

Nonsurgical Periodontal Therapy Then and Now: Changes Since the Early 1980s

By Lynne Hollister Slim, RDH, BSDH, MSDH, and Colleen Rutledge, RDH

According to many Internet sources, the 1980s saw some of the worst fashion, fads, and music of any decade of the 20th century. The 1980s timeline in health care featured the introduction of the new education slogan, “Just Say No” as an attempt to combat growing drug abuse in the United States. French scientist Luc Montagnier, MD, PhD, discovered HIV in this decade, too, and our fears of contracting the virus in the oral health care workplace were heightened. It was also in the 1980s that Per-Ingvar Branemark described techniques for the osseointegration of dental implants.

Irene Woodall, RDH, was senior consulting editor for the relatively new magazine, *RDH*. Ahead of her time, she wrote about dental hygiene as more than just cleaning teeth, and questioned the profession’s continued focus on scaling and polishing as its fundamental role. “The most astute diagnostician who knew how to assemble the information and plan appropriate dental hygiene care would not graduate, pass boards or be employable (it was believed) if calculus and stain were routinely detected on ‘completed’ patients,” she wrote.¹ In other words, Woodall understood that the reality of the times limited clinical dental hygiene to the bread-and-butter practice of scaling and polishing.

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Keyes Technique and Soft-Tissue Management

It was in 1981 when Paul Keyes, DDS, revolutionized dental hygiene by cofounding the International Dental Health Foundation (IDHF), which pioneered conservative anti-infective therapy. Often referred to as “The Father of Anti-Infective Therapy,” Keyes was best known for his advocacy of baking soda and peroxide as

a homemade dentifrice to fight the pathogens associated with plaque-induced gingivitis and periodontitis. The use of peroxide was eventually called into question, but clinicians today still recommend baking soda as an antibacterial agent in the form of either a toothpaste or a powder that is moistened and applied with a rubber tip or other perio-aid.

Keyes and other members of IDHF believed that periodontal lesions would be arrested and stabilized following sustained suppression and/or eradication of bacterial risk factors as a primary target.² In addition, Keyes and others advocated microbiological surveillance through phase contrast microscopy as a way to monitor bacteria and white blood cells. Many issues of *Annotations*, a newsletter from IDHF, discussed controlled clinical studies from the 1970s and early 1980s that refuted periodontal surgery as the “treatment of choice” and focused instead on studies showing that competent clinicians could treat advanced periodontal lesions nonsurgically with similar outcomes.²

The mid ’80s benchmarked the term “soft-tissue management” (STM), which debuted with Pro-Dentec’s Rota-dent® power toothbrush. STM was a revolutionary approach to managing periodontal disease by anesthetizing one quadrant at a time to remove the big offender: calculus! According to Steve Gutter, DDS, who was involved in the pioneering days of STM, many in the dental community scoffed at the idea of nonsurgical therapy, especially after the perceived notion that the “Keyes Technique” was advocating nonsurgical therapy *in place of* periodontal surgery. Gutter was the first dentist on staff at Pro-Dentec, and he encouraged the company to sell its toothbrush as part of a package that would include developing office protocol for incorporating STM into the dental hygiene department. Gutter introduced a Keyes program (including phase contrast microscopy) into his dental practice in San Francisco and found that it was a great way to reinvestigate an ailing practice.³

Changes in Emphasis on Root Planing and Increased Use of Ultrasonics

In the 1989 (sixth) edition of *Clinical Practice of the Dental Hygienist* by Esther M. Wilkins, BS, RDH, DMD, the principle objective of subgingival instrumentation included subgingival calculus removal and planing of the root surface with minimum trauma to the gingival tissues.⁴ The belief that endotoxins were firmly embedded in the cementum made glassy-smooth root surfaces, planed with light, shaving-like strokes a criterion for clinical expertise.

At that time, the standard of care directed clinicians to use both sonic and ultrasonic scalers as adjuncts to hand instrumentation, providing an efficient way to remove gross supragingival deposits and allowing more time for meticulous root planing and subgingival calculus removal. It was emphasized that sonic and ultrasonic scaling did not replace manual instrumentation.⁴ Several limitations of sonic and ultrasonic use were professed at the time, such as lack of tactile sensitivity, decreased visibility, and discomfort for both the operator and client.

Studies at the University of California in the late '70s comparing hand instrumentation to ultrasonics changed the focus of therapy from root surface smoothness to evaluation of tissue response.⁵ The results revealed that hand instrumentation with curets produced smoother surfaces than ultrasonic scalers, while the tissue response for either group was the same. Subsequent studies in the early '80s suggested that the traditional goal of smooth surfaces would be better replaced with the goals of decreased inflammation and healing.⁶

With the acceptance of these findings, clinical practice changed dramatically. Ultrasonic companies, aware of the paradigm shift, began manufacturing thinner inserts for magnetostrictive units that conformed better to tooth anatomy. Coincidentally, piezoelectric technology, which had long since been the standard in Europe, was now emerging in the United States. This technology supported microultrasonic tips that provided for a standard for scaling and conservative

root planing that instruments could not.

Soft-tissue curettage as a selective procedure was described in Wilkins's 1994 (seventh) edition,⁷ as definitive treatment that included (as one of several objectives) the reduction of pocket depth.⁵ Soft-tissue curettage as a deliberate procedure was also included in the 1995 (first) edition of *Dental Hygiene Theory and Practice* by Michele L. Darby, RDH, MS, and Margaret Walsh, MS, EdD.⁸ Soft-tissue curettage was performed intentionally to remove inflamed, ulcerated soft tissue from the periodontal pocket. In today's dental hygiene departments, the procedure is no longer considered a definitive treatment, but instead an unintentional result of scaling and root planing (SRP).

It wasn't until Wilkins's 1999 (eighth) edition textbook that ultrasonic tip designs, including the thinner tips, were compared. It was advocated that manual instrumentation follow ultrasonic instrumentation, and it was emphasized that ultrasonic tips were bulky and of limited application subgingivally.⁹

Today's clinicians have come to the understanding, based on years of research, that there is comparable efficacy between manual and ultrasonic scaling.¹⁰ In addition, newer ultrasonic inserts are thinner and designed to access deep pockets and furcations.

Professional Irrigation and Preprocedural Mouthrinsing

In Wilkins's 1994 (seventh) edition, professional irrigation was recommended based on the theory that delivery of various antibacterial agents would enhance the treatment outcome of SRP.⁷ The Academy of Periodontology (AAP) published a position paper in 1995 citing a small quantity of data showing that a single professional application of an antibacterial agent would enhance root planing outcomes.¹¹ Additionally, AAP reported that there was limited evidence

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to support the use of professionally applied subgingival antibacterial agents in inaccessible areas like furcations and deep or tortuous pockets.¹¹ In the same report, however, AAP mentioned that there were some preliminary data suggesting that professional irrigation with high concentrations of substantive drugs might enhance the efficacy of SRP, but the term “substantive drugs” was not defined in the report.¹¹

Some of today’s dental hygiene clinicians continue to irrigate subgingivally with various medicaments before or after SRP. The 2002 edition of *Mosby’s Dental Hygiene* recommends subgingival irrigation before ultrasonic scaling for patients who have received antibiotic premedication.¹² In the 2003 Workshop on Contemporary Science in Clinical Periodontics, a systematic evaluation of literature-based evidence to determine the efficacy of therapist-delivered chlorhexidine gluconate (CHX) during SRP found no evidence of an adjunctive effect.¹⁰

Rinsing with an antiseptic mouthrinse (e.g., chlorhexidine gluconate, essential oils, or povidine-iodine) is strongly recommended before an invasive dental hygiene procedure,¹¹ because it can 1) reduce the number of microorganisms the client releases in the form of aerosol or splatter that could act as a contaminant, and 2) decrease the number of microorganisms in the client’s bloodstream during debridement.¹³

Nonsurgical Periodontal Therapy with an Emphasis on Productivity

A steady increase in dental practice overhead each decade, coupled with a decrease in dental caries in the United States, prompted dentists to start looking more closely at dental hygiene department revenue potential. About 20 years ago, John A. Wilde, DDS, switched from traditional dental hygiene to what he called “expanded hygiene.”¹⁴ Wilde’s system required one dental hygienist who worked out of two rooms, and a dental assistant who worked exclusively with the dental hygienist. Not only did Wilde increase dental hygiene department productivity to 50%, but also his compensation package added 25% to production. Wilde’s action plan for a profitable dental hygiene department

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included Pro-Dentec’s STM program, which recommended the company’s oral care products along with an outlined protocol. Dental hygiene departments today can turn easily from “loss leaders” with minimal daily production into “production leaders” achieving much higher production when they begin to employ a comprehensive periodontal therapy program.¹⁵ Since the early 1980s, a growing number of dental practice management consultants specialize in the development and refinement of dental hygiene departments that provide superior quality of clinical care for patients and increased profitability for den-

tal practices. In many cases, dental hygienists are better compensated—based, in part, on their level of expertise in non-surgical periodontal therapy and daily production. Approximately 20–40% of dental hygiene revenue can come from periodontal procedures.¹⁵

Many practices maintain a *mechanical* model that focuses on removing calculus, plaque, and stain and performing root planing one quadrant at a time, two weeks apart. In reality, many cases are not completed until months later, at which time the treated quadrants have been reinfected by bacteria from the untreated ones.¹⁶

Research now directs us to a *medical* model, decreasing the bacterial load in the entire mouth by means of treatment completed within 24–48 hours.¹⁶ Although longer appointments are necessary, proper use of ultrasonics increases efficiency, requiring one or two one-and-a-half-hour appointments rather than four one-hour appointments. The addition of sustained-release local anti-infective agents can enhance the clinical benefits achieved by SRP.¹⁰

Evidence-based Dentistry and Medicine

Evidence-based dentistry and medicine (EBDM) is a relatively new approach to clinical practice and wasn’t applied to dental hygiene clinical practice until recently.^{17,18} In the 1980s and 1990s, clinicians were educated to rely on the best available research when making treatment decisions for patients, but most dental hygiene students in associate-degree educational programs were not educated in research methodology. It is probably fair to say that these dental hygiene graduates were more heavily influenced by various authorities such as dental hygiene faculty, pharmaceutical representatives, dental manufacturers, peers, or dentist-employers. Many dental hygienists still ignore or avoid dental research at all costs. Some dental hygienists may view research as someone else’s responsibility or the responsibility of academicians or researchers, and even if they were taught the skills necessary to find current evidence, they may not be applying evidence-based findings to clinical decision making.¹⁷

The emergence of EBDM as what might be an “intellectual fashion” in health care today will undoubtedly have an impact on dental hygiene practice. Its success will depend on the quality of evidence at hand and the unbiased nature of evidence-based recommendations. In addition, clinicians will have to weigh evidence against clinical judgment and client preferences. At one time, traditional reviews of the literature sometimes influenced treatment decisions. Now, unbiased systematic reviews of large volumes of research are becoming available, but will systematic reviews prove to be too academic to apply to real-life practice?

In the realm of nonsurgical periodontal therapy, dental hygienists today have several resources for evidence-based information, including the Cochrane Collaboration; reputable peer-reviewed, evidence-based dental and medical

journals; and AAP. The Cochrane Collaboration is an international nonprofit organization that provides evidence-based health care databases including the Cochrane Oral Health Group. To date, only a handful of oral health reports from the Cochrane Oral Health Group provide pertinent information for providers of nonsurgical periodontal therapy, but the search continues for new dental/medical evidence that contributes to a better understanding of the many facets of periodontal diseases.

In 2003, AAP held the Workshop on Contemporary Science in Periodontics, at which the role of evidence-based methodology in clinical practice was discussed in detail. AAP regularly publishes consensus statements and position papers on topics that pertain to nonsurgical periodontal therapy, as well as evidence-based systematic reviews on pertinent topics.

Where were we before EBDM, and how did we make clinical decisions? Many clinicians used personal experience, journal/magazine articles, lectures, authorities such as instructors or dentist-employers, or peers. Because of the limitations of these particular sources of knowledge, it is hoped that dental hygiene clinicians today understand the value of research-based practice.^{17,18} Systematic reviews of published research are conducted in the hope that practitioners will base treatment on the findings.

Some Old and New Paradigms in Periodontics

Until recently, the contribution of plaque biofilm to the development of gingival and periodontal diseases has been the predominant focus in clinical practice. In particular, some clinicians support the use of specific antibiotics or antimicrobial agents, whereas others focus more on mechanical plaque biofilm removal. Still others prefer to combine the two approaches.

It wasn't until 2002 that dentistry and dental hygiene began to embrace the concept of biofilm.¹⁹ When technology allowed the visualization of "dental plaque" in its natural state, as a complex mixture of microorganisms representing more than 500 species, the plaque ecosystem or housing was revealed, which we now refer to as a biofilm. Knowledge of its structure and function changed our concept of how aerobic and anaerobic bacteria are distributed, and why anaerobic bacteria are sometimes found in supragingival areas.^{19,20}

Another noteworthy paradigm shift is beginning that may be even more significant. There is mounting evidence of relationships among and between systemic, genetic, environmental, and anxiety conditions and periodontal disease.¹⁰ Recognizing the mouth as a portal to the rest of the human body might help save the lives of individuals at high risk for certain systemic conditions like cardiovascular disease or stroke. The mere presence of periodontitis may be adding to the inflammatory burden of the individual.¹⁰ Physicians, nurses, and other health care workers outside of oral health

care need to be aware that the source of an increased inflammatory burden may be the mouth.

Clinical research studies over time have found that thorough, conventional SRP in clients with moderate to advanced periodontitis results in significant clinical improvement in visible manifestations of inflammation, decreased probing depth, and gain in or relative stability of clinical attachment levels.¹⁰ Some periodontal researchers are now testing another theory that marked clinical improvement could result from lower total numbers of bacteria combined with the activation of the body's immune response. Roy Page, DDS, PhD, associate dean of the Research Center in Oral Biology; professor in the Department of Pathology; and professor in the Department of Periodontics at the University of Washington, describes current research as an investigation into "vaccination of the client with their own pathogens."²¹

A pharmacotherapeutic advancement used to enhance outcomes for some patients is host-modulatory therapy. Some clinicians use host-modulatory therapy as an adjunct to conventional SRP in patients at high risk for periodontal disease, such as people who smoke and people with diabetes.²²⁻²⁴ Meta-analysis of preliminary data has shown that the adjunctive use of doxycycline (20 mg taken twice daily) along with SRP resulted in significant improvement in probing depth reduction and clinical attachment gain when compared to conventional SRP.¹⁰ At present, Periostat® is the only host-modulatory agent approved for use in dentistry by the Food and Drug Administration.

Diabetes and Clinical Considerations

Although diabetes was considered a risk factor for periodontal infection in the 1980s, its immunoinflammatory component was not well recognized. Even though the bacterial challenge of periodontitis is the same for people with and without diabetes, those with the disease differ from those without because their host immunoinflammatory response to pathogens is different.^{23,24} In the patient with diabetes, neutrophils do not destroy pathogens as readily as they do in others. In addition, it is theorized that massive tissue destruction occurs as a result of the overproduction of immune cells and proinflammatory mediators by other host defense cells in response to invading pathogens.^{23,24}

Recent evidence also suggests that periodontitis might increase risk of a person with diabetes losing glycemic control, which is most likely to occur in patients with a severe form of periodontitis.²⁴ More important, periodontal therapy that combines mechanical debridement (SRP) and a tetracycline antibiotic seems to improve glycemic control in some patients with diabetes.²⁴

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Local Delivery Anti-Infective Pharmaceutical Agents

From the 1990s onward, controlled-release anti-infective pharmaceutical agents have been used as alternatives to traditional mouthrinsing and irrigation. Tetracycline fibers are no longer commercially available, but other local delivery antibiotics currently in use can be applied directly into the periodontal pocket, which results in higher drug concentrations than a systemic antibiotic can provide. In addition, these drugs exhibit sustained, long-term release and less risk of systemic side effects.¹⁰ Clinical studies have repeatedly demonstrated statistically significant gains in clinical attachment levels, and decreases in probing depths and bleeding, in sites that were 5 mm or deeper.¹⁰

The two local delivery antibiotics available commercially are Atridox® and Arestin®. Clinicians need to weigh the benefits of local delivery antibiotics against their cost. Even though probing-depth reduction in pockets treated with local antibiotics may represent a 50–70% improvement over SRP alone, the differences amount to an average of only about 0.5 mm.²⁵ In addition, in some of the clinical studies, local delivery agents were applied subgingivally using more than one dose, which could significantly increase the initial cost of the localized delivery agent.¹⁰ The Cochrane Oral Health Group has developed a protocol for a systematic review of local delivery antimicrobials for chronic periodontitis, but the results have not yet been published.²⁶

Another local delivery agent worth mentioning is the chlorhexidine gluconate chip (PerioChip®). Clinical results have been positive, with an average pocket reduction similar to those of local delivery antibiotics.¹⁰

Some clinicians use local delivery antimicrobials at initial therapy (at the time of SRP) and others apply them at reevaluation in pockets with poor clinical outcomes. Local delivery antimicrobials also can be applied in localized pockets during periodontal maintenance. Clinicians frequently use bleeding sites and probing depth reduction as surrogate clinical outcomes following SRP, but their validity and reliability have been questioned.^{10,27} Probing depth reduction following periodontal therapy does not provide any information about outcomes such as retention of teeth, comfort, function, and aesthetics, all of which are important to clients.¹⁰

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New Technologies and Equipment

Because technology and equipment change and become outdated so rapidly, clinicians must adapt quickly and be prepared to learn new skills to be able to compete effectively. Traditional ‘chat and polish hygienists’ who continue to

Table I. State-of-the-art technology choices for periodontal therapists

- Computer-controlled local anesthesia delivery system
- Intraoral camera
- Automated and voice activated periodontal probing systems
- Digital radiography
- Video-based counseling/educational systems with flat panel monitors
- Phase contrast microscopy
- Chairside laboratory tests for malodor and anaerobic periodontal pathogens
- Periodontal endoscope and other calculus-detecting fiber optic probes
- Computer- and Web-based periodontal risk calculator
- Ultrasonic/Air polishing devices with built in sterile irrigation systems, fiber-optic illumination system and thin, probe-like microultrasonic inserts. (Some ultrasonic units have an analgesic accessory.)
- Wrist blood pressure cuff with advanced position
- Magnification loupes with illumination
- Ergonomic hygiene stools and ergonomic dental chairs with built-in back massager
- Subgingival periodontal anesthetic gel (2.5% prilocaine/2.5% lidocaine)

practice with outdated skills and protocols may find themselves at a professional disadvantage.

Practice emphasis in the 21st century is on state-of-the-art technology that can be applied to every aspect of nonsurgical periodontal therapy. Table I lists some of the new technologies and equipment available to today’s dental hygienist/periodontal therapist. Dental hygiene operatories in many modern dental practices include video-based counseling systems with flat panel monitors—ideal for viewing and discussing intraoral images and digital radiographs. Some dental units even have programmable, motor-driven headrests! In selecting high-tech equipment, clinicians must consider the evidence that supports its use, the increased cost to the client, and how quickly it will be worn out or obsolete.

Years ago, nonsurgical periodontal therapy was accomplished without any devices that aided in the visualization and detection of subgingival calculus. Today, an automatic detection system called DetecTar® uses a fiber-optic probe to detect subgingival calculus, at which point it lights up and makes a sound. Calculus can also be detected with an endoscope. The DV2 Perioscopy™ System was developed so that oral health care clinicians could explore and visualize the periodontal pocket. It produces an image of the root surface, including furcations, and can detect root fractures and root caries at crown margins. A 2004 pilot study that

compared conventional SRP to SRP with Perioscopy™ revealed no statistically significant differences in clinical (including inflammatory) markers or inflammatory analysis of the control and experimental sites.²⁸ Further studies are needed to determine the effectiveness of Perioscopy™ as an adjunctive therapeutic tool to enhance nonsurgical periodontal therapy outcomes.

A new risk assessment tool called the Previser Oral Health Information Suite™ includes a Web-based Periodontal Risk Calculator, which assesses a person's risk of periodontal disease based on nine risk factors: age, smoking history, diabetes diagnosis, history of periodontal surgery, probing depths, furcation involvement, restorations or calculus below the gingival margin, radiographic bone height, and vertical bone lesions. Clinicians print one copy of the risk score for the chart, and present another to the client along with detailed information about the score's significance. "Previser's risk assessment technology has been clinically validated to accurately predict the course of periodontal disease as measured by tooth and bone loss."²⁹

Another chairside tool useful for nonsurgical periodontal therapy regimens is the chairside test for malodor and periodontal risk called the BANA test. This chairside test can detect the presence of three anaerobic bacteria commonly associated with adult periodontitis and malodor: *Porphyromonas gingivalis*, *Bacteroides forsythus*, and *Treponema denticola*.

To detect malodor, the clinician wipes the patient's tongue with a cotton swab. To assess periodontal risk, subgingival plaque is obtained with a curet. Samples are placed on the BANA test strip, which is then inserted into a slot on a toaster-sized incubator, which heats the sample to 55° for five minutes. If any of the bacteria are present, the test strip turns blue. The bluer it turns, the higher the concentration of organisms. A color guide is printed on the container.

No single set of criteria is sufficient to tell clinicians all there is to know about a patient's level of disease, mainly because the disease has bacterial, environmental, and host factor etiologies. For clinicians who wish to obtain more reliable probing measurements, with a spectacular display of technology particularly in the area of capturing and storing data, automated and voice activated periodontal probing systems are available in different price ranges. Automated probing systems have the advantage of maintaining probing forces at an ideal level³⁰ and clients receive a colorful, detailed printout as an educational tool.

Discussion

As consumers continue to question the need for periodontal surgery, interest in nonsurgical therapy is at an all-time peak. General dentists in particular are looking closely at dental hygiene departments within general dental practices as an additional revenue source, while dental hygienists are becoming passionate about their role as periodontal therapists in the dental hygiene department.

Today's clinical practices are strikingly different from those in the 1980s, and nonsurgical periodontal therapy is teeming with unprecedented challenges and opportunities for dedicated clinicians; for example, the goal of creating predictable and successful clinical outcomes. Under these circumstances, the potential for the advancement of the dental hygiene profession is extremely favorable: new equipment, devices, and materials are available, and there is an abundance of rapidly changing information that affects the standard of care.

Responsible management of patients nonsurgically will reduce the need for some types of surgery and should enhance the value of other types, including implants and predictable regenerative procedures. This trend may reasonably be expected to continue well into the future as periodontal therapies continue to evolve.

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Lynne Slim, RDH, BSDH, MSDH, is president of Perio C Dent (Perio-Centered Dentistry), a practice management consulting firm; a member of the Speaking and Consulting Network (SCN); and the periodontal therapy columnist for *RDH* magazine. She can be reached at periocdent@mindspring.com.



Colleen Rutledge, RDH, is a national speaker, practicing dental hygienist, and the owner of Perio-Therapeutics & Beyond, a consulting firm. She also serves as trustee for her local component and is a member of Speaker/Consultant Network and CollaGenex Pharmaceuticals, Inc. Speakers Bureau. She welcomes visitors to her Web site: www.perioandbeyond.com.

