Mechanical plaque control is still the most effective means of preventing gingivitis and periodontitis. The initial gingival lesion begins within four days of undisturbed plaque growth. Thorough mechanical plaque removal on all tooth surfaces every other day effectively prevents clinical signs of gingivitis. The every-other-day, all tooth surfaces approach is more effective than the current practice of daily brushing of facial and lingual surfaces, since these surfaces are at lower risk of developing gingivitis than interproximal surfaces.

Plaque accumulates first on the proximal surfaces of mandibular molars and premolars, followed by the proximal surfaces of the maxillary molars. The maxillary lingual surfaces accumulate very little plaque in comparison.

Rather than repeating tedious, detailed oral hygiene instructions to patients, we should engage them in self-diagnosis to identify areas at risk and a plan to focus oral hygiene on those areas.

Linking is a means of connecting an established habit with a desired new habit. An example is linking interdental cleaning to brushing, by having patients clean between their teeth before brushing. If the new habit is done first, before the established habit, it is less likely to be forgotten, and the established habit will be retained.

Clinical Implications: Both daily oral hygiene and professional dental hygiene visits need to focus on effectively removing interproximal bacterial plaque rather than simply cleaning facial and lingual surfaces.


What effect does patient plaque control performance have on plaque score changes? Fifty percent seems to be the recurring number for buccal, lingual and interproximal surfaces. Twenty-four patients with moderate to severe periodontitis took part in the study. A plaque score was done prior to any treatment. The average score for buccal surfaces with plaque was 30 percent, lingual surfaces 40 percent and interproximal surfaces 80 percent. Oral hygiene instruction included a soft bristle brush, dental floss and interproximal brushes, where space allowed. Scaling and root planing was done by quadrant or sextant and usually involved at least four to six appointments.

Following this initial therapy, plaque scores were again measured. Buccal surfaces scored 15 percent, lingual 20 percent and the interproximal 40 percent, a reduction of 50 percent for each area. Plaque scores remained the same following the surgical phase of therapy for the buccal surfaces. The lingual and interproximal surfaces showed a slight increase in plaque scores. In particular, the lower right posterior lingual area was the most difficult area to clean.

Clinical Implications: Toothbrushing only removes 50 percent of plaque and the lower right lingual is the most difficult area to reach.

Video Used to Record Brushing Patterns

Researchers in England used a videotape to document toothbrushing patterns for 85 11- to 13-year-olds and 30 18- to 22-year-olds. The videotaping was done without the subjects knowledge, a technique no longer possible due to strict rules regarding informed consent of study participants. The patients had agreed to participate in a dental study, but were not told their brushing would be observed. They were simply told to go to the sink and brush their teeth as usual, before beginning the study. The sink and mirror were set up in a doorway, completely shielding from view the room behind which held the video equipment.

The videotapes were reviewed several times to determine toothbrushing sequence, hand preference and time spent in each of 16 sections of the mouth. Maxillary and mandibular sextants were divided between facial and lingual, accounting for 14 areas, plus occlusal surfaces in each quadrant for a total of 16 sections.

Toothbrushing began most often on the maxillary facial surfaces, with a cross-arch start for most brushers, that is, right-handed brushers started on the left side and left-handed brushers started on the right side. Only two people brushed with both hands and nine people were left-handed.

The pattern observed most often was erratic, with the brusher returning several times to the first area brushed, which was a maxillary facial surface. Forty-five percent of the study subjects neglected the lingual surfaces entirely, while those who did brush the lingual surfaces spent only 10 percent of their brushing time in that area, usually leaving it until last.

The average time spent brushing by the 11-13-year-olds was 60 seconds in sharp contrast to only 38 seconds for the 18-20-year-olds.

The authors concluded that individualized, as well as group instructions, and printed information on tooth brushing should stress lingual and palatal brushing, since these areas are so frequently missed. The importance of toothbrushing patterns was established by this study.

Clinical Implications: Videotapes revealed erratic brushing patterns with little or no time spent on lingual surfaces.

Dry Brush Inside First

Toothbrushing instructions focus primarily on brush placement and brushing stroke without focusing on where to start or what order the teeth should be brushed.

Twenty-nine private practice RDHs across the United States tested the “dry brushing inside first” approach on a total of 126 recall patients. Baseline data included bleeding on probing and calculus scores measured on the lingual surfaces of the mandibular teeth.

Patients were simply instructed to brush the inside of their bottom teeth first with a dry toothbrush, no water and no toothpaste. They were instructed to brush their entire mouth without toothpaste until teeth felt clean and tasted clean. Then they rinsed their brushes with water and brushed again with toothpaste. Bleeding and calculus scores were recorded again at their next recall visit, an average of six months later.

Bleeding scores were reduced 55 percent overall. Calculus scores were reduced 58 percent for all mandibular lingual surfaces and 63 percent for the anterior section alone. Notes from the examiners indicated that patients reported brushing longer than usual as a result of this approach. Some of the patients were so excited with the results that they made unscheduled visits to the dental office to point out their lack of calculus and improved gingival health.

Clinical Implications: Instructing patients to dry brush first until the teeth feel clean and taste clean and then add toothpaste will lead to longer brushing times and more effective plaque removal.


How Xylitol Research Began

The first caries studies using xylitol began at the University of Turku in Finland in late 1969. The first study compared 100 percent xylitol consumption to sucrose, glucose or fructose consumption. These sweeteners were consumed as sweeteners in coffee, tea, rolls and candies. Subjects also swished with a mixture of their assigned sugar and water five times each day. Dental students were the test subjects and they refrained from oral hygiene during the four-day study. Those consuming xylitol demonstrated the greatest reduction in plaque accumulation, a reduction of 50 percent. Plaque was removed from all surfaces of the teeth and weighed. Those consuming sucrose had an average plaque weight of just more than 40mg compared to less than 20mg for the xylitol group. Plaque weight in the fructose group was just less than 30mg and in the glucose group it was just more than 30mg. A second study of five days was repeated a year later with similar results.

Based on the findings from these first two studies the “xylitol concept” for caries prevention was presented to the world dental health community in 1975 for the purposes of expansion of this research and verification of the findings by other researchers. Over the next 30 years, many independent researchers in a variety of long-term clinical trials and hundreds of short-term laboratory studies confirmed the original findings. Many of the clinical studies used chewing gum as the delivery system for xylitol.

Clinical Implications: Xylitol consumed several times each day will reduce plaque levels approximately 50 percent when compared to plaque levels in a sucrose diet.


The Hawthorne Effect

From 1924 to 1927, research was conducted at the Western Electric Company, Hawthorne Works, in Chicago, to evaluate the effect of illumination on worker efficiency. Rather than demonstrating a correlation between room light and productivity, they showed worker efficiency increased simply by participating in the research. This has become known as the Hawthorne Effect.

The first experiment compared three departments exposed to room illumination increased at different rates. One department showed fluctuating production, and the other two departments showed production increases seemingly independent of the increase in illumination.

To control for differences in work and workers, the second experiment was conducted in a single department with workers of similar age and experience. A control group was established that worked under standard illumination while the test group worked under variable illumination intensity. Results for both groups showed a steady and nearly identical increase in production.

Thinking that the combination of natural and artificial light might have influenced the first two experiments, the third experiment tested only artificial light. The control group worked under constant light of 10 foot-candles, while the test group started at 10 foot-candles and decreased in one foot increments to three foot-candles, at which time workers protested the darkness and production decreased. However, production had steadily increased for both groups until a level of three foot-candles had been reached in the test group.

The phenomenon of improvement simply because of participation in a research study has become known as the Hawthorne Effect. This effect is often apparent in oral hygiene studies. Improvements of up to 35 percent for plaque and gingivitis scores are reported for study subjects when their actions will be evaluated but no changes are made to their oral hygiene routine.

Clinical Implications: To improve oral hygiene, simply tell all your patients they are part of a research study!