

Promoting the Oral Health of Older Adults Through the Chronic Disease Model: CDC's Perspective on What We Still Need to Know

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Abstract: The Centers for Disease Control and Prevention (CDC) has adopted a multicomponent approach to health promotion: the Chronic Disease Model. Among its underlying public health principles are 1) recognition of the universal preference for primary prevention of disease, 2) awareness that prevention often takes place outside of clinical settings and is influenced by behaviors that can be affected by social circumstances and institutional policies, 3) the need to base program efforts on the best available science, 4) the special responsibility of public health for at-risk populations, and 5) the need for population-based approaches. Such approaches require public health agencies to build programs that engage broad networks of partners; monitor diseases, risk factors, and behaviors; implement proven prevention strategies; and evaluate programs rigorously. If CDC is to implement comprehensive programs to promote the oral health of elderly people, more information is needed. In this short report we comment on gaps in knowledge concerning the components of programs, measurement of oral diseases and risk factors, and the effectiveness of preventive interventions at the self-care, clinical, and community levels for dental caries and oral and pharyngeal cancers.

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Any perspective on “what we still need to know” must be shaped by the mission, constituency, and major activities of the agency from which the observer views an existing body of evidence. Because in the present case these observers come from the Centers for Disease Control and Prevention (CDC), our evaluation of that evidence—and interpretation of its meaning—will be filtered through a focus on preventing and controlling disease through the essential public health services¹ that fall within CDC’s mission. Among those services prioritized by CDC are: 1) monitoring health status, documented risk factors, and behaviors; 2) implementing preventive interventions, particularly primary prevention, and population-based health promotion strategies; and 3) supporting applied, community-based research (sometimes called “public health research”).

Over the past thirty years, the broader public health literature has paid increasing attention to more comprehensive views of health, health care, disease

determinants, and prevention of disease. As one example, McGinnis et al.² noted that a person’s health prospects are shaped by experiences in five domains: 1) genetics and gestation; 2) social circumstances (e.g., education, employment, poverty, housing, social cohesion of the community); 3) environmental conditions; 4) behavioral choices; and 5) quality or use of health care. Of these five, behavioral choices are identified as the “single most prominent domain of influence over health prospects in the United States,” accounting for at least 900,000 deaths annually, of which more than 40 percent are premature.² Even so, the domains are interconnected powerfully. For example, behavioral choices are greatly affected by social circumstances. Genetic predispositions affect a person’s needs for health care, and social circumstances affect the care received. Within the domain of health care, however, current evidence strongly suggests that improvements in quality or use “have a relatively limited ability to reduce deaths among Americans.”²

The Chronic Disease Model: A Multicomponent Approach

Of the trillion dollars spent annually on health in the United States, about 95 percent pays for health services, while only 5 percent funds population-based approaches to improving health.^{2,3} In the context of this imbalance (given the relative contribution of various domains to health outcomes), CDC has adopted a multicomponent approach to health promotion and disease prevention: the Chronic Disease Model.⁴ In this model, ensuring timely receipt of clinical preventive services, for example, is but one component of a comprehensive strategy. The model recognizes the contributions of all five domains to disease identified by McGinnis et al.² and the need to address all of them to make meaningful progress in reducing disease.

The Chronic Disease Model is built on several underlying principles.⁴ First, the primacy of prevention means that nearly anyone, given the choice, would prefer not to have disease at all. Second, much of chronic disease prevention lies outside the clinic and is influenced by behaviors that can be fostered or hindered by social circumstances and institutional policies. If efforts to prevent and control disease occur only among those who seek health care, progress toward disease control will be limited. Third, choice of interventions must depend on science and evidence of effectiveness, i.e., the science must be mature enough to offer reasonable hope of success if the intervention is applied broadly within the population. Fourth, approaches must advance the quest for equity and social justice, especially when the burden of disease is great or large disparities in prevalence exist across and among populations. Finally, the interdependence and interconnectedness of risk factors—and of the communities of interest—demand that population-based approaches be included in efforts to address chronic diseases. Such approaches will require health agencies to engage broad networks of partners; to monitor diseases, risk factors, and behaviors routinely; and to evaluate programs rigorously.

CDC leaders recognize, however, that such comprehensive population-based efforts are only one piece of the puzzle. Dr. James Marks (former director of the National Center for Chronic Disease Prevention and Health Promotion within CDC) stated, “No important public health problem of our time can

be solved by public health alone, or clinical care alone, or research alone. Chronic diseases and their risk factors are highly interrelated, with many forces affecting risk.”⁴

Elements of CDC-Supported State-Based Programs

CDC has encouraged the creation of multiple state-based programs for preventing and controlling chronic disease using this model, e.g., programs in arthritis, diabetes, comprehensive cancer control, and tobacco control.⁴ Each program emphasizes multiple, interdependent elements:

- *Program Leadership*, which is critical to ensure stable funding, efficient use of funds, and program efforts targeted where they are most needed.
- *Epidemiology and Surveillance*, which provides the foundation for establishing the burden of disease, framing the problem, selecting appropriate preventive interventions, and assessing program outcomes. Most state programs rely on the Behavioral Risk Factor Surveillance System⁵ or other data collection efforts (such as state cancer registries or state tobacco surveys) for this continuous monitoring.
- *Partnerships* with other governmental and non-governmental organizations to achieve common goals. When all contribute from their strengths to the overall effort, no one organization must create the comprehensive program from scratch, and substantial efficiencies can be achieved. In addition, that external support may become crucial to program sustainability over the long term.
- *Comprehensive State Plans* to guide program efforts and outline the contributions of multiple partners.
- *Interventions*, as part of a comprehensive strategy that includes changing the practices of organizations or “systems” (e.g., schools, work sites, health facilities) and social policies as a means of promoting changes in individual persons. Interventions selected for these plans increasingly must be based on evidence of effectiveness and results of formal program evaluation. Such mature science must come from collaboration between program personnel and scientists with expertise in research and evaluation, so that evidence meets current, more stringent methodological requirements.

- *Evaluation*, based on systematic approaches, determines whether comprehensive programs to control chronic disease have been implemented successfully, whether programs are as efficient as they can be, and whether objectives are being met.

Applying the Chronic Disease Model to Older Adults' Oral Health: Selected Gaps in Knowledge

In attempting to replicate the successful state-based programs from other health disciplines within dental public health, CDC is working with twelve funded states to develop all of the essential elements, in combinations appropriate for states' goals and resources. Some obvious questions arise: What elements comprise an effective program and contribute to desired outcomes for adults, particularly older adults? How can existing potential partners (e.g., the Aging Services network) be identified and encouraged to contribute to population-based efforts focused on adults, especially older adults? What unique resources can public health agencies bring to the effort? Examples might include expertise in health communication or in social marketing or programs that already target populations at risk for oral diseases.

Within the Chronic Disease Model, interventions focus on promoting healthy behaviors through approaches with multiple components that can include:

- increasing awareness among individual people, professionals, and policymakers about methods that have been shown to effectively prevent, control, or manage disease;
- encouraging stakeholders to participate in creating policies and organizational changes that support healthy behaviors (e.g., avoiding tobacco use and receiving oral assessments and preventive services in a timely fashion);
- fostering healthful environments (e.g., adjusting fluoride content of community water systems); and
- implementing effective preventive services at clinical and community levels where the science is mature enough to offer reasonable hope of success.

If CDC is to implement such broad, comprehensive, population-based programs for elderly populations, more information is needed, especially about

the burden of oral diseases and conditions among older adults, determinants of disease in this group, and the effectiveness of preventive interventions at the self-care, clinical, and community levels.

Information about health conditions in the community is provided by public health surveillance, the "ongoing, systematic collection, analysis, and interpretation of outcome-specific data for use in the planning, implementation, and evaluation of public health practice."⁶ Over the past decade CDC has worked with its partners, such as the Association of State and Territorial Dental Directors, to ensure that the status of oral disease, risk behaviors, and other factors can be routinely and regularly monitored over time. Efforts include the addition of oral health measures (assessed by respondent or interviewers) to existing surveillance systems, such as the Behavioral Risk Factor Surveillance System⁵ or the Pregnancy Risk Assessment Monitoring System,⁷ the establishment of the National Oral Health Surveillance System,⁸ and the identification of simpler, "open mouth" measures of oral health that, for example, assess status at the level of the person rather than the tooth.⁹ Routine collection of data at the state and small-area levels demands continued development of simple, valid, and reliable measures as well as innovative information systems. These improvements will permit more resources to be invested in the analysis of data and the interpretation and dissemination of findings instead of data collection alone.

The effectiveness of preventive interventions provides a basis for guidelines and program recommendations. Although recent reviews have found sufficient evidence to recommend that all persons drink water with an optimal fluoride concentration and brush their teeth regularly (i.e., twice daily) to prevent caries,¹⁰⁻¹⁴ published evidence for other preventive interventions among adults, particularly older adults, is generally more limited. In this short report, only the evidence of effectiveness of clinical interventions for preventing caries and for screening for oral cancers and precancers will be reviewed.

In March 2001, the National Institute of Dental and Craniofacial Research (NIDCR) and the NIH Office of Medical Applications of Research convened a consensus development conference to examine the current state of research on dental caries.¹⁴ Presentations, discussion, and deliberations were based on systematic reviews of the research literature. Among the issues addressed were the best methods available for the primary prevention of dental caries

throughout life and for the arrest and reversal of carious lesions. Scientists and panel members considered several interventions, including application of acidulated phosphate fluoride gel (APF), fluoride varnish and chlorhexidine gels, and the use of dentifrices and other products containing noncariogenic sweeteners. The conference found that almost all relevant studies involved populations of children. For primary prevention the final conference statement said that “the panel [of nonadvocate, nonfederal experts] could make no comment on the primary prevention of secondary caries or on primary prevention of either occlusal or interproximal caries in adults, as no evidence was available to address these

questions. Evidence regarding primary prevention of root caries is also very limited. Additional studies will be required to define optimal preventive intervention strategies for these conditions.”

When the arrest or reversal of carious lesions, specifically root caries, was considered, the panel found that limited evidence showed consistent support for use of fluorides. The panel concluded that “practice would be further enhanced, however, by further research that addressed caries in the adult population, secondary caries, and root caries.”

Evidence for the effectiveness of screening by examination for early detection of oral and pharyngeal cancers also has been considered by several re-

Table 1. Gaps in knowledge relevant to building comprehensive programs to promote oral health among adults and older adults

Multicomponent statewide programs to prevent chronic disease

- What elements comprise an effective program and contribute to desired outcomes?
 - How can public health approaches complement (or work synergistically with) clinical care processes and advances in research to reduce the burden of oral disease among older adults?
 - How can existing potential partners (e.g., the Aging Services network) be identified and then encouraged to contribute to population-based efforts focused on adults and older adults?
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Burden of disease

- Can we develop simple, valid, and reliable measures of oral diseases, risk behaviors, and other factors?
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Effectiveness of interventions at the self-care, clinical, and community levels for preventing dental caries and oral and pharyngeal cancers

- What is the effectiveness of laws, policies, and incentives to encourage communities to start or continue water fluoridation?
- What is the effectiveness of self-administered modalities other than fluoride toothpaste, such as fluoride mouth rinse, for preventing caries?
- What is the current effectiveness, both individually and in combination, of fluoride mouth rinse, supplements, and other modalities in preventing dental caries?
- Should studies of the effectiveness of community-based interventions to screen for oral and pharyngeal cancer be deferred until clinical effectiveness of screening to reduce morbidity and mortality has been established?
- How should effort and other resources be allocated among strategies designed primarily to prevent these cancers (e.g., preventing tobacco use) versus strategies aimed at early detection?
- To what extent should efforts to reduce use of tobacco and overuse of alcohol emphasize their roles as primary causes of oral and pharyngeal cancers?

Sources:

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viewing bodies.^{13,15} In its recent update of an earlier evidence review, the U.S. Preventive Services Task Force (USPSTF) concluded that the evidence is insufficient to recommend for or against routinely screening adults for oral cancer. Its supporting rationale states that “the USPSTF found no new good-quality evidence that screening for oral cancer leads to improved health outcomes for either high-risk adults (i.e., those over the age of fifty who use tobacco) or for average-risk adults in the general population. It is unlikely that controlled trials of screening for oral cancer will ever be conducted in the general population because of the very low incidence of oral cancer in the United States. There is also no new evidence for the harms of screening. As a result, the USPSTF could not determine the balance between benefits and harms of screening for oral cancer.”¹⁵

Screening examinations for oral and pharyngeal cancers and precancers also can be part of multicomponent population-based interventions that include 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.^{10,11} The Task Force on Community Preventive Services^{10,11} and *Oral Health in America: A Report of the Surgeon General*¹³ found that evidence of effectiveness for these population-based programs was insufficient. The task force concluded that there was insufficient evidence on which to base a recommendation and, therefore, made no recommendation for or against using population-based interventions for early detection of cancers and precancers. A determination that there is “insufficient evidence to determine effectiveness” does not, however, mean that the intervention does not work, but rather indicates that additional research is needed to determine whether the intervention is effective. Priority areas for research and examples of important research questions identified by the task force are listed in Table 1.

The surgeon general’s report highlighted the accessibility of the oral cavity for early detection of cancers and precancers by health professionals and by the general public through self-examination and the potential that heightened public awareness could improve examination rates and opportunities for counseling about risk behaviors. Finally, this report noted that “advances in understanding the molecular events involved in developing cancer might pro-

vide the tools needed to design novel preventive, diagnostic, prognostic, and therapeutic regimens to combat oral cancers.”¹³

In conclusion, the development of comprehensive programs to improve the oral health of adults, particularly older adults, demands that important gaps in knowledge be addressed and that the evidence supporting clinical and population-based interventions to promote oral health and prevent oral disease among adults be strengthened substantially. The questions in Table 1 rest on a foundation of the domains cited by McGinnis et al.² and use the multiple interventions of the Chronic Disease Model rather than relying solely on a clinical care strategy. The questions, while not exhaustive, illustrate the breadth of needed research and provide definitions of problems congruent with those used by others who work to prevent and control an array of chronic diseases.

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