Higher caregiver education level linked to fewer cavities in children

By Dr. Safura Baharin, Malaysia

Demand for dental treatment has been increasing in recent years as people have become more aware of their oral health and the benefits of good dental aesthetics. Maintaining and practicing stringent cross-infection control procedures therefore have never been more essential to ensure the health and safety of dentists, dental hygienists and assistants, as well as other supporting staff who may be indirectly involved in the treatment process.

Dental professionals are at high risk of cross-infection. A report published in 1999 has shown that in developing countries, for example, the number of dental staff contaminated during treatment is increasing by almost 6 percent each year. [1] Research has shown that infectious micro-organisms can be transmitted by blood or saliva via direct or indirect contact, aerosols, or contaminated instruments and equipment.[2] As stated by the US Centers for Disease Control and Prevention (CDC) in their 2003 guidelines, the transmission of infectious disease can occur in four ways: direct contact with blood or body fluids, indirect contact with contaminated objects or surfaces, contact with bacterial droplets or aerosols, and inhalation of airborne microorganisms.[3]

The most likely mode of transmission in dentistry is through inhalation of bacterial aerosols or splatters. Their potential health hazards are well documented and acknowledged. [4–9] Both can be host to a large variety of micro-organisms and viruses, which can be infectious to susceptible individuals. During treatment, the dentist’s face and patient’s chest are most affected by splatter, as the majority of the splatters are radiated towards them.[10, 11] According to studies, the most contaminated area on the dentist’s face during treatment is around the nose and inner corner of the eyes.[11] Splatter consists of large particles of greater than 100 µm generated during the use of dental equipment, such as turbines, ultrasonic scalers, or water and air syringes. Owing to this, splatter tends to travel in a trajectory, thereby contacting objects in its path. Aerosol consists of smaller particles.

Infection control in dentistry has never been more essential

By Dental Tribune International

CLEVELAND & SEATTLE, USA: A recently published study has found that the prevalence of caries is lower in children of caregivers with a higher level of education. Individuals with low literacy often have poorer health knowledge and status compared with those with higher levels. As children depend on their caregivers for access to and instruction on oral care, low adult literacy can negatively affect boys’ and girls’ dental health.

In order to determine whether caregiver education level affects untreated dental caries in children, the researchers looked at the frequency of dental visits, use of routine care, and frequency of toothbrushing for both the caregiver and the child in 423 African-American children of kindergarten age from low-income families and their caregivers. They observed that caregivers who completed high school visited the dentist 1.76 times more often than did those who did not complete high school. In turn, children whose caregivers had a high school education were 5.78 times more likely to visit the dentist. Moreover, children who visited the dentist more often had 26 percent fewer untreated decayed teeth compared with children who did not have routine visits. In addition, children with higher-educated caregivers had 54 percent fewer untreated decayed teeth and 28 percent fewer decayed or filled teeth, the researchers reported.

The study, titled “Caregiver’s Education Level and Child’s Dental Caries in African-American: A Path Analytic Study,” was published in the March issue of the Caries Research Journal. It was conducted by researchers at Case Western Reserve University in collaboration with the University of Washington.

Children need to be instructed on proper brushing techniques. (Photograph: Google)
Philips Sonicare DiamondClean; Product of the Year Winner in the Oral Care Category in the GCC Countries

By Philips

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UBAI, UAE - Philips is proud to present that Sonicare DiamondClean has been elected Product of the Year in the oral care category among the most valued awards in consumer perception of products.

Sonicare DiamondClean takes sonic tooth brushing to its most sophisticated level and wins by delivering Sonicare’s best clean yet removing up to 100% more plaque in hard to reach places than a manual toothbrush.

Sonicare DiamondClean harnesses Philips Sonicare’s patented sonic technology to provide a cleaning action for a difference users can see and feel. It is gentle, it reaches areas that a manual toothbrush can’t, helping to keep teeth stronger and healthier for longer. Philips Sonicare gently whips toothpaste into an oxygen-rich foamy liquid and direct between your teeth and along the gumline where plaque bacteria flourish.

Sonicare DiamondClean is clinically proven to remove up to 100% of plaque from hard to reach places and to improve gum health in just two weeks. It is also clinically proven to whiten teeth in one week, and its gentle technology actually helps protect against gum irritation and erosion to help reduce sensitivity. Now is the perfect time to go and protect your teeth’s celebrity treatment and switch to Sonicare to really experience the difference.

The brush is able to deliver a unique white mouth clean feeling thanks to its five brush modes that allow you to tailor your brushing according to your needs as well as your dental professional’s advice. The brush modes range from:

• White – removes surface contact with bacterial aerosols and splatters, is vital.

Regular maintenance of the air-conditioning system is recommended too, as good ventilation has a diluting effect on the airborne microbial load, especially at night when the clinic is closed.[14] Air samples taken at different times at a multi-chair dental clinic showed that bacterial aerosols are more concentrated during treatment and that there is higher concentration of circulating bacterial aerosols at the beginning of the day, which may be related to reduced ventilation.[14] Reduced bacterial aerosols can be removed through air filters or ultraviolet light.

As splatters can travel as far as the door or supply counter in the middle of a multi-chair dental clinic,[4] all clean, unused instruments and equipment should be kept in closed cabinets or drawers to prevent contamination. Other important measures that must be taken to prevent cross-infection include adequate sterilisation of dental instruments, disinfection of work surfaces before and after each dental procedure, disinfection of all dental materials and work sent out to the laboratory, and regular maintenance of the dental water lines and equipment, which has the potential to harbour bacteria. All dental water lines should be purged at the beginning of each day for between 5 and 30 minutes and flushed thoroughly with water, as residual water may become contaminated overnight and inflow may develop along the inner side of the tube. Purging will result in a significant decrease in bacterial counts.[15, 16]

The Canadian Dental Association recommends running high-speed handpieces and burs for 2–5 minutes after each treatment to purge all potentially contaminated air and water. This procedure has been proven to reduce the bacterial load in the water line significantly.[17] Blood cells, as well as bacterial and viral particles, can survive inside handpieces even after disinfection. They must therefore be sterilised between patients.[17, 18]

The clinic floor should be disinfected and cleaned with an antimicrobial disinfectant solution at least twice per day to eradicate any bacterial residue from splatter or aerosols.

It is a well-known fact that private dental clinics sometimes employ dental assistants who have not received certified training. Improperly trained personnel, however, may lead to poor infection control practices. It is the responsibility of every dentist to educate and train his or her assistants in the standard procedures. Furthermore, DHCP immunisation status should be up to date.

Eliminating the risk of exposure to dental aerosols remains a difficult task. The best way to reduce the risks, however, is to employ routine cross-infection protocols recommended by the health authorities, such as CDC, WHO and ministries of health. To date, various infection control reports and procedures have been published to inform and educate dental health care personnel (DHCP) about the importance of practising adequate infection control.
The Ultimate Sonicare Power Toothbrush

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New Philips Sonicare DiamondClean—the ultimate clean for ultimate results.

Help your patients experience the difference of Sonicare technology. It will be love at first brush.

• Our newest power toothbrush removes 45% more plaque than Sonicare FlexCare1 with ProResults brush head6
• Powerful yet gentle dynamic cleaning action helps improve gum health in just 2 weeks5
• Clinically proven to whiten teeth in just 1 week5


A representative independent survey conducted by TNS on a sample of 3,600 consumers in the GCC
Toothbrush developments. Oral health benefits

PPD hears from Procter & Gamble researcher Karen Claire Zimmet about the ground-breaking advances behind the Oral-B CrossAction toothbrush

By Karen Claire-Zimmet MS BS

Toothbrush research and development combines science, technology and art. Optimising toothbrush performance involves several disciplines including an understanding of mechanical systems, filament properties and physics, production technology, and in addition ergonomics and human behaviour via consumer research. This combination of efforts has yielded toothbrushes that significantly contribute to improvements in the oral health of the population.

The modern toothbrush has its origins in primitive designs (Figure 1) that had large brush heads with straight, hard and abrasive boar’s hair bristles. In the early 1900s, the first Oral-B manual brush (Figure 2) was developed with multi-threaded nylon filaments that were flattened, vertical, and end-rounded for safe brushing. This was the first modern toothbrush design and similar designs are still in use globally.

The full importance of brush head morphology and bristle configurations had yet to be discovered. Before that could happen, and more effective designs could be developed, it was necessary to fully understand the basic fundamentals and cleaning efficiencies of the individual elements that make up a toothbrush.

Understanding the fundamentals

In order to gain a thorough understanding of toothbrushes and what defined toothbrush success or failure, our team used the power of observation and created a defined problem statement: how can we maximise toothbrush bristle contact interdentally, for improved cleaning and oral health? By breaking down this problem statement into more basic elements, we were able to gain that understanding. Although toothbrushes may appear simple, they are actually quite complicated. As with complex chain molecules, that consist of basic chemical elements, at Oral-B we broke down toothbrush mechanisms and design into basic physical elements.

We developed our knowledge base by transitioning from what one could call a ‘macroscopic’ perspective to a ‘microscopic’ perspective on the variables that affect toothbrush efficacy and use, first examining brush heads, then tufts of bristles and then individual filaments. Our research needed to address how tufts behaved during use; how individual filaments moved and behaved; what influence usage had on tuft and filament direction and movement, and how this influenced plaque removal efficacy.

Other basic elements that required research included discovering which factors determine the ability of a single bristle/filament to penetrate interproximally, as well as the influence of filament and tuft length, width and shape. I had studied physical chemistry during my masters degree studies - specifically, polymer dynamics using techniques of light scattering and Fourier transform analysis to understand the time dependence of polymer behaviour. The leap from polymer dynamics to toothbrush bristle behaviour, particularly the ability and time dependence of filaments reaching interproximally, is not as large as one might first think.

More fundamentally, we further needed to thoroughly understand how consumers actually brushed - for instance, we found that a basic horizontal scrubbing motion (rather than a modified Bass technique) was used most often by consumers.

All of this was crucial knowledge - only after gaining an understanding of how consumers really use our products would we be able to improve the design of a toothbrush to work most effectively with common brushing techniques used by consumers.

A Journey of Discovery

Our basic filament dynamics research led to discoveries around the influence of filament/filament angle and diameter, and the applied brushing load on bristle penetration. I led the filament research, which included creating an experimental setup with a model dentition to enable us to study the ability of filaments to reach interproximally (Figures 3-5).

Our hypothesis was that filaments bent towards the direction of travel would be more likely to enter the interproximal gap. From this we created a defined problem statement: how can we maximise toothbrush bristle contact interproximally, as well as the importance of filament sizes and shapes, and directional change. The CrossAction toothbrush has bristle tufts with a 16º angle to the brush head in both directions, as well as tall, thin, ellipsical bristle tufts supported by dense neighbouring tufts that collapse and cannot reach interproximally while shorter, thicker filament tufts are superior for flat tooth surfaces.

We also discovered that if too much load (brushing pressure) is applied to individual bristles that they collapse and cannot enter the interproximal gap. Conversely, if too little load is applied, the bristles may ‘skip’ over the gap and miss their target. These were key learnings in defining what the final tuft density of the CrossAction design would be.

Key Learnings

- Angled bristles (>12º) are superior in reaching interproximal sites
- Longer, thinner bristle tufts are more effective interproximally
- Shorter, thicker bristle tufts are more effective on accessible surfaces
- Filament packing density influences brushing load on individual filaments and, correspondingly, the ability of bristles to contact and clean sites

The Outcome: CrossAction

The first time we tested an early prototype design of the CrossAction toothbrush in our performance laboratory we could not believe its cleaning performance, it was so good. We literally recalibrated the test and analysis equipment, to make sure there were no errors in the analysis and to confirm the calibration. We had never seen anything that performed so well, the results were off the chart!

The result of our research was a shift in the art and science of making toothbrushes, and a novel manual toothbrush design that was based on an understanding of the superiority of angled filaments, as well as the importance of filament sizes and shapes, and directional change.

CrossAction was shown in numerous clinical trials to provide superior plaque removal and gingivitis benefits versus not only various manual toothbrushes, but also battery-powered toothbrush models.

An important observation and outcome was the response of people testing the CrossAction toothbrush, as well as the reaction of dental professionals.

People loved the CrossAction - they could feel a difference and intuitively understood that angled bristles would be able to reach between the teeth more effectively. After testing it, they did not want to give it back.

At the time of its development, the CrossAction toothbrush was impossible to make with existing brush-making equipment, due to the angled bristle design and very high bristle packing densities. Making the
HEALTHIER & STRONGER TEETH* STARTING FROM DAY 1

WITH CONTINUED USE

*ON ENAMEL PLAQUE AND ENAMEL EROSION VS ORDINARY TOOTHPASTE

Toothpaste from the No.1 toothbrush brand used by dentists themselves worldwide
How implant prosthetic design influences implant maintenance access

By Shirley Branam, USA and Gerhard Mora, USA

Achieving a balance between implant-support ed restoration esthetics and maintaining periodontal health is important in an overall successful outcome of the prosthesis. The goal is to create an emergence profile design that allows for minimal tissue displacement while achieving optimal cervical contours for esthetics. It is important in the design to allow access for proper cleaning by the patient and clinician (Fig. 1).

There are two types of implant restoration designs commonly used in single-tooth replacement prosthodontics. They are a screw-retained crown or a two-piece abutment and cement-retained crown. The screw-retained crown design is the technique more commonly used in Europe, Whereas, the cement retained crown prosthesis is currently used in the United States.

The screw-retained restorations contain a small chamfer access hole where the screw retainer design is inserted. The crown is screwed directly into the implant and the access chamfer is typically closed with a tooth-colored resin (Sarnomt, 2009). There are several advantages to this restoration design. First, since cement is not used in this method, the opportunity for subgingival residual excess cement to remain on the prosthesis cannot occur. When excess cement is left, it can create the opportunity for inflammation and peri-implantitis to develop in the implant sulcus. Second, the screw can be easily removed from the restoration, allowing for cement removal if necessary during any maintenance procedures.

The two-piece abutment and cement-retained crown restoration has an abutment that is designed to provide the subgingival emergence profile and allows the crown to be cemented onto the abutment (Fig. 2). The emergence profile refers to the subgingival contours that lie between the implant platform and the emerging abutment and crown (Sarnomt, 2009). Using a custom designed abutment provides greater predictability in determining the proper shape of the emergence profile compared with pre-fabricated standard abutment design.

To obtain a pleasing restoration, the subgingival contours must start at the small circle of the implant head and emerge from the tissue with an anatomical profile (Sarmont, 2009). The result should be an emergence profile that allows for minimal displacement of the surrounding tissue while creating an esthetically pleasing appearance (Fig. 5). This design allows for easy access into the implant sulcus area so cleaning and maintaining can be easily achieved by both the patient and the clinician. Over or under contouring of the abutment and/or restoration can result in inadequate cleaning and peri-implantitis. It is important for the emergence profile to resemble that of a natural tooth. Often the adjacent teeth can be used as a guide to determine the proper contours.

The protocol for margin location has an impact on the implant’s success rate and the prosthetic health. As margin location and emergence profiles extend further subgingival, the ability to maintain these sites becomes more challenging.

Evidence has shown that power scalers with nonmetallic tips can be beneficial in maintaining the implant prosthesis (Sato, 2004). Several manufacturers offer tip designs that will accommodate the different types of power scalers. DENTSPLY Professional has an insert whose unique design allows a polymer sleeve to be assembled to the active tip area of this ultrasonic implant insert (Fig. 4). When fully assembled, the Cavitron® Softtip® Ultrasonic Implant Insert can easily be incorporated into a clinician’s implant maintenance procedure.

Incorporating ultrasonics scaling into the implant maintenance protocol may have several benefits. Combining mechanical movement and ionic and mechanical irrigation can aid in the removal of biofilm and other debris in the implant prosthetic sulcus. Wilkins wrote in 2012 that “Studies indicate cavitation is capable of destroying surface bacteria and can remove endotoxin in the root surface.” And: “Oscillation of the ultrasonic tips causes hydrodynamic waves to surround the tip. This acoustic turbulence is believed to have a disruptive effect on surface bacteria” (Wilkins, 2012). Multiple in vitro studies have discussed that cavitation may have the potential to disrupt the cell wall of the bacteria, and acoustic turbulence is believed to have disruptive effect on the surface bacteria (Baehni, 1992; McGeary C.J., 1995)

References


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Fig. 1: Emergence profile and crown should resemble that of a natural tooth so the patient and the clinician can easily maintain the implant prosthetics. (Photo/Provided by G P Mora, CDT)

Fig. 2: Custom abutment and crown design.

Fig. 3: Ideal subgingival formation created by proper emergence profile of the implant abutment

Fig. 4: Custom SoftTip Ultrasonic Implant Insert (Photo/Provided by DENTSPLY Professional.)

About the Author

Karen Claire-Zimmer MS, BS She is a senior scientist at The Procter & Gamble Company. She began her career in oral care research and development with Oral-B in the late 1980s. She received her master of science (MS) degree in physical chemistry from Stanford University, and her bachelor of science (BS) degree in chemical engineering from Michigan State University.

Karen has applied insights from understanding work such as that described here to both marketed and power toothbrush designs used in numerous oral care products.

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Fig. 2: Custom abutment and crown design.
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