

## **Problem**

Dental caries (tooth decay) is a chronic, progressive, multi-factorial, infectious disease that can begin in early infancy and that, by the time children reach adulthood, will affect over 92 percent of the U.S. adult population.<sup>1</sup> A smaller proportion of the U.S. population will develop moderate or severe dental caries. Dental caries prevalence and severity varies by age, dentition, and type of tooth surface.<sup>2</sup> In addition, dental caries and other oral diseases are highly related to socio-environmental determinants, with the greatest burden on disadvantaged and socially-marginalized populations.<sup>3,4</sup> Historically, dental caries control has been addressed by daily brushing, modifying dietary practices, and improving the resistance of tooth enamel to acid attack. However, only fluorides and dental sealants demonstrate a high degree of scientific evidence for reducing dental caries in populations. Benefiting from fluoride in drinking water and fluoride toothpastes, the baby boomer generation will be the first in which the majority will maintain natural teeth over their entire lifetime, according to the Centers for Disease Control and Prevention (CDC).<sup>5</sup>

## **Methods**

Fluoride modalities are systemic and topical and include: drinking water (natural and adjusted levels), milk, salt, toothpaste, mouthrinse, and the professional application of concentrated fluoride in gels, foams or varnishes. Caries protection, lifetime cost and appropriateness for use in populations will vary by the fluoride method or combination of fluoride methods selected.<sup>6,7,8,9,10,11,12</sup> Fluorides are most effective when used in combination with other modalities to prevent, control and reverse early dental caries.<sup>13,14,15,16</sup> Fluorides are more effective in preventing dental caries on the smooth surfaces of teeth than in the pits and fissures.<sup>17</sup> However, for carious lesions that are limited to the pits and fissures of permanent molar teeth, dental sealants alone or combined with multiple fluoride applications are more effective than fluoride alone.<sup>18,19</sup> Daily, multiple low exposures to fluoride facilitate the balance between remineralization and demineralization of tooth enamel, thus reducing caries incidence.<sup>20</sup>

School-based fluoride mouthrinse programs have been used for many years as a community-based caries prevention strategy, recognized by the ASTDD Best Practices Project as a Best Practice Approach for State and Community Oral Health Programs.<sup>21</sup> Fluoride mouthrinses containing a concentration of 0.2 percent sodium fluoride are prescribed for weekly school fluoride rinsing programs. Other ingredients may include saccharin, potassium sorbate, purified water, flavor, citric acid and coloring agents. Fluoride mouthrinses are approved as a caries preventive agent by the Food and Drug Administration, CDC and the American Dental Association.<sup>22</sup>

Fluoride mouthrinses work in the same way as other topical fluorides by enhancing fluoride concentrations in saliva, plaque and enamel. Current laboratory and epidemiologic evidence indicate that fluoride's predominant effect is post eruptive and topical, and the effect depends on regular fluoride availability.<sup>20,21,22,23, 24</sup>

Use of fluoride mouthrinse by children ages six years and older does not place them at risk for enamel fluorosis. By age six, most children can rinse and spit with little to no ingestion, making a rinse a good method for topical fluoride. Fluoride rinses are not recommended for children under the age of six because some young children might swallow the rinse rather than spit it out.<sup>22</sup> Substantial fluoride ingestion at this young age when the teeth are developing might result in enamel fluorosis, thus affecting the appearance of the teeth.

Not all people have regular access to optimally fluoridated community water supplies or other sources of fluoride. Schools provide an ideal setting for promoting oral health education and prevention activities with approximately 88 percent of U.S. children attending public schools.<sup>25</sup> An integrated approach that combines school health policy, skills-based health education, a health-supportive school environment and school health services can tackle major common risk factors and contribute to effective control of oral disease.<sup>26</sup> School fluoride mouthrinse programs can be administered by school personnel trained in mouthrinsing procedures and safe storage of fluoride, according to individual state regulations.

Evidence from studies conducted before 1985 supported the effectiveness of 0.2 percent sodium fluoride mouthrinses in preventing coronal caries of permanent teeth in school populations. These studies collectively showed that regular use of sodium fluoride mouthrinses reduced caries increments in children by 20 percent to 35 percent over two to three years.<sup>27,28,29</sup>

The National Preventive Dentistry Demonstration Program (NPDDP), conducted in ten U.S. cities to compare the cost and effectiveness of caries-prevention procedures in the late 1980's, found only a limited reduction in dental caries attributable to fluoride mouthrinse, especially when children were also exposed to fluoridated water. Benefits were more likely for children in high risk schools.<sup>22,30,31</sup>

U. S. studies on effectiveness of school fluoride mouthrinsing programs since the NPDDP have been limited. The 2003 Cochrane Review of fluoride mouthrinsing in schools found a 26 percent dental caries reduction in permanent teeth in their reviewed studies. In 2007, an observational study in Europe targeting at-risk schools demonstrated caries reductions of 20 percent.<sup>32</sup> Two studies (1985-86) reported benefits of fluoride mouthrinsing programs approximately 2.5 and seven years after completion of school-based mouthrinsing programs, but a later study (1995) did not find benefits four years after completion of a mouthrinsing program.<sup>33,34,35</sup> Fluoride mouthrinsing in school programs has been discontinued in some countries similar to the U.S. because of doubts regarding the cost-effectiveness for children with a low

prevalence of dental caries.<sup>36,37</sup> While dental caries has continued to decline, school mouthrinsing programs appear to be effective in populations at high risk for dental caries.<sup>38</sup>

The proportion of states with fluoride mouthrinsing programs has decreased 15 percent since 2003. Of the 50 states and the District of Columbia reporting to the 2010 ASTDD State Synopsis, 35 states have fluoride mouthrinse programs, primarily targeting high risk schools in non-fluoridated communities.<sup>39</sup> Increased effectiveness of fluoride mouthrinsing would be expected in schools with a high caries increment (~ 2 DMFS per year)<sup>6, 30,40,41</sup> Increased effectiveness is expected in communities with less use of other systemic and topical fluorides.<sup>42</sup>

School fluoride mouthrinse programs are inexpensive compared to professionally applied fluorides, especially when volunteers are used. Cost estimates in 1988 ranged from \$0.52 to \$1.78 per child per school year for fluoride mouthrinsing, depending on whether paid staff or volunteers supervise the procedure.<sup>43</sup> In a 2010 ASTDD survey, states reported fluoride mouthrinse program costs between \$0.54 cents and \$2.54 per child per year.<sup>44</sup>

The single greatest risk factor predicting dental caries in populations is low socio-economic status. Programs based on populations selected for socio-economic status alone, without considering dental caries incidence, may result in increased costs compared to the benefits.<sup>2,45,46,47</sup> Other population risk or protective factors to consider in school program planning include availability of dental care; proportion of the population who 1) are low SES, 2) are an ethnic minority, 3) speak English as a second language, 4) are homeless, 5) have limited education, 6) have special health care needs, 7) have high caries incidence and prevalence rates or advanced disease, and 8) lack access to fluoridated water.<sup>6,15,22</sup> Additionally, school districts and schools need to be sufficiently involved to assure a majority of students achieve 30 applications a year for at least two years, ideally age six to 16, to achieve caries reductions in the erupting permanent teeth.<sup>21</sup>

### **Policy Statement**

ASTDD supports the use of fluoride mouthrinse programs in schools for children age six years and older, when exposure to optimal systemic and topical fluorides is low, populations of children are at high risk for tooth decay and there is demonstrated support by school personnel.

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