# Pre-procedural mouthrinsing: beyond bacterial control

## Having your patient rinse before a procedure is healthier for all

By Professor Laurence J. Walsh

The use of antimicrobial mouthrinses as an adjunct to mechanical methods for controlling dental plaque biofilms is well established. Fewer clinicians, however, are aware of the possible benefits of antimicrobial mouthrinses used immediately before clinical procedures to reduce the levels of microorganisms in aerosols generated by air turbine handpieces; ultrasonic scalers; air polishing and air abrasion devices; and triple water sprays. These aerosol clouds extend approximately one metre from the patient's mouth and contain bacteria, fungi and viruses from the patient's oral cavity as well as bacteria from dental equipment waterlines. The latter can pose a risk of respiratory infection to dental staff with compromised physical or immune defences. While large droplets generated from a patient's saliva may fall under the influence of gravity to the floor, smaller droplets remain suspended in the air for 30 minutes or more, during which time they may be inhaled by dental staff as well as by other patients.

A number of methods have been shown to reduce (but not eliminate) the microbial content of aerosols, including the use of rubber dam, placement of high velocity evacuation, surgical plume filtration near the oral cavity, and patients brushing their teeth immediately before a dental visit.

In the past 15 years, numerous studies have shown that antimicrobial mouthrinses when used as pre-procedural rinses can decrease the number of microorganisms aerosolized during clinical procedures. These studies have typically involved patients who have abstained from all oral hygiene procedures for 24 hours, who then undergo a conventional procedure whilst culture plates positioned in multiple locations across the dental surgery recover viable aerobic bacteria in the aerosol cloud. These methods underestimate the total effect of these rinses on the microbial flora since fastidious bacteria, anaerobes, fungi and viruses are not enumerated. Nevertheless, they give some indication as to the reducing effect gained from this strategy.


*Figure 1. Effect of a 30-second mouthrinse with an essential oil product (Listerine) on salivary microflora (aerobic bacteria). The upper part of the culture plate (marked with an ink pen) shows the baseline level of bacteria before rinsing, while the lower panel shows bacteria recovered immediately after rinsing, using sterile saline. Colony counts show a reduction of greater than 2 logs (recovery less than 1%).*

### Essential oils

A double-blind, controlled, cross-over, clinical study showed that using an essential oil antiseptic mouthrinse for 30 seconds produced a 94.1% reduction in recoverable bacteria (measured in colony forming units - CFUs) during 10 minutes of ultrasonic scaling, compared to non-rinsed controls, while a vehicle control rinse produced a 33.9% reduction.[1]

Follow-up clinical studies which followed the same basic design determined that rinsing with an essential oil rinse (Listerine Cool Mint) gave a 92.1% reduction in viable bacteria in aerosols generated immediately after rinsing and a 91.3% reduction in aerosols generated 40 minutes after rinsing,[2,3] while using a 5% hydroalcohol control rinse gave only a 10%-20% decrease relative to baseline levels. Later studies documented that the suppressing effect was sustained for up to 60 minutes.[4]

## Chlorhexidine

Clinical studies assessing the effect of chlorhexidine rinses on aerosols have in general used the 0.12% concentration products from the North American market rather than the 0.2% products commonly in use in Australia. Nevertheless, positive results have been reported for these less concentrated chlorhexidine rinses, compared with vehicle controls.[5] While the spectrum of action differs between the two, looking at total microbial counts, the effect size is similar between chlorhexidine and essential oil products, with some studies indicating a greater effect with chlorhexidine than with essential oils.[6] Typical suppression rates for 0.2% chlorhexidine products (such as Colgate Savacol) are an 84-87% reduction immediately after rinsing, and an 88-92% reduction up to 5 hours after mouthrinsing.

## What about fungi and viruses?

The anti-fungal actions of chlorhexidine and essential oil products have been known about for many years, however less attention has been drawn to potential antiviral actions of these agents. As biocides, both work on multiple sites within cell membranes. Their action on lipid-based membranes gives them the ability to affect viral envelopes.[7,8] Many common pathogenic viruses, including Herpes Simplex virus (HSV) and HIV have envelopes which are derived from human host cells when the assembled viruses bud off from the cell.

Laboratory studies exploring the effects of various formulations of essential oils (Listerine and Listerine Tartar Control) and chlorhexidine (0.12% and 0.2%) using cell cultures have shown that a 30 second exposure of concentrated preparations of HSV and HIV leads to inactivation of these viruses. The antiviral effects of all four products were found to be similar.[8] HIV is not transmitted via saliva, whereas salivary transfer is the major route of transmission for HSV, since patients with active lesions of herpes labialis have Herpes simplex virus type I in their saliva. When such patients use pre-procedural mouthrinses, direct measurement can be made of the effects of rinsing on viral levels. Use of an essential oil rinse for 30 seconds has been shown to reduce recoverable infectious viral particles (virions) to zero, with a 100 fold reduction in viral levels at 60 minutes after rinsing.[9] While patients with active oral or peri-oral HSV lesions are regarded as unsuitable for dental treatment without the use of additional precautions, the finding of this clinical study reinforces the point that using antimicrobial rinses can exert effects on enveloped viruses as well as bacteria. This is not to depreciate in any way the importance of wearing a mask, but does emphasize the value of pre-procedural rinsing as an adjunctive infection control measure.

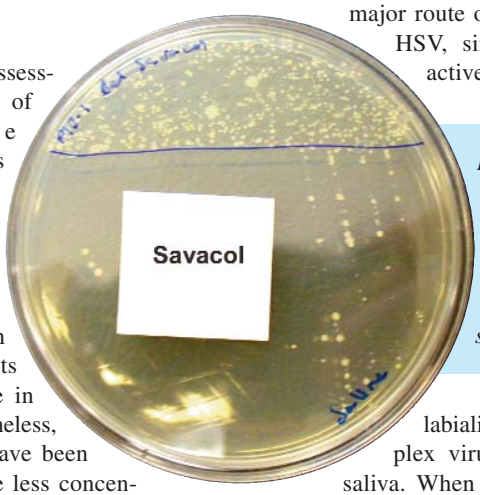


*Figure 2. Effect of a 30-second mouthrinse with 0.2% chlorhexidine (Colgate Savacol) on salivary microflora (aerobic bacteria). As with Figure 1, the upper part of the culture plate (marked with an ink pen) shows the baseline level of bacteria before rinsing, while the lower panel shows bacteria recovered immediately after rinsing, using sterile saline. Colony counts show a reduction of greater than 2 logs (recovery less than 1%).*

## References

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