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Oral Health

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In the twentieth century, most people in the United States experienced substantial improvements in their oral health, yet more than an estimated \$70 billion is still spent annually on dental services.¹ Each year, people make about 500 million visits to dental offices,² and estimated hospital charges for inpatient treatment of diseases of the mouth and disorders of the teeth and jaw were \$451 million in 1996.² In addition, young people (5–24 years old) make about 600,000 visits to hospital emergency departments for sports-related craniofacial injuries each year.³ In most cases, dental caries (tooth decay), oral (mouth) and pharyngeal (throat) cancers, and sports-related craniofacial injuries can be prevented. These conditions impose significant financial and human costs and sometimes result in facial disfigurement, disability, or death. For these reasons, we wanted to find effective means to prevent the illness and death associated with these oral and craniofacial conditions.

*Insufficient evidence means that we were not able to determine whether or not the intervention works.

The Task Force approved the recommendations in this chapter in 2000. The research on which the findings are based was conducted between 1966 and December 2000. This information has been previously published in the *American Journal of Preventive Medicine* (2002; 23(1S):16–20, and 21–54) and the *MMWR Recommendations and Reports* (2001; 50(RR-21):1–13).

OBJECTIVES AND RECOMMENDATIONS FROM OTHER ADVISORY GROUPS

Many of the proposed *Healthy People 2010*⁴ objectives in chapters 3, 15, and 21 (Cancer, Injury and Violence Prevention, and Oral Health, respectively) relate directly to preventing and controlling oral and craniofacial diseases, conditions, and injuries and improving access to related services (Table 7-1).

The Surgeon General's Report on Oral Health,⁵ published in June 2000, described the principal components of a National Oral Health Plan (National Call To Action To Promote Oral Health, www.surgeongeneral.gov/topics/oralhealth/nationalcalltoaction.htm) to promote and improve oral health: increasing awareness (among the public, policymakers, and health providers) that the health of the mouth and of other parts of the body are related, accelerating the growth of research and application of scientific evidence on intervention effectiveness, building an integrated infrastructure, removing barriers between services and people in need, and using public-private partnerships to reduce disparities. This model of oral health promotion aims to achieve universal oral health literacy through education; prevention and control of common or life-threatening craniofacial diseases, disorders, and injuries; and improvement in general health through better oral health.

A comparison of *Community Guide* oral health recommendations and recommendations recently developed by others has been made by Gooch et al.⁶ and is available at www.thecommunityguide.org/oral.

METHODS

Methods used for the reviews are summarized in Chapter 10. Specific methods used in the systematic reviews of oral health interventions have been described (see Appendix A in Truman et al., 2002,⁷ also available at www.thecommunityguide.org/oral). The logic framework depicting the conceptual approach used in the oral health reviews is presented in Figure 7-1.

ECONOMIC EFFICIENCY

A systematic review of economic evaluations was conducted for the two recommended interventions (i.e., those shown to be effective), and a summary of each economic review is presented with the related intervention. The methods used to conduct these economics reviews are summarized in Chapter 11.

RECOMMENDATIONS AND FINDINGS

This section presents a summary of the findings of the systematic reviews conducted to determine the effectiveness of the selected interventions in this

Table 7-1. Selected *Healthy People 2010*⁴ Oral Health Objectives

<i>Objective</i>	<i>Population</i>	<i>Baseline^a</i>	<i>2010 Objective</i>
<i>Dental Caries</i>			
Dental caries experience (i.e., life-time number of decayed, missing, or filled teeth measured at a single point in time) in primary or permanent teeth	2-4-year-olds	18% (1988-94)	11%
	6-8-year-olds	52% (1988-94)	42%
	15-year-olds	61% (1988-94)	51%
Untreated dental decay	2-4-year-olds	16% (1988-94)	9%
	6-8-year-olds	29% (1988-94)	21%
	15-year-olds	20% (1988-94)	15%
	35-44-year-olds	27% (1988-94)	15%
Never had a permanent tooth extracted because of dental caries or periodontal disease	35-44-year-olds	31% (1988-94)	42%
Have had all their natural teeth extracted	65-74-year-olds	26% ^b (1997)	20%
Proportion of children who have received dental sealants on their molar teeth	8-year-olds	23% (1988-94)	50%
	14-year-olds	15% (1988-94)	50%
Proportion of the U.S. population served by community water systems with optimally fluoridated water	All	62% (1992)	75%
<i>Oral and Pharyngeal Cancers</i>			
Proportion of oral and pharyngeal cancers detected at the earliest stage (stage 1, localized)	All	35% (1990-95)	50%
Proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers	Adults >40 years	13% ^b (1998)	20%
Annual oropharyngeal cancer deaths per 100,000 population	All	3.0 (1998)	2.7%
<i>Sports-Related Craniofacial Injuries</i>			
Increase the proportion of public and private schools that require use of appropriate head, face, eye, and mouth protection for students participating in school-sponsored physical activities	Students	Developmental	

^aYears indicate when the data were analyzed to establish baseline estimates. Some estimates are age-adjusted to the year 2000 standard population.

^bBased on self-report in National Health Interview Survey, 1997 or 1998.

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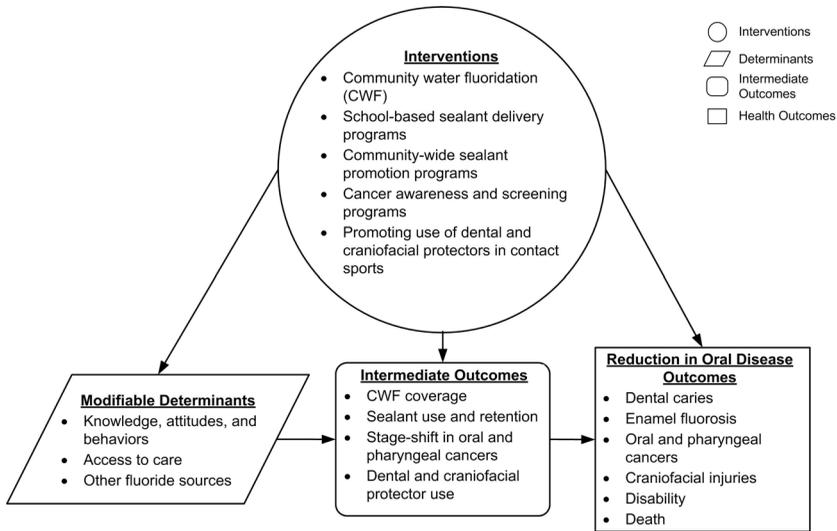


Figure 7–1. Logic framework illustrating the conceptual approach used in the systematic reviews of interventions to improve oral health. (Reprinted from Am J Prev Med, Vol. 23, No. 1S, Truman BI et al., Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries, p. 24, Copyright 2002, with permission from American Journal of Preventive Medicine.)

topic area. Interventions are grouped into three categories: preventing or controlling dental caries, preventing or controlling oral and pharyngeal cancers, and preventing or controlling sports-related craniofacial injuries.

Preventing or Controlling Dental Caries

Dental caries—commonly known as *tooth decay*—affect people of all ages, causing tooth loss if not treated. The number of people with decayed, missing, or filled permanent teeth increases with age. Among children 5–11 years of age, 1 in 4 has one or more decayed, missing, or filled permanent teeth; by the time they are adolescents (12–17 years old), 2 out of 3 are affected, and among adults the prevalence rises to over 9 out of 10 people.^{8,9}

The prevalence of dental caries is not evenly distributed throughout the population. In the United States, 80% of decayed, missing, or filled permanent teeth are found in 25% of children 5–17 years of age who have at least one permanent tooth.^{4,8,10} Lower income, Mexican-American, and African-American children have more untreated decayed teeth than their higher-income or non-Hispanic white counterparts. Among low-income or poor children, more than one third have untreated caries in their primary teeth, which may be linked to eating difficulties and being underweight.¹¹

Comprehensive population-based strategies to prevent or control dental caries aim to:⁵

- increase public and professional awareness of caries and ways to address the problem;
- promote practices that support oral health (such as reducing consumption of refined sugar and brushing with toothpaste that contains fluoride);
- ensure optimal exposure to fluoride from all sources (including community water fluoridation); and
- ensure access to and efficient use of regular preventive and restorative dental care, including optimal use of sealants delivered in school-based or school-linked settings.

This section reports on three community interventions to prevent and control dental caries: community water fluoridation, school-based or school-linked pit and fissure sealant delivery programs, and statewide or community-wide sealant promotion programs.

Community Water Fluoridation: Recommended (Strong Evidence of Effectiveness)

Community water fluoridation (CWF), the basis for primary prevention of dental caries (tooth decay) for over 50 years, is the controlled addition of a fluoride compound to a public water supply to achieve an optimal fluoride concentration (since 1962, the U.S. Public Health Service has recommended that community drinking waters contain 0.7–1.2 ppm [parts per million] of fluoride¹²). Community water fluoridation has been recognized as 1 of 10 great achievements in public health of the twentieth century because it has been linked to large reductions in tooth decay in many industrialized countries during the latter half of the century.^{12,13}

In 2000 approximately 162 million people in the United States (65.8% of the population served by public water systems) were being supplied with water containing the optimal level of fluoride to protect teeth from caries.¹⁴ The national objective is for at least 75% of the population to be served by community water systems providing optimal levels of fluoride by the year 2010.⁴

Effectiveness

- Starting or continuing CWF is effective in reducing dental caries by 30%–50% in communities.
- Stopping CWF results in increases in dental caries in some communities.

Applicability

- These findings should be applicable to most people in the United States and other industrialized countries who use public water systems, regardless of race, ethnicity, or socioeconomic status.

The findings of our systematic review are based on 21 studies.^{15–35} An additional nine studies were identified but did not meet our quality criteria and were excluded from the review.^{36–44}

Overall, we found that CWF reduces dental caries approximately 30% to 50% over expected estimates for communities with nonfluoridated water. Further, stopping CWF in situations where other sources of fluoride are inadequate can be expected to result in increases in dental caries (median estimate from our review, 17.9%).⁷ All of the study populations were children 4–17 years old, and dental decay was measured in both primary and permanent teeth.

These findings should be applicable to all people in the United States and most industrialized countries. Studies were conducted in many settings; among different cultures; from the 1950s to 2000; on five continents—Europe, North America, Asia, Australia, and Africa; on the effects of starting, continuing, and stopping CWF; and using differing levels of CWF (fluoride concentrations varied from 0.6 to 1.8 ppm in fluoridated water supplies and from 0 to 0.8 ppm in comparison [nonfluoridated] water supplies).

Potential benefits of CWF include reducing the disparity in caries risk and prevalence across socioeconomic, racial, ethnic, and other groups⁴⁵ and a *halo effect*, which can spread the effects of CWF to residents of nonfluoridated communities who consume processed food and beverages made with fluoridated water.⁴⁶

A recent review of potential adverse effects of CWF showed no clear association between water fluoridation and incidence of mortality from bone cancers, thyroid cancer, or all cancers.⁴⁵

The findings of our systematic review of economic evaluations of CWF are based on nine studies—four in the United States, one in Canada, two in the United Kingdom, and two in Australia.^{47–55} Seven studies reported the annual fluoridation cost per person for 75 water systems of various sizes,^{47,49–51,53–55} and five studies calculated net cost (program cost less cost of averted decay) or net cost per tooth surface saved from decay.^{48,49,52–54} In general, reporting was based on CWF systems that served three population categories: less than 5000, between 5000 and 20,000, and over 20,000.

The results pointed to economies of scale as the main source of variation in the cost per person per year. The median cost per person was \$2.70 for 19 systems serving populations less than 5000; \$1.41 for 21 systems serving populations between 5000 and 20,000; and \$0.40 for 35 systems serving populations greater than 20,000. From a societal perspective, CWF was cost saving in all studies for populations above 20,000.^{48,49,52–54}

Major barriers to the adoption or maintenance of CWF include limited knowledge among the general population and some health professionals of oral health promotion, some organized opposition to CWF (based on fear of adverse effects and appeals for personal autonomy in controlling exposure to fluoride), and some continuing debate about the net balance of benefits and risk of harm from excess fluoride ingested from all sources (of which CWF is one).

In conclusion, the Task Force recommends CWF on the basis of strong evidence of effectiveness in reducing dental decay. This finding should be applicable to most people in the United States who use public water systems, regardless of age, race, ethnicity, or socioeconomic status.

School-Based or School-Linked Pit and Fissure Sealant Delivery Programs: Recommended (Strong Evidence of Effectiveness)

These programs provide pit and fissure sealants directly to children who might not otherwise receive them. *School-based* programs usually are conducted entirely in school settings. *School-linked* programs are conducted partially in the schools (e.g., patient selection and parental permission) but generally provide sealants at private dental practices or other clinics outside of schools. Many programs target *high-risk* children (those unlikely to receive dental care, often those eligible for free or reduced-cost lunch programs) or high-risk teeth (all teeth with deep pits and fissures, especially the first and second permanent molars, which erupt around ages 6 and 12, respectively). A school-based or school-linked component often is an integral part of a community-wide sealant application program.

The appropriate application of pit and fissure sealants to at-risk teeth is one of many complementary strategies for preventing dental caries (tooth decay). Although sealants are necessary to further reduce pit and fissure caries, fluoride is necessary to prevent caries on all types of tooth surfaces.

Effectiveness

- These programs are effective in reducing dental caries by approximately 60% among children aged 6–17 years, of varying socioeconomic levels and baseline caries levels.

Applicability

- Our findings should be applicable to school-age children in a variety of school settings.

Sealants are clear or opaque plastic materials applied to the pits and fissures of teeth to prevent dental caries (tooth decay). When applied properly, sealants prevent food, bacteria, and debris from collecting within the pits and fissures

of vulnerable teeth (mainly molars). Because sealants are effective in preventing caries only as long as the sealant material remains in place, ongoing monitoring of retention and periodic re-application of sealant may be necessary to ensure long-term effectiveness.

Since 1998, federal agencies—including the Centers for Disease Control and Prevention (CDC), the National Institute of Dental and Craniofacial Research (NIDCR), the National Institutes of Health (NIH), the Health Resources and Services Administration (HRSA), and the Indian Health Service (IHS)—have supported state-level partnerships (including departments of health and education and private sector businesses and organizations) to develop, expand, and evaluate school-based and school-linked models integrating oral health into their existing coordinated school health programs.

The findings of our systematic review are based on 10 studies that measured the effectiveness of school-based or school-linked sealant delivery programs in reducing tooth decay among children.^{56–65} An additional 27 studies were identified but did not meet our quality criteria and were excluded from the review.^{66–92}

The studies in our review compared pit and fissure dental caries of children who received sealants in a school-based or school-linked program with children who did not receive sealants. Seven of the 10 studies reported on the effects of using bisphenol A glycidyl methacrylate (bis-GMA) sealant resin as the only caries preventive intervention, and 3 reported on the effects of using bis-GMA sealant combined with other caries preventive interventions (e.g., fluoride gel or rinse, fluoridated water, or health education). In the 10 studies, receiving sealants in a school-based or school-linked program was associated with a median decrease in dental caries of 60% (range, 5% to 93%). School-based programs showed a higher median decrease (65%; range, 23% to 93%) than school-linked programs (37%; range, 5% to 93%). Programs in which sealants were re-applied at some point between initial application and follow-up showed a higher median decrease (65%; range, 23% to 93%) than programs in which sealants were not re-applied (30%; range, 5% to 93%). Overall, these results show that school-based and school-linked pit and fissure sealant programs are effective in reducing dental caries.

The findings should be applicable to school-age children in a range of settings. Studies varied by time, place, population characteristics, number of times sealant was applied to the same tooth surface, and duration of follow-up between sealant application and evaluation of caries status. Studies were conducted in the United States, Guam, the United Kingdom, Australia, Spain, Thailand, and Colombia. All of the study populations involved children aged 6–17 years, and the prevalence of caries was measured in both primary and permanent teeth.

Other potential positive effects of school-based or school-linked sealant delivery programs include increased support for coordinated school-based programs to address related dental and non-dental needs of children from low-income families (e.g., immunization and better nutrition) and increased willingness of third-party payers to pay for sealants applied in other settings. Potential negative effects include competition for time and resources between sealant programs and other school-related activities. In addition, some dentists in private practice are concerned that children who receive dental services in school-based programs may be less likely to keep appointments for regularly scheduled checkups.

The findings of our systematic review of economic evaluations of school-based and school-linked pit and fissure sealant delivery programs are based on six studies—four in the United States, one in Australia, and one in Canada—from the early 1970s to the mid-1990s.^{50,53,60,93–95} Two of the U.S. studies limited their analyses to the costs of school-based and school-linked sealant programs.⁹³ In addition to sealant program costs,⁵⁰ the remaining four studies also provided sufficient data on rates of tooth decay and treatment costs to calculate the net cost per tooth surface saved from decay.^{53,60,94,95}

Although the number of teeth sealed and resealed varied among school-based and school-linked sealant programs, sealant program costs per child ranged from \$18.54⁹³ to \$59.83,⁶⁰ with a median cost of \$39.10. The net cost per surface saved from decay ranged from less than \$0 (cost saving) to \$487.

Major barriers to the adoption or maintenance of school-based or school-linked sealant delivery programs include limited knowledge of the availability and value of dental sealants among the general population and some health professionals; limited resources and limited political and administrative support in some school districts; state dental practice laws and regulations that limit the authority to apply sealants to selected categories of dental care professionals; and resistance of some dentists in private practice.

In conclusion, the Task Force recommends school-based and school-linked pit and fissure sealant programs on the basis of strong evidence of effectiveness in reducing decay in pits and fissures of children's teeth. These findings should be applicable to most children of school age.

***Statewide or Community-Wide Sealant Promotion Programs:
Insufficient Evidence to Determine Effectiveness***

These programs encourage sealant use among private practitioners and through community-based programs (often including school-based programs). Program activities can include continuing education courses for dental health professionals; educational campaigns for consumers, community leaders,

and third-party payers; and efforts to promote school-based or school-linked sealant delivery programs.

Effectiveness

- We found insufficient evidence to determine the effectiveness of statewide or community-wide sealant promotion programs in increasing sealant use or reducing tooth decay.
- Evidence was insufficient because the only available data did not show the effects of these programs on the stated outcomes.
- Insufficient evidence means that we were not able to determine whether or not the intervention works.

Statewide or community-wide sealant promotion programs aim to increase public and professional awareness of the health benefits of sealants, appropriate use of sealants by dental practitioners, and access to sealants (e.g., through school-based programs) for disadvantaged populations that might not otherwise receive them, and to encourage third-party reimbursement for sealants. Today, sealant application is supported through several federally funded programs (e.g., Indian Health Service; Health Resources and Services Administration; Centers for Disease Control and Prevention) and is listed among covered services in all state Medicaid programs.⁵ A 1994 workshop on Guidelines for Sealant Use produced recommendations for sealant use in both community-based and individual care programs.⁹⁶

The findings of our systematic review are based on one study.⁸⁹ This study provided insufficient evidence to determine whether or not statewide or community-wide sealant promotion programs are effective in decreasing dental caries, because we could not determine from the data to what extent the programs contributed to a change in sealant use or a decrease in tooth decay.

Because we could not establish the effectiveness of these programs, we did not examine situations in which they would be applicable, barriers to implementation, or information about economic efficiency.

In conclusion, the Task Force found insufficient evidence to determine the effectiveness of statewide and community-wide sealant promotion programs in increasing sealant use or preventing tooth decay. Only one study qualified for the review, and the change in sealant use or reduction of related tooth decay could not be estimated from the data presented in that study.

Preventing or Controlling Oral and Pharyngeal Cancers

Each year, cancers of the oral cavity (mouth) or pharynx (throat) are diagnosed in about 30,000 Americans; about 8000 people die each year of these

malignancies, which are mainly squamous cell carcinomas.^{4,97,98} Tobacco use and excessive alcohol consumption together account for 90% of all oral cancers.^{4,99} Oral and pharyngeal cancers are the 4th, 7th, and 14th most common cancers among African-American men, white men, and all women, respectively.⁹⁷ They are most often diagnosed at late stages and treated by methods (surgery, radiation therapy, and chemotherapy) that are often disfiguring and costly.¹⁰⁰ Overall relative five-year survival rates are about 50%, and mortality is nearly twice as high among some minorities (especially African-American men) as among whites.⁹⁸

Since 1992, organized efforts to develop and implement a national strategic plan for preventing and controlling oral and pharyngeal cancers have been gaining momentum in the United States.¹⁰¹ In 1996, a coalition of national, state, and local health agencies began promoting coordinated strategies in five areas: (1) advocacy, collaboration, and coalition building; (2) public health policy; (3) public education; (4) professional education and practice; and (5) data collection, evaluation, and research. Controversy, however, surrounds the conduct of interventions to prevent and control these cancers, including such issues as the roles of dental and medical practitioners in early detection, whether efforts to prevent tobacco use are more effective than early detection of cancers, and whether or not screening through oral examinations actually helps to prevent and control these cancers.

***Population-Based Interventions for Early Detection of Pre-Cancers and Cancers:
Insufficient Evidence to Determine Effectiveness***

These programs educate the public about risk factors, symptoms, signs, and the value of early detection and train health workers to detect suspicious lesions. People at high risk of developing cancer, or those with cancer symptoms, are encouraged to examine themselves for suspicious lesions and to get a professional examination and follow-up. To help reach more people, such programs can also include examining people at the workplace, at home, at health fairs, in field clinics, or where people usually receive health care. Such examinations result in referrals of people with suspicious lesions for follow-up and treatment.

Effectiveness

- We found insufficient evidence to determine the effectiveness of population-based interventions for early detection of pre-cancers and cancers in reducing morbidity or mortality or improving the quality of life.
- Evidence was insufficient because no studies examined the effects of these programs on the stated outcomes.
- Insufficient evidence means that we were not able to determine whether or not the intervention works.

The findings of our systematic review are based on 19 studies (in 24 reports).¹⁰²⁻¹²⁵ Although the studies looked at many aspects of the effects of population-based interventions for early detection of pre-cancers and cancers, none of them measured the three outcomes we had chosen to evaluate in this review: morbidity, mortality, and quality of life. The studies, therefore, provided insufficient evidence to determine whether or not these population-based interventions are effective in reducing cancer morbidity or mortality or in improving quality of life.

Because we could not establish the effectiveness of these programs, we did not examine situations in which the programs would be applicable, barriers to implementation, or information about economic efficiency.

In conclusion, the Task Force found insufficient evidence to determine the effectiveness of population-based interventions for early detection of pre-cancers and cancers in reducing cancer morbidity or mortality, or in improving the quality of life, because no studies in the review measured effectiveness in terms of those outcomes.

Preventing or Controlling Sports-Related Craniofacial Injuries

The consequences of sports-related injuries (e.g., bone fractures, tooth loss, concussions, brain damage) range from something as simple yet frustrating as a loss of game time to the much more serious events of paralysis and death. Helmets, facemasks, and mouthguards protect users from injuries to the head, face, and mouth. Protective equipment is mandatory in some professional sports. For example, baseball requires use of helmets, football requires helmets and facemasks, ice hockey requires helmets, and boxing requires mouthguards. In amateur sports, helmets, facemasks, and mouthguards are mandatory in boxing, football, ice hockey, and men's lacrosse and mouthguards are mandatory in women's field hockey. *Healthy People 2010*⁴ established a developmental objective to increase the proportion of public and private schools that require the use of appropriate head, face, eye, and mouth protection for students participating in school-sponsored physical activities (Table 7-1).

Population-Based Interventions to Encourage Use of Helmets, Facemasks, and Mouthguards in Contact Sports: Insufficient Evidence to Determine Effectiveness

Population-based interventions to encourage the use of helmets, facemasks, and mouthguards when engaged in contact sports aim to prevent injuries to the head, face, and mouth. Rules of play concerning helmets, facemasks,

goggles, and mouthguards vary by sport and position on the team. Intervention programs educate health professionals, parents, coaches, players, and officials of organized sports about the risk of injury and potential benefits of protective equipment, offer incentives for regular use of protective equipment at both practice and formal competition, and encourage the enforcement of rules of play involving safety equipment.

Effectiveness

- We found insufficient evidence to determine the effectiveness of population-based interventions in encouraging the use of helmets, facemasks, and mouthguards when engaging in contact sports.
- Evidence was insufficient because the reported effects of the intervention in increasing the use of protective equipment or decreasing related injuries were small and inconsistent.
- Insufficient evidence means that we were not able to determine whether or not the intervention works.

The findings of our systematic review are based on four studies.^{126–129} An additional 13 studies were identified but did not meet our quality criteria and were excluded from the review.^{130–142} To be able to recommend use of population-based interventions to encourage use of protective equipment in contact sports, the Task Force required that studies show increases in the use of such equipment or decreases in sports-related craniofacial injuries attributable to the intervention.

The four studies reported inconsistent and small effects of the intervention in increasing use of protective equipment or decreasing related injuries. The Task Force, therefore, found insufficient evidence to determine whether or not these interventions are effective in achieving the stated outcomes.

Because we could not establish the effectiveness of these interventions, we did not examine situations in which they would be applicable, barriers to implementation, or information about economic efficiency.

In conclusion, the Task Force found insufficient evidence to determine the effectiveness of population-based interventions to encourage use of helmets, facemasks, and mouthguards in contact sports, because available studies showed inconsistent and small effects.

IMPROVING ORAL HEALTH THROUGH USE OF THESE RECOMMENDATIONS

Public officials, community leaders, school systems, healthcare systems, and oral health practitioners can use the recommendations in this chapter to pre-

vent and control dental caries. In this section, we provide information to help apply the recommended interventions to prevent dental caries in communities, along with the results of economic evaluations to estimate the resources needed to implement effective interventions where they are needed.

The Task Force found insufficient evidence to determine the effectiveness of interventions to prevent or control oral and pharyngeal cancers and sports-related craniofacial injuries, and therefore was not able to recommend for or against use of these interventions at this time. Users of the *Community Guide* who are developing or modifying organized efforts to prevent and control these conditions, however, can consider the findings presented in this chapter and the recommendations of other groups (described below), along with the need for additional research to fill gaps in our knowledge about the effectiveness of these promising interventions.

Preventing and Controlling Dental Caries

The Task Force has recommended community water fluoridation (CWF) and school-based or school-linked pit and fissure sealant delivery programs on the basis of strong evidence of effectiveness. To decide if CWF should be continued, expanded, or modified in their communities, public officials and water system operators should consider the recommendations and other evidence provided in this book along with such local information as the burden and cost of dental caries, resource availability, and the laws that regulate public water supplies.

Similarly, school systems, public officials, parents, and practitioners can use the recommendation for school-based sealant delivery programs as one factor in their decision to start, expand, or modify existing programs in their school districts. Other local factors include the overall burden and disparities in dental caries, especially in school districts with large proportions of vulnerable children who are less likely to receive dental sealants from private sources (e.g., children in low-income households). Some children of racial and ethnic minority groups have about three times more untreated decayed and missing teeth due to caries but are about one-third as likely to receive sealants.^{8,11,143} In 2000, 29 states reported dental sealant programs serving 193,000 children, a number that represented only about 3% of poor children who could receive sealants.¹⁴⁴

Community water fluoridation and school-based sealant programs should be considered in the context of other community-wide, provider-based, and individual strategies for preventing or controlling dental caries in communities.^{5,12} Moreover, the results of the economic evaluations can also be used to help decision makers determine whether CWF and school-based sealant

programs are affordable and wise expenditures that provide the worthwhile benefits of avoiding the often underestimated health consequences of dental caries.

Preventing and Controlling Oral and Pharyngeal Cancers

Users of the *Community Guide* who are developing or modifying organized efforts to reduce the burden of oral and pharyngeal cancers should consider the findings presented here together with recommendations of other groups.^{101,145,146} For example, some experts have encouraged more widespread use of effective strategies to reduce tobacco use, an important cause of oral and pharyngeal cancers,¹⁴⁷⁻¹⁴⁹ and other experts have encouraged clinicians to consider periodic oral examinations of people engaging in risk behaviors (tobacco use or excessive alcohol consumption) or manifesting suspicious symptoms.¹⁴⁵ We published a comparison of selected evidence reviews and recommendations on interventions to prevent oral and pharyngeal cancers in 2002,⁶ and this article is also available at www.thecommunityguide.org/oral. Such comparisons can help readers of the *Community Guide* put the evidence and recommendations compiled by different authorities into a common framework that aids decision making.

In the absence of definitive recommendations on effective interventions to prevent and control oral and pharyngeal cancers in this report and other sources, users of this book may choose to advocate for new research studies on the effectiveness of various methods of oral examination (by dental care practitioners and other medical practitioners who must examine the mouth during the course of routine medical care) in detecting pre-cancers and in reducing sickness, disfigurement, and premature death from oral and pharyngeal cancers. Research questions identified through a systematic review of population-based interventions designed to prevent oral and pharyngeal cancers were published as part of the comprehensive evidence review conducted by the Task Force and previously published (see Truman et al., 2002⁷ or www.thecommunityguide.org/oral/oral-rsch-quest.htm).

Preventing and Controlling Sports-Related Craniofacial Injuries

Users of the *Community Guide* who are developing or modifying organized efforts to prevent and control sports-related craniofacial injuries should consider the findings presented here together with findings and recommendations of other groups including the Office of the Surgeon General, American Dental Association, the American Academy of Pediatric Dentistry, the American Medical Association, and the American Academy of Pediatrics (see Table 5 in Gooch et al., 2002,⁶ available at www.thecommunityguide.org/oral/oral).

ajpm-c-compare-ev-rev.pdf). (Evidence of the efficacy of protective sports equipment in preventing injuries was not the focus of this review. Yet some investigators have observed that the frequency and severity of head, face, and oral injuries have decreased in some sports since the use of helmets, face-masks, and mouthguards became mandatory in selected organized contact sports [e.g., football and ice hockey].)^{150,151} A comparison of selected evidence reviews and recommendations on interventions to prevent and control sports-related craniofacial injuries (see Table 6 in Gooch et al., 2002,⁶ available at www.thecommunityguide.org/oral/oral-ajpm-c-compare-ev-rev.pdf) has revealed that the Surgeon General's report, policies and guidelines from selected medical and dental professional organizations, and mandatory rules of play from major governing bodies of organized sports all promote increased awareness and use of protective equipment in contact sports with risk of injury.

In the absence of definitive recommendations on effective use of protective head and face equipment to avoid injuries and death in contact sports, users of the *Community Guide* may choose to advocate for new research studies to fill the evidence gap. Research questions that were developed as previously described are available online at www.thecommunityguide.org/oral/oral-rsch-quest.htm.

CONCLUSION

This chapter summarizes Task Force conclusions and recommendations on interventions to prevent or control dental caries (tooth decay), oral (mouth) and pharyngeal (throat) cancers, and sports-related craniofacial injuries. The Task Force recommends both CWF and school-based or school-linked pit and fissure sealant delivery programs to help reduce dental caries. Evidence was insufficient to determine the effectiveness of population-based interventions for early detection of pre-cancers and cancers in reducing morbidity or mortality or improving the quality of life. Evidence was also insufficient to determine the effectiveness of population-based interventions to encourage the use of helmets, facemasks, and mouthguards in increasing the use of such equipment or decreasing sports-related craniofacial injuries. Details of these reviews have been published^{6,7,152,153} and these articles, along with additional information about the reviews, are available at www.thecommunityguide.org/oral.

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This chapter was written by the members of the systematic review development team: Benedict I. Truman, MD, MPH, Office of Minority Health, Office of the Director, Centers

for Disease Control and Prevention (CDC), Atlanta, Georgia; Barbara F. Gooch, DMD, MPH, Division of Oral Health (DOH), National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), CDC, Atlanta; Iddrisu Sulemana, MPH, MA, Division of Epidemiology and Surveillance, National Immunization Program, CDC, Atlanta; Helen C. Gift, PhD, Division of Social Sciences, Brevard College, Brevard, North Carolina; Alice M. Horowitz, PhD, National Institute of Dental and Craniofacial Research (NIDCR), National Institutes of Health (NIH), Bethesda, Maryland; Caswell A. Evans, Jr., DDS, MPH, NIDCR/NIH, Bethesda; Susan O. Griffin, PhD, DOH/NCCDPHP/CDC, Atlanta; and Vilma G. Carande-Kulis, MS, PhD, Division of Prevention Research and Analytic Methods/Epidemiology Program Office (DPRAM/EPO)/CDC, Atlanta.

Consultants for the reviews were: Myron Allukian, Jr., DDS, MPH, Boston Public Health Commission, Boston, Massachusetts; Eugenio Beltran, DMD, DrPH, DOH/CDC, Atlanta; Aljernon Bolden, DMD, MPH, Boston University, Goldman School of Dental Medicine, Boston; Maria Teresa Canto, DDS, MPH, NIDCR/NIH, Bethesda; Timothy R. Collins, DDS, MPH, Los Angeles County Department of Health Services, Los Angeles, California; Stephen B. Corbin, DDS, MPH, Special Olympics, Inc., Washington, DC; Teresa A. Dolan, DDS, MPH, University of Florida College of Dentistry, Gainesville; Thomas F. Drury, PhD, NIDCR/NIH, Bethesda; Harold Goodman, DDS, MPH, Office of Oral Health, State of Maryland Department of Health and Mental Hygiene, Baltimore; Larry Hill, DDS, MPH, Cincinnati Health Department, Cincinnati, Ohio; Lori Hutwagner, MS, Division of Public Health Surveillance and Informatics, EPO/CDC, Atlanta; Amid I. Ismail, BDS, MPH, DrPH, University of Michigan School of Dentistry, Ann Arbor; Robert Isman, DDS, MPH, Office of Medi-Cal Dental Services, California Department of Health Services, Sacramento; William Kohn, DDS, MPH, DOH/NCCDPHP/CDC, Atlanta; Jayanth Kumar, DDS, MPH, New York State Health Department, Albany; Raymond A. Kuthy, DDS, MPH, University of Iowa College of Dentistry, Iowa City; Corinne E. Miller, DDS, PhD, Michigan Department of Community Health, Lansing; R. Gary Rozier, DDS, MPH, School of Public Health, University of North Carolina, Chapel Hill; Randy H. Schwartz, MSPH, American Cancer Society, Atlanta; Robert Selwitz, DDS, MPH, NIDCR/NIH, Bethesda; Mark Siegal, DDS, MPH, Bureau of Oral Health Services, Ohio State Health Department, Columbus; Janet Stansell, MLM, NCCDPHP/CDC, Atlanta; Scott L. Tomar, DMD, DrPH, University of Florida College of Dentistry, Gainesville; Steven Uranga McKane, DMD, MPH, SUM Consulting, West Hills, California; and B. Alex White, DDS, DrPH, Kaiser Permanente Center for Health Research, Portland, Oregon.

Articles included in the reviews were abstracted by: Dionne Johnson; Kim Johnson; and Virginia Noland.

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