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Uses of Mouthwashes in Primary Dental Care

Abstract: There are a large number of mouthwashes available, with the majority available to buy without prescription. Different active ingredients in mouthwashes serve different functions, and it can be confusing for patients who may seek guidance from their general dental practitioner on which formulation best suits their oral healthcare needs. It is important that patients are given direction by their dentist on the duration they should use a mouthwash for, side effects they may encounter, and where the mouthwash fits in their daily oral hygiene routine.

CPD/Clinical Relevance: Mouthwashes are typically well tolerated, easy to use, and can be a useful addition to a patient's oral healthcare routine.

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Mouthwashes are, in the main, easily available and well tolerated by patients. The range of mouthwashes available is continually growing and patients will frequently ask their general dental practitioner for advice on the best mouthwash for their oral health needs. For context, searching the website of a large pharmacy retailer for mouthwash products produced 96 different products.¹ Therapeutic mouthwashes are available both over-the-counter and by prescription, depending on the formulation. There are therapeutic mouthwashes that are formulated to reduce dental plaque biofilm, gingivitis, halitosis, caries, and to provide analgesia. There has also been an increase in

mouthwashes claiming to whiten teeth, reduce dental hypersensitivity and even reverse dental erosion.

Given the easy availability of mouthwashes, it is a safe assumption that many, if not most, are selected by patients based on their marketing rather than by the recommendation by a dental healthcare professional (Figure 1). This gives rise to the risk of patients selecting a mouthwash that may not be the best option for their oral healthcare needs. Even if an appropriate mouthwash is selected by a patient, there may be incorrect use of mouthwashes in terms of the correct duration of treatment or timing of delivery as part of their home oral hygiene routine.

Efficacy of mouthwashes in periodontal diseases (gingivitis and periodontitis) and peri-implant disease

Following the recent European Federation of Periodontology S3-Level Clinical Practice Guideline on the treatment of periodontitis,² the British Society of Periodontology (BSP) published a UK version to assist clinicians in implementing these guidelines into UK practice through a stepwise approach.³ Briefly, the first step in therapy (step I) is to guide patient behaviour and to build the foundations for optimal treatment outcomes, step II aims to control/eliminate the subgingival biofilm and calculus, step III of therapy advises on management of those sites that have not responded to step II. The final step (step IV) maintains periodontal stability by providing supportive periodontal care. These guidelines focus on periodontitis and, although interventions for gingivitis control were not specifically addressed in the systematic reviews that underpinned the latest guidelines, previous publications have provided such guidance^{4,5} and are inferred

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Figure 1. A typical oral healthcare aisle in a pharmacy.

within step IV, which follows successful periodontitis management and therefore gingival inflammation.

A fundamental principle of dental plaque biofilm-induced inflammation that spans the management of gingivitis and periodontitis is the mechanical disruption (or elimination) of dental plaque. The use of mouthwashes was considered as part of the recommendations from the BSP clinical treatment guidelines in steps I, II and IV, and are summarized in Table 1. For periodontitis, step I involves tooth brushing and inter-proximal cleaning, step II is professional mechanism plaque removal (PMPR) and in both cases, the guidelines make specific reference to 'adjuncts' in relation to mouthwashes to make it explicitly clear that when mouthwash usage is recommended, it is in addition to, and not a replacement for mechanical disruption.

There were no recommendations made for mouthwashes in step III of the treatment guideline; however, step III may involve periodontal surgery and in the immediate post-surgery period, the authors' preference is to recommend 0.2% chlorhexidine gluconate mouthwash for patients in the area of the surgery until mechanical brushing can resume, which is usually at 7 days.⁶

Despite the excellent short-term efficacy of 0.2% chlorhexidine gluconate mouthwash following surgery, the long-term use of mouthwashes that cause extrinsic staining on teeth should be avoided; a point highlighted in *Delivering Better Oral Health* (2021) along with the incompatibility of chlorhexidine with some toothpaste ingredients resulting in the formation of salts with anions such

as phosphate, sulphate and carboxyl.⁷ The issue of extrinsic staining is particularly important in patients who are susceptible to periodontal inflammation because it is plaque retentive, which is counterproductive in those patients where minimizing plaque accumulation is a cornerstone strategy.

When considering specific mouthwashes, *Delivering Better Oral Health*⁷ provides some key signposting statements that are helpful for clinicians:

- The body of available evidence suggests that of the products evaluated, there is high certainty evidence for the use of chlorhexidine mouthwash to reduce dental plaque and gingivitis;
- Plaque scores (very low certainty evidence) and gingivitis scores (moderate certainty evidence) are reduced to a similar degree, whether using chlorhexidine mouthwash containing sodium fluoride or chlorhexidine alone;⁸
- There is low to moderate certainty evidence that adjunctive antiseptics in mouthwashes, including essential oils and cetylpyridinium chloride provide statistically significant reductions in gingival, bleeding and plaque indices when compared to mechanical plaque control alone.⁹

When clinicians encounter patients who may need adjunctive mouthwashes in the long term, such as patients with impaired manual dexterity, it is useful to consider a recent network meta-analysis (NMA) study that compared the efficacy of different oral hygiene products for chemical biofilm control over a period of 6 months' home

use, mouthwashes containing essential oils showed the greatest effect on gingival index scores.¹⁰

For necrotizing periodontal diseases, in addition to addressing risk factors (plaque control, smoking, stress, diet etc), the authors recommend 3% hydrogen peroxide mouthwash during the acute inflammatory phase while home plaque control may be difficult, and often before any professional mechanical plaque and calculus removal can be tolerated.

The quest for evidence-based approaches for the management of peri-implant mucositis and peri-implantitis continues. Unfortunately, there is a paucity of evidence on the value of mouthwashes for peri-implant disease. The value of mouthwashes may be thought of as an adjunct to biofilm removal through mechanical brushing and/or applied to the implant surface following debridement, but evidence and consensus-based clinical guidelines are not available at this time (as they are for periodontitis) despite antiseptic therapy being part of the Cumulative Interceptive Supportive Therapy (CIST) protocol from the late 1990s.¹¹

Mouthwashes with an anti-carries effect

The decision on whether to recommend a mouthwash to reduce caries risk should be taken following an individualized caries risk assessment. For example, in the CAMBRA (Caries Management by Risk Assessment) tool, patients identified as moderate or high caries risk are placed on a preventive plan incorporating either a 0.05% NaF rinse or a 0.12% chlorhexidine mouthwash regimen for caries prevention.¹² For patients who are at high risk of dental caries, it is important to emphasize the importance of brushing with a fluoride-containing toothpaste, and that any mouthwash (even a fluoride-containing one) should be used at a different time of the day as any rinsing after toothbrushing should be discouraged. Mouthwashes may be recommended as part of an individualized caries risk reduction plan including dietary changes and improved plaque control.

Mouthwash solutions of 0.05% sodium fluoride, containing 230ppm F, are available commercially for daily home use, but are not indicated for use in children under the age of 6 years because of the risk of swallowing and possible poisoning. Ethanol-containing rinses should be avoided in children, and may also be of concern in adults given its association

| Treatment step/intervention/question | BSP recommendation | Background/context |
|---|---|---|
| STEP I: Building foundations for optimal treatment outcomes | | |
| Intervention: supragingival dental biofilm control (by the patient) | | |
| 1.1 What are the adequate oral hygiene practices of periodontitis patients in the different steps of periodontitis therapy? | We recommend that the same oral hygiene guidance to control gingival inflammation is practised throughout steps 1–4 of periodontal therapy including supportive periodontal care | As adjuncts to mechanical plaque control, antiseptic agents, delivered in different formats, such as dentifrices and mouth rinses have been recommended |
| STEP II: subgingival instrumentation | | |
| Intervention: use of adjunctive chemical agents to subgingival instrumentation | | |
| 2.13 Does the adjunctive use of adjunctive chemotherapeutics (antiseptics) improve the clinical outcome of subgingival instrumentation? | Adjunctive antiseptics may be considered, specifically chlorhexidine mouth rinses for a limited period of time, in periodontitis therapy, as adjuncts to mechanical debridement, in specific cases | In order to control gingival inflammation during periodontal therapy, the adjunctive use of some agents has been proposed. Chlorhexidine mouth rinses have been frequently tested for this indication, and used in different settings |
| STEP IV: maintenance/supportive periodontal care | | |
| Intervention: adjunctive therapies for gingival inflammation | | |
| 4.10 What is the value of adjunctive antiseptics/chemotherapeutic agents for the management of gingival inflammation? | The basis of the management of gingival inflammation is self-performed mechanism removal of plaque. Adjunctive measures, including antiseptics, may be considered in specific cases, as part of a personalized treatment approach | In order to control gingival inflammation during periodontal maintenance, the adjunctive use of some agents has been proposed. These agents are mainly antiseptic agents, and can be delivered as dentifrices, as mouth rinses or both |
| 4.11 Should adjunctive chemotherapeutics be recommended for patients in supportive periodontal care? | The use of adjunctive antiseptics may be considered in specific cases, to help control gingival inflammation for patients in supportive periodontal care | In order to control gingival inflammation during supportive periodontal care, the adjunctive use of some agents has been proposed. These agents are mainly antiseptics but some other agents, such as probiotics, prebiotics, anti-inflammatory agents and antioxidant micronutrients, can be found in the literature. The products are mainly delivered as dentifrices or mouth rinses |
| | We do not know whether other adjunctive agents (such as probiotics, prebiotics, anti-inflammatory agents, antioxidant micronutrients) are effective in controlling gingival inflammation in patients in supportive periodontal care | |
| 4.13 Which antiseptic is the most effective in mouth rinses? | A specific recommendation was unable to be made and further research is appropriate | In order to control gingival inflammation during supportive periodontal care, the adjunctive use of some agents has been proposed. These products can be delivered as mouth rinses |

Table 1. BSP recommendations on the role of mouthwashes for patients with stage I–III periodontitis.

with increased risk of head and neck cancer in long-term frequent users.¹³ The indication for children over the age of 6 years, adolescents and adults is to rinse once daily (ideally at a different time to brushing) with 10 ml for 1 minute and spit out. Patients should also be directed to avoid drinking, eating or rinsing for 15 minutes after use.

A Cochrane review on the use of fluoride mouthwash to prevent caries in

children and adolescents, reported that the combined results of 35 trials showed that, on average, there is a 27% reduction in decayed, missing and filled tooth surfaces in permanent teeth with fluoride mouthwash compared with placebo or no mouthwash.¹⁴ However, many of these studies involved supervised school mouth rinsing programmes, using higher concentrations than those typically used by patients in the

UK, and 31 of the 35 trials were conducted in settings that did not have community water fluoridation.

The evidence from another Cochrane review showed that children using another form of topical fluoride therapy (TFT), such as a fluoride mouthwash with fluoride toothpaste will experience additional reductions in dental caries, compared with children using fluoride toothpaste only.¹⁵

However, possible side effects of exposure to multiple fluoride sources were not reported in the included studies. It has been suggested that the addition of a fluoride mouthwash to regular toothbrushing with fluoride toothpaste may be considered in children with a caries increment of around two D(M)FS per year or more.¹⁶

The data to assess the caries prevention effectiveness of 0.05% sodium fluoride mouthwash in adults are sparse. One clinical trial found no difference between 0.05% sodium fluoride mouthwash and placebo in a 3-year follow up of coronal and root caries incidence.¹⁷ However another study on older adults reported significantly increased root caries lesion reversal when a daily fluoride mouthwash was used compared to a placebo.¹⁸

A 2015 Cochrane review found no studies that investigated the effect of chlorhexidine mouthwashes on the prevention of caries in children or adolescents.¹⁹ A more recent systematic review in 2017 reported statistically significant differences in *Streptococcus mutans* levels during and after the use of a chlorhexidine mouthwash, but did not report any data on whether this resulted in lower caries incidence.²⁰ A systematic review on the non-invasive management of root caries reported no significant difference in root caries incidence when chlorhexidine mouthwash was compared to no treatment or placebo treatment.²¹

Role of mouthwashes in managing common oral mucosal conditions

Recurrent aphthous stomatitis (RAS) is one of the most common chronic painful oral mucosal conditions, affecting approximately 20% of the population worldwide.²² Patients may experience prodromal symptoms, such as a tingling or burning sensation, for up to 2 days in advance of a macular or papular lesion, which subsequently becomes ulcerated. RAS is clinically characterized by recurrent painful single or multiple small well-delineated round or ovoid ulcers with a yellowish centre and peripheral erythematous halo.²³

Since there is no curative management for RAS, the primary therapeutic goals are to alleviate pain, accelerate healing and reduce frequency of recurrence. Appropriate topical treatment is generally effective for the majority of patients with RAS. This may include the use of topical anaesthetics,

such as benzydamine hydrochloride 0.15% mouthwash, to provide analgesia. Patients with RAS may also benefit from the use of topical corticosteroids. Various types and preparations of topical corticosteroids have been reported to be effective in reducing RAS symptoms and healing time, particularly when used in the early manifestation of the ulceration. Topical corticosteroid mouthwashes are considered an effective treatment in reducing inflammation and alleviating pain when clinically indicated.²⁴ Examples of topical corticosteroid mouthwashes include betamethasone 500 µg soluble tablets or prednisolone 5 mg soluble tablets dissolved in 10–20 ml water, and made up into a mouthwash. Although commonly prescribed in the management of painful inflammatory oral mucosal disease, there is poor evidence to support their use, and prescriptions are considered off-label.²⁵

Other proposed uses of mouthwashes

Intra-oral dryness is a common complaint, with approximately 20% of the population reporting some form of oral dryness.²⁶ It may be the result of salivary gland hyposalivation (SGH), in which there is a reduction in quantity of saliva produced, or xerostomia, in which there is a subjective symptom of oral dryness. There are numerous causes of intra-oral dryness, including dehydration, salivary gland disease and medications. The most common cause of dry mouth is medication-related xerostomia, with over 500 drugs associated with intra-oral dryness.²⁷ These medications include anti-hypertensives, anti-depressants, anti-histamines, anti-reflux drugs, such as proton pump inhibitors, and analgesics, such as opiates. Dry mouth can have a significant impact on oral function, with patients reporting challenges including difficulty swallowing dry foods and problems with speaking. A reduction in saliva production can also make it difficult to wear removable dental prostheses, and there can also be an increase in dental caries.²⁸

Treatment of dry mouth may include identification and management of any contributory underlying condition, or changing the medication linked to the intra-oral dryness. In patients with persistent oral dryness, the main goals of treatment are to relieve symptoms and restore oral function. There are numerous over-the-counter products that may aid in oral lubrication, including Biotene Mouthwash (GlaxoSmithKline) and Oasis Moisturising

Mouthwash (GlaxoSmithKline). In a Cochrane review on topical therapies used in the management of dry mouth, 36 randomized controlled trials were reviewed with no strong evidence that any one topical therapy is superior to any other in relieving the symptoms of oral dryness.²⁹

Halitosis, commonly resulting from dental disease, is one of the most socially unacceptable oral conditions and is likely to be a significant driver in patients choosing to use a mouthwash. CB12 (MEDA OTC, Sweden) is a commercially available, over-the-counter mouthwash, containing a combination of two active ingredients: zinc acetate (0.3%) and a low concentration of chlorhexidine (0.025%). A 2019 Cochrane review on interventions for managing halitosis identified only one study that did not find any statistically significant improvement following the use of a zinc acetate and chlorhexidine mouthwash.³⁰ No studies of any other mouthwashes were eligible for inclusion in the review.

However, another systematic review, which included *in vitro* studies with outcomes such as bacterial growth inhibition, concluded that mouthwashes containing essential oils are effective against halitosis, but did advise that clinical studies should be conducted.³¹

The demand for tooth whitening is ever increasing, and the range of mouthwashes for tooth whitening on the market has increased to meet this demand. These are easy to use and generally safe; however, they have a low whitening potential in comparison with professionally prescribed products and in-office treatments. Also, patients are likely to seek out these mouthwashes without consulting with their dentist, and so the opportunity to determine the aetiology of the tooth discolouration and the appropriateness of a whitening mouthwash. Many whitening mouthwashes name hydrogen peroxide as their active ingredient but, given the low concentration required to avoid adverse soft tissue effects, the potential for tooth whitening is low.³² Another popular active ingredient is charcoal; however, to date, there are no clinical or laboratory published studies that have demonstrated therapeutic or cosmetic benefits of charcoal mouthwash usage.³³

There has been considerable interest in the use of pre-procedural mouthwashes to reduce the risk of COVID-19 transmission. The most commonly studied or recommended rinses were chlorhexidine,

hydrogen peroxide, cetylpyridinium chloride and povidone-iodine, with all showing potential for reducing viral load.^{34,35}

Conclusions

The range of mouthwashes available to buy over the counter is increasing; however, it is important for dentists to communicate to patients the low level of evidence around many of the claims made in the marketing of these products.

General dental practitioners should ask patients about mouthwash use and give appropriate recommendations. This should include guidance on how frequently to use the mouthwash, at what time of day, and whether the mouthwash is suitable for daily use on an ongoing basis or whether it should be halted following a prescribed course.

Compliance with Ethical Standards

Conflict of Interest: The authors declare that they have no conflict of interest.

Informed Consent: Informed consent was obtained from all individual participants included in the article.

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