The New Standard for Preventio

by Trisha E. O'Hehir, RDH, MS

Despite what you're hearing about immune response and genetic predisposition, the primary etiologic factor for both caries and periodontal disease is still bacterial biofilm. Bacterial biofilm accumulates in areas that are well protected, specifically between the teeth and under the gums. Areas between the teeth, just below the contact point are also the places carious lesions begin. The bacteria metabolize sugars and produce lactic acid that melts the enamel. Caries is as much about pH as it is about bacterial biofilm. Periodontal tissue under the contact, called the col area, is less keratinized than facial and lingual tissue and thus more susceptible to the toxic waste products released by the bacterial biofilm. The toxic waste products trigger the immune response and white blood cells are dispatched to the area to attack the bacteria, but on the way to the sulcus, they destroy connective tissue and bone. Caries and periodontal disease are still significant problems that can be prevented.

According to text books authored by Dr. Per Axelsson, both caries and periodontal disease are more prevalent between the teeth than on facial or lingual surfaces. Despite this fact, oral hygiene instructions of the past put greater emphasis on brushing surfaces than on interproximal surfaces, the surfaces at greatest risk of disease. Brushing was always taught first, followed by flossing. Occasionally an interdental brush was recommended, rarely was oral irrigation suggested and xylitol was a well-kept secret. To this day, many think oral hygiene instruction means brushing and flossing. That was the standard of care, until today.

Today is the dawning of a new standard of care for oral hygiene instructions. This is the new prevention, where brushing comes last, not first. Prevention is no longer simply a stick with bristles and a piece of string – both of these require skill by the user. What about children, teens, the elderly, nursing home residents, people with arthritis or those in hospitals? Prevention needs to work even when individuals don't have skills or dexterity to brush and floss. The new standard for prevention controls bacterial biofilm first with xylitol and oral probiotics and then with sticks, picks, interdental brushes or water between the teeth and brushing comes last.

Bypass Mechanical Skills with Xylitol and Oral Probiotics

Brushing and flossing require skill and dexterity to effectively remove bacterial biofilm. Reviewing the research, Dr. van der Weijden reported a 50 percent reduction (at best) in plaque and gingivitis scores with oral hygiene instructions and prophylaxis. This is not a very good success rate, primarily because of a lack of dexterity and accuracy with a toothbrush and dental floss. Also lacking is a way to measure if the plaque is successfully removed.

There is a way to reduce plaque levels 50 percent without relying on the skill and technique needed for brushing and flossing. According to research published in the 1970s by Drs. Scheinin and Makinen, five exposures of xylitol each day will reduce plaque levels up to 50 percent. That's comparable to the effect of daily brushing and flossing. Introducing xylitol five times daily will change the bacterial environment by blocking the metabolism of sugar. Xylitol is a natural sweetener, but it is a five-carbon molecule rather than a six-carbon molecule like fructose, glucose and sorbitol. The smaller molecular size allows the xylitol to pass through the bacterial cell wall. However, the bacteria is unable to metabolize the xylitol and has to use its own membrane pump to pump out the xylitol molecule. The xylitol molecule simply turns around and goes back inside the bacteria, creating a cycle of energy use by the bacteria with no energy being derived from the xylitol molecule. The bacteria cannot produce more acid, cannot communicate with neighboring bacteria and therefore no polysaccharide slime is produced to keep the biofilm intact. The biofilm dissolves and the bacteria simply slides off the teeth and down the digestive tract. At the same time, the oral pH is elevated.

Oral probiotics are now available to change the balance of bacteria in the mouth to a balance that favors health. The bacterial make-up of a healthy mouth is much different from a mouth full of cavities or periodontal disease. By studying the healthy mouths as well as those with disease, researchers have identified bacteria present in healthy mouths that are missing from diseased mouths. Oral probiotics deliver the missing bacteria in a xylitol mint or candy to be dissolved in the mouth, thus delivering millions of colony-forming units of the missing bacteria to change the balance of bacteria in the oral cavity. Creating a healthy mix of bacteria in the mouth prevents caries and periodontal disease. Xylitol and oral probiotics provides reliable measures to reduce bacterial biofilm without depending on manual dexterity skills to mechanically remove bacterial biofilm with a toothbrush and dental floss.

The first two steps in the new standard for prevention require no skill on the part of the user, simply use xylitol products five times daily and oral probiotics twice daily. Xylitol is available in many forms – gums, candies, gels, baby wipes, toothpaste, mouth rinse and packets for eating. Xylitol is also used to sweeten oral probiotics. Look for products like those from Spry that are 100 percent xylitol-sweetened and available in health food stores or online. Evora probiotics provide the missing oral bacteria to establish a healthy oral flora.

Mechanical Disruption

With the bacterial biofilm reduced significantly with xylitol and the bacterial balance shifted toward health, it's time for the mechanical disruption of the remaining plaque biofilm. Since disease begins between the teeth, it makes sense to start the mechanical disruption of biofilm between the teeth, using sticks, picks, interdental brushes or oral irrigation. Flossing statistics from Drs. Steward and MacGregor confirm what dental professionals already know – two to 10 percent of people actually floss on a daily basis. It seems the only people who floss regularly and effectively are hygienists and dentists! Patients are skillful at putting floss between their teeth without ever touching the plaque or going below the gingival margin. Offer other alternatives that are easy to use and comfortable. The most overlooked option for interdental plaque disruption is oral irrigation; it's like flossing with water. Oral irrigation is effective in blasting off huge sections

continued on page 9

continued from page 8

of biofilm both supra and subgingivally. It's also easy to do; simply aim the jet tip 90 degrees toward the interproximal space and hold for a few seconds. Done.

The last step in the mechanical disruption process is the toothbrushing. Working with what people are already doing will make this part successful. According to Dr. Beals, people in the U.S. spend only 37 seconds brushing their teeth. Using this as a starting place, the only toothbrush to cover all surfaces in such a short time is the 30-Second Smile power toothbrush. This brush is a car wash for the mouth. Simply bite on the brush head and it will brush top, bottom, inside, outside and biting surfaces all at once, taking only 30 seconds to cover the entire mouth. This brush removes the need for skill in placing and moving the toothbrush correctly. Many standard power toothbrushes now have two-minute timers to ensure adequate time to move the brush around to all surfaces of the teeth.

For those using a manual toothbrush, the short brushing time is due to the foaming and bubbles of toothpaste. Without toothpaste, people brush much longer and more evenly around the mouth. Plaque biofilm levels are the highest on the lingual of the lower teeth, especially the right side. This is where toothbrushing should start. Instruct patients to start brushing on the lower lingual surfaces and brush until all the teeth feel clean and taste clean. When the biofilm has been removed, then add toothpaste and brush once more around the mouth. Brushing without toothpaste allows the patient to feel the bacterial biofilm before and after brushing, something not possible when using toothpaste due to the flavor and wetting agents. Toothpaste makes the mouth feel clean when it's not yet clean. Dry brush first until the teeth feel clean and taste clean, then add toothpaste.

The tongue also needs to be cleaned to remove bacterial biofilm and volatile sulfur compounds. No gold standard has yet been identified for tongue cleaning, so recommend what you prefer to use yourself. Some prefer a brush, others prefer one of the many tongue scrapers now available. Gentle brushing or scraping will remove tongue biofilm.

Self-tests for Prevention

Feeling bacterial biofilm on the teeth, testing the salivary pH and checking for bleeding between the teeth are three easy self-tests. Before any action to control the biofilm, teach patients to feel the biofilm in their own mouth using their tongue. Focus on the lingual of the lower posterior teeth along the gingival margin and along the gingival margin on the facial surfaces of the maxillary molars. Using the tongue they can feel for biofilm before and after each oral hygiene session and throughout the day as biofilm accumulates. Knowing where the biofilm is before taking action will provide the feedback to evaluate toothbrushing effectiveness. In order for the tongue to evaluate bacterial biofilm removal, toothbrushing needs to be done first without toothpaste until the bacterial biofilm is removed. After the teeth feel clean to the tongue the toothpaste can be added.

Testing salivary pH is easy using a piece of litmus paper or a pH strip. Simply spit into a spoon and then apply the pH strip and check the color change. The pH strip is also good for checking the pH of foods, drinks and oral hygiene products. People are surprised that drinking coffee all day will lower their salivary pH.

The Eastman Interdental Bleeding Index (EIBI) is a toothpick test for interdental bleeding developed by Drs. Caton and Polson. It was shown in a study by Dr. Bliedin to be more reflective of interdental inflammation than bleeding on probing scores. Where interdental space allows, insert a triangular wooden stick from the facial and push in and out four times, looking for bleeding within 15 seconds. This can be done in all interproximal areas to check for bleeding, a sign of infection. Although no research has been published using plastic sticks, they just might provide similar information about interdental infection when used to do the EIBI test.

Five Parts of the New Standard of Prevention

1. Xylitol five times a day
2. Probiotics
3. Start cleaning in between
4. Dry brush
5. Tongue cleaning

Conclusion

It's time to move beyond brushing and flossing to the new standard for prevention. Today prevention focuses first on changing the oral environment with xylitol and oral probiotics before cleaning between the teeth and eventually brushing and tongue cleaning. Feeling plaque biofilm with the tongue before and after brushing, testing pH of the saliva and checking for bleeding between the teeth are easy ways to monitor success. Giving patients the science, ingredients and tools to effectively control bacterial biofilm and salivary pH is the new standard for prevention. ■

References

1. *Axelsson, P.: Diagnosis and Risk Prediction of Dental Caries. Quintessence Publishing, 2000.*
2. *Axelsson, P.: Diagnosis and Risk Prediction of Periodontal Diseases. Quintessence Publishing, 2002.*
3. *van der Weijden G., Hioe K.: A systematic review of the effectiveness of self-performed mechanical plaque removal in adults with gingivitis using a manual toothbrush. J Clin Perio; 32 (Suppl. 6): 214–228, 2005.*
4. *Scheinin, A., Makinen, K.: The effect of various sugars on the formation and chemical composition of dental plaque, Inter Dent J, 21:302–321, 1971.*
5. *Scheinin, A., Makinen, K.: Effect of sugars and sugar mixtures on dental plaque, Acta Odon Scand 30: 235–257, 1972.*
6. *Steward, J., Strack, S., Graves, P. Development of oral hygiene self-efficacy and outcome expectancy questionnaires. Com Dent Oral Epid 25: 337–342, 1997.*
7. *Steward, J., Wolfe, G.: The retention of newly-acquired brushing and flossing skills. J Clin Perio 16: 331–332, 1989.*
8. *Macgregor, I., Balding, J., Regis, D.: Flossing behaviour in English adolescents. J Clin Perio 25: 291–296, 1998.*
9. *Beals, D., Ngo, T et al. Development and laboratory evaluation of a new toothbrush with a novel brush head design. A J of Dent 13, 5A–14A, 2000.*
10. *Caton, J., Polson, A.: The interdental bleeding index: a simplified procedure for monitoring gingival health. Comp of CE in Dent 6: 89, 1985.*
11. *Bliedin, T., Caton, J. et al: Examiner reliability for an invasive gingival bleeding Index. J of C Perio 19: 262, 1992.*