School-Based Fluoride Mouthrinse Programs Policy Statement
Association of State and Territorial Dental Directors (ASTDD)
Adopted: March 1, 2011

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.[1] 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.[2] 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.[3,4] 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).[5]

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.[6,7,8,9,10,11,12] Fluorides are most effective when used in combination with other modalities to prevent, control and reverse early dental caries.[13,14,15,16] Fluorides are more effective in preventing dental caries on the smooth surfaces of teeth than in the pits and fissures.[17] 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.[18,19] Daily, multiple low exposures to fluoride facilitate the balance between remineralization and demineralization of tooth enamel, thus reducing caries incidence.[20]

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.[21] 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.[22]

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.[20,21,22,23, 24]

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.[22] 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.[25] 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.[26] 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. [27,28,29]

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. [22,30,31]

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.[32] 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.[33,34,35] 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.[36,37] While dental caries has continued to decline, school mouthrinsing programs appear to be effective in populations at high risk for dental caries.[38]

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.[39] Increased effectiveness of fluoride mouthrinsing would be expected in schools with a high caries increment (~ 2 DMFS per year).[6, 30,40,41] Increased effectiveness is expected in communities with less use of other systemic and topical fluorides.[42]

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.[43] In a 2010 ASTDD survey, states reported fluoride mouthrinse program costs between $0.54 cents and $2.54 per child per year.[44]

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.[2,45,46,47] 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.[6,15,22] 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.[21]

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.

[1] Dye BA, Tan S, Smith V, et al. Trends in oral health status: United States, 1988-1994 and 1999-2004. *Vital Health Stat 11*. 2007(248):1-92.
[2] Macek MD, Heller KE, Selwitz RH, Manz MC. Is 75 percent of dental caries really found in 25 percent of the population? *J Public Health Dent.* 2004;64(1):20-25.
[3] Fisher-Owens SA, Gansky SA, Platt LJ, Weintraub JA, Soobader MJ, Bramlett MD, Newacheck PW. Influences on children's oral health: a conceptual model. *Pediatrics*. 2007:120(3):e510-520.
[4] Erickson PE.The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol*. 2003;31(s1):3-24.

[5]U.S. Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.
[6] American Dental Association Council on Scientific Affairs. Professionally applied topical fluoride: Evidence-based clinical recommendations, *J Am Dent Assoc.* August 2006;137(8):1151-1159. http://jada.ada.org/cgi/reprint/137/8/1151. Accessed December 28, 2010.
[7] Marinho VC, Higgins JP, Logan S, Sheiham A. Topical fluoride (toothpastes, mouthrinses, gels or varnishes) for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2003(4):CD002782. doi:10.1002/14651858.CD002782.
[8] Marinho VC, Higgins JP, Logan S, Sheiham A. Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2002(3):CD002279. doi:10.1002/14651858.CD002279.
[9] Marinho VC, Higgins JP, Sheiham A, Logan S. Combinations of topical fluoride (toothpastes, mouthrinses, gels, varnishes) versus single topical fluoride for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2004(1):CD002781. doi:10.1002/14651878.CD002781.pub2.
[10] Marinho VC, Higgins JP, Sheiham A, Logan S. One topical fluoride (toothpastes, or mouthrinses, or gels, or varnishes) versus another for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2004(1):CD002780. doi:10.1002/14651858.CD002780.pub2.
[11] Marinho VC, Higgins JP, Logan S, Sheiham A. Fluoride gels for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev*. 2002(2):CD002280. doi:10.1002/14651858.CD002280.
[12] American Academy of Pediatric Dentistry and American Academy of Pediatrics. Policy on early childhood caries (ECC): classifications, consequences, and preventive strategies. American Academy of Pediatric Dentistry Web site. http://www.aapd.org/media/Policies_Guidelines/P_ECCClassifications.pdf. Published 2008. Accessed December 28, 2010.
[13] National Institutes of Health. Diagnosis and management of dental caries throughout life. NIH Consensus Development Conference Statement. 2001 Mar 26-28;18(1):1-24.
[14] Takahashi N, Nyvad B. Caries ecology revisited: microbial dynamics and the caries process. *Caries Res*. 2008;42(6):409-18. Epub 2008 Oct 3.
[15] Beltran-Aguilar ED, Goldstein JW, Lockwood SA. Fluoride varnishes: A review of their clinical use, cariostatic mechanism, efficacy and safety. *J Am Dent Assoc.* 2000;131(5):589-596.
[16] Weintraub JA, Ramos-Gomez, F, June B. Fluoride varnish efficacy in preventing early childhood caries. *J Dent Res.* 2006; 85(2):172-176.
[17] VanDorp CS, TenCate JM. Preventive measures and caries progression: an in vitro study on fissures and smooth surfaces of human molars. *ASDS J Dent Child*. 1992;59(4):257-262.
[18] Hiiri A, Ahovuo-Saloranta A, Nordblad A, Mäkelä M. Pit and fissure sealants versus fluoride varnishes for preventing dental decay in children and adolescents. *Cochrane Database Syst Rev.* 2006;(4):CD003067. doi:10.1002/14651858.CD003067.pub2.
[19] Griffin SO, Oong E, Kohn W, Vidakovic B, Gooch BF. CDC Dental Sealant Systematic Review Work Group, J. Bader, J. Clarkson, M.R. Fontana, D.M. Meyer, R.G. Rozier, J.A. Weintraub, D.T. Zero. The effectiveness of sealants in managing caries lesions. *J Dent Res*. 2008;87(2):169-174. doi:10.1177/154405910808700211.
[20] Featherstone JD, Prevention and reversal of dental caries: role of low level fluoride, *Community Dent Oral Epidemiol*. 1999; 27(1):31-40.
[21] Marinho VCC, Higgins JPT, Logan S, Sheiham A. Fluoride mouthrinses for preventing dental caries in children and adolescents. *Cochrane Database Syst Rev.* 2003;(3):CD002284. doi:10.1002/14651858.CD00284.
[22] Centers for Disease Control and Prevention. Recommendations for using fluoride to prevent and control dental caries in the United States. *MMWR Recomm Rep*. August 17, 2001;50(RR-14):1-42. http://www.cdc.gov/mmwr /preview/mmwrhtml/rr5014a1.htm. Accessed December 28, 2010.
[23] Zero DT, Raubertas RF, Fu J, Pedersen AM, Hayes AL, Featherstone JDB. Fluoride concentrations in plaque, whole saliva, and ductal saliva after application of home-use topical fluorides. *J Dent Res* 1992;71:1768-1775.
[24] Featherstone JD. The science and practice of caries prevention, *J Am Dent Assoc.* 2000;131:887-899
[25] U.S. Department of Education, National Center for Education Statistics. *Digest of Education Statistics*. 2008. Ch 1.
[26] Petersen PE. World Health Organization global policy for improvement of oral health – World Health Assembly 2007. *Int Dent J*. 2008;58(3):115-121.
[27] Burt BA, Eklund SA. *Dentistry, Dental Practice, and the Community*. 5th ed. Philadephia, PA: W.B. Saunders; 1999.
[28] Birkeland JM, Torell P. Caries-preventive fluoride mouthrinses. *Caries Res.* 1978;12(Suppl 1):38-51.
[29] Forsman B. The caries preventing effect of mouthrinsing with 0.025 percent sodium fluoride solution in Swedish children. *Community Dent Oral Epidemiol*. 1974;2(2):58-65
[30] Klein SP, Bohannan HM, Bell RM, Disney JA, Foch CB, Graves RC. The cost and effectiveness of school-based preventive dental care. *Am J Public Health*. 1985;75(4):382-391.
[31] Graves RC, Bohannan HM, Disney JA, Stamm JW, Bader JD, Abernathy JR. Recent dental caries and treatment patterns in US children. *J Public Health Dent.* 1986;46(1):23-29.
[32] Levin KA, Jones CM, Wight C, Valentine C,Topping GV, Naysmith R. Fluoride rinsing and dental health inequalities in 11-year-old children: an evaluation of a supervised school-based fluoride rinsing programme in Edinburgh. *Community Dent Oral Epidemiol*. 2009 Feb;37(1):19-26. Epub 2008 Nov 12.
[33] Haugejorden O, Lervik T, Riordan PJ. Comparison of caries prevalence 7 years after discontinuation of school-based fluoride rinsing or toothbrushing in Norway. *Community Dent Oral Epidemiol*. 1985;13(1):2-6.
[34] Leske GS, Ripa LW, Green E. Posttreatment benefits in a school-based fluoride mouthrinsing program. Final results after 7 years of rinsing by all participants. *Clin Prevent Dent*. 1986;8(5):19-23.
[35] Holland TJ, Whelton H, O'Mullane DM, Creedon P. Evaluation of a fortnighly school-based sodium fluoride mouthrinse 4 years following its cessation. *Caries Res*. 1995;29(6):431-434.

[36] Stamm JW, Bohannan HM, Graves RC, Disney, JA. The efficiency of caries prevention with weekly fluoride mouthrinses. *J Dent Educ.* 1984;48(11):617-626.
[37] Sterritt GR, Frew RA, Rozier RG. Evaluation of Guamanian dental caries preventive programs after 13 years. *J Public Health Dent.* 1994;54(3):153-159.
[38] Kumar JV, Moss M. Fluorides in dental public health programs. *Dent Clin North Am*. 2008;52(2):387-401.
[39] Association of State and Territorial Dental Directors. Synopses of state and territorial dental public health programs. 2009. http://apps.nccd.cdc.gov/synopses/ProgramDataV.asp?ProgramID=8. Accessed December 28, 2010.
[40] Levin KA, Jones CM, Wight C, Valentine C, Topping GVAm, Naysmith R. Fluoride rinsing and dental health inequalities in 11 year old children: an evaluation of a supervised school-based fluoride rinsing programme in Edinburgh. *Community Dent Oral Epidemiol*. 2009;37(1):19-26.
[41] Skold, UM, Petersson, LG, Birkhed D, Norlund A. Cost-analysis of school-based fluoride varnish and fluoride rinsing programs. *Acta Odontologica Scandinavica*, 2008;66(5):286-292.
[42]Kobayashi S, Kishi H, Yoshihara A, Horii K, Tsutsui A, Himeno T, Horowitz AM.Treatment and posttreatment effects of fluoride mouthrinsing after 17 years. *J Public Health Dent.* 1995;55(4):229-33.
[43] Garcia AI. Caries incidence and costs of prevention programs. *J Public Health Dent.* 1989;49(5 Spec No):259-271.
[44] Association of State and Territorial Dental Directors. Fluoride Mouthrinse Program Survey of States. (Unpublished data, 2011).
[45] Quinonez RB, Stearns SC, Talehar BS, Rozier RG, Downs SM. Simulating cost-effectiveness of fluoride varnish during well-child visits for Medicaid-enrolled children. *Arch Pediatr Adolesc Med*. 2006;160(2):164-170.
[46] Psoter WJ, Pendrys DG, Morse DE, Zhang H, Mayne ST. Associations of ethnicity/race and socioeconomic status with early childhood caries patterns. *J Public Health Dent.* 2006;66 (1):23-29.
[47] Association of State and Territorial Dental Directors, Fluorides Committee. Fluoride Varnish – An Evidence-Based Approach Research Brief. September 2007. http://www.astdd.org/docs/FluorideVarnishPaperASTDDSept2007.pdf 2007. Accessed December 28, 2010.