by Trisha E. O’Hehir, RDH, MS, Hygienetown Editorial Director

It’s hard to miss all the buzz about evidence-based oral health care and evidence-based decision making these days. Examples of using evidenced-based decision making in oral hygiene usually refer to deciding a preference for one product over another based on the findings reported in systematic reviews — specifically meta analysis combining the data from several studies on a topic. Comparing research between products is a good idea, but let’s back up a step, taking a look at the scientific foundation for oral hygiene instructions in general. When establishing your oral health and prevention philosophy, it’s a good idea to have a handful of classic research studies to support basic oral health before narrowing down the choice of specific products to recommend.

Over the years, many classic research papers have been published dealing with basic oral health facts that create a foundation for your prevention philosophy. Identifying areas in the mouth at greatest risk of dental disease provides the basis for developing an effective oral hygiene program. Rather than giving every area in the mouth the same degree of attention and time, targeted oral hygiene will focus the limited time now spent on oral hygiene on the areas in the mouth at greatest risk and will provide greater value in return for the time spent.

Next are the studies identifying the most effective approaches to disrupting bacterial biofilm. This also includes an evaluation of which traditional approaches work and which don’t, plus a look at innovative approaches that work as well, if not better than, traditional means. Before embarking on “evidenced-based decision making” between various toothbrushes or floss products, look to the research to determine if today’s traditional approaches to follow. It’s time to break away from traditions that do not provide the best outcomes possible and look to the research for answers and guidance. Scientific research together with the experience of the clinician and the preferences of the patient are more likely to achieve greater oral health than continuing with the brushing and flossing tradition.

**What is the Research Base for Daily Oral Hygiene?**

The primary reason oral hygiene instructions are given to patients is to prevent both caries and periodontal disease. Toothbrushing is the most commonly taught approach, despite the fact that caries and periodontal disease affect proximal surfaces more often than surfaces reached by a toothbrush. The smooth surfaces at greatest risk for caries and periodontal disease are the surfaces between the teeth, not facial and lingual where the toothbrush reaches. For that reason, Axelsson et al. recommends that daily oral hygiene begin between the teeth on interproximal surfaces first, before toothbrushing.

Since the proximal surfaces are at greatest risk, toothbrushing should not be taught first. Toothbrushing is taught first based on tradition, not a clear focus on preventing or controlling disease. Toothbrushing is taught first because it’s considered easier to do than flossing. Others teach toothbrushing first because that’s the one basic oral hygiene task performed daily by nearly all adults. Just because that’s a fact doesn’t make it a sound scientific decision. Since disease begins between the teeth, daily oral hygiene between the teeth should be mastered before toothbrushing.

**Toothbrushing**

After the bacterial biofilm has been disrupted on all the proximal surfaces, only then should the focus be turned to brushing. Interestingly, toothbrushing isn’t very effective. Toothbrushes, either manual or powered, are simply a stick with bristles. Effective toothbrushing depends completely on proper placement of the brush head, proper motion of the manual brush or powered brush and adequate time to effectively disrupt the bacterial biofilm. Not everyone has the dexterity or the attention to focus on proper brush placement and brushing. Children, those

*continued on page 122*
with arthritis, the elderly and those in the hospital often fail to effectively brush their teeth. In many research studies evaluating either professional toothbrushing or at home brushing the effectiveness of plaque removal is about 50 percent at best.

Toothbrushing instructions suggest following a systematic pattern that does not reflect a needs-based approach. It makes sense to begin brushing the areas at greatest risk of bacterial plaque biofilm formation and gingivitis. According to research published by DeVore, et al., the area at greatest risk is the lower lingual, specifically the right side for right-handed brushers and left for left-handed brushers. However, toothbrushing brochures and packages suggest brushing front teeth first, the area at least risk of biofilm accumulation and gingivitis. This anterior-first approach is based on tradition and perhaps the idea that showing brushing on the facial surfaces of the anterior teeth is easier than focusing on the areas at greatest risk of disease. Proper brush placement to reach posterior mandibular lingual areas is more difficult and requires more patience and instruction for patients to successfully achieve.

Despite the efforts of dentists and hygienists to convince people to follow a systematic approach to brushing that covers all surfaces equally, research published by MacGregor and Rugg-Gunn demonstrated that toothbrushing patterns are erratic and not methodical. When observed and recorded with a hidden video camera, these children and young adults began brushing on maxillary facial surfaces corresponding to the hand they use to hold the toothbrush and returned to those areas several times during brushing. Rarely were the lingual surfaces ever brushed. Only 10 percent of their brushing time was spent on lingual surfaces. Total brushing times for these subjects varied from 38 to 60 seconds. Ten percent or 3.8 to six seconds isn’t much time to brush the area at greatest risk for plaque accumulation and gingivitis. This study was done before rules were in place to inform study subjects they were being videotaped. For that reason, this study is now a classic that can’t be repeated. Telling patients they will be videotaped while toothbrushing will result in brushing times much longer than normal.

In an effort to reduce calculus formation on the lingual of the lower anterior teeth, hygienists and dentists have told patients for years to brush the inside of the lower front teeth first. A study published in JADA in 1998 by O’Hehir and Suvan confirmed what clinicians already knew. Instructing patients to dry brush inside first, brushing all the teeth in the mouth until the teeth felt clean and tasted clean resulted in a reduction in lingual calculus of 63 percent and a reduction in bleeding of 55 percent. It makes sense to instruct patients to begin toothbrushing in the area at greatest risk of plaque and calculus accumulation and gingival bleeding. Simply changing the toothbrushing pattern will impact effectiveness.

**Most Effective Biofilm Removal**

Xylitol is a natural sugar that bacteria can’t metabolize. Xylitol also interferes with acid production by the bacteria and breaks down biofilm integrity. Early studies with xylitol showed an amazing reduction in plaque levels when consumed several times each day. When consumed three to five times daily, xylitol reduced plaque accumulation by 50 percent. Interestingly, toothbrushing also reduces plaque by 50 percent. Toothbrushing depends on the dexterity of the person holding the toothbrush. Xylitol works no matter what the dexterity. By using xylitol daily the first 50 percent is removed no matter what the toothbrushing skill level. There is no skill needed, simply chew gum, suck on candy or use toothpaste, mouthrinse, gel or dry mouth spray sweetened with 100 percent xylitol. Perhaps focusing the toothbrushing on areas at greatest risk will then reach a higher percentage of plaque reduction. This is especially true for those who are unable to even remove 50 percent of plaque with a toothbrush. It makes sense to encourage people to use xylitol daily to control plaque biofilm. Based on these findings, xylitol consumption should be the method of choice for disruption and prevention of plaque biofilm forming on facial and lingual surfaces.

The research supporting daily xylitol use has accumulated for the past 40 years, long enough to confirm original findings and determine dosage suggestions. Xylitol research studies don’t directly compare toothbrushing with daily xylitol use, but clinicians determined to help patients achieve the best oral hygiene possible will see xylitol as an option to reduce plaque biofilm with something easier to use than a toothbrush. This shifts the emphasis from toothbrushing instructions to discussions about plaque biofilm formation and disruption using xylitol.

**The Hawthorne Effect**

The participation in a research study motivates people to do better than average work. This is called the Hawthorne Effect. In oral hygiene studies, the Hawthorne Effect is responsible for more plaque removal and reductions in bleeding when subjects are told to continue doing their regular oral hygiene. This research phenomenon can be used to achieve better oral health in your patients. If ever you find yourself rushed and with no time to discuss oral hygiene, simply tell patients they are in a research study and they should continue doing their regular oral hygiene. Let them know at the next visit bleeding and plaque scores will be measured. Of course, some will completely forget what you’ve told them by their next visit, but for those who take it seriously, you should expect to see a 35 percent reduction in plaque and bleeding, due to the Hawthorne Effect. Simply participating in a research study motivates people to do their best. Why not put all your patients into a research study?

Check out this month’s Perio Reports for summaries of the classic research studies mentioned in this article. These studies provide a basis for discussion and debate among your team members as you define and refine your prevention philosophy as it relates to toothbrushing. Have fun with this topic and push the edges of your traditional philosophy. You might even become comfortable telling patients to skip toothbrushing and start cleaning in between.