child and adolescent population, no similar
resources are currently available from the AAP for periodontal treatment considerations for the elderly. Nevertheless, for the individual elderly patient, the dental practitioner should understand and assess the role of other age-related conditions such as systemic diseases, concomitant medications and reduced motor and/or cognitive function as well as the overall goals or therapy for that individual patient. Such an understanding of these treatment considerations for the elderly patient will help that patient maintain a functioning dentition for a higher quality of life.

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Driven by unsustainable costs and unsatisfactory health outcomes, the three goals for health reform, often called the “triple aim,” are to:

- Improve the experience of care.
- Improve the health of populations.
- Reduce per capita costs of health care.¹

Achieving the triple aim for oral health depends on providing both appropriate dental care and effectively influencing the key factors that produce and maintain health over the lifespan. These factors include common medical conditions, health literacy of older adults and their caregivers and the effectiveness of daily mouth care routines. While children and pregnant women have long been the primary beneficiaries of most publicly funded dental programs, and the value of a healthy start for children is indisputable, there are multiple reasons that a limited focus on pediatric benefits is ultimately costly.

¹ The July and August issues of the Journal highlight the multiple challenges we face as a society and as dental professionals to care for our aging patients, parents and grandparents. Apple Tree Dental’s community collaborative practice model illustrates a sustainable, patient-centered approach to overcoming barriers to care across the lifespan.

Apple Tree Dental: An Innovative Oral Health Solution

Deborah Jacobi, RDH, MA, and Michael J. Helgeson, DDS

ABSTRACT The Surgeon General’s Report on Oral Health called attention to the “silent epidemic” of dental disease. Older adults and other vulnerable people continue to suffer disproportionately from dental disease and inadequate access to care. As a society and as dental professionals, we face multiple challenges to care for our aging patients, parents and grandparents. Apple Tree Dental’s community collaborative practice model illustrates a sustainable, patient-centered approach to overcoming barriers to care across the lifespan.

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Multiple national organizations and initiatives have highlighted oral health as essential to overall health and called for the development of safe, effective, accessible and affordable systems of care (TABLE).
As baby boomers reach the age of 65, there are many more elders who have kept more of their natural teeth and have much higher expectations regarding dental care in their old age than did previous generations. Older adults, particularly those who live in long-term care settings, suffer disproportionately from active and untreated mouth infections, aging and ill-fitting dentures, and impairments in salivation and masticatory functions. Many are more dependent upon others for help with daily mouth care than children are. They are also more likely to have chronic conditions, such as diabetes and heart disease, which are negatively affected by mouth diseases. Aspiration pneumonia, a leading cause of hospitalization and death in elders, has been directly linked with bacteria from the mouth. For multiple reasons, institutionalized and community dwelling elders are often unable to access traditional dental offices and clinics to the same degree as younger and much healthier population groups. Such access disparities, in combination with the significant health and financial consequences of untreated mouth diseases in vulnerable adults, have come to the attention of policymakers and funders and resulted in calls for sustainable oral health care delivery models that meet the needs of underserved populations, including the rapidly growing population of older adults and people with disabilities. The following describes the development and impact of a successful, replicable approach.

What Is Apple Tree Dental?

Apple Tree is a nonprofit group dental practice founded in 1985 to address the unmet dental needs of individuals living in Minnesota. The mission of Apple Tree is to improve the oral health of
all people, including those with special dental access needs who face barriers to care. Apple Tree’s staff works to achieve its mission by delivering education, prevention and restorative dental services to vulnerable populations and by providing leadership and innovation to transform the health care system.

Inspired by the Mayo Clinic’s nonprofit group medical practice model, Apple Tree’s interdisciplinary group dental practice includes clinical and support staff working together on the patient’s behalf. These teams collaborate with teachers, nurses, physicians, family members and other caregivers to restore and maintain patients’ oral health and to share their interprofessional knowledge and experience.

A volunteer board of directors is responsible for strategic planning to meet Apple Tree’s mission, contributing expertise in health care administration and research, dentistry, public policy, nonprofit governance, early childhood development and epidemiology. Apple Tree’s executive and administrative staff has expertise in program planning, management and evaluation, fundraising, finance and administration, implementing internal and external education programs, and promoting policy development and dental access legislation. Staff work collaboratively within Apple Tree and create strong, long-lasting community partnerships to achieve a common goal of strengthening and creating healthy communities.

Originally focused on nursing facility residents, Apple Tree’s programs have expanded to reach other underserved populations in response to requests from local community leaders. In addition to establishing its own regional programs in Minnesota, Apple Tree has assisted local leaders in Louisiana and North Carolina to replicate aspects of its model.5

Apple Tree currently has more than 200 paid employees who serve low-income children and families in rural and urban areas, veterans, adults with disabilities, minorities and new immigrants, mental health patients and elders living in nursing and long-term care facilities. Apple Tree provides dental care at regional Centers for Dental Health (Centers) in Mounds View, Coon Rapids, Hawley, Madelia, Fergus Falls and Rochester, Minn., and recently opened a Center for Dental Health in San Mateo, Calif. (FIGURE 1).

Apple Tree also delivers on-site dental services year-round at more than 130 community oral health care sites including Head Start centers, schools, nursing facilities and other long-term care settings. With seamless integration between care provided at the Centers and on-site locations, Apple Tree provides a comprehensive range of oral health care services including diagnostic consultations, preventive, educational and restorative services. Advanced services provided include periodontics, endodontics, prosthodontics and oral surgery. In 2014, Apple Tree provided nearly 80,000 dental visits and screenings for 28,400 patients (FIGURE 2). The value of dental services delivered in 2014 exceeded $22 million (FIGURE 3).
Partnerships, Policy and Advocacy

Partnership is a hallmark of Apple Tree’s approach to care delivery and policy development. Successful collaborations with long-term care facilities helped identify a solution for long-standing barriers to dental care. For young children, a partnership with the Minnesota Dental Association, Minnesota Dental Hygienists’ Association and the Minnesota Head Start Association expanded the use of collaborative practice and improved access to care for Head Start preschoolers statewide. This effort helped federal officials recognize the need for new staffing and care delivery models and allowed local private dentists and hygienists to establish collaborative practices to serve local Head Start programs. This effort increased the percentage of Head Start children obtaining examinations statewide from less than 70 percent to nearly 90 percent.

Apple Tree is actively involved in policy development at the state and national levels including:

- California Dental Association’s Phased Strategies for Reducing the Barriers to Dental Care in California Access Report — citing Apple Tree Dental as a potential solution.
- Minnesota Dental Association — supporting legislation to improve public program reimbursement and workforce innovations.
- Minnesota Oral Health Coalition — raising awareness about the importance of oral health.
- American Dental Association’s National Elder Care Advisory Committee — advancing dental care delivery, education and research to improve the oral health of older adults.
- Administration for Community Living (formerly the U.S. Administration on Aging) Oral Health for Older Adults Subject Matter Expert Group — developing best practice models.
- Special Care Dentistry Association — advocating for dental care for people with disabilities, older adults and people requiring hospital-based dental care.
- Apple Tree has been recognized as a leading model by the American and California Dental Associations, in the Surgeon General’s Call to Action and by national foundations including the Robert Wood Johnson and Kellogg Foundations.

Education and Research

Michael Helgeson, DDS, the CEO and co-founder, has lectured widely on geriatric and special needs dentistry as well as on the Apple Tree model. With support from multiple Minnesota Department of Health Clinical Dental Education Innovation grants, Apple Tree has offered new learning experiences in partnership with the University of Minnesota School of Dentistry, Minnesota State Colleges and Universities and other dental education programs. Dental, dental therapy, dental hygiene, dental assisting and nursing students have experienced interprofessional care for elders and children, oral health screening and assessment, safe patient handling, dental laboratory procedures and the use of telehealth technologies.

From its inception in 1985, Apple Tree has been recording diagnostic codes along with billing information in its custom information systems. The result is an unprecedented longitudinal database, which has been used by researchers to understand the impact of prevention and treatment on oral health outcomes for institutionalized elders.

How Does Apple Tree Deliver Care?

Although often referred to as a “safety net” provider, Apple Tree is not content to catch people who have already fallen into a dental access chasm. Instead, Apple Tree utilizes a proactive, prevention-oriented, patient-centered practice approach, called community collaborative practice, to deliver dental care and education. Apple Tree’s delivery system goal is to reach at-risk individuals when they are healthy and to provide education, prevention and restorative care to keep them healthy. Apple Tree’s philosophy is to practice dentistry as an integrated team of professionals focused on meeting the needs of children, adults and elders across the lifespan.

Apple Tree employs unique workforce teams that include dentists, oral surgeons, nurse anesthetists, advanced dental therapists, dental hygienists, dental assistants, community care coordinators and lab technicians. Through collaborative practice, dental hygienists are able to serve as front line clinicians in community settings as described below.
Delivering On-Site Care

Apple Tree’s on-site services can be delivered at a wide variety of community sites within a 60-minute travel time radius of each Center for Dental Health (FIGURES 4 and 5).

Community partnerships allow Apple Tree to co-locate on-site dental services within long-term care facilities and other settings where people live, learn and receive other health and social services. Sometimes described as a “hub and spoke” delivery system, the model creates an accessible care network linked via a fully certified electronic health record (EHR) and allows multiple points of accessible care for patients and communities.

Apple Tree uses both lightweight portable equipment and heavier custom mobile units to provide on-site care in shared spaces within long-term care facilities and other community settings. Portable dental units are transported in a car or minivan and used by dental hygienists to provide preventive services. For restorative and surgical services, specially designed trucks can transport multiple complete Mobile Dental Offices. In a carefully planned route, staff truck drivers pick up and drop off one or more complete Mobile Dental Offices at each scheduled location in the afternoon and evening, outside of normal business hours. On-site dental care teams provide dental care at each location for one or more days according to the number of patients due to be seen.

The Apple Tree Mobile Dental Office is nearly identical ergonomically and functionally to the equipment in Apple Tree’s Centers. One difference is that the dental chair and other units are on wheels so they can be spread out, making it easier to safely transfer patients to and from wheelchairs. Dental treatment may also be provided at a Center, where operatories are designed to accommodate wheelchairs, have specialized lifts to transfer patients into the dental chair and are equipped for sedation if required for a successful visit (FIGURES 6A–6C).

Long-term care residents in facilities served by Apple Tree enter the dental care system through a program established for all residents and managed by a dental director. Similar to a nursing facility’s medical director, Apple Tree takes on the role of dental director, working closely with nursing facility staff to establish programs and processes that help ensure that every residents’ oral health needs are met. The Minimum Data Set (MDS) is a standardized health assessment instrument used to assess the overall health of older adults admitted to nursing facilities. Research has documented that oral health conditions are typically underreported when the MDS is completed by nurses or aides, that the majority of dependent residents are resistant to daily oral care and also suggests that most receive inadequate oral health care. To provide accurate oral health assessments, Apple Tree’s on-site dental hygienist becomes part of the nursing facility’s assessment team and is responsible for completing the oral health portions of the MDS. In addition, the hygienist develops a personalized daily mouth care plan for each new resident, coaches facility caregivers on how to care for residents’ teeth and dentures, triages residents needing follow-up care and provides periodic in-service education for the facility’s staff.

For nursing facility residents choosing Apple Tree as their dental provider, community care coordinators on staff at Apple Tree take all necessary steps to obtain consent for treatment from the responsible party, facilitate and document needed medical-dental consultations and schedule on-site dental appointments for treatment. On-site dental treatment is scheduled on a regular basis throughout the year by a consistent team ensuring timely care and strong patient-provider relationships. When residents have extensive disease or special needs, they may also be scheduled at a nearby Apple Tree center, where care can be seamlessly provided using the same EHR.

A Sustainable Solution

High levels of uncompensated care associated with Medicaid and uninsured populations make it difficult or impossible for most private practices to accept significant numbers of public program and low-income patients. In order to
serve these populations, Apple Tree has developed multiple funding streams to support a sustainable business model. Earned revenue, including insured and full-pay patients, is supplemented with federal, state and local foundation grants, corporate support and individual gifts (FIGURES 7A and 7B).

Apple Tree’s nonprofit status and delivery model keep costs low and allow fundraising efforts to help fill the uncompensated care gap. Innovative collaborative practices allow services to be provided in shared spaces, with shared staffing leveraging community resources and eliminating transportation barriers (FIGURE 8).

According to the Institute of Medicine’s 2011 report, “Improving Access to Oral Health for Vulnerable Populations,”10 to be successful, an evidence-based oral health system will:
- Eliminate barriers that contribute to oral health disparities.
- Prioritize disease prevention and health promotion.
- Provide oral health services in a variety of settings.
- Rely on a diverse and expanded array of providers who are competent, compensated and authorized to provide evidence-based care.
- Include collaborative and multidisciplinary teams working across the health care system.
- Foster continuous improvement and innovation.

All these markers of success are evident in Apple Tree’s founding mission and the evolution of its model. With a culture of patient-centered innovation, Apple Tree has continually incorporated new providers, new technologies and evidence-based services into its practice. The provision of on-site care by interdisciplinary teams eliminates transportation barriers and helps integrate oral health with other health care services.

REFERENCES

THE CORRESPONDING AUTHOR, Deborah Jacobi, RDH, MA, can be reached at djacobi@appletreedental.org.
# National Resources for the Oral Health of Older Adults

Compiled by Susan Hyde, DDS, MPH, PhD, FACD

<table>
<thead>
<tr>
<th>Resource</th>
<th>Link</th>
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<tbody>
<tr>
<td><strong>FOR CLINICIANS</strong></td>
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<tr>
<td>Geriatric Oral Health</td>
<td><a href="http://geriatricoralhealth.org/topics/default.aspx">geriatricoralhealth.org/topics/default.aspx</a></td>
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<tr>
<td>Nursing Home Oral Health</td>
<td><a href="http://www.uky.edu/NursingHomeOralHealth">www.uky.edu/NursingHomeOralHealth</a></td>
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<tr>
<td>Oral Care in Continuing Care Settings</td>
<td><a href="http://ahprc.dal.ca/projects/oral-care/default.asp">ahprc.dal.ca/projects/oral-care/default.asp</a></td>
</tr>
<tr>
<td>American Geriatrics Society Beers Criteria</td>
<td><a href="http://healthinaging.org/medications-older-adults">healthinaging.org/medications-older-adults</a></td>
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<tr>
<td><strong>FOR EDUCATORS</strong></td>
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<tr>
<td>Association for Prevention Teaching and Research</td>
<td><a href="http://aptrweb.org/?PHLM_15">aptrweb.org/?PHLM_15</a></td>
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<tr>
<td>Portal of Geriatrics Online Education</td>
<td><a href="http://pogoe.org">pogoe.org</a></td>
</tr>
<tr>
<td><strong>FOR PATIENTS</strong></td>
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<tr>
<td>Patient Education for the Older Adult</td>
<td><a href="http://toothwisdom.org/resources/category/importance-of-oral-health">toothwisdom.org/resources/category/importance-of-oral-health</a></td>
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**Note:** The links provided are for informational purposes and may change over time.
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<tbody>
<tr>
<td>LOS ANGELES COUNTY</td>
<td><strong>CANOGA PARK (GP)</strong> - Price Reduced!!</td>
<td>Seller is currently working 1 day/wk with ½ day of hygiene. 2 equipped operatories. Property ID #4357.</td>
</tr>
<tr>
<td></td>
<td><strong>LOS ANGELES</strong> - This practice with over 30 Years of goodwill, and approximately 60% of it’s income comes from capitulation. Property ID #5012.</td>
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<tr>
<td></td>
<td><strong>LOS ANGELES (GP)</strong> - 3 equipped operatories with digital x-rays in a 1,000 sq ft. Office. The reception area was recently remodeled. Grossed approximately $277,130 in 2014. Property ID #5040.</td>
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<tr>
<td></td>
<td><strong>MISSION HILLS</strong> - Leasehold Improvements &amp; Equipment Only!! 8 equipped Property ID #5014.</td>
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<tr>
<td></td>
<td><strong>MONTEREY PARK</strong> - Leasehold Improvements &amp; Equipment Only!! 3 equipped operatories. Property ID #4449.</td>
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<tr>
<td></td>
<td><strong>RESEDA</strong> - 3 equipped operatories (stand up dentistry). Projecting approximately $292,796 for 2014 with monthly revenues of $24K. Property ID#5017.</td>
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</tr>
<tr>
<td></td>
<td><strong>SANTA CLARITA (GP)</strong> - This turn-key practice Reestablished the practice in September 2013. Great opportunity for a 1st time buyer. Property ID #5013.</td>
<td></td>
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<tr>
<td></td>
<td><strong>TORRANCE</strong> - 3 equipped operatories, Grosse $321,051 in 2013. Practice is averaging $28K in monthly revenue. Property ID #4477.</td>
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<td></td>
<td><strong>VENTURA, SANTA BARBARA &amp; KINGS COUNTY</strong> - Approx. 8-10 pa.</td>
<td>Approx. 8-10 pa. Currently working 1 day/wk with ½ day of hygiene. 2 equipped operatories. Grossed $918K in 2013. Projecting approx. $948K for 2014. Buyer’s net of $398K. Property ID #4357.</td>
</tr>
<tr>
<td></td>
<td><strong>VENTURA (GP)</strong> - 4 fully equipped operatories in a 1,862 (+ free bonus room) sq ft. Each operator has floor to ceiling windows for plenty of natural light. Grossed approximately $423K in 2014. Property ID #5039.</td>
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<td></td>
<td><strong>SAN LUIS OBISPO COUNTY</strong> - 6 equipped ops. Has monthly revenues of $90K. Property ID #5037.</td>
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<td><strong>EL CENTRO (GP)</strong> - 3 equipped operatories in an approximately 4,464 office. Grossed $1,700,000 in 2013 and projecting approximately $1,900,000 for 2014 with monthly revenues of $165,000. Property ID #4231.</td>
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<tr>
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<td><strong>SAN DIEGO COUNTY</strong> - Multi-Specialty practice. 7 equipped operatories in an approximately 4,464 office. Grossed $1,700,000 in 2013 and projecting approximately $1,900,000 for 2014 with monthly revenues of $165,000. Property ID #4231.</td>
<td></td>
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**Contact Us for a Free Consultation**

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WWW.CALPRACTICESALES.COM

CA DRE #00491323
Embezzlement is typically defined as the theft of money or property by a person trusted with those assets. It usually occurs in employment settings, and small businesses suffer more losses from fraud than larger organizations, according to the Association of Certified Fraud Examiners.

Analysts with The Dentists Insurance Company say dentists may inadvertently put their practices at risk for fraud by trusting a single employee with sole financial responsibility or by not reviewing accounts payable and receivable. However, this vulnerability can be reduced through awareness of “red flag” behaviors and a few key accounting protections.

Fraudulent activity can happen in a number of ways, and TDIC case studies show instances of employees deleting appointment and ledger entries, endorsing patient checks to personal accounts, forging payroll checks, modifying payroll, misappropriating a credit card and using a signature stamp without authorization.

Jennifer Duggan, a Northern California attorney specializing in business and employment law, says there are also more sophisticated schemes in which employees fabricate fictitious vendors, create nonexistent employees, receive kickbacks from patients or from vendors for awarding company contracts or actually coerce subordinate employees to carry out theft.

“The prototypical thief is a long-time employee who is extremely familiar with the financial aspects of your business. He or she interacts with clients and vendors, and may handle or process accounts receivable, accounts payable or banking functions for the practice,” she said. The employee is viewed within the practice as a loyal, trusted, giving individual and would be last on a list of people you might suspect.

The employee is viewed within the practice as a loyal, trusted, giving individual and would be last on a list of people you might suspect.

You are not a policy number.

And at The Dentists Insurance Company, we won’t treat you like one because we are not like other insurance companies. We were started by, and only protect, dentists. A singular focus that leads to an unparalleled knowledge of your profession and how to best protect you. It also means that TDIC is in your corner, because with us, you’re never a policy number. You are a dentist.

Contact the Risk Management Advice Line at 800.733.0634.
This creates a delicate situation for practice owners, but experts say basic awareness of red-flag behavior keeps employers from having to be unnecessarily suspicious. Red flags include an “ever-present” employee who comes in early or stays to close up after everyone else has gone home or someone who regularly refuses to take a vacation. Illicit activity may surface if the employee is required to be away from work for a week or two and is not able to cover up the trail of fraud. Other things to be aware of are financially frustrated employees who are always short on cash or territorial employees who refuse to cross-train coworkers. Analysts say one red flag is not typically cause for alarm, but a combination of these behaviors warrants concern.

TDIC analysts say practice owners lose more than money when fraud shatters the “family feeling” and trust in the office. “When an employee steals from the practice owner, the owner feels betrayed and can have a hard time recovering from that,” notes a senior analyst.

By implementing accounting controls, small business owners can significantly reduce the chances of becoming a victim of employee theft, Duggan says.

“Simply reviewing your bookkeeping structure and implementing accounting measures will greatly reduce the probabilities of falling victim to employee theft,” she said. “Instituting controls also communicates to employees that you are paying attention and discourages even the thought of stealing.”

Accounting controls for dental practice owners include:

- Avoiding single-person control of all of the practice’s financial dealings. Separating tasks, such as opening incoming mail and data entry for deposit and receivable information, minimizes the possibility of an employee manipulating account information.
- Separating job functions of reviewing monthly bank statements and preparing monthly bank reconciliations. If you have multiple authorized signers, separating the job functions of preparing the checks and signing the checks reduces risk. If you use online banking, separating the job functions of entering payments and reconciling monthly activity is key.
- Requesting that the bank mail statements to your home or personal email address and reviewing statements regularly for unusual accounts payable names or other inconsistencies.
- Securing company checks in a location accessible only to authorized employees.
- Requiring supporting documentation (a vendor invoice or credit card statement, for example) for every check you sign and reviewing supporting documentation to ensure the expenditure is justified.

CONTINUES ON 464
QUESTIONS MOST OFTENASKED BY SELLERS:

1. Can I get all cash for the sale of my practice?
2. If I decide to assist the Buyer with financing, how can I be guaranteed payment of the balance of the sales price?
3. Can I sell my practice and continue to work on a part time basis?
4. How can I most successfully transfer my patients to the new dentist?
5. What if I have some reservation about a prospective Buyer of my practice?
6. How can I be certain my Broker will demonstrate absolute discretion in handling the transaction in all aspects, including dealing with personnel and patients?
7. What are the tax and legal ramifications when a dental practice is sold?

QUESTIONS MOST OFTENASKED BY BUYERS:

1. Can I afford to buy a dental practice?
2. Can I afford not to buy a dental practice?
3. What are ALL of the benefits of owning a practice?
4. What kinds of assets will help me qualify for financing the purchase of a practice?
5. Is it possible to purchase a practice without a personal cash investment?
6. What kinds of things should a Buyer consider when evaluating a practice?
7. What are the tax consequences for the Buyer when purchasing a practice?

Lee Skarin & Associates have been successfully assisting Sellers and Buyers of Dental Practices for nearly 30 years in providing the answers to these and other questions that have been of concern to Dentists.

Call at anytime for a no obligation response to any or all of your questions
Visit our website for current listings: www.LeeSkarinandAssociates.com
Running an accounts payable history to review invoice numbers and amounts.

Providing specific instructions or guidelines to your bank including a list of your approved vendors and authorized signers.

Watching for an increase in patient refunds, adjustments or bad-debt write-offs. An unusual number of accounts turned over to a collection agency and a decline in the gross income or profitability of the practice is suspicious. Discrepancies between accounts receivable records and patient statements should also be suspect.

Noticing any increase in patient complaints regarding their accounts, which could indicate fraudulent activity or a need to develop a policy clarifying account procedures with patients and staff. Reviewing and responding to patients’ concerns personally is recommended.

If you discover facts indicating that you are the victim of employee fraud, call TDIC immediately. Trained analysts will discuss the situation with you, including documentation of the fraud. Practice owners with evidence of fraud should also be prepared to call the police. TDIC offers identity theft recovery for the individual dentist under its Professional Liability policy. The business owners’ property policy covers employee dishonesty. In order for coverage to be effective, practice owners must file a police report and submit it to the claims department.

Contact TDIC’s Risk Management Advice Line at 800.733.0634.
6090 SANTA ROSA  Entry level opportunity includes 1,200 sq. ft. condo. On relaxed schedule, PPO practice collected $274,000 in 2014 with Profits of $154,000 with no rent expense. Near Memorial Hospital.

6089 MOUNT SHASTA  Small town living renowned for mountain recreation, lakes & streams, fishing, golfing and abundant culture. Perfect escape from the Rat Race and corporate intrusion. On 3-day week, revenues topped $800,000 in 2014.

6088 SANTA CRUZ  Well established, lots of patients. Strong Hygiene Department with 6.5 days of hygiene per week. Collected $600,000 in 2014. 2015 trending $675,000+. Full Price $375,000.

6087 LAKE TAHOE - NEVADA'S STATELINE  Located adjacent to California's South Lake Tahoe. “Out-of-Network” practice. Collections last year topped $600,000 with Available Profits of $220,000. 3.5 days of hygiene per week. Escape California income taxes!

6085 PERIO PRACTICE – SAN FRANCISCO BAY AREA  2014 grossed $2 Million. 7 Doctor days per week. Seller can work back. Beautiful 8-Op office. Strong foundation anchored by 4-days of Hygiene. Endo and Os referred. Digital, paperless and well equipped. Beautiful A Class building.

6079 BERKELEY'S ALTA BATES MEDICAL VILLAGE – “SOLD”  Strong performer on Owner’s 24 hour location. 2014 collected $687,000. Available Profits of $305,000. 2-days of Hygiene. 5-ops in 1,700 sq.ft. Extend hours and revenues shall increase.

6078 SANTA CLARA  El Camino Real location. 2014 collected $8,000. Available Profits of $305,000. 2-days of Hygiene. 5-ops in 1,700 sq.ft. Extend hours and revenues shall increase.

6075 MONTEREY BAY AREA – “SOLD”  Digital, paperless and well positioned for future. 2014 collected $1.47 Million with Profits of $690,000. 7+ days of Hygiene. First Quarter of 2015 collected $449,000. Extremely unique opportunity.

6074 MOUNT VERNON  Strength is 4-day Hygiene schedule. Retiring DDS focuses on restorative. Endo, Os, Perio & Pedo referred. 2014 collected $450,000. Beautiful 4-Op office. Full Price $150,000.


ANAHEIM HILLS  Group member wanted. Hi identity. GP has space to share with Specialist. Pedo, Ortho or ?

ARROWHEAD  Great mountain practice. Hi identity location. Conservative part-time owner with Associate grosses $425,000. 3,000 patients. 4-ops. Digital x-rays. Practice $350K and RE $250K.

BAKERSFIELD AREA  Small town. 4-op practice with building. Full Price $350,000 includes real estate. Renovations make property look new.

BAKERSFIELD  Lady DDS grosses $800,000. Low overhead. Full Price $550,000.

CLAREMONT-UPLAND  Gross $500,000+. Refers $250,000 in Ortho, OS, Endo. Hi identity. Seller can work back if acquired by Specialist.

DENTAL LOCATIONS  Bell and Bell Gardens.

DENTURE PRACTICE  Sees 30 denture patients per day. Perfect for Prosthodontist.

DIAMOND BAR  Part-time practice. Grosses $400,000. Great opportunity. Full Price $360,000.

HAWTHORNE  Located in strip center at busy intersection. 6-ops, 2 equipped in 1,600 sq.ft. suite. Full Price $95,000.

IRVINE  Part-time practice is grossing $400,000. Beautiful office. Full Price $360,000.

LAKE FOREST  7 ops across street from major employer in Orange County.

LOS ANGELES  HMO practice doing $4.15 Million. $33,000 per month in cap checks. Includes real property.

MISSION HILLS  Grossed $350,000, nets 50%. Senior DDS wants to work-back 2.5 days. Seller will finance.

REDLANDS  Full Price $35,000. 25-year phone number and fictitious name. Great rehab opportunity which will grow with TLC.

REDLANDS  Low overhead. 5- Ops. Should do $300-to-$400K first year with little marketing. Great Lease at $1.00 sq. ft. FP $250,000.

RIALTO  Dental building on 2.3 acres. Land shall soon have $8,000 per month in rental income.

RIVERSIDE  Walmart Location.

SAN DIMAS HMO  $8,000 month in cap checks. Hi Identity shopping center. Refers a lot. Specialist OK.

TORRANCE  Grosses $300,000 with older DDS. 3-ops plumbed, 2 equipped. Beautiful A Class building. Full Price $250,000.

TUSTIN  Free standing dental building with 5 ops. Full Price $1.4 Million.

TUSTIN  Best Location in city Hi identity corner. Double your volume.

VICTORVILLE  “Coming Up”

WEST LOS ANGELES  Grosses $1.2 Million. Seeks Korean Lady DDS for specialty team. Plan to grow to $2 Million per year. Quality office. Full Price for 1/3 of goodwill $350,000.

YUCCA VALLEY  Hi identity location. Small office. Used to do $500,000. Needs TLC. Full Price $150,000 includes building.
NORTHERN CALIFORNIA:

NORTHERN CALIFORNIA:


SANTA CRUZ COUNTY: General Dentistry. 3 Ops, 1,100 sq. ft., Schick Digital. Dentrix. GR $33K #CA550

SANTA ROSA: General Dentistry & Building. 3 Ops. 2013 GR $542K w/Adj. Net $182K #CA200

WALNUT CREEK: PRICED REduced! Prosthodontics Practice. 6 Ops. 2013 GR $141K #CA540

CENTRAL CALIFORNIA:

CENTRAL COAST: 6 Ops, 8 days of hygiene/wk. 2013 GR of $2.3M and $804K in adj. net. Dentrix, Digital, Paperless. #CA208

FRESNO: General Dentistry Partnership. 2013 Partnership GR $4.7M. Selling Partner #CA196

FRESNO: 5 Ops. 4 add'd 1,400 sq. ft. w/Pano. 3 yr. GR averaging $450K. Priced to sell. #CA243

KINGS COUNTY: NEW LISTING! 4 Ops, Pano, established for 50+ years. GR of $346K in 2014. #CA265

PORTERVILLE: General Dentistry, 6 Ops. 2014 GR $555K, 7 yr. old equipment, retail center. #CA223

NORTHERN CALIFORNIA:

ANAHEIM: General Practice & Bldg. 6 Ops, 3 Equipped, 3 Plumb. Near Disneyland. Est. 39 years. #CA186


BAKERSFIELD: General Practice. 4 Ops, 20+ Years. 2013 GR $521K. #CA193

BALDWIN PARK: General Practice. 5 Ops. Equipped 2014 GR $276K. #CA176

BANNING: General Practice. 6 Ops. Paperless, Digital, EasySoft. 8 Days Hyg/ Week. 2014 GR $1.4M+. #CA183

BEVERLY HILLS: Small boutique practice. 2 Ops, 1 Equipped. 2014 Digital, Digital Pano. 2014 GR $120K on 3 days/wk. #CA215


CYPRESS: NEW LISTING! General Practice, 5 Ops, 3 years of Goodwill. 7 days Hygiene per week, most spec. work referred. $948K GR. #CA257

GREATER LOS ANGELES: Perio Practice: 5 Ops. 3 years of Goodwill. Dentrix, Digital, Laser, general referral base. #CA173

HUNTINGTON BEACH: NEW LISTING! 5 Ops, 28 years of Goodwill, Digital. GR of $1.1M+. #CA255

LOS ANGELES: General Dentistry, 6 Ops, 5 Equipped, Est. 50+ years, SoftDent, Digital. 2014 GR $591K. #CA255

LOS ANGELES: NEW LISTING! Endo Practice, 4 Ops, Cone Beam, 2014 GR of $360K on 21 hours/week. #CA249

N. ORANGE COUNTY: General Practice. 7 Ops, 6 Equipped, EasySoft, Digital, Seller works 2½ days/wk. 2014 GR of $542K. #CA248

N. ORANGE COUNTY: General Practice. 4 Ops, Beautiful design, great location near freeway & shopping #CA343 IN ESCROW!

ORANGE COUNTY: NEW LISTING! Perio Practice, Easy freeway access. 30 years of Goodwill. 6 Ops, 5 Equipped. 2014 GR of $468K. #CA264


PALM DESERT: NEW LISTING! General Practice, 5 Ops. Est. for 32 years, 6 days of hygiene/wk/ GR of $824K and $539K adj. net. #CA245

PICO RIVERA: NEW LISTING! General Dental, 6 Ops, Est. in 1960. DentistSoft, Pano, 4½ days of hygiene per week. 2014 GR of $690K. #CA258

S. ORANGE COUNTY: Pedo Practice with 4 Ops, 1 year new equipment, digital, Pano/ $236K GR with room to grow. #CA222

SOUTH BAY, LOS ANGELES: General Dentistry. 4 Ops, Dentrix, Dexcel, Pano, mostly Fri. $335K GR with room to grow. #CA218

SOUTH PASADENA: NEW LISTING! General Practice, 4 Ops, 3 Equipped, paperless, digital, est. 37 years. GR $276K with $217K adj. net. #CA244

TorrANCE: General Dentistry. 3 Ops, 2 Equipped. Est 19+ years. 2013 GR of $320K adj. net. #CA253

UPLAND: NEW LISTING! General Practice. 4 Ops, Equipped. 25+ years of Goodwill. 2014 GR of $221K with room to grow. #CA219

VICTORIA: General Practice. 3 Ops, 3 Plumb. 2,150 sq. ft. Est. 34 years. SoftDent 2014 GR $273K. #CA149

WEST COVINA: General Practice with 4 Ops in a retail center location. Dentrix, Digital, 35 yrs. of Goodwill. 2014 GR of $402K. #CA233

WEST LOS ANGELES: General Practice, 4 Ops, newly built-out suite, desirable high vtr. 50+ years goodwill. FFS. 2014 GR of $651K. #CA226

WEST HOLLYWOOD: General Practice. 4 Ops, Mediudent, Intra-Oral Camera, Digital, Laser, 5 yr. old equip. 2014 GR of $561K. #CA212 IN ESCROW!

CENTRAL SAN DIEGO:

CENTRAL SAN DIEGO: NEW LISTING! Very busy 6 Op General Practice with room to grow. #CA219

SAN DIEGO:

SAN DIEGO: NEW LISTING! Pedo Practice and Building. Adjacent to retail center. 2014 GR of $256K adj. net. #CA219

SANTEE: NEW LISTING! General Practice, 4 Ops, retail center, Est. 35 years. #CA109

DOWNTOWN: NEW LISTING! Leasehold sale. Modern and chic downtown office in prime location. 3 ops + expand to. #CA232

LA MESA: General Practice. 4 Ops, Equipped, PPO. Dentrix. Digital. 2014 GR $340K. #CA227 IN ESCROW!

N. COUNTY COASTAL: NEW LISTING! General Practice, 3 Ops, Digital, FFS/PPO. 2014 GR of $530K with room to grow. #CA251

N. COUNTY INLAND: NEW LISTING! General Practice & Bldg. 4 Ops, PPO/FFS, Digital, Pano. Cerc. GR over $1M. #CA216

SAN DIEGO: General Practice. 3 Ops. FFS. PracticeWorks. Located in Central San Diego. 2014 GR $187K. #CA161

Santee: NEW LISTING! General FFS/ PPO Practice, 6 Ops, retail center. Dentrix, Digital, $780K GR in 2014. 7 days of hygiene/ week, long-term staff. #CA228

S. BAY AREA, SAN DIEGO: General Dentistry, 3 Ops, 4 days hyg/wk. Retail center, Dentrix Digital, Pano PPO & FFS. 2014 GR $324K. #CA206

OUT OF CALIFORNIA:

HAWAII (MAUI): PRICED REDUCED! General Practice, 4 Ops. Approx. 1,200 Sq. Ft. GR $630K. #20101

S. BAY AREA, SAN DIEGO: General Dentistry, 3 Ops, 4 days hyg/wk. Retail center, Dentrix Digital, Pano PPO & FFS. 2014 GR $324K. #CA206

OUT OF CALIFORNIA:
Marketing and Advertising Rules

CDA Practice Support

Marketing and advertising are key to the success of any dental practice. Dentists and their marketing consultants need to be aware of marketing and advertising rules to ensure their ventures are compliant. The state Dental Practice Act (DPA), Health Insurance Portability and Accountability Act (HIPAA) and state privacy laws apply, and dentists also should keep the CDA Code of Ethics in mind.

How does the state Dental Practice Act (DPA) affect marketing and advertising?
In general, the DPA:

- Defines “advertising” or “advertisement” and states what dental practice advertising may include.
- Prohibits the use of false, misleading or deceptive statements, images or claims.
- Prohibits the advertisement of a guarantee of any dental service.
- Prohibits compensation (including thank-you gifts) and inducements for patient referrals.
- Requires a permit if the dental practice uses a name other than the name under which a dentist is licensed to practice (fictitious name permit).
- Establishes rules for group advertising and referral services.
- Establishes rules for advertising fees, discounts and dentures.

What is considered advertising?
The DPA defines “advertising” or “advertisement” as any written or printed communication for the purpose of soliciting, describing or promoting a dentist’s licensed activities, or any directory listing caused or permitted by a dentist that indicates his or her licensed activity, or any radio, television, or airwave or electronic transmission that solicits or promotes the dentist’s practice, or any printing or writing on novelty objects or dental care products. Advertising does NOT include (1) any printing or writing used on buildings or uniforms where the purpose of the writing is for identification or (2) any printing or writing on memoranda or other communications used in the ordinary course of business other than solicitation or promotion of the dentist’s practice.

What are the rules for advertising fees and discounts?
Any fee advertisement shall be exact, without the use of phrases, including, but not limited to, “as low as,” “and up,” “lowest prices” or words or phrases of similar import. Any advertisement that refers to services, or costs for services, and that uses words of comparison shall be based on verifiable data substantiating the comparison. Any advertising shall be prepared to provide information sufficient to establish the accuracy of that comparison. Fee advertising shall not be fraudulent, deceitful or misleading, including statements or advertisements of bait, discount, premiums, gifts or any statements of a similar nature. In connection with fee advertising, the fee for each product or service shall be clearly identifiable. The fee advertised...
NOW IS THE BEST TIME IN YEARS TO BUY OR SELL A PRACTICE!

ARCADIA – (4) op comput G.P. Located in a well known Prof. Bldg. on a main thoroughfare. Cash/Ins/PPO pt base. Annual Gross Collect $300K+ on a (3) day week. NEW


CULVER CITY – (3) op Turnkey Office with included charts. In free standing Bldg. NEW


MONTREY PARK – (6) op comput G.P. located in a street front suite on a main thoroughfare w exposure & visibility. Cash/Ins/PPO & small % Denti-Cal. Annual Gross Collect $250K+ p.t. Seller retiring but will assist with Transition. NEW

PASADENA – Nearly New Turnkey Office w some charts. Newer eqt. Gorgeous!

RANCHO CUCAMONGA - (4) op comput. G.P. in a strip ctr. w visibility. (3) ops eqt’d (4th) op plumbed. Annual Gross Collect $185K+ on 2.5 days/wk. Cash/Ins/PPO pts. Seller moving.

SANTA BARBARA COUNTY – (3) op comput G.P. & 1,900 sq ft Bldg. Cash/Ins/PPO pts. No HMO and No Denti-Cal. 2015 Projected Gross Collections $250K on a very relaxed 3½ day week. Seller refers all O.S., Perio, Ortho and Endo. Also refers implant placement. Seller is retiring but will assist with a transition period to moving out of state. NEW


SOUTHWEST RIVERSIDE COUNTY - (5) op comput. G.P. (4) ops eqt’d/5th plumbed. 2015 Project Gross Collections $400K+. Cash/PPO. Located in a smaller prof. bldg. in a condo which can be purchased or leased. Seller giving up private pract. to accept institutional position. NEW


SANTA BARBARA - (3) op comput G.P. First floor street front location on a main thoroughfare. Exposure/visibility/signage. Cash/Ins/PPO. No HMO & No Denti-Cal. Pano eq’t’d & Computerized. 2014 Gross Collect. of $549K+ on a (3½) to (4) day Associate run week. NEW

TUSTIN – (3) op comput G.P. & 1,900 sq ft Bldg. Cash/Ins/PPO pts. No Denti-Cal or HMO. Growth potential.

WEST SAN FERNANDO VALLEY - (4) op comput. G.P. in a well known, easily accessible Med/Dental bldg. Digital x-rays & CEREC. Annual Gross Collect $460K+ on an easy 4½ day week. Cash/Ins/PPO. No Dent-Cali or HMO. Growth potential.


D&M SERVICES:
- Practice Sales and Appraisals
- Practice Search & Matching Services
- Practice and Equipment Financing
- Locate and Negotiate Dental Lease Space
- Expert Witness Court Testimony
- Medical/Dental Bldg. Sales & Leasing
- Pre - Death and Disability Planning

Paul Maimone
Broker/Owner

CA Representative for the National Association of Practice Brokers (NAPB)

468 AUGUST 2015 CDA JOURNAL, VOL 43, Nº8
4075 PETALUMA GP
Established GP located in Petaluma in stunning 1,856 sq. ft. seller owned facility in class A, 2 story, 10 year-old professional building. State-of-the-art office includes 6 ops, staff lounge, reception area, private office, business office, lab area, sterilization area, consult room, separate storage area, bathroom plus private bathroom. 4 doctor-days & 4 hygiene days/wk. Avg. GR $640K. Asking $440K.

4077 SAN JOSE GP
Seller re-locating out of state. Offering turn-key GP in San Jose's Willow Glen neighborhood. 4 fully equipped ops with 2 additional ops (plumbed but not fully equipped) in approx 2,000 sq. ft. Plentiful parking and easy freeway access from Hwy 280. Approx 300+ active patients. 2014 GRs $167K. Asking price for practice only $100K.

4043 SANTA ROSA GP
Well-established, well respected general dental practice located within a lovely professional center in the heart of town. Beautifully landscaped grounds with ample parking. Condo is also available for purchase. Gross receipts average $730-$800K every year. Asking price for practice only $495K.

4019 SF GP
Retiring owner offering well-established, hygiene driven GP w/ focus on Restorative care. Excellent location in the Marina/Cow Hollow neighborhood. 4 fully equipped ops in approx. 700 sq. ft. 2014 GR $426K with adj. net of $175K. Well-trained & seasoned staff. Asking $285K.

4069 SOUTH BAY PERIO
Well established Perio practice in desirable South Bay location. Approx. 1,700 sq. ft. facility w/4 fully-equipped ops. in a professional dental building. 2014 GR $800K+. 3 doctor days per week. Practice sees 30-40 new pts. per month. Cone beam scanner & panoramic x-ray purchased recently. Seller willing to help in the transition. Asking $460K.

4076 MORGAN HILL GP
Absolutely beautiful and modern; established practice in well-known Professional Center. State-of-the-art office in approx. 1,000 sq. ft. 3 fully equipped ops, with room for a 4th op. 300+ active patients. Gross Receipts approx. $245K. Ideal turn-key operation. Asking $215K.

4071 SAN MATEO GP
Well-est. GP in single story professional dental building located on a heavily traveled main artery between downtown San Mateo and downtown Burlingame. 4 fully-equipped ops in modern office w/digital x-ray, inter-oral camera, laser & Cerec. 2014 GR $673K+ w/adjusted net of $232K+. Asking $459K.

4081 HAYWARD GP
Seller retiring from successful GP with well-trained, seasoned staff. 4 fully-equipped ops w/ several equipment upgrades in seller owned building. Practice averages over $1M/year w/ adjusted net of $334K+ averaging 4 doctor days per week & 6 hygiene days per week. All fee-for-service. Asking price for practice only $732K. Building is also available for purchase.

4051 CENTRAL COAST PROSTHO
Well-established practice located in California's gorgeous Central Coast area. Beautifully appointed, spacious 1,568 sq.ft. office with 4 fully equipped ops, pros lab and other amenities. Situated just minutes from the ocean and <5 miles away from one of California's historic Mission Cities, this practice is nestled in a highly desirable community. 2013 gross receipts were $1.2M+ and 2014 is annualized at $1.3M+ on a 4 day doctor workweek, w/4 days of hygiene/week. Approx. 15 new patients a month and ~1,500 active patients (all fee-for-service). Owner/doctor is willing to help Buyer for smooth transition.

UPCOMING:
SF GP, San Jose GP, Marin County GP
person licensed under this division or the Chiropractic Initiative Act of any rebate, refund, commission, preference, patronage dividend, discount, or other consideration, whether in the form of money or otherwise, as compensation or inducement for referring patients, clients, or customers to any person, irrespective of any membership, proprietary interest, or co-ownership in or with any person to whom these patients, clients, or customers are referred is unlawful.”

What are the limitations established by HIPAA and state privacy laws?

State and federal laws overlap in the regulation of a dental practice’s use of patient information for marketing purposes. The federal HIPAA Privacy Rule and the state Confidentiality of Medical Information Act (CMIA) require a dental practice to obtain a patient’s authorization prior to using patient health information to communicate about a product or service that encourages a recipient of the communication to purchase or use the product or service, or to give to another entity to market its product or service. Patient authorization is not required for the following types of communications for which the practice is not financially remunerated by a third party:

■ Making a patient aware of a health-related product or service (or payment for such product or service) that is included in the patient’s dental benefit plan.
■ Providing patient treatment.
■ Coordinating care with other providers, such as nursing homes.
■ Providing inexpensive items with the practice name and contact information.
■ Face-to-face communication.

If a dental practice receives financial remuneration, including, but not limited to, gifts, fees, payments, subsidies or other economic benefits, from a third party for making any marketing, treatment or health care operations communication, the practice must obtain authorization from the patient prior to making that communication.

Additionally, state law requires the dental practice to:
■ Notify the individual receiving the marketing communication in typeface no smaller than 14-point type of the fact that the practice has been remunerated and the source of the remuneration.
■ Provide the individual with an opportunity to opt out of receiving future remunerated communications.
■ The communication must contain instructions in typeface no smaller than 14-point type describing how the individual can opt out of receiving further communications by calling a toll-free number of the dental practice making the remunerated communications. No further communication may be made to an individual who has opted out after 30 calendar days from the date the individual makes the opt-out request.

How does the CDA Code of Ethics govern dental marketing and advertising?

Section 6 of the CDA Code of Ethics advises that dentists have the obligation to represent themselves in a manner that contributes to the esteem of the profession. The standard for judging the ethical propriety of any dentist’s advertisement to the public is whether the ad, taken as a whole, is false or misleading in any material respect. A dentist should always ask, “Could my ad be misinterpreted or potentially misleading to someone who knows nothing about my practice or my profession?” The rationale for the standard is protection of the public; a dentist’s advertising should contain any information that a patient would consider necessary to make informed choices about practitioners and services. The CDA Code of Ethics, Advisory Opinion 1.G.1, also advises dentists that, in many circumstances, promotional activities on school grounds are considered unethical.

Information on additional marketing and advertising rules can be found in the article, “Dental Practice Marketing and Advertising 101.” The article and sample patient authorization forms are available at cda.org/practicesupport.

Regulatory Compliance appears monthly and features resources about laws and regulations that impact dental practices. Visit cda.org/practicesupport for more than 600 practice support resources, including practice management, employment practices, dental benefit plans and regulatory compliance.
Parents in the operatory and children’s dental procedures


Purpose: The purposes of this study were to determine if the type of dental procedure being performed on children had an effect on parents’ desire to be present in the operatory and to determine if the percentage of parents desiring to be present for their child’s treatment had remained consistent over the past two decades.

Materials and methods: A survey was conducted with parents of children who presented for dental appointments at three sites: a pediatric clinic at the University of Nevada, Las Vegas, School of Dental Medicine and two private practice settings in southern Nevada. Parents or caretakers were asked to complete a three-section, 20-item survey. The sections were demographic information, past medical and dental history, and different scenarios commonly associated with treatment in a pediatric office (i.e., examination and radiographs, restorative treatment, exodontia, conscious sedation and protective stabilization). The parents were asked whether they had observed the procedure before, would prefer to be present or absent during the procedure, if their opinion would change if their child were struggling or crying during the procedure and if they preferred that the dentist make the decision whether they remained in the room during the procedure. The survey was field tested and approved by the Institutional Review Board of UNLV.

Results: Three hundred and thirty-nine parents completed the survey. Demographic information was as follows: 73 percent female parent, 60 percent Hispanic, all between 25 and 40 years old and have a high school education. Majority of the responders had a household income less than $50,000 annually. More than half of the children were between 4 and 9 years old and healthy. Seventy-nine percent of parents said that their child never had a bad experience with the dentist. Seventy-eight percent of parents would prefer to be present during their child’s treatment. Sixty-two percent of the parents indicated that the primary reason they want to be present is they feel their child is more comfortable with their presence. The majority of the parents wanted to be present for the dental procedures mentioned above. Only 38 percent of parents would let the dentist decide whether they should be permitted to remain during treatment.

Statistically significant findings included the following: female and parents who were 31-40 years old stated that their child’s well-being was the reason they wanted to be present during treatment. Parents with a high school education or greater chose being unfamiliar with the dentist as a significant factor in wanting to be present. Married parents chose wanting to obtain more information about the procedure so they could explain it to their spouse as a factor for being present in the operatory.

Conclusion: Most parents preferred to be present during their child’s treatment regardless of the dental procedure. More than one-third of the parents do not want the dentist to be the sole person to determine their involvement in their child’s dental visit. Parental desire to be present during dental treatment has not changed over the last 20 years.

Reviewer’s comments: Parental presence is a behavior guidance technique endorsed by the American Academy of Pediatric Dentistry. As parenting styles and societal attitudes change, more parents want to be involved with the treatment decisions for their child. Parents want to be present to support and ensure that their child is comfortable during treatment. This study also confirms that the more educated the parents are, the more likely they want to be present if they are unfamiliar with the dentist. Parental presence during treatment can be a good practice builder but it will only work if the dentist establishes expectations and builds trust with the parents.

— Thomas S. Tanbonliang Jr., DDS
**MICROBIOLOGY**

**Oral microflora effect on bone levels**


**Background:** It has long been known that the commensal oral microflora plays a role in homeostatic regulation of alveolar bone. However, little is known regarding the underlying mechanisms of alveolar bone loss mediated by the commensal oral microflora.

**Methods:** Histomorphometric analyses of alveolar bone loss in specific-pathogen-free (SPF) mice and germ-free (GF) mice were carried out. Immunohistochemical staining of neutrophil markers, T-cell markers and receptor activator of nuclear factor kappa B (RANKL) were conducted to identify the cellular compositions within junctional epithelium (JE). Tartrate-resistant acid phosphatase (TRAP) staining for the identification of osteoclastic cells was also carried out.

**Results/Discussion:** SPF mice revealed increased alveolar bone loss and increased numbers of both TRAP+ osteoclastic cells and RANKL+ cells at the alveolar bone surface than GF mice. This was associated with increased numbers of neutrophils, CD3+, CD4+ and interleukin-17+ cells in the JE of SPF mice compared to GF mice. These results suggested that the host-commensal oral microflora interactions result in the release of osteoclastogenic molecules from the host, leading to the alveolar bone loss seen in the clinically healthy periodontium. Since RANKL has been known to be expressed by neutrophils and activated Th17 cells, it is possible that increased alveolar bone loss caused by the commensal oral microflora in SPF mice was due to the activation of both innate and adaptive immune systems.

**Conclusions:** An alveolar bone loss occurring in clinically healthy periodontium is mediated, at least in part, by the immunomodulately effects of commensal oral microflora on host cells.

— Takahiro Chino, DDS, MSD, PhD

**PERIODONTICS**

**Surgical periodontal therapy — together is better**


**Aim:** To compare the outcomes of surgical periodontal therapy with and without initial scaling and root planing.

**Methods:** Twenty-four patients with severe chronic periodontitis were divided into two treatment groups, both who had modified Widman flap surgery but only one preceded the surgery with scaling and root planing (control group). The test group had surgery only. Clinical parameters evaluated included probing depths, attachment levels, bleeding on probing and radiographic evidence of bone level changes from base level to six months. Inflammatory biomarkers of wound healing were also assessed.

**Results:** Both groups showed improvement in attachment levels at three and six months compared to baseline. No statistically significant change in biomarkers was shown between the groups. There was a statistically significant improvement in probing depth reduction in favor of the control group at both three and six months.

**Conclusion:** Combining scaling and root planing with surgery yielded greater probing depth reduction than surgery without initial scaling and root planing.

**Clinical relevance:** Scaling and root planing is an important component of periodontal therapy, helping to resolve inflammation, reduce pockets and gain clinical attachment, even if surgery needs to be performed. Based upon this study scaling and root planing might contribute to a more favorable outcome when performed prior to surgery in the form of improved pocket depth reduction. Proponents of a “direct-to-surgery” approach should keep this in mind.

— Gerald Drury, DDS
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<table>
<thead>
<tr>
<th>Location</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC-335 SAN FRANCISCO</td>
<td>Two great practices for the price of one! Now Only $475!</td>
</tr>
<tr>
<td>AG-053 SAN FRANCISCO</td>
<td>3,000 sf w/ 9 ops + 1 add'l. PRIME LOCATION! $475k</td>
</tr>
<tr>
<td>BN-183 HAYWARD</td>
<td>Kick it up a notch by increasing the current very relaxed work schedule! 1,300 sf w/ 3 ops $150k</td>
</tr>
<tr>
<td>BN-279 CONTRA COSTA COUNTY</td>
<td>Excellent Merger Opportunity! 2-story. 1,350 sf w/ 3 ops +1 add’l $60k</td>
</tr>
<tr>
<td>BC-361 OAKLAND</td>
<td>Established for over 23+ years! 2,200 sf w/ 7 ops. Now Only: $385k</td>
</tr>
<tr>
<td>BC-381 PLEASANT HILL</td>
<td>Open Floor Plan! 1,852 sf w/6 equipped ops! Move in Ready! $80k</td>
</tr>
<tr>
<td>BG-407 SAN LEANDRO</td>
<td>Prof bldg. Great signage! 1,200 sf w/ 3 ops $140k</td>
</tr>
<tr>
<td>BN-426 BURLINGTON</td>
<td>Step into this quality practice and you’ll know you belong here! 1,386 sf w/ 3 ops. $495k</td>
</tr>
<tr>
<td>BC-432 PITTSBURG</td>
<td>Own this family-oriented Practice! 1,640 sf w/ 6 ops. $350k</td>
</tr>
<tr>
<td>CC-390 SOLANO COUNTY</td>
<td>Near Travis AFB! High-ly visible location! 950 sf w/ 3 ops REDUCED! $180k</td>
</tr>
<tr>
<td>CG-366 SANTA ROSA</td>
<td>Vibrant, growing community! 1,300+ sf w/ 4 ops. Over $760k in collections! $450k</td>
</tr>
<tr>
<td>CG-449 SANTA ROSA</td>
<td>Vibrant, highly desired town! Prof Bldg 1860 sf w 4 ops + 1 add’l $250k</td>
</tr>
<tr>
<td>DC-370 SAN JOSE</td>
<td>Location, Location, Location!! Move in Ready! Only $120k</td>
</tr>
<tr>
<td>DG-341 SUNNYVALE/LOS GATOS</td>
<td>Contact our office for details. $605k</td>
</tr>
<tr>
<td>DG-396 SERRAMONTE AREA</td>
<td>Small Town Feel in Heart of SF. 850 sf &amp; 4 ops $485k</td>
</tr>
<tr>
<td>DN-312 LIVERMORE</td>
<td>Don’t miss out on this one! 1,070 sf w/ 3 ops. REDUCED! $75k</td>
</tr>
<tr>
<td>DC-403 SANTA CRUZ</td>
<td>Well-established, modern, quality practice! 1,335 sf w/4ops. $725k</td>
</tr>
<tr>
<td>DC-419 NEWARK FACILITY</td>
<td>Location, Location, Location! 1,400 sf w/ 4 op. $140k</td>
</tr>
<tr>
<td>DC-406 SAN JOSE</td>
<td>Amazing opportunity in Westgate Shopping Center. 6 ops + 80 mall hours per week! $400k</td>
</tr>
<tr>
<td>DG-434 MENLO PARK</td>
<td>Well-Established. Near Facebook, Stanford, Google and Tesla! 1702 sf w/ 5 ops. Excellent Opportunity! $1,2m</td>
</tr>
<tr>
<td>DN-447 SUNNYVALE</td>
<td>Quality, family-oriented opportunity awaits your talent and skill. 1,400 sf w/ 3 ops + 1 add’l. $395k</td>
</tr>
<tr>
<td>EN-340 SACRAMENTO</td>
<td>Large HMO practice! 3,400 sf w/ 10 ops and Plumbed for 1 add’l $950k</td>
</tr>
<tr>
<td>EN-350 SACRAMENTO</td>
<td>The Perfect Merger Opportunity! Old-fashioned values and philosophy! 674 sf w/ 1 op. $85k</td>
</tr>
<tr>
<td>EN-379 LINCOLN</td>
<td>Quality practice with a wonderful patient base! 1,369 sf w/ 2 op + 3 add’l. $170k</td>
</tr>
<tr>
<td>EN-379 ROSEVILLE</td>
<td>An amazing opportunity in the location of your dreams! 1,040 sf w/ 3ops. $295k</td>
</tr>
<tr>
<td>EN-423 FOLSOM Oral Surgery Facility</td>
<td>Primed for success! 3,450 sf w/ 2 Lrg. Treatment Rooms. Now Only $50k!</td>
</tr>
<tr>
<td>FN-299 FERNDALE</td>
<td>Live and practice on the beautiful North Coast! 1,300 sf w/ 3 ops $195k (Real Estate: $309k)</td>
</tr>
<tr>
<td>FC-343 NORTHERN CA</td>
<td>Quality &amp; location are the keys to success! 1,200 sf w/ 3 ops + 1 add’l &amp; 1 hyg. Op. $500k (Real Estate $375k)</td>
</tr>
<tr>
<td>FC-415 FT. BRAGG</td>
<td>An excellent practice, located in a peaceful, family-oriented community! 1,800 sf w/ 5 ops + 1 hyg. Op. $425k</td>
</tr>
<tr>
<td>GG-320 CHICO</td>
<td>Large, Unique, Originally designed for more than 1 dds! 5,000 sf w/ 7 ops (+2 add’l) $985k</td>
</tr>
<tr>
<td>GG-386 REDDING</td>
<td>Practice &amp; Real Estate! 2,860 sf w/ 4 ops. Plumbed for 2 add’l! PR: $330k / RE: $660k</td>
</tr>
<tr>
<td>GN-201 CHICO</td>
<td>Beautiful practice, major thoroughfare, stellar reputation! 1,400 sf w/ 4 ops &amp; room for another $425k</td>
</tr>
<tr>
<td>GN-244 OROVILLE</td>
<td>Must See! Gorgeous, Spacious. 2,500 sf w/5 ops! Collections over $450k in 2013. Only $315k</td>
</tr>
<tr>
<td>GN-258 REDDING</td>
<td>Pristine and attractive! Conveniently located! 1,050 sf w/ 2 ops. $215k</td>
</tr>
<tr>
<td>GN-399 REDDING</td>
<td>Loyal patient base and relaxed workweek schedule. 1,440 sf w/3 ops. $150k</td>
</tr>
<tr>
<td>GN-418 REDDING</td>
<td>Goodwill Galore! Established for ~37 years and the seller is retiring! 3,200 sf w/6 ops +2 add’l. $495k</td>
</tr>
<tr>
<td>HG-293 REDDING Foothills</td>
<td>HEALTH FORCES SALE! Includes Cerec! 2,000 sf w/ 5 ops. Practice $100k / Real Estate $250k</td>
</tr>
<tr>
<td>HN-213 ALTRARAS</td>
<td>Close to Oregon Border. FFS practice is 2,200 sf w/3 ops + 1 add’l! $115k</td>
</tr>
<tr>
<td>HN-280 NORTHEASTERN CA</td>
<td>“Only Practice in Town” 900 sf w/ 2 ops $110k</td>
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ASK THE BROKER

Should there be a reduction in the value of a “Delta Premier only” dental office?

First, let’s define the problem, as there is a great deal of misunderstanding on this issue. About four or five years ago, Delta decided that all new contracts with dentists would include both the Premier and the PPO contract. There was no choice on the matter from the dentist. On face value, this did not seem like a big deal in practice transitions as the assumption was that the buyer would keep all the “premier patients” on the higher fee schedule and that he would acquire many more new patients on the PPO fee schedule, albeit at a lower fee schedule. In fact, it seemed like a good way to grow the practice after the transition.

The first time we discovered this assumption was incorrect, was upon listing a practice that voluntarily added the PPO product to his office. He also assumed that his current “Premier” patients would keep their fee schedule. He soon found that Delta was paying 25 to 30 percent less on about 90% of his past Delta Premier patients. However, he finished off that year with his highest production ever, due to the increased patient flow!

What we did not fully comprehend is that Delta has not really sold any new “Premier” plans for many years. Each year, the percentage of Delta Premier patients is reduced compared to the PPO plans. Currently, the percentage of Delta Premier patients is approximately 7%. Today’s current “Premier Only” doctors normally do not realize that as much as 93% of their “Delta Premier” patients are really what we refer to as “PPO Plus”, meaning that Delta has agreed to pay the Premier fee schedule for the time being, but any change in the contract will reduce all of these patients to the standard PPO fee schedule.

We have also witnessed transitions over the years where the practice’s gross receipts did suffer after the buyer was forced to take the lower fee schedule. However, since 2011 when we began following this phenomenon, I can say that there is no direct correlation to declining revenue just because of the Delta fee change issue. We recently sold a predominately Delta practice that had 1.7 Million in gross receipts. We expected this practice would suffer as this practice did not need to grow their patient base with the additional PPO patients. Six months after the sale the monthly collection numbers were actually greater!

It is imperative that buyers understand this issue and find out how much of the revenues are generated by a “Delta Premier only” office. However, it is just one of the many variables a buyer should understand in making a good decision to purchase a practice.
A look into the latest dental and general technology on the market

Google Photos (Google Inc., Free)

Google Photos for iOS provides all users with cloud storage backup for photos and videos on mobile devices. The application and service is also available for Mac, PC and Android devices. Once logged in with a Google account, Google Photos works seamlessly in the background by continuously backing up all photos and videos on the iOS device through a Wi-Fi connection. When backups are complete, users are free to delete photos and videos from their camera rolls on their iOS devices. All photos and videos are available to view on the cloud through the Google Photos app. Within the Google Photos app, users can view their photos sorted by date or collections based on photo location data. Tapping on any item enlarges it to full screen, where users can share, edit, view info or delete the item from cloud storage. Users can apply filters and use simple editing tools for their photos and videos. Google offers two storage options for this service: Original and High Quality. The Original storage option backs up and syncs photos and videos at their full resolution and quality. This option counts against the standard storage quota for a Google account, which is 15GB and is shared amongst other services such as Gmail and Google Drive. The High Quality storage option provides unlimited storage for photos and videos that are equal to or less than 16MP or 1080p resolution. For most users, the High Quality option will more than suffice.

— Hubert Chan, DDS

70 Percent of World Using Smartphones by 2020

Smartphones have become part of most people’s day-to-day lives and that trend is expected to increase over the next five years, according to a study by Ericsson Mobility Report. Specifically, 70 percent of the world’s population will have a smartphone by 2020. The study went on to state that mobile traffic in the first quarter of 2015 was 55 percent higher than the first quarter of 2014 and that by 2020, 80 percent of mobile traffic will be from smartphones. “Video continues to be the key growth factor, with 60 percent of all mobile data traffic forecast to be from online video by 2020,” according to the study. The study also states that those who use larger screens with their mobile devices (tablets) spend 50 percent more time watching videos.

— Blake Ellington, Tech Trends editor

HEALTHYDAY (McNeil-PPC Inc., Free)

HEALTHYDAY is a new app that uses crowdsourcing data to provide real-time tracking status of health trends in any location. HEALTHYDAY works by gathering location and reports from its users. When the app determines its location, it asks the user simply, “How are you feeling today?” A color feeling indicator face can be cycled through green (good), yellow, orange and red (bad). If a user is not feeling well, the app will try to determine what the user is most likely suffering from using the trends of reports in the area. If the app is incorrect in determining what a user is suffering from, he or she can choose from a list of common ailments that he or she thinks may be the cause of their illness. Each user report is combined with reports from other users to create a local dashboard, which shows the trends and risks of allergies, colds and flu in the area. An “Illness Map” provides locations and reports of what is going around in the neighborhood so that users can be on the alert when common illnesses are on the rise. In addition to providing real-time reports and trends in the area, HEALTHYDAY provides “30-Second Solutions,” which are helpful tips and answers to the most common health questions people ask.

— Hubert Chan, DDS

Adding Photo Filters Boosts Social Interaction

Adding filters to photos on social media is something amateurs and more advanced photographers do, but what does it do to enhance social interaction? Yahoo! Labs released a study aimed at determining how filters affect photo engagement such as likes, comments and views. The study analyzed 7.6 million public photos on Flickr, an online photo management and sharing application, which resulted in the finding that filtered photos saw a 21 percent increase in views and 45 percent increase in comments. “Filters that increase contrast and correct exposure can help a photo’s engagement, and filters that create a warmer color temperature are more engaging than those with cooler color effects,” according to the study.

— Blake Ellington, Tech Trends editor
Aging Gracefully (and Other Indignities)

When I pay one of my infrequent visits to my primary care guy, I make certain to get my $10 co-payment’s worth by saving up symptoms until I’m sure I have enough to command his attention for at least 10 minutes. These are carefully recorded on a list I bring with me.

My left knee has begun to hurt. My knees, unlike some of my other body parts, had not communicated with me for more than eight decades. I compared the ailing knee with its mate. Although they are both the same age and appear to be dimpled twins, the complainant had taken on a life of its own, either refusing to bend comfortably or threatening to flex both ways without advance warning.

After six weeks of ignoring it, I finally managed to accumulate a qualifying number of unrelated complaints, including a twinge in my right shoulder and two suspicious spots on my right forearm at least 4 microns in width. In addition, an annoying extra trip to the bathroom around 4:30 a.m. convinced me that at least one or two of these symptoms confirm the presence of a fatal disease requiring surgical intervention immediately. Time to shell out the $10 co-pay.

My instinctive distrust of general anesthesia was intensified by the probability of the operating surgeon assigned to save my life being revealed as a head case on the verge of going postal from stress and fatigue. “You need to make an appointment,” I told myself. I did — the following spring.

An overhead wide-angle shot of a surgical amphitheater overflowing with students and resident doctors forms clearly...
in my mind. Gathered from as far away as Rochester, the assemblage leans forward in hushed reverence to witness my surgeon’s legendary expertise. I had just become aware of two morgue attendants standing expectantly in the background beside their gurney when I hear a female voice announce, “Robert, you may come in now.”

I try to respond in kind by attempting to read her name tag pinned to her blouse just south of her left clavicle, but realize that staring any longer to make out the words would not be in my best interests. Laying aside the article I had been reading in Woman’s Day on how to cope with those pesky postpartum stretch marks, I trail after the paisley-topped assistant into the inner sanctum. Young enough to be my granddaughter, she is preternaturally cheerful as she confides that we will pause for a moment to weigh me.

At the end of the hall is the scale, impossible to circumvent. The drill is always the same and her buoyancy is ill-suited for the occasion. “Hop on,” she trills cheerfully. Every time I have ever mounted one of these doctor scales it is obvious the patient before me could not have weighed more than 110 pounds. There follows a deliberate, prolonged humiliation during which the weights are slowly advanced along their tracks almost to the end before balance is achieved. “My shoes weigh at least five pounds each, you know,” I always offer, feeling this should pause for a moment to weigh me.

“Then don’t do that.” His eyes grow pensive. “How long?”

“Six weeks.” He palpates the joint in a doctorly manner. “A stretched ligament or tendon,” he says, conserving unnecessary words as if texting me. “Nothing to worry about. Take a while to disappear. Couple of Advil or Aleve are OK.”

“Then don’t do that.” It is too late. Obviously, administering extreme unction to my knee is premature and the problem is too intricate and inconsequential to warrant recapitulating.

“Need a flu shot and a pneumonia shot,” he states. “Take this form to the lab. See you in two weeks.”

He’s out the door and I am left sitting on the crinkly paper-covered table, as my list of assorted ailments flutters to the floor. Left knee, CHECK.

She departs to fetch the doctor, taking my 2-inch thick folder with her lest I sneak a peak at my own records that I couldn’t read anyway, written as they are in Physicianese!

Modern medicine has streamlined the whole medical appointment experience to the point where the doctor is the last person encountered. When I was younger, the next step would be the entrance of the doctor, an older man radiating compassion and wisdom, sort of like my grandfather, only richer.

In time (this is Doctor Time, different from Patient Time), the doctor breezes in. A substantial part of my wardrobe is older than he. He gets right to the point, the meter is running. “What’s the matter with your knee?” he asks. Well, duh! At $10 I have to do my own diagnosis!

“It hurts when I do this,” I explain, flexing my left leg gingerly.

“What’s the matter with your knee?” he asks. Well, duh! At $10 I have to do my own diagnosis!

“Six weeks.” He palpates the joint in a doctorly manner. “A stretched ligament or tendon,” he says, conserving unnecessary words as if texting me. “Nothing to worry about. Take a while to disappear. Couple of Advil or Aleve are OK.”

“But, I …” It is too late. Obviously, administering extreme unction to my knee is premature and the problem is too intricate and inconsequential to warrant recapitulating.

“Need a flu shot and a pneumonia shot,” he states. “Take this form to the lab. See you in two weeks.”

He’s out the door and I am left sitting on the crinkly paper-covered table, as my list of assorted ailments flutters to the floor. Left knee, CHECK.

What a nice man! Not once did he mention the fact that at my age it would be unrealistic to expect anything less than a yard-long grocery list of physical woes. Maybe I’ll come back next fall after a summer of reckless hedonism. I should have a list to reckon with by then.

We’re taking your requests

If you have a favorite Dr. Bob column you want to see again, email Publications Specialist Andrea LaMattina at andrea.lamattina @ cda.org. We will oblige by reprinting those requested favorites interspersed with any new Dr. Bob submissions.
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