



July 2, 2015

RE: Comments Regarding the Cochrane Review of
Water Fluoridation for the Prevention of Dental Caries

Dear Colleagues,

In June 2015, the Cochrane Oral Health Group released a publication on community water fluoridation. This review has attracted attention because it appears to reach different conclusions about the effectiveness of this community-based intervention than the final Public Health Service (PHS) recommendation recently released by the U.S. Department of Health and Human Services (HHS). The Centers for Disease Control and Prevention's (CDC) Division of Oral Health would like to provide some clarification on this issue in order to stress where key findings regarding the effectiveness of water fluoridation are in fact the same, and to explain where and why differences exist between the two documents. Above all, we want to assure you that HHS maintains its confidence in water fluoridation as a valuable tool to prevent tooth decay in children as well as adults, and views it as the basis for the primary prevention of tooth decay.

The Cochrane review and the PHS recommendation both identified reductions in caries in children's permanent and primary teeth associated with community water fluoridation. Further, data from national surveys conducted in the U.S. continue to show that the percentage of adolescents who have tooth decay has continued to decline across socio-economic and racial and ethnic groups. Both the Cochrane review and the PHS recommendation agree that dental caries continues to be a significant public health problem, and HHS is committed to reducing dental disease through evidence based interventions such as community water fluoridation.

In 2010, HHS convened a federal, interdepartmental, interagency panel of scientists to review the PHS 1962 recommendation that community water systems add fluoride to their drinking water to prevent tooth decay. The PHS review panel utilized the best available science in making their recommendations. The panel concluded that water fluoridation remains a safe and effective strategy to reduce tooth decay, and that it is the most cost effective and feasible way for communities to address dental disease. One key difference between this review and the Cochrane review is that Cochrane used more restrictive criteria for including studies in their analyses. A consequence of their approach was that studies included in the Cochrane review were primarily conducted before 1975. As a result, Cochrane found insufficient information available to determine if water fluoridation had an impact in an environment where fluoride products such as toothpaste are now widely used. Although valid, peer-reviewed studies document the effectiveness of community water fluoridation in children and adults even after the use of fluoride toothpaste became widespread, these studies were not considered by Cochrane. Another factor that impacted Cochrane's assessment of the quality of the evidence is that their methodology favors

randomized controlled trials (RCTs). While RCTs are a preferred study design for studies comparing different clinical treatments among individual patients, this research design is often not feasible for interventions that occur on a community level, like community water fluoridation.

A more detailed comparison of the findings between the Cochrane report and the PHS recommendation along with key references is attached. We hope you find this summary useful.

Sincerely,

A handwritten signature in cursive script that reads "Katherine Weno".

Katherine Weno, DDS, JD

Director

Division of Oral Health

National Center for Chronic Disease Prevention
and Health Promotion

Centers for Disease Control and Prevention

Attachment: Summary Comparison of Findings

Attachment:

Discussion of Community Water Fluoridation Systemic Reviews:

- Cochrane Collaborative, [Water Fluoridation to Prevent Tooth Decay](#), 2015
- Public Health Service (PHS) [Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries](#), 2015

(Note: The 2010 HHS Panel utilized reviews from the 2013 [Community Preventive Services Task Force](#) (Task Force) in the development of the 2015 PHS recommendation. The Task Force is an independent, nonfederal, unpaid panel of public health and prevention experts that provides evidence-based findings and recommendations about community preventive services, programs, and policies to improve health. Its members represent a broad range of research, practice, and policy expertise in community preventive services, public health, health promotion, and disease prevention.)

Effectiveness of Community Water Fluoridation:

Effectiveness of Water Fluoridation in Reducing Caries in Children:

- Cochrane found that water fluoridation is effective in reducing caries in primary and permanent teeth in children. The Cochrane review found that water fluoridation resulted in fewer teeth affected by cavities (about 2 primary teeth and 1 permanent tooth), compared to communities that did not have water fluoridation. These differences indicate that initiation of water fluoridation can result in notable decreases, up to 35%, in cavities in children. In addition, water fluoridation resulted in higher percentages of children without any cavities (caries-free).
- These estimates of fewer teeth affected by cavities in fluoridated communities and a higher percentage of caries-free children are similar to findings of other evidence-based reviews (e.g., the Task Force in 2013).
- For adolescents, the prevalence of tooth decay in the permanent teeth decreased from 90% in the 1960's to 60% in recent national surveys; the number of teeth affected decreased from more than 6 to fewer than 3.

Effectiveness of Water Fluoridation in Reducing Caries in Adults:

- No studies met Cochrane's criteria regarding the effectiveness of water fluoridation in adults. Cochrane includes only studies where the outcomes are evaluated at two points in time in the same sample of adults. Clearly, such an evaluation over a long time period could be difficult.
- Research published in the peer-reviewed literature (in Australia and the United States) found differences in caries experience (i.e., numbers of teeth or tooth surfaces with caries) between adults who have access to community water fluoridation and those who do not. Although these studies used methods designed to control factors that might bias findings, they did not meet criteria established for the Cochrane review.

These studies opted to collect data at one point in time among adults with or without lifetime exposure to fluoridation and then look back to the time when their permanent teeth would have erupted free of tooth decay. In these studies, the researchers used statistical methods to control other factors, such as age, education, and other fluoride exposures, that could affect the relationship between fluoridation and tooth decay. Findings show that water fluoridation resulted in lower caries levels in adults who were exposed to fluoridation even after other sources of fluoride, such as fluoride toothpaste, became widely available.

- Griffin SO, Regnier E, Griffin PM, Huntley V. Effectiveness of fluoride in preventing caries in adults. *J Dent Res* 2007;86:410-5.
- Slade GD, Sanders AE, Do L, Roberts-Thompson K, Spencer AJ. Effects of fluoridated drinking water on dental caries in Australian adults. *J Dent Res* 2013;92:376-82.

Strength of the Evidence Supporting Community Water Fluoridation:

- While other reviews, such as that done by the Task Force, concluded that the evidence supporting water fluoridation is strong, Cochrane interpreted this differently. Their selection criteria excluded most studies conducted after 1975, so they found insufficient evidence to determine if water fluoridation had an impact in an environment where fluoride products such as toothpaste are widely used. There are more recent peer reviewed, scientifically sound studies done after 1975 which have found that water fluoridation is effective in children and adults, but these studies did not meet Cochrane's criteria for inclusion.
 - Rugg-Gunn AJ, Do L. Effectiveness of water fluoridation in caries prevention. *Community Dent Oral Epidemiol* 2012;40(Suppl. 2):55-64.
 - Brunelle JA, Carlos JP. Recent trends in dental caries in U.S. children and the effect of water fluoridation. *J Dent Res* 1990;69(Spec Iss):723-727
 - Griffin SO, Regnier E, Griffin PM, Huntley V. Effectiveness of fluoride in preventing caries in adults. *J Dent Res* 2007;86:410-5.
 - Slade GD, Sanders AE, Do L, Roberts-Thompson K, Spencer AJ. Effects of fluoridated drinking water on dental caries in Australian adults. *J Dent Res* 2013;92:376-82.
- Of studies that were included in the review by Cochrane, only one – the most recent – showed no effect on severity of tooth decay. Cochrane noted in their discussion that this study had a low level of tooth decay at the beginning of the study and the shortest duration of follow-up. Cochrane also noted that the study was conducted in Australia – a country where water fluoridation is widespread. Low caries levels may reflect the diffusion of fluoride from fluoridated to non-fluoridated regions through the commercial distribution of processed foods and beverages.

Impact of Community Water Fluoridation on Disparate Populations:

- Cochrane concluded that there was insufficient information to show that fluoridation works to reduce differences in tooth decay across socio-economic groups.
- Data from national surveys in the U.S. show that prevalence of tooth decay for groups of adolescents defined by poverty status or race/ethnicity has continued to decline over time. The biggest advantage of community water fluoridation is that it is the best method of delivering

fluoride to all members of the community, regardless of age, education, income level or access to routine dental care.

- Furthermore, CDC recognized community water fluoridation as a major factor responsible for declines in the prevalence and severity of tooth decay over the past 70 years, and named it one of 10 great public health achievements during the 20th century.
 - For example, several studies at the state level have found that Medicaid costs for treatment of tooth decay were lower in fluoridated than non-fluoridated communities. The difference in annual per child treatment costs ranged from \$28 to \$67.

Need for more Research:

- Both the Cochrane Review and the latest review conducted by the Task Force identified the need for more research to address the effectiveness of fluoridation in the current environment of widespread use of fluoride toothpaste and other measures to prevent tooth decay, such as fluoride varnish and dental sealants.
 - In the U.S., the Centers for Disease Control and Prevention (CDC) uses data from the National Health and Nutrition Examination Survey (NHANES) to monitor the oral health of the population. NHANES began testing home water samples for fluoride content in 2013 and is also asking questions about use of other fluoride products, such as toothpaste and prescription fluoride drops/tablets, and residence history. Researchers also will continue to examine data for tooth decay as well as dental fluorosis on a national level and for selected socioeconomic and racial groups.