Infection control in dentistry has never been more essential

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 per cent 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 2005 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 micro-organisms.[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.[4,11]

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 with contaminated objects or surfaces, contact with bacterial droplets or aerosols, and inhalation of airborne micro-organisms.[5]

Using personal protective equipment such as surgical masks, safety glasses as well as disposable gowns and gloves is vital. (Photo stanproskop.podbean.com)
Philips Sonicare DiamondClean; Product of the Year Winner in the Oral Care Category in the GCC Countries

By Philips

DUBAI, UAE - Philips is proud to present that the DiamondClean electric toothbrush, Sonicare DiamondClean has been elected Product of the Year in the oral care category. The independent survey was conducted among 3,600 consumers in 12 countries, among the most valued awards in consumer perception of products.

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

Sonicare DiamondClean harbors Philips Sonicare’s patented sonic technology to produce high-amplitude vibrations that deliver a unique cleaning action for a difference users can see and feel. It is gentle, it is effective, and it is smart – delivering a clean that only a Philips sonic toothbrush can deliver.

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Sonicare DiamondClean holds an impressive three weeks charge.

Brilliant cut

Sonicare DiamondClean has a diamond head that features a new diamond-cut tuft formation to provide you with an even more efficient brushing experience. The uniquely designed diamond bristle heads have 44% more bristles than Philips Sonicare’s standard sized ProResults brush heads, providing 44% more effective plaque removal and whitener teeth. The heads come in two sizes – Standard and Compact – for focused cleaning in areas of special need, for orthodontic patients and those with smaller mouths.
Winner in the Oral Care Category

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 FlexCare+ with ProResults brush head.
• Powerful yet gentle dynamic cleaning action helps improve gum health in just 2 weeks.
• Clinically proven to whiten teeth in just 1 week.


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

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 short, hard and abrasive boar’s hair bristles. In the early 1900s, the first Oral-B manual brush (Figure 2) was developed with multitudinous 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 mechanisms 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 interdendally, 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 microscopic 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.

Our hypothesis was that filaments bent towards the direction of travel would be more likely to enter the interproximal space before bending away from the direction of travel while still in the interproximal gap (Figure 6). Taking a more macroscopic view of the brush design, including evaluating different filament shapes and heights – we found taller, thinner filament tufts are better able to 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 delineating what the final tuft density of the CrossAction design would be.

Key learnings

- Angled bristles (>12°) 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 our equipment and analysis, 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.

The CrossAction toothbrush has bristle tufts with a 16° angle to the brush head in both directions, as well as tall, thin, ellipsoidal bristle tufts supported by densely neighbouring tufts that increase horizontal scrubbing motion (Figure 7). Its design increases bristle contact with the tooth surface and improves approximal recession during brushing, both of which lead to greater plaque removal efficacy.

The effectiveness of CrossAction in interproximal reach, and related approximation plaque removal, was initially demonstrated in laboratory studies and the findings were confirmed in clinical laboratory research published in 2000 demonstrated significantly greater plaque removal for CrossAction relative to 84 manual toothbrushes found in global use. Significant scientific clinical trials, including single-use and long-term studies, corroborated the in vitro data.

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 idea of a high-precision 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 prosthesis design influences implant maintenance access

By Shirley Branam, USA and Gerhard Mora, USA

Achieving a balance between implant-supported 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 prosthetics. 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 design is commonly used in the United States.

The screw-retained restorations contain a small chamfer access hole where the screw retainer of the restoration is inserted. The crown is screwed onto the abutment (Fig. 2). The emergence profile refers to the portion of the crown that emerges from the tissue with an anatomical profile (Sarmont, 2009). The emergence profile determines where the screw is removed. The emergence profile starts at the small circle of the implant head and emerges from the tissue with an anatomical profile (Sarmont, 2009). The emergence profile serves as a guide, allowing for minimal displacement of the surrounding tissue while creating an esthetically pleasing appearance (Fig. 3). 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. One can see the importance of the emergence profile in determining the proper 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. One can see the importance of the emergence profile in determining the proper contours. The protocol for margin location of a standard implant restoration is still under debate. As margin location and emergence profile differences extend further subgingival, the ability to maintain these sites becomes more challenging.

Evidence has shown that power scalers with non-typical tips can be beneficial in maintaining the implant prosthesis (Sato, 2004). Several manufacturers offer tips designs that will accommodate the different types of power scalers. DENTSPLY Professional has an insert whose unique design allows for easy access into different types of power scalers. The CrossAction toothbrush is a great example of a company providing a great experience. It was won by Warren PR. The Oral-B CrossAction toothbrush innovation. We have increased our ability to understand work such as that described here to both maintenance and power toothbrush designs. CrossAction was the first in numerous oral care patents.

How implant prosthesis design influences implant maintenance access

About the Author

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References


Innes, 1993; Walmsley, 1999). However, further in vivo studies need to be conducted to determine if the same principles are achieved in the sulcus.

Another benefit to incorporating power scaling into the maintenance procedure is the ability to adapt the active tip area into the implant sulcus. Incorporating vertical adaptation of the active tip, at a zero-to 15-degree angle, to the implant restoration can allow for significant subgingival surface contact for efficient deposit removal. When the emergence profile follows the anatomical shape of a natural tooth, this instrumentation technique can be an effective method of maintaining the site.

Finally, easy access for the patient is extremely important in the success of the implant prosthetics. There are a variety of interdental brushes, cleaners, and floss options available to the patient. It is important for the cleaners be easy to use, not cause tissue trauma in the implant sulcus, or surface damage to the esthetic materials in the restoration.

Dental implants are increasing in demand in part by their high success rates and the improved esthetics they provide the patient. A key to this success is having the proper design incorporated into the implantation.

When designed properly, the implant restoration can be easily maintained by both the patient and clinician.
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