Use of tray-applied 10 percent carbamide peroxide gels for improving oral health in patients with special-care needs

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One of the most frustrating aspects of treating patients with special-care needs is coping with a general inability to maintain acceptable levels of oral hygiene. This is a universal problem that all dental practitioners have encountered in many kinds of special patient groups. Many times the dentist puts great effort into achieving an optimal restorative result, only to see it fail in a relatively short time owing to the patient's inability to remove food debris and plaque from the teeth and gingiva. In addition, special-care patients may experience increased rates of plaque accumulation or be at increased risk of experiencing oral disease because of xerostomia, medications' side effects or a compromised immune system.

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Poor oral health occurs in many groups of special-care patients for a variety of reasons. A number of factors contribute to this problem: impaired manual dexterity and physical challenges (such as in Parkinson disease,[1] stroke[2] and advanced age[3]); mental challenges resulting in an inability to cooperate with caregivers (such as in Alzheimer disease[4] or psychiatric disorders[5,6]); drug-induced, radiation-

ABSTRACT

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Background. Plaque accumulation and resulting caries or periodontal disease is a frequent problem in patients with special-care needs. Tray-applied 10 percent carbamide peroxide (CP) is a tooth-bleaching agent that has positive effects on plaque, gingival health and caries.

Methods. The authors review the antibacterial properties of CP and the effects of CP on saliva, plaque, caries and gingival health. They also review tray fabrication options and techniques, application methods, safety and side effects. Finally, they address the challenges involved in and research needed regarding use of tray-applied CP materials in special-care patients.

Results. In their literature review and clinical experience, the authors found 10 percent CP delivered in a custom-fitted tray to be an effective treatment for caries in patients with compromised oral hygiene. Plaque suppression and caries control result from a CP-induced increase in salivary and plaque pH caused by CP's urea component, and from possible antimicrobial action via physical debridement and the direct chemical effect of hydrogen peroxide.

Conclusions. Tray-applied 10 percent CP may hold great promise for improving the oral health of many special-care patients, including elderly patients, patients with cancer and patients with dry mouth. Further research is needed to verify the potential benefits, specifics of treatment times and protocols and most cost-effective products for use in various patient groups.

Clinical Implications. Application of 10 percent CP in a custom-fitted tray may reduce caries by elevating the pH above the level at which the caries process can occur, in addition to debriding the teeth and improving gingival health.

Key Words. Carbamide peroxide; caries control; urea; peroxides; dental plaque; tooth bleaching.
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induced or disease-induced xerostomia[7]; and lack of financial resources and access to routine preventive dental services. In addition, for patients who are institutionalized or living in long-term care facilities, staff issues may complicate oral care: staff members' negative attitudes or lack of knowledge about oral hygiene and dental disease, time constraints due to heavy workloads and lack of training[8] or the absence of written oral health protocols.[9]

One possible solution to the oral hygiene problem in some of these patients may be the use of carbamide peroxide (CP), also known as "urea peroxide," applied in a nightguard bleaching tray as an agent of plaque suppression and alteration of pH for caries control. Suppression of plaque by means of CP when oral hygiene is compromised may reduce caries rates and improve gingival health.

Suppression of plaque by means of carbamide peroxide when oral hygiene is compromised may reduce caries rates and improve gingival health.

Various commercial preparations of CP have long been used in tooth-bleaching procedures. Although the technique of using a custom-fitted mouth tray for application of CP to improve wound healing and gingival health dates to the 1960s,[10] it first was documented in the literature as a way to lighten teeth in 1989.[11] Since that time, the effectiveness and safety of various materials and techniques for tooth bleaching have been documented extensively.[12] However, the effects of CP on plaque, gingival health and caries generally have been overlooked in recent clinical practice even though studies document the benefits of peroxide-based preparations for oral health in infants,[13] patients undergoing orthodontic treatment[14] and dental students,[15,16] with only a few studies involving special-care populations.[17-19] We address those latter studies below.

HISTORY OF CARBAMIDE PEROXIDE'S USE IN THE SPECIAL-CARE POPULATION

A study published in 1970 examined the effectiveness of a commercially available 10 percent CP-glycerin gel in improving the oral health of patients with tuberculosis who are institutionalized and ambulatory patients with cerebral palsy.[17] The researchers examined gingival health, debris and calculus deposits and calculated plaque scores initially and then after finger massage of the experimental or placebo gel onto gingivae and teeth for two minutes three times daily for one month. The authors concluded that the CP gel was effective in improving gingival health and decreasing the amounts of plaque and calculus deposits. No side effects were apparent. It should be noted that the gel was applied without a tray. One would expect that application via tray would increase contact time between CP and oral tissues and possibly yield better results. Others found similar results using a similar protocol in hospitalized patients and hospital staff members, although gingival index (GI) scores did not improve.[18] The researchers suggested that although plaque scores were reduced in the hospitalized patients, GI scores were not because the patients had significant chronic medical problems and untreated periodontal disease (significant subgingival calculus and deep periodontal pockets). Improvement in GI scores would not be expected without periodontal treatment.

A later study involved staff and physically challenged patients of a nonresidential facility.[19] Participants used a commercially prepared 1.5 percent hydrogen peroxide rinse (not containing urea) three times daily for seven days. This peroxide concentration is approximately one-half of that resulting from breakdown of the 10 percent CP present in many common commercial bleaching agents. The use of the rinse resulted in a statistical reduction in gingival and plaque index (PI) scores and in gingival crevicular flow. The authors proposed that the improvement in oral health resulted from the mechanical action on plaque and debris resulting from the solution's release of oxygen, the antibacterial effect of peroxide and improvement in tissue healing by means of the increased amount of oxygen supplied to injured periodontal tissues.

From the results of these studies, we see that the use of hydrogen peroxide preparations for decreasing plaque and improving oral health in special-care patients is not unprecedented.

THE ANTIBACTERIAL PROPERTIES OF CARBAMIDE PEROXIDE

Ten percent CP commonly is used in tooth-bleaching procedures and is the most thoroughly

ABBREVIATION KEY. CP: Carbamide peroxide. **CRF:** Chronic renal failure. **GI:** Gingival index. **OTC:** Over the counter. **PI:** Plaque index.