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# A Comparison of Selected Evidence Reviews and Recommendations on Interventions to Prevent Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries

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## Introduction

The reports in this supplement<sup>1,2</sup> represent the work of the Task Force on Community Preventive Services (the Task Force), an independent, nonfederal group of national, regional, and local public health and prevention services experts supported by public and private partners. This report is one in a series of topics published as part of the *Guide to Community Preventive Services* (the *Community Guide*). Previously published topics include vaccine-preventable diseases, tobacco use and control, reducing injuries to motor vehicle occupants, diabetes, and physical activity. A full listing of published articles can be found at the website ([www.thecommunityguide.org](http://www.thecommunityguide.org)).

In addition to expanding the *Community Guide*, the reviews and evidence-based recommendations in this supplement<sup>1,2</sup> add to the growing body of guidelines that identify and document the effectiveness of population-based interventions to promote oral health, as well as identifying areas in which high-quality research on effectiveness is still needed. The Task Force reports complement other recent efforts that provide informa-

tion and guidance to personnel in state and local health departments, purchasers of health care, people responsible for funding public health programs, policymakers, third-party payers, and others who have an interest in or responsibility for improving oral and related general health in all segments of the population. This article presents a summary of selected guidelines and evidence reviews available as of August 2001, and provides an accessible review of the current evidence of effectiveness of interventions related to those evaluated by the Task Force. These interventions address the prevention of dental caries (through community water fluoridation, school-based or school-linked pit and fissure sealant delivery programs, and statewide and community-wide sealant promotion programs), oral and pharyngeal cancers, and sports-related craniofacial injuries.

In this article we first describe the focus and general content of selected evidence reviews and guidelines, and the type of information contained in Tables 1 through 6. This is followed by a brief discussion of the comparisons across evidence reviews and guidelines for each oral health problem. The evidence of effectiveness is presented for two clinical interventions—sealant applications and soft-tissue examinations for oral and pharyngeal cancers and pre-cancers—that relate directly to the population-based interventions reviewed in the *Community Guide*. For prevention of sports-related craniofacial injuries, mandatory requirements for craniofacial protection in selected sports are also considered. The tables themselves are presented at the end of the article, organized by oral condition and intervention.

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## **Selected Evidence Reviews and Guidelines to Prevent Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries**

The primary objective of this article is to compare the evidence reviews and recommendations from the *Community Guide* with reviews and recommendations produced recently by other major governmental and non-governmental groups. Frequently-cited reports include the Centers for Disease Control and Prevention's (CDC) *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States*<sup>3</sup>; *Oral Health in America: A Report of the Surgeon General*<sup>4</sup> (SGR); *Systematic Review of Water Fluoridation*<sup>5</sup> (conducted by the National Health Service Centre for Reviews and Dissemination, University of York, England [NHS York Review]); *Preventing and Controlling Oral and Pharyngeal Cancer: Recommendations from a National Strategic Planning Conference*<sup>6</sup>; and *The Canadian Guide to Clinical Preventive Health Care*<sup>7</sup> (by the Canadian Task Force on Preventive Health Care [CTFPHC], formerly Canadian Task Force on the Periodic Health Examination). Other evidence reviews and guidelines are included to provide additional sources for assessment of the strength of the evidence of effectiveness of an intervention, estimates of effectiveness, or a specific implementation recommendation from another agency or group.

This section identifies and briefly describes selected guidelines and evidence reviews included in this summary report. Methods for finding, evaluating, and summarizing the evidence of effectiveness varied among the different reporting groups, and are described below. After evaluating the evidence of effectiveness, some reporting groups provided summary effect measures (i.e., changes in outcome attributable to the intervention), some translated the evidence into recommendations on the basis of established rules, and others did both. As a result of these variations, the descriptions provided here cannot fully elaborate on the methods used or the target audience for each publication. In addition, several reviews (including the oral health section of the *Community Guide*, the CDC's *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States*, the SGR, and the *Systematic Review of Water Fluoridation* [NHS York Review]) occurred concurrently and often in collaboration. To varying degrees these reviews shared the same literature and subject-matter specialists.

### *The Guide to Community Preventive Services: Interventions to Prevent Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries* (2002)

The oral health section of the *Community Guide*<sup>1,2</sup> includes evidence reviews on five interventions to promote oral health. *Community Guide* methods, which

have been summarized elsewhere,<sup>8</sup> basically involve a systematic process of (1) identifying and selecting interventions to review; (2) searching for published evidence (generally limited to studies published in English); (3) abstracting and evaluating the quality of each identified study; (4) summarizing the available body of evidence on effectiveness, other effects, applicability, economic evaluation, and barriers to implementation; (5) translating evidence of effectiveness into recommendations, by using established rules; and (6) identifying remaining questions for future research. Methods specific to the oral health systematic reviews are summarized elsewhere in this supplement (see Truman et al.,<sup>2</sup> Appendix A). In general, strength of evidence of effectiveness links directly to the strength of a recommendation. Evidence other than effectiveness can also be incorporated in Task Force recommendations. For example, evidence of harms resulting from an intervention might lead to a recommendation that the intervention not be used, even if it is effective in improving some outcomes. No oral health recommendation was so modified.

### *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States* (2001)

Because fluoride is now widely available from many sources, the CDC convened a workgroup in 1996 to develop recommendations for using fluoride to prevent and control dental caries in the United States. The report<sup>3</sup> includes "critical analysis of the scientific evidence regarding the efficacy and effectiveness of fluoride modalities in preventing and controlling dental caries, ordinal grading of the quality of the evidence, and assessment of the strength of each recommendation," based primarily on the evidence of effectiveness. Workgroup members collectively agreed on the quality of the evidence and strength of each recommendation. The recommendations address public health and professional practice, self-care, consumer product industries and health agencies, and needs for further research.

### *National Institutes of Health, Consensus Development Conference Statement, Diagnosis and Management of Dental Caries Throughout Life*, March 26–28, 2001

National Institutes of Health (NIH) Consensus Statements are narrative summaries prepared by a nonadvocate, nonfederal panel of experts. The Consensus Statements are based on (1) presentations made during a one-and-a-half day public session by investigators working in areas relevant to the consensus questions; (2) questions and statements from conference attendees during open discussion periods that are part of the public session; and (3) closed deliberations by the panel during the remainder of the second day and

morning of the third. This conference,<sup>9</sup> sponsored by the National Institute of Dental and Craniofacial Research (NIDCR) and the NIH Office of Medical Application of Research, was convened to examine the current state of dental caries research to help health-care providers and the general public make informed decisions. Cosponsors included the National Institute on Aging and the U.S. Food and Drug Administration. The best methods available for the prevention of dental caries initiation throughout life were among key questions addressed, and the evidence of effectiveness of pit and fissure sealants was examined.<sup>10,11</sup> Presentations by investigators were based on systematic reviews of the dental research literature provided by the Agency for Healthcare Research and Quality.<sup>12</sup> An extensive bibliography of dental caries research articles was also prepared by the National Library of Medicine. Scientific evidence was given precedence over clinical anecdotal experience.

#### *Oral Health in America: A Report of the Surgeon General (2000)*

The major message of the first Surgeon General's report on oral health was that oral health is essential to general health and well-being *and* can be achieved by all people in the United States. However, all people are *not* achieving optimal oral health. The report<sup>4</sup> is a comprehensive narrative review of the published scientific literature about oral and craniofacial health and is presented in five parts:

- What is oral health?
- What is the status of oral health in America?
- What is the relationship between oral health and general health and well-being?
- How is oral health promoted and maintained, and how are oral diseases prevented?
- What are the needs and opportunities to enhance oral health?

In Part 4, the evidence for the efficacy and effectiveness of health promotion and disease prevention measures is reviewed with a focus on community efforts and on those conditions that pose the greatest burden to the U.S. population. Narrative reviews of the evidence of effectiveness are provided for most interventions, usually without a summary effect measure or a formal recommendation for use.

#### *Systematic Review of Water Fluoridation (National Health Service Reviews, September 2000)*

This evidence-based review of water fluoridation<sup>5</sup> had five objectives: (1) determine the effects of fluoridation of drinking water supplies on the incidence of caries; (2) determine the effect over and above that offered by the use of alternative interventions and strategies;

(3) determine if fluoridation results in a reduction of caries across social groups and brings equity; (4) determine if fluoridation has negative effects; and (5) determine if the effect differs by natural and artificial water fluoridation. This review involved a systematic process of (1) searching for evidence (25 electronic databases with no language restriction and the Internet); (2) determining quality inclusion criteria; (3) extracting data and assessing validity of studies; (4) summarizing the available body of evidence of effectiveness and conclusions about original objectives; (5) identifying limitations and implications for future research; and (6) translating findings into information that can guide practice. Where the data were in suitable format, summary measures of effect (range, median, and plots of 95% confidence intervals) were reported.

#### *Benefits and Risks of Water Fluoridation: Report Prepared for Ontario's Public Consultation on Water Fluoridation Levels (November 1999)*

This technical report<sup>13</sup> provided an update to the 1996 Canadian Federal-Provincial Subcommittee Report concerning fluoride in the water supply.<sup>14</sup> It included a systematic (1) search strategy (studies published between 1994 and 1999); (2) use of inclusion criteria; (3) assessment of study research design; (4) extraction process; (5) summary of the body of evidence on fluoridation's positive and negative effects (with range of fluoridation's beneficial and harmful effects stratified by study's country of origin); and (6) translation of the evidence into a qualified recommendation. Critical appraisal and interpretation of the literature and all recommendations were largely the work of one scientist.

#### *Preventing and Controlling Oral and Pharyngeal Cancer: Recommendations from a National Strategic Planning Conference (1998)*

In 1996, CDC convened a national conference to develop strategies for preventing and controlling oral and pharyngeal cancers in the United States. The conference was cosponsored by the NIDCR (formerly the National Institute of Dental Research) and the American Dental Association. Experts in oral and pharyngeal cancer prevention, treatment, and research developed recommendations in five areas<sup>6</sup>: (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. The recommendations included approaches successfully applied to other public health problems and were based on background papers—narrative summaries of the state of the science with regard to oral cancer prevention, control, and treat-

ment—that drew on current literature reviews and the authors' critical analysis and expert opinion.

*Institute of Medicine: Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride* (1997)

“This is the initial report of a major new activity of the Food and Nutrition Board (FNB) of the Institute of Medicine: the development of a comprehensive set of reference values for dietary nutrient intakes for the healthy population in the United States and Canada.”<sup>15</sup> Based on interaction with and information from expert panels and subcommittees, the Dietary Reference Intakes (DRI) Committee determined the DRI values included in this narrative report. The process included critical analysis of the scientific literature, evaluation of criteria of adequacy, provision of substantive rationales for each criterion, and review and application of risk assessment models for estimating levels of nutrients that may increase risk of toxicity or adverse effects (upper reference levels). “[T]he reference value that will be used for fluoride is Adequate Intake (AI). The AI is based on estimated intakes that have been shown to reduce the occurrence of dental caries maximally in a population without causing unwanted side effects including moderate dental fluorosis.”<sup>15</sup>

*Guide to Clinical Preventive Services: Report of the U.S. Preventive Services Task Force* (1996)

The U.S. Preventive Services Task Force (USPSTF) provides evidence-based recommendations for clinical practice about preventive interventions (e.g., screening tests for early detection of diseases, vaccinations, and counseling for risk reduction) for a wide variety of conditions. The main audience for the second edition of the *Guide to Clinical Preventive Services*<sup>16</sup> consisted of primary care physicians, nurse practitioners, and physician assistants. The USPSTF conducted evidence reviews using (1) a standardized search for evidence of effectiveness of clinical preventive services, (2) standardized inclusion criteria, and (3) standardized evaluations of the evidence concluding with a narrative review and a recommendation based on the strength of the evidence of effectiveness.

*Workshop on Guidelines for Sealant Use: Recommendations. Association of State and Territorial Dental Directors (ASTDD); the New York State Health Department; the Ohio Department of Health; and the School of Public Health, University of Albany, State University of New York* (1995)

An expert panel was convened in 1994 to revise earlier guidelines for sealant use in community and individual-care programs.<sup>17</sup> The publication<sup>18</sup> is an updated and

expanded approach to determining which communities, individuals, teeth, and tooth surfaces are to receive sealants. The revisions were based on expert opinion, informed by available information on the epidemiology, clinical diagnosis, progression, and treatment of dental caries.

*The Canadian Guide to Clinical Preventive Health Care* (1994, with periodic updates)

The CTFPHC uses a standardized methodology for evaluating the effectiveness of preventive healthcare interventions and for developing clinical practice guidelines primarily on the basis of evidence from published medical research. The explicit methodology includes (1) a standardized approach to evaluating the intervention (i.e., criteria of effectiveness); (2) a standardized search for evidence of effectiveness; (3) a standardized evaluation of the evidence of effectiveness; and (4) development of practice recommendations based on the evidence of effectiveness viewed within the context of the clinical practice and healthcare settings to which the recommendations apply. In 1994, a compilation of recommendations was published.<sup>7</sup> Since 1994, updates have been published primarily in the *Canadian Medical Association Journal*. Updates on prevention of dental caries<sup>19</sup> and prevention of oral cancer<sup>20</sup> are considered in this review.

*Cochrane Collaboration* (various reports)

The Cochrane Collaboration is an international coalition of participating researchers conducting systematic evidence reviews on a wide variety of clinical and public health topics.<sup>21</sup> No reviews on the effectiveness of any intervention related directly to those reviewed in the *Community Guide* to promote oral health had been published by August 2001, although protocols (introduction, objective, materials, and methods for reviews currently being prepared) have been developed for several related interventions, including pit and fissure sealants. The published reports will provide assessments of the effectiveness of interventions based on a systematic process including (1) a search for evidence (not usually restricted to the English language); (2) standardized inclusion and exclusion criteria; (3) standardized evaluation and abstraction of information; (4) a pooled summary estimate using meta-analytic techniques when appropriate, and a narrative review when a pooled summary estimate could not be conducted; and (5) a process of updating reviews as new evidence is identified.

## Organization of the Summary Tables

Evidence reviews and recommendations are summarized in tables at the end of this article, arranged as follows:

- Table 1. Clinical application of dental sealants to reduce dental caries
- Table 2. Community interventions to reduce dental caries
- Table 3. Clinical examinations for early detection of oral and pharyngeal cancers
- Table 4. Community interventions to reduce oral and pharyngeal cancers
- Table 5. Community interventions to encourage use of protective equipment to reduce craniofacial injuries in contact sports
- Table 6. Use of craniofacial protective equipment mandated by major governing bodies in selected sports

Summaries of the supporting evidence reviews are presented for each intervention. These include (1) a formal strength-of-evidence rating or recommendation, if provided; (2) narrative conclusion, if any; (3) summary effect measurements, if provided, with a brief description of the effect measure; and (4) other pertinent information.

In Tables 1 and 3, the evidence of effectiveness is presented for clinical interventions (i.e., sealant applications and soft-tissue examinations for oral and pharyngeal cancers and pre-cancers) that relate directly to the evaluations of effectiveness of related community interventions reviewed in the *Community Guide*. Community interventions in Tables 2, 4, and 5 were reviewed in the *Community Guide*. Community interventions not evaluated in the *Community Guide* (e.g., school-based fluoride mouth rinse and tablet programs, public and professional education) are not presented in these tables.

### Comparing Recommendations from Selected Guidelines

Four of the selected evidence reviews (the *Community Guide*<sup>2</sup>; *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States*<sup>3</sup>; USPSTF<sup>16</sup>; and CTFPHC<sup>7</sup>) present formal recommendations based on the evidence of effectiveness for each intervention. Three reviews (*Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States*<sup>3</sup>; USPSTF<sup>16</sup>; and CTFPHC<sup>20</sup>) used the same evaluation criteria. One review, *Systematic Review of Water Fluoridation* (NHS York Review)<sup>5</sup> assessed the quality of the evidence on the positive and negative effects of community water fluoridation but did not offer a recommendation for or against implementing the intervention. In summarizing the conclusions from these reviews, the strength of evidence rating or recommendation is presented. In some cases, a brief quotation or statement is also presented. For several interventions, longer recommendation statements in the original document were abbreviated to fit the table format.

In all of the guidelines, readers were cautioned not to

confuse an assessment of insufficient evidence of effectiveness with evidence of ineffectiveness, and that caution applies as well to the summaries presented here. In most cases, an assessment of insufficient evidence was based on an inadequate number of qualifying studies (i.e., studies meeting established criteria for study design and execution that allow reported changes in outcomes to be validly attributed to the intervention).

#### *Guide to Community Preventive Services*

Recommendations for or against use of an intervention were based on the evidence of effectiveness and consideration of other effects (positive and negative). The three options are: (1) strongly recommended (for or against); (2) recommended (for or against); and (3) insufficient evidence (no recommendation for or against).

#### *Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States; Guide to Clinical Preventive Services; The Canadian Task Force on Preventive Health Care*

A letter rating was assigned to denote the strength of the evidence of effectiveness supporting the recommendation from both the USPSTF (although their approach was changed in 2001) and the CTFPHC for or against use of the intervention. Letter ratings range from A, "good evidence to support the recommendation to include" to E, "good evidence to support the recommendation to exclude." A letter rating of C denotes an evaluation of "insufficient evidence."

#### *Systematic Review of Water Fluoridation* (NHS York Review)

Quality inclusion criteria were based on a predefined hierarchy of evidence: Level A, "highest quality of evidence with minimal risk of bias"; Level B, "evidence of moderate quality, moderate risk of bias"; and Level C, "lowest quality of evidence with high risk of bias."

### Comparing Narrative Reviews from Selected Guidelines

Some of the selected guidelines provided a narrative evaluation of the evidence of effectiveness of the intervention. For presentation in the summary tables of this article, pertinent sections of the text were identified and quoted. In most cases, the included text represents an excerpt or quotation from an extended narrative evaluation of the studies providing evidence.

### Comparing Summary Effect Measurements from Selected Guidelines

After evaluating the evidence of effectiveness of the intervention, three of the evidence reviews (*Guide to*

*Community Preventive Services*<sup>2</sup>; *Systematic Review of Water Fluoridation*<sup>5</sup>; and *Benefits and Risks of Water Fluoridation*<sup>13</sup>) provided summary effect measures. This information is provided in the tables with additional comments or information as needed. In all cases, the original document included a more detailed presentation and discussion of the summary effect measurements than is provided in this text or Tables 1 through 6.

#### *Guide to Community Preventive Services*

For community water fluoridation (CWF), before-and-after or post-exposure measures of dental caries prevalence were calculated at the tooth level. Summary effect measures included the range and median of (1) the absolute and relative change in dental caries, comparing the intervention group that started (or continued) fluoridation with the control group; and (2) the absolute and relative change in dental caries, comparing the intervention group that stopped fluoridation with controls. The summary effect measures for school-based and school-linked sealant delivery programs were the range and median of the percentage reduction in dental caries in the occlusal surfaces of posterior teeth between the control and the intervention groups, where dental sealants were delivered directly to children in school-based or school-linked settings.

#### *Systematic Review of Water Fluoridation* (NHS York Review)

Summary effect measures included the range and median of the absolute difference in the change in dental caries prevalence from baseline to the final examination between the control group (nonfluoridated areas) and the intervention group (fluoridated areas). Dental caries prevalence was measured at the tooth level and as the percentage of caries-free children. Only studies reporting before-and-after measures in concurrent comparison groups and variance data were used to calculate the effect measures.

#### *Benefits and Risks of Water Fluoridation: Report Prepared for Ontario's Public Consultation on Water Fluoridation Levels*

Summary effect measures included the range of absolute and percentage reductions in cumulative dental caries prevalence between control and intervention groups. Measures were presented for the primary and permanent teeth for each included study and aggregated by the countries in which the studies were undertaken. Effect measures in Table 2 are categorized into groups: countries with established market economies and those with developing market economies.

#### *Cochrane Collaboration*

Findings of systematic reviews had not yet been released at the time that the summary tables presented here were being prepared.

### **Discussion**

Comparison of the systematic reviews and recommendations presented here reveals substantial agreement on both the effectiveness of community water fluoridation and school-based and school-linked sealant programs and the recommendations based on the strength of that evidence. All reviews indicate that the evidence of effectiveness of statewide or community-wide sealant promotion programs is very limited, and is insufficient to support a recommendation for or against their use, according to the *Community Guide's* rules.<sup>8</sup> For other interventions in which the evidence of effectiveness also was considered to be insufficient—interventions to reduce oral and pharyngeal cancers and to encourage use of craniofacial protective equipment in contact sports—different reviews reached different conclusions about the evidence and its implications for practice.

There was uniform agreement among recent reviews on the effectiveness of the clinical application of sealants to children's permanent molars in preventing decay, especially among children at high risk (Table 1). Consistent with the *Community Guide's* finding of strong evidence of effectiveness, the SGR<sup>4</sup> and the *Workshop on Guidelines for Sealant Use*<sup>18</sup> provide strong support for community sealant programs, such as school-based and school-linked programs (Table 2). Although the *Community Guide* strongly recommended school sealant programs, it found insufficient evidence to recommend for or against large-scale promotional activities directed towards practitioners, consumers, community leaders, and third-party payers. None of the other groups summarized effectiveness or made recommendations about the use of promotional activities, although the SGR and the *Workshop on Guidelines for Sealant Use* described such activities.

There was uniform agreement that CWF is effective in decreasing dental caries prevalence in communities (Table 2). CDC's recommendations on use of fluorides,<sup>3</sup> SGR,<sup>4</sup> the Institute of Medicine,<sup>15</sup> and the CTFPHC<sup>19</sup> agreed with the *Community Guide's* strong recommendation for community water fluoridation. Two systematic reviews (*Systematic Review of Water Fluoridation*<sup>5</sup> [NHS York Review] and *Benefits and Risks of Water Fluoridation*<sup>13</sup>) varied in the assessment of the strength of the evidence (e.g., moderate quality and limited quantity) but showed effect sizes that were similar to each other and to the *Community Guide's* findings. One of the reviews<sup>13</sup> concluded that the size of the effect was "small in absolute terms." CDC's recommendations on use of fluorides and the SGR also

highlighted findings that fluoridation was cost effective relative to other interventions to prevent dental caries. Their conclusions are consistent with the *Community Guide's* systematic review of the economic evaluations that reported fluoridation to be cost saving. CDC's recommendation on use of fluorides and the SGR also noted that fluoridation benefits all people regardless of socioeconomic status or access to care. The *Systematic Review of Water Fluoridation*<sup>5</sup> (NHS York Review) found "some" evidence that fluoridation reduced inequalities in caries rates among children across social classes (in England).

In the absence of data on the effectiveness of oral cancer examinations on health outcomes, the SGR, the USPSTF, and the CTFPHC found insufficient evidence to recommend for or against routine clinical screening (Table 3). All promoted consideration of oral examinations for people engaging in risk behaviors (tobacco use and regular alcohol consumption) or manifesting suspicious symptoms. The American Cancer Society<sup>22</sup> and the National Strategic Planning Conference on Preventing and Controlling Oral and Pharyngeal Cancer<sup>6</sup> recommended routine clinical examinations for asymptomatic people based on the rationale that such encounters provide opportunities for health counseling and case finding. The CTFPHC, however, noted that the usefulness of routine screening may be limited and the potential for false positive diagnoses increased when the incidence and prevalence of oral cancer is low.

The *Community Guide*, the SGR, and the CTFPHC agree that the evidence of effectiveness of population-based programs for early detection of pre-cancers and cancers, including screening of the general population, is insufficient (Table 4). Response to this lack of evidence varied, however. The *Community Guide*, consistent with its rules, did not make a recommendation for or against population-based approaches. The SGR highlighted the accessibility of the oral cavity for clinical and self-examination and the potential that heightened public awareness could increase examination rates and opportunities for provider determination of and advice about risk behaviors. The CTFPHC recommended excluding screening of the general population on the basis of the low prevalence and incidence of oral cancer in Canada and the potential for false positive diagnoses. The National Strategic Planning Conference on Preventing and Controlling Oral and Pharyngeal Cancer developed recommendations for population-based strategies addressing public advocacy, collaboration, and coalition building; public health policy and public education; professional education and practice; and data collection, evaluation, and research.

The *Community Guide* found insufficient evidence to recommend for or against interventions that encourage use of helmets, facemasks, and mouthguards in contact sports (Table 5). The SGR, policies and guidelines from

selected medical and dental professional organizations, and mandatory rules of play from major governing bodies of organized sports (Table 6), however, all promote increased awareness and use of protective equipment in contact sports with risk of injury. These positions, policy statements, and mandatory rules are based on expert opinion and epidemiologic evidence about the risks of craniofacial injuries inherent to specific sports, and decreases in the occurrence of such injuries since mandatory requirements for craniofacial protection were implemented in certain sports, such as football and hockey.

## Conclusion

This article has compared evidence reviews and recommendations by major governmental and nongovernmental groups that are focused primarily on selected population-based interventions to promote oral health. There was agreement that community water fluoridation and school-based and school-linked sealant programs are effective strategies to prevent dental caries. Several reviews noted that fluoridation can be cost saving and that it benefits all people regardless of socioeconomic status or access to care. There was also uniform agreement that clinical delivery of sealants to children's permanent molars is effective in preventing decay, especially among children at increased risk for dental caries. Consistent assessments of effectiveness and recommendations for use among various groups support initiation or increased use of these interventions in communities and healthcare systems when appropriate, based on local goals and resources.

For the other interventions reviewed in this report—community-wide sealant promotion programs to prevent dental caries, clinical oral cancer examinations, population-based interventions to reduce oral and pharyngeal cancers, and population-based interventions to encourage use of craniofacial protective equipment in contact sports—all systematic reviews found insufficient evidence of effectiveness or ineffectiveness. It should be noted again that a finding of insufficient evidence is not a recommendation for or against use of an intervention, but rather a reflection both of the lack of qualifying studies on which to base a recommendation and of the need for more and better research on intervention effectiveness. In the absence of evidence that meets current standards for effectiveness, some organizations based recommendations for action on other factors, described briefly in this report. Until research findings become available, state and local health departments, funders of public health programs, and policymakers and other decision makers can judge the usefulness of these interventions based on other criteria and approaches.

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**Table 1.** Clinical application of dental sealants to the pit and fissure surfaces of teeth to reduce dental caries—recommendations and summary effect measurements from selected guidelines and systematic reviews

<p><b><u>National Institutes of Health Consensus Development Conference Statement, Diagnosis and Management of Dental Caries Throughout Life, March 26–28, 2001</u></b><sup>a, b</sup></p> <p><b>Strength of evidence = A</b></p> <p>[For] children between 6 and 15 years of age... [t]he interventions included application of acidulated phosphate fluoride gel (APF), fluoride varnish, chlorhexidine gels, pit and fissure sealants, and the use of dentifrices and other products containing noncariogenic sweeteners... Pit and fissure sealants have been demonstrated to be effective in the primary prevention of caries, and their effectiveness is strong as long as the sealants are retained.</p> <p>[Preventive use of sealants] may be particularly effective in high-risk populations while raising questions about their cost-effectiveness in low-risk populations. (p. 1165)</p>
<p><b><u>Oral Health in America: A Report of the Surgeon General</u></b><sup>a</sup></p> <p>Several comprehensive [narrative] reviews and a meta-analysis of the amount of caries prevented testify to the utility of these materials [dental sealants]. Pooled results from 17 studies [in the meta-analysis] found that second-generation sealants reduce caries over 70 percent.</p> <p>... a sealant is virtually 100 percent effective if it is fully retained on the tooth.</p> <p>Retention rates for second-generation sealants ranged from 92–96% after 1 year ... [to] 41–57% after 10 years. (p. 166)</p>
<p><b><u>Canadian Task Force on Preventive Health Care</u></b> (formerly Canadian Task Force on the Periodic Health Examination)<sup>a, b</sup></p> <p><b>Strength of Evidence = A</b></p> <p>Recommendation: Good evidence for selective use on permanent molars within 3 years of eruption in children at high risk of caries.</p> <p>Effectiveness: Decay of pit-and-fissure surfaces is significantly statistically and clinically reduced if such sealants are used selectively.</p>

Footnotes:

<sup>a</sup> Sources for guidelines and reviews summarized in Table 1:

NIH Consensus Development Conference on Diagnosis and Management of Dental Caries Throughout Life. Bethesda, MD. March 26–28, 2001. Conference Papers. J Dent Educ 2001; 65: 935–1179.

(NIH Consensus Development Conference) Rozier RG. Effectiveness of methods for the primary prevention of dental caries: a review of the evidence. J Dent Educ 2001;65:1067–77.

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.

Lewis DW, Ismail AI. Periodic health examination. 1995 update: 2. Prevention of dental caries. Canadian Task Force on the Periodic Health Examination. Can Med Assoc J 1995;152:836–46.

*Table 1 continued*

<sup>b</sup> Evidence ratings

NIH Consensus Development Conference, Diagnosis and Management of Dental Caries Throughout Life (criteria specified by the Research Triangle Institute—University of North Carolina Evidence-Based Practice Center)

- A (Good) Data are sufficient for evaluating efficacy. The sample size is substantial, the data are consistent, and the findings indicate that the intervention is clearly superior to the placebo/usual care alternative.
- B (Fair) Data are sufficient for evaluating efficacy. The sample size is substantial, but the data show some inconsistencies in outcomes between intervention and placebo/usual care groups such that efficacy is not clearly established
- C (Poor) Data are sufficient for evaluating efficacy. The sample size is sufficient, but the data show that the intervention is no more efficacious than placebo or usual care.
- I (Incomplete Evidence) Data are insufficient for assessing the efficacy of the intervention, based on limited sample size and/or poor methodology.

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- A Good evidence to support the recommendation that the condition be specifically considered in a periodic health examination (PHE).
- B Fair evidence to support the recommendation that the condition be specifically considered in a PHE.
- C Poor evidence regarding inclusion or exclusion of a condition in a PHE, but recommendations may be made on other grounds.
- D Fair evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.
- E Good evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.

**Table 2.** Community interventions to reduce dental caries—recommendations and summary effect measurements from selected guidelines and systematic reviews

<b>Community water fluoridation (CWF): Controlled adjustment of fluoride concentration to provide optimal concentrations for caries prevention</b>
<p><b>Guide to Community Preventive Services</b><sup>a,b</sup></p> <p><b>Strongly recommended</b> (<i>n</i>=21 qualifying studies)<sup>c</sup></p> <p><b>- Starting or continuing CWF is effective in reducing dental caries in communities (caries measured in children aged 4 to 17 years, of varying socioeconomic status and levels of caries risk)</b></p> <p><u>(<i>n</i>=7 studies with before-and-after measurement in concurrent comparison groups)</u>            Relative decrease in dental caries<sup>d</sup>            Median: 29.1 %; Range: 66.8% increase to 110.5% decrease            6 of 7 studies and 16 of 21 estimates showed relative decreases</p> <p>Absolute decrease in number of teeth with dental caries<sup>d</sup>            Median: 1.3 teeth; Range: 2.7 increase to 3.3 decrease</p> <p><u>(<i>n</i>=7 studies with after/post measurement only)</u>            Relative decrease in dental caries<sup>e</sup>            Median: 50.7%; Range: 22.3% to 68.8%            All studies and estimates showed relative decreases</p> <p><b>- Stopping CWF is associated with increases in dental caries in some communities and decreases in others:</b></p> <p><u>(<i>n</i>=3 studies with before-and-after measurement)</u>            Relative increase or decrease in dental caries<sup>d</sup>            Median: 17.9% increase; Range: 31.7% increase to 42.2% decrease            2 of 3 studies and 3 of 5 estimates showed relative increases</p> <p>Absolute increase in number of teeth with dental caries<sup>d</sup>            Median: 0.6 teeth; Range: 0.4 decrease to 4.1 increase</p> <p><u>(<i>n</i>=1 study with after/post measurement only)<sup>e</sup></u>            Relative increase in dental caries: 59.5%</p> <p><b>- Economic</b></p> <p>Costs varied greatly by water system, with lower costs in systems serving larger populations. The median cost per person per year ranged from \$2.70 among 19 systems serving ≤5000 people to \$0.40 among 35 systems serving ≥20,000 people. Five studies included sufficient data to calculate the cost-effectiveness ratio, and community water fluoridation was found to be cost saving.</p>

Table 2 continued

**CDC Recommendations on Use of Fluorides** <sup>a,b</sup>

**Strength of Recommendation: A**

Good evidence to support the use of this modality.

Continue and extend fluoridation of community drinking water... This modality benefits persons in all age groups and of all SES [socioeconomic status], including those difficult to reach through other public health programs and private dental care. Community water fluoridation also is the most cost-effective way to prevent tooth decay among populations living in areas with adequate community water supply systems. Continuation of community water fluoridation for these populations and its adoption in additional U.S. communities are the foundation for sound caries-prevention programs. (p. 26)

Health economists at the 1989 workshop on cost-effectiveness ...calculated that the average annual cost of water fluoridation in the United States was \$0.51 per person (range: \$0.12 to \$5.41). In 1999 dollars, this cost would \$0.72 per person (range: \$0.17 to \$7.62)... Water fluoridation is one of the few public health measures that results in true cost savings (i.e., the measure saves more money than it costs to operate); in the United States, water fluoridation costs an estimated average of \$3.35 per carious surface saved (\$4.71 in 1999 dollars)... still lower than the fee for a one-surface restoration (...\$65 in 1999 dollars). (p. 22)

**Oral Health in America: A Report of the Surgeon General** <sup>a</sup>

Given the modest cost of less than 1 dollar per person per year to fluoridate water systems serving most people, community water fluoridation is recommended as a very effective and cost-effective method of preventing coronal and root caries in children and adults. Moreover, water fluoridation benefits all residents served by community water supplies regardless of socioeconomic status. (p. 161–2)

Epidemiologic studies carried out during the last five decades provide strong evidence supporting the effectiveness of water fluoridation in preventing coronal and root caries in children and adults. Further support of effectiveness comes from studies that indicate that caries experience increases in communities that no longer fluoridate the water supply (and where there are few other exposures to fluorides).

Compared to the cost of restorative treatment, water fluoridation actually provides cost savings... The mean annual per capita cost of fluoridation ranges from \$0.68 for systems serving populations greater than 50,000 (large systems) and \$0.98 for systems serving between 10,000 and 50,000 (medium systems) to \$3.00 for systems serving less than 10,000 (small systems) (reported in 1999 dollars). (p. 161)

*Table 2 continued*

**Systematic Review of Water Fluoridation (NHS York Review)** <sup>a,b</sup>

Strength of Evidence = B (No recommendation made)  
(n=26 qualifying studies)

**- Decreases caries prevalence (number of teeth or % caries-free children) in communities initiating water fluoridation**

Absolute difference in number of teeth with dental caries (n= 4 studies) <sup>f</sup>

Median: 2.25 teeth; Range: 0.5 to 4.4 teeth

15 of 16 analyses found a significantly greater mean change (reduction) in decayed teeth in fluoridated areas than in nonfluoridated areas.

Absolute difference in percentage of caries-free children (n=9 studies) <sup>g</sup>

Median: 14.6% decrease; Range: 5% decrease to 64% increase

In the fluoridated areas there was a significant increase in the proportion of caries-free children in 19 of 30 analyses and only one analysis found a significant decrease in the proportion of caries-free children.

**- Increases caries prevalence (number of teeth) following withdrawal of water fluoridation**

The best available evidence from studies following withdrawal of water fluoridation indicates that caries prevalence increases, approaching the level of the low fluoride group. (p. xii)

**- Reduces caries prevalence (number of teeth) across social classes, bringing equity**

There is some evidence [strength of evidence = C] that water fluoridation reduces inequality in dental health across social classes in 5- and 12-year-olds [in England]... The small quantity of studies, differences between these studies, and their low quality rating, suggest caution in interpreting these results. (pp. xii-xiii)

**Benefits and Risks of Water Fluoridation: Report Prepared for Ontario's Public Consultation on Water Fluoridation Levels** <sup>a</sup>

(n = 29 qualifying studies)

While the evidence suggests that water fluoridation continues to be beneficial in terms of reducing the prevalence of dental decay, the magnitude of the difference between fluoridated and non-fluoridated communities is small in absolute terms, particularly in communities where the prevalence of dental caries is low. In such communities a careful assessment of the balance between reductions in dental decay and increases in dental fluorosis should be undertaken.

**Decreases caries prevalence (number of teeth) in communities with water fluoridation:**

- Range of absolute reduction in decayed teeth (in 3 established and 3 developing market economies, respectively) <sup>h</sup>

In United Kingdom:

0.4 to 1.57 teeth (primary dentition) (n=11 studies)

In United States and New Zealand:

0.15 to 2.19 teeth (permanent dentition) (n=5 studies)

In Libya, Brazil, and Chile:

0.6 to 2.8 teeth (primary dentition) (n=5 studies)

0.3 to 3.18 teeth (permanent dentition) (n=7 studies)

-Range of percentage reduction in decayed teeth (in 3 established and 3 developing market economies, respectively) <sup>i</sup>

In United Kingdom:

17% to 64% (primary dentition) (n=11 studies)

In United States and New Zealand:

9% to 48% (permanent dentition) (n=5 studies)

In Libya, Brazil, and Chile:

29% to 54% (primary dentition) (n=5 studies)

18% to 58% (permanent dentition) (n=7 studies)

Table 2 continued

**Institute of Medicine: Dietary Reference Intakes For Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride**<sup>a</sup>

The cariostatic effect associated with residence in communities served with optimally fluoridated water (ca. 1 mg/liter) has been confirmed by numerous epidemiological studies conducted in countries through the world. (p. 301)

Ages >6 months: ...the Adequate Intake (AI) for fluoride from all sources is set at 0.05 mg/kg/day [and] is recommended...because it confers a high level of protection against dental caries and is associated with no known unwanted health effects. (p. 302) ...Infants and children living in nonfluoridated water areas will not easily achieve the AI for fluoride. (p.305)

Infants: Ages 0 through 6 months: ...fluoride intake...varies widely during the first 6 months of life...Human milk-fed infants receive about 0.01 mg/day (0.001 to 0.003 mg/kg). Infants fed a formula reconstituted with fluoridated water may receive as much as 1.0 mg/day. Since the intake of fluoride by human milk-fed infants during this period of life does not appear to significantly increase the risk of dental caries, fluoride from human milk is deemed adequate in early life.

**Canadian Task Force on Preventive Health Care** (formerly Canadian Task Force on the Periodic Health Examination)<sup>a,b</sup>

**Strength of Evidence = A**

Good evidence that water fluoridation is the most effective, equitable and efficient preventative for coronal and root dental caries.

**School-based or school-linked sealant delivery programs:** Direct delivery of dental sealants to children (unlikely to receive them otherwise) in school-based or school-linked (clinic) settings

**Guide to Community Preventive Services**<sup>a,b</sup>

**Strongly Recommended**

(*n* = 10 qualifying studies)

Reduces dental caries on the occlusal surfaces of permanent posterior teeth (control = no sealant) (*n*=10 studies) in children ages 6 to 17 years, of any socioeconomic status, and any level of caries risk.

Percent reduction–Median: 60%; Range: 5% to 93%; Follow-up: 2–5 years

**- Economic**

[Sealant program] costs per person served ... ranged from \$18.50 to \$59.83 (median = \$39.10). Four studies included sufficient data to calculate cost-effectiveness ratios. The adjusted cost per averted decayed surface ranged from cost saving (<\$0) to \$487 as a result of wide variation among programs in effectiveness and number of teeth sealed.

**Oral Health in America: A Report of the Surgeon General**<sup>a</sup>

Studies carried out during the last 20 years provide strong evidence to support the effectiveness of sealants in preventing the development of caries in tooth pits and fissures.

Economic analyses suggest that community sealant programs are cost-effective and may even provide cost savings when used in high-risk populations. Experts recommend that programs should be limited to high-risk children and high-risk teeth. (p. 168)

*Table 2 continued*

**Workshop on Guidelines for Sealant Use (ASTDD, 1995)**<sup>a</sup>

Sealants have been demonstrated to be a safe and effective long-term method to prevent pit and fissure caries.

**Sealant use in community programs:** The design of a community sealant program should be based on an assessment of the oral health needs and resources of a community. Because comprehensiveness and continuity of care cannot be assumed ... it would be prudent to use sealants more liberally on sound and questionable teeth<sup>1</sup> observed in those programs (p. 271)... Participants... were unanimous in their support for increasing the appropriate use of pit and fissure sealants in ... community care programs. (p. 272)

**Statewide or community-wide sealant promotion programs:** Large-scale promotional activities directed towards practitioners, consumers, community leaders, and third-party payers, including Medicaid.

**Guide to Community Preventive Services**<sup>a,b</sup>

**Insufficient evidence** on which to base a recommendation ( $n=1$  qualifying study)

One before-and-after study of fair quality provided insufficient evidence according to *Community Guide* rules (small number of studies and limitations in study design and execution). In this 3-year study, dentists reported an increase in sealant use (absolute percentage change = 12.4%, baseline = 79.4%).

**Oral Health in America: A Report of the Surgeon General**<sup>a</sup>

Several community-based public health initiatives have arisen to promote sealant use among private practitioners and through community-based programs. These activities include reaching dentists through continuing education courses ... directing large-scale promotional activities to consumers, community leaders, and third-party payers ... and providing sealants directly to children in school programs. (p. 167)

**Workshop on Guidelines for Sealant Use (ASTDD, 1995)**<sup>a</sup>

Community or public health options for reducing pit and fissure caries through sealant use, however, go beyond the direct service approach. Additional options include sealant promotion to increase their use in private dental practices and the development of public policies that foster sealant use (e.g., through Medicaid rules or dental practice acts). (p. 268)

Footnotes:

<sup>a</sup> Sources for guidelines and reviews summarized in Table 2:

(Guide to Community Preventive Services) Truman BI, Gooch BF, Sulemana I, et al. and the Task Force on Community Preventive Services. Reviews of evidence on interventions to reduce dental caries, oral and pharyngeal cancers, and sports-related craniofacial injury. *Am J Prev Med* 2002; in this supplement.

CDC. Recommendations for using fluoride to prevent and control dental caries in the United States. *MMWR* 2001;50(RR-14):1-42.

U.S. Department of Health and Human Services. Oral health in America: a report of the Surgeon General. Rockville, MD: Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

(NHS York Review) McDonagh MS, Whiting PF, Wilson PM, et al. Systematic review of water fluoridation. *BMJ* 2000;321:855-9.

*Table 2 continued*

(NHS York Review) McDonagh MS, Whiting PF, Bradley M, et al. A systematic review of public water fluoridation. NHS Centre for Reviews and Dissemination, University of York, September 2000. Available online at <http://www.york.ac.uk/inst/crd/fluorid.pdf>. Accessed March 21, 2002.

Locker D, Lawrence H, Jokovic A. Benefits and risks of water fluoridation: an update of the 1996 Federal Provincial sub-committee report. Health Canada: Ontario Ministry of Health and First Nations and Inuit Health Branch, 1999.

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<sup>b</sup> Evidence ratings cited in Table 2:

Guide to Community Preventive Services (Recommendations are issued by the Task Force on Community Preventive Services)

Strongly Recommended: The Task Force recommends use of the intervention based primarily on a strong body of evidence of effectiveness.

Recommended: The Task Force recommends use of the intervention based primarily on a sufficient body of evidence of effectiveness.

Insufficient Evidence: The available studies provided insufficient evidence for the Task Force to assess the effectiveness of the intervention.

CDC Recommendations on Use of Fluorides: Strength of Evidence Rating (Adapted from the U.S. Preventive Services Task Force)

A Good evidence to support the use of the modality

B Fair evidence to support the use of the modality

C Lack of evidence to develop a specific recommendation (i.e., the modality has not been adequately tested); or mixed evidence (i.e., some studies support the use of the modality and some oppose it)

D Fair evidence to reject the use of the modality

E Good evidence to reject the use of the modality

Systematic Review of Public Water Fluoridation (NHS York Review)

A Highest quality, minimal risk of bias

B Moderate quality, moderate risk of bias

C Lowest quality, high risk of bias

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A Good evidence to support the recommendation that the condition be specifically considered in a periodic health examination (PHE).

B Fair evidence to support the recommendation that the condition be specifically considered in a PHE.

C Poor evidence regarding inclusion or exclusion of a condition in a PHE, but recommendations may be made on other grounds.

D Fair evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.

E Good evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.

*Table 2 continued*

<sup>c</sup> Twenty-one qualifying studies that measured the effect of starting (or continuing) community water fluoridation or stopping (or reducing) community water fluoridation were grouped into 3 subsets. Some studies were in more than one group because they used more than one kind of measurement. Group A included 9 studies with before-and-after measurement of tooth-level caries in concurrent comparison groups. Group B included 7 studies with post-exposure measurement of tooth-level caries in concurrent comparison groups. Group C included 21 studies with measurement of caries at any level (tooth-surface or child) using any study design (6 studies unique to Group C are not included in this report but are presented at the website: [www.thecommunityguide.org](http://www.thecommunityguide.org)).

<sup>d</sup> The Community Guide: Formula for calculation of effectiveness in studies with before-and-after measurement in concurrent comparison groups  
Relative decrease in tooth level caries  $((F_{pre} - F_{post}) - (NoF_{pre} - NoF_{post}))/NoF_{pre}$   
 $F_{pre}$  and  $F_{post}$  = caries prevalence in population exposed to community water fluoridation at baseline and follow-up, respectively.  
 $NoF_{pre}$  and  $NoF_{post}$  = caries prevalence in population not exposed to community water fluoridation at baseline and follow-up, respectively.  
(See Truman et al.,<sup>2</sup> Appendix A, in this supplement, for a detailed description of the formulas.)

<sup>e</sup> The Community Guide: Formula for calculation of effectiveness in studies with after/post measurement only in concurrent comparison groups  
Relative decrease in tooth level caries  $(F_{post} - NoF_{post})/NoF_{post}$   
 $F_{post}$  = caries prevalence in population exposed to community water fluoridation.  
 $NoF_{post}$  = caries prevalence in population not exposed to community water fluoridation.  
(See Truman et al., Appendix A, in this supplement, for a detailed description of the formulas.)

<sup>f</sup> NHS York Review: Formula for calculation of effectiveness  
All included studies had before-and-after measurement in concurrent comparison groups.  
Absolute change in tooth level caries:  $(F_{pre} - F_{post}) - (NoF_{pre} - NoF_{post})$   
 $F_{pre}$  and  $F_{post}$  = caries prevalence in population exposed to community water fluoridation at baseline and follow-up, respectively.  
 $NoF_{pre}$  and  $NoF_{post}$  = caries prevalence in population not exposed to community water fluoridation at baseline and follow-up, respectively.

<sup>g</sup> NHS York Review: Formula for calculation of effectiveness  
All included studies had before-and-after measurement in concurrent comparison groups.  
Absolute change in the percent of caries-free children:  $(F_{pre} - F_{post}) - (NoF_{pre} - NoF_{post})$   
 $F_{pre}$  and  $F_{post}$  = percent caries-free children in population exposed to community water fluoridation at baseline and follow-up, respectively.  
 $NoF_{pre}$  and  $NoF_{post}$  = percent caries-free children in population not exposed to community water fluoridation at baseline and follow-up, respectively.

<sup>h</sup> Ontario report: Formula for calculation of effectiveness. Absolute reduction in post-exposure tooth level caries in concurrent comparison groups:  
 $F_{post} - NoF_{post}$   
 $F_{post}$  = caries prevalence in population exposed to CWF.  
 $NoF_{post}$  = caries prevalence in population not exposed to CWF.

<sup>i</sup> Ontario report: Formula for calculation of effectiveness. Percent reduction in post-exposure tooth level caries in concurrent comparison groups:  $(F_{post} - NoF_{post})/NoF_{post}$   
 $F_{post}$  = caries prevalence in population exposed to CWF.  
 $NoF_{post}$  = caries prevalence in population not exposed to CWF.

<sup>j</sup> Questionable teeth are those in which it is difficult to distinguish sound pits and fissures from those with caries limited to the enamel.

**Table 3.** Screening by clinical examination for early detection of oral and pharyngeal cancers—recommendations from selected guidelines and systematic reviews

<p><b><u>Oral Health in America: A Report of the Surgeon General</u></b><sup>a</sup></p> <p>There are large gaps in knowledge of the efficacy of oral cancer examinations... Methodologies and settings differ across studies. Moreover, these studies do not provide definitive evidence supporting the oral cancer exam... Further research is thus needed.</p> <p>...In addition [to smoking cessation activities] providers should perform oral cancer examinations on high-risk persons regularly... Oral cancers occur in sites that lend themselves to early detection by most primary health care providers and, to a lesser extent, by self-examination. (p. 172)</p>
<p><b><u>Preventing and Controlling Oral and Pharyngeal Cancer, Recommendations from a National Strategic Planning Conference</u></b><sup>a</sup></p> <p>Encourage health-care agencies and professionals to recommend that all clinicians who deliver primary health care routinely examine their patients for oral cancer.</p>
<p><b><u>Guide to Clinical Preventive Services</u></b><sup>a, b</sup></p> <p><b>Strength of Evidence = C</b></p> <p>There is insufficient evidence to recommend for or against routine screening of asymptomatic persons for oral cancer by primary care clinicians... Although direct evidence of a benefit is lacking, clinicians may wish to include an examination for cancerous and precancerous lesions of the oral cavity in the periodic health examination of persons who chew or smoke tobacco (or did so previously), older persons who drink regularly, and anyone with suspicious symptoms or lesions detected through self-examination. (p. 178)</p> <p>Effectiveness: No controlled trials of screening for oral cancer that include data on clinical outcomes have been reported. There is consistent evidence that persons with early-stage oral cancer have a better prognosis than those diagnosed with more advanced diseases. Because of the possible effects of lead-time and length bias, however, these observational data are not sufficient to prove that screening and earlier detection improve the prognosis in patients with oral cancer. (pp. 176–7)</p> <p>All patients, especially those at increased risk, should be advised to receive a complete dental examination on a regular basis. (p. 178)</p>
<p><b><u>Canadian Task Force on Preventive Health Care</u></b><sup>a, b</sup></p> <p><b>Strength of Evidence = C</b></p> <p>Insufficient evidence to recommend inclusion or exclusion of screening for oral cancer by clinical examination in a periodic health examination of asymptomatic patients; for high-risk patients, annual examination by physician or dentist should be considered. Major risk factors include a history of tobacco use and excessive alcohol consumption.</p> <p>The usefulness of screening is limited by: the low prevalence and incidence of disease [in Canada], the potential for false positive diagnoses, and poor compliance with screening and referral.</p>
<p><b><u>American Cancer Society (2001)</u></b><sup>a</sup></p> <p>The ACS recommends a cancer-related check-up every 3 years for asymptomatic individuals aged 20 to 39, and annually for asymptomatic men and women aged 40 years and older... These encounters may include case finding examination of the thyroid, testicles, ovaries, lymph nodes, oral region, and skin.</p>

*Table 3 continued*

Footnotes:

<sup>a</sup> Sources for guidelines and reviews summarized in Table 3:

U.S. Department of Health and Human Services. Oral health in America: a report of the Surgeon General. Rockville, MD: Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

CDC. Preventing and controlling oral and pharyngeal cancer. Recommendations from a National Strategic Planning Conference. *MMWR* 1998;47(RR-14):1–12.

U.S. Preventive Services Task Force. Guide to clinical preventive services: report of the U.S. Preventive Services Task Force, 2nd ed. Baltimore, MD: Williams & Wilkins, 1996.

Hawkins RJ, Wang EE, Leake JL. Preventive health care, 1999 update: prevention of oral cancer mortality. *The Canadian Task Force on Preventive Health Care. J Can Dent Assoc* 1999;65:617–27.

Smith RA, von Eschenbach AC, Wender R, et al. and the ACS Prostate Cancer Advisory Committee, ACS Colorectal Cancer Advisory Committee, and ACS Endometrial Cancer Advisory Committee. American Cancer Society guidelines for the early detection of cancer: update of early detection guidelines for prostate, colorectal, and endometrial cancers. Also: update 2001—testing for early lung cancer detection. *CA Cancer J Clin* 2001;51:38–75.

<sup>b</sup> Evidence ratings

Guide to Clinical Preventive Services (Issued by the U.S. Preventive Services Task Force)

- A There is good evidence to support the recommendation that the condition be specifically considered in a periodic health examination (PHE).
- B There is fair evidence to support the recommendation that the condition be specifically considered in a PHE.
- C There is insufficient evidence to recommend for or against the inclusion of the condition in a PHE, but recommendations may be made on other grounds.
- D There is fair evidence to support the recommendation that the condition be excluded from consideration in a PHE.
- E There is good evidence to support the recommendation that the condition be excluded from consideration in a PHE.

Canadian Task Force on Preventive Health Care, Grade of Recommendations

- A Good evidence to support the recommendation that the condition be specifically considered in a periodic health examination (PHE).
- B Fair evidence to support the recommendation that the condition be specifically considered in a PHE.
- C Poor evidence regarding inclusion or exclusion of a condition in a PHE, but recommendations may be made on other grounds.
- D Fair evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.
- E Good evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.

**Table 4.** Population-based interventions for early detection of oral and pharyngeal pre-cancers and cancers (community-wide coordinated public education, professional education and training, professional examination of high-risk people in various settings, and referral of people with suspicious lesions)—recommendations and summary effect measurements from selected guidelines and systematic reviews

<p><b><u>Guide to Community Preventive Services</u></b> <sup>a,b</sup></p> <p><b>Insufficient evidence</b> on which to base a recommendation (<i>n</i> = 0 qualifying studies)</p> <p>No studies meeting inclusion criteria reported on outcomes required for assessing effectiveness, such as improvement in health or reduction in mortality.</p>
<p><b><u>Oral Health in America: A Report of the Surgeon General</u></b> <sup>a</sup></p> <p>There are large gaps in knowledge of the efficacy of oral cancer examination and the effectiveness and cost-effectiveness of community approaches to early detection of oral cancers. Methodologies and settings differ across studies. Moreover, these studies do not provide definitive evidence supporting the oral cancer exam, and there have been no controlled clinical trials for defining the effectiveness of screening programs. Further research is thus needed. (p.172)</p> <p>...In addition [to smoking cessation activities] providers should perform oral cancer examinations on high-risk persons regularly... Oral cancers occur in sites that lend themselves to early detection by most primary health care providers and, to a lesser extent, by self-examination. Heightened awareness in the general population could help with early detection and could stimulate dialogue between patients and their primary health care providers about behaviors that may increase risk. (p. 172)</p>
<p><b><u>Canadian Task Force on Preventive Health Care (1999 update)</u></b> <sup>a,b</sup></p> <p><b>Strength of Evidence = D</b></p> <p>Fair evidence to exclude screening the general population [in Canada] for oral cancer by clinical examination.</p> <p>The usefulness of screening is limited by the low prevalence and incidence of oral cancer [in Canada], the potential for false positive diagnoses, and the poor compliance with screening and referral. There is no evidence that screening of the general population or high-risk groups leads to a reduction in mortality or morbidity from oral cancer.</p>
<p><b><u>Preventing and Controlling Oral and Pharyngeal Cancer. Recommendations from a National Strategic Planning Conference</u></b> <sup>a</sup></p> <ul style="list-style-type: none"> <li>- Encourage Medicaid, Medicare, traditional insurance plans, and managed care entities to consider making oral cancer examinations an integral part of comprehensive physical and oral examinations;</li> <li>- After assessing local needs, develop, implement, and evaluate statewide models to educate all relevant groups;</li> <li>- Develop and conduct a national promotional campaign to raise public awareness of oral cancer and its link to tobacco use and heavy alcohol consumption;</li> <li>- Develop health care curricula that require competency in prevention, diagnosis, and multidisciplinary management of oral and pharyngeal cancer;</li> <li>- Promote continuing education for health-care professionals on the multidisciplinary management of all phases of oral cancer and its sequelae;</li> <li>- Strengthen organizational approaches to reducing oral cancer by developing organized cooperative and collaborative arrangements, funding formal centers, and involving commercial firms.</li> </ul>

*Table 4 continued*

Footnotes:

<sup>a</sup> Sources for guidelines and reviews summarized in Table 4:

(Guide to Community Preventive Services) Truman BI, Gooch BF, Sulemana I, et al. and the Task Force on Community Preventive Services. Reviews of evidence on interventions to reduce dental caries, oral and pharyngeal cancers, and sports-related craniofacial injury. *Am J Prev Med* 2002; in this supplement.

U.S. Department of Health and Human Services. Oral health in America: a report of the Surgeon General. Rockville, MD: Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

Hawkins RJ, Wang EE, Leake JL. Preventive health care, 1999 update: prevention of oral cancer mortality. The Canadian Task Force on Preventive Health Care. *J Can Dent Assoc* 1999;65:617–27.

CDC. Preventing and controlling oral and pharyngeal cancer. Recommendations from a National Strategic Planning Conference. *MMWR* 1998;47(RR-14):1–12.

<sup>b</sup> Evidence ratings

Guide to Community Preventive Services (Recommendations are issued by the Task Force on Community Preventive Services)

Strongly Recommended: The Task Force recommends use of the intervention based primarily on a strong body of evidence of effectiveness.

Recommended: The Task Force recommends use of the intervention based primarily on a sufficient body of evidence of effectiveness.

Insufficient Evidence: The available studies provided insufficient evidence for the Task Force to assess the effectiveness of the intervention.

Canadian Task Force on Preventive Health Care

A Good evidence to support the recommendation that the condition be specifically considered in a periodic health examination (PHE).

B Fair evidence to support the recommendation that the condition be specifically considered in a PHE.

C Poor evidence regarding inclusion or exclusion of a condition in a PHE, but recommendations may be made on other grounds.

D Fair evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.

E Good evidence to support the recommendation that the condition be specifically excluded from consideration in a PHE.

**Table 5.** Population-based interventions to encourage use of protective equipment in contact sports: coordinated education about and promotion of the use of helmets, facemasks, and mouthguards to prevent sports-related traumatic injuries to the head, face, and mouth, directed to both players and the public—recommendations and summary effect measurements from selected guidelines and systematic reviews

**Guide to Community Preventive Services**<sup>a,b</sup>

**Insufficient evidence** on which to base a recommendation  
(*n*=4 qualifying studies)

Four studies of fair quality yielded 12 measures of effectiveness, which failed to produce a body of evidence (considered separately or together) sufficient to meet minimum requirements for a Task Force recommendation regarding population-based interventions to encourage use of helmets, facemasks, goggles, or mouthguards.

**Oral Health in America: A Report of the Surgeon General**<sup>a</sup>

Football: Face mask reduces oral-facial injury by 50 percent; addition of a mouthguard reduces risk to less than 1 percent; Hockey: Full-face protection reduced chance of upper facial injury; half visor same as no face protection; 60 times more likely to sustain oral injury without mouthguard; 30 percent reduced risk of oral-facial injury for those wearing mouthguards. (p. 174)

Prevention of craniofacial injuries: Health education and injury prevention campaigns addressing the need for protective gear in sports and cycling activities can increase awareness and use. More rapid adoption can occur through legislation or regulation. (p.176)

**American Academy of Pediatrics (AAP)**<sup>a</sup>

**Safety in Youth Ice Hockey: The Effects of Body Checking (RE9835)**

The acceptance and use of the combination helmet-face mask... virtually eliminated facial trauma, [but was followed by] ... an increase in the number of neck and spine injuries ... [U]se of helmet-face masks was believed to create a false sense of protection from serious injury... Rule changes instituted in the mid-1970s substantially decreased, but did not eliminate, these tragic injuries.

The AAP recommends limiting [the practice of] checking among hockey players 15 years of age and younger ... to reduce injuries. Strategies such as the fair play concept can also help decrease injuries that result from penalties or unnecessary contact.

**Risk of Injury From Baseball and Softball in Children (RE0032)**

... Serious and potentially catastrophic baseball injuries can be minimized by the proper use of available safety equipment... [including] approved batting helmets, and helmets, masks, and chest and neck protectors for all catchers ... in games and practices and in organized and informal participation.... Baseball and softball players should be encouraged to wear polycarbonate eye protectors on their batting helmets to reduce the risk of eye injury... [For players aged 5–14 years] Prevent Blindness America has recommended the use of batting helmets with polycarbonate face guards that meet standard F910 of the American Society for Testing and Materials. These cover the lower part of the face from the tip of the nose to below the chin. They also protect against injuries to the teeth and facial bones.

*Table 5 continued*

**American Medical Association (AMA)**<sup>a</sup>

**H-470.974 Athletic Helmets:** The AMA urges the Consumer Product Safety Commission to establish standards that athletic and recreational helmets, including but not limited to football, baseball, hockey, horseback riding, bicycle and motorcycle riding, lacrosse, and skiing, produced or sold in the United States provide protection against head injury; and that the AMA advocate the use of appropriate and safe clear face guards as a permanent installation on the current bilateral ear protective batter's helmet to be worn by all baseball and softball players as required safety equipment in all organized baseball and softball for those children from 5 to 14 years of age. (Sub. Res. 16, I-88; Res. 419, A-93)

**H-470.985 Goalie Face Masks in Hockey:** The AMA endorses the mandatory use of an adequate cage-type face mask for goalies in all amateur, high school and college hockey programs in the nation. (Res. 4, I-81; Reaffirmed: CLRPD Rep. F, I-91)

**H-470.988 Face Masks in Hockey:** The AMA urges all amateur high school and college hockey programs throughout the nation to require the use of hockey face masks. (Sub. Res. 65, A-80; Reaffirmed: CLRPD Rep. C, I-90; Reaffirmed: Sunset Report, I-00)

**American Dental Association (ADA)**<sup>a</sup>

Resolved, that the ADA recognizes the preventive value of orofacial protectors and endorses the use of orofacial protectors by all participants in recreational and sports activities with a significant risk of injury at all levels of competition including practice sessions, physical education and intramural programs, and be it further

Resolved, that constituent and component dental societies be urged to adopt formal policies and programs aimed at encouraging widespread use of properly fitting orofacial protectors (such as mouthguards, face shields and helmets) by athletes in their communities, and be it further

Resolved, that the ADA work actively with international and national sports conferences, sanctioning bodies, school federations and others to mandate the use of orofacial protectors, and be it further

Resolved, that the appropriate Association agency make the implementation of this policy a priority item...

**American Academy of Pediatric Dentistry (AAPD)**<sup>a</sup>

The AAPD ... recommends the continuation of those prevention practices instituted in youth, high school and college football, lacrosse, and ice hockey. In addition the following are deemed critical for reducing the prevalence of oral and facial injuries as well as other bodily injuries in youth sports.

1. A properly fitted sports mouthguard be recommended for all children and youth participating in organized and unorganized contact and collision sports.
2. The Academy supports mandates for the use of athletic mouthguards in any sporting activity containing the risk of orofacial injury.
3. A dentist with expertise in dental and facial injuries be consulted prior to the start of a season to recommend procedures for dealing with sports-related injuries, such as avulsed teeth.
4. A certified (per the American Society of Testing Materials) face protector be required (made mandatory according to the playing rules of the sport) for boys and girls age 12 and under participating in organized baseball and softball activities and be recommended for youths age 13 through high school participating in organized baseball and softball activities.

*Table 5 continued*

Footnotes:

<sup>a</sup> Sources for guidelines and reviews summarized in Table 5:

(Guide to Community Preventive Services) Truman BI, Gooch BF, Sulemana I, et al. and the Task Force on Community Preventive Services. Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injury. *Am J Prev Med* 2002; in this supplement.

U.S. Department of Health and Human Services. Oral health in America: a report of the Surgeon General. Rockville, MD: Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

Current AAP policy statements: <http://www.aap.org/policy> (accessed Oct. 30, 2001). These recommendations do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

American Medical Association, Policy Finder. Located by name or number under "House of Delegates" at: [http://www.ama-assn.org/apps/pf\\_online/pf\\_online](http://www.ama-assn.org/apps/pf_online/pf_online), accessed Oct. 30, 2001.

American Dental Association (ADA), Council on Access, Prevention and Interprofessional Relations. *Orofacial Protectors* (1995:613)

American Academy of Pediatric Dentistry. *Journal of the American Academy of Pediatric Dentistry, Special Issue Reference Manual* 1998–99;20(6):23–4.

<sup>b</sup> Evidence ratings

Guide to Community Preventive Services (Recommendations are issued by the Task Force on Community Preventive Services)

Strongly Recommended: The Task Force recommends use of the intervention based primarily on a strong body of evidence of effectiveness.

Recommended: The Task Force recommends use of the intervention based primarily on a sufficient body of evidence of effectiveness.

Insufficient Evidence: The available studies provided insufficient evidence for the Task Force to assess the effectiveness of the intervention.

**Table 6.** Use of craniofacial protective equipment<sup>a</sup> (helmet, facemask, mouthguard, and throat protector by position) mandated by governing bodies of selected sports

	Amateur		Professional
	High School	College <sup>b</sup>	Adult
Baseball	<p><b>Helmet</b> (on-deck batters, batters, runners, retired runners, players/students in the coaches boxes, non-adult bat/ball shaggers, and catchers)</p> <p><b>Facemask and throat protector</b> (catcher)<sup>c</sup></p>	<p><b>Helmet and facemask</b> (catchers, batters, and base runners)</p> <p><b>Throat protector</b> (catchers)</p>	<p><b>Helmet<sup>d</sup></b> (all players signed after 1982)</p>
Basketball (men's or women's)	No mention	No mention	No mention
Field Hockey	<p><b>Helmet and facemask</b> (goalkeeper)</p> <p><b>Mouthguard</b> (all players)<sup>e</sup></p>	<p><b>Helmet and throat protector</b> (kicking back)</p> <p><b>Mouthguard</b> (all players)</p>	
Football	<p><b>Helmet, facemask, and mouthguard</b> (all players)<sup>f</sup></p>	<p><b>Helmet, facemask, and mouthguard</b> (all players)</p>	<p><b>Helmet and facemask<sup>g</sup></b> (all players)</p>
Ice Hockey	<p><b>Helmet, facemask, and mouthguard</b> (all players)</p> <p><b>Throat protector</b> (goalkeeper)<sup>h</sup></p>	<p><b>Men's and women's: helmet, facemask, and mouthguard</b> (all players)</p>	<p><b>Helmet<sup>i</sup></b> (all players)</p>
Lacrosse (boys/men)	<p><b>Helmet, facemask, and mouthguard</b> (all players)<sup>j</sup></p>	<p><b>Helmet, facemask, and mouthguard</b> (all players)</p> <p><b>Throat protector</b> (goalkeeper)</p>	
Lacrosse (girls/women)	<p><b>Helmet, facemask, and throat protector</b> (goalkeeper)<sup>k</sup></p> <p><b>Mouthguard</b> (all players)</p>	<p><b>Helmet, facemask, and throat protector</b> (goalkeeper)</p> <p><b>Mouthguard</b> (all players)</p>	

Table 6 continued

## Footnotes

<sup>a</sup> Specifications for helmets, facemasks, throat protectors, and mouthguards vary by sport.

<sup>b</sup> NCAA (National Collegiate Athletic Association) Guide Line 4a Protective Equipment. 2001–2002 NCAA Sports Medicine Handbook, Painter J (ed) Indianapolis:NCAA, 2001:62–67. [http://www.ncaa.org/library/sport\\_sciences/sport\\_med\\_handbook/2001-01](http://www.ncaa.org/library/sport_sciences/sport_med_handbook/2001-01), accessed Oct. 29, 2001.

<sup>c</sup> Baseball 2001 Rules Book. National Federation of State High School Associations, Indianapolis: Robert F. Kanaby (publisher), 2000; pp 7–8.

<sup>d</sup> [http://www.mlb.com/NASApp/mlb/mlb/baseball\\_basics\\_objectives.jsp](http://www.mlb.com/NASApp/mlb/mlb/baseball_basics_objectives.jsp), accessed May 7, 2001

<sup>e</sup> Field Hockey 2000–01 Rules Book. National Federation of State High School Associations, Indianapolis: Robert F. Kanaby (publisher), 2000; pp 12–13.

<sup>f</sup> Football 2001 Rules Book. National Federation of State High School Associations, Indianapolis: Robert F. Kanaby (publisher), 2001; pp 11–14.

<sup>g</sup> National Football League. NFL 2000 league policies for players. New York, NY: National Football League, 2000.

<sup>h</sup> Ice Hockey 2000–01 Rules Book. National Federation of State High School Associations, Indianapolis: Robert F. Kanaby (publisher), 2000; pp 19–21.

<sup>i</sup> <http://nhl.com/hockeyu/rulebook/rule22.html>, accessed Oct. 30, 2001.

<sup>j</sup> Boys Lacrosse 2001 Rules Book. National Federation of State High School Associations, Indianapolis: Robert F. Kanaby (publisher), 2000; p 11.

<sup>k</sup> 2001 Women's Rules: Official Rules for Girls & Women's Lacrosse. National Governing Body of Lacrosse; pp 19–21.

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