MIDDLESEX-LONDON HEALTH UNIT

REPORT NO. 014-11

TO: Chair and Members of the Board of Health

FROM: Graham L. Pollett, MD, FRCPC
Medical Officer of Health

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FLUORIDATION OF THE CITY OF LONDON'S DRINKING WATER

Recommendation

It is recommended that the Board of Health support the ongoing fluoridation of the City of London's drinking water supply as a measure to achieve optimal dental/oral health for all residents, which is an important component of total health.

Introduction

The Board of Health has considered water fluoridation in several past Board of Health Reports including: Report No. 043-07 re Ontario Fluoridation Office (March 2007), Report No. 107-07 re Request to Establish an Ontario Fluoridation Office (June 2007), Report 111-08 re Water Fluoridation (September 2008) and Report No 006-09 re Water Fluoridation (January 2009) (Appendix A). As well, on October 16, 2008, the Board of Health heard a presentation by Mrs. Carole Clinch, Research Coordinator for the People for Safe Drinking Water, entitled "To Stop Water Fluoridation."

The purpose of this current Board of Health Report is to seek the Board of Health's support for the ongoing fluoridation of London's drinking water. This report will provide an overview of water fluoridation in London including background information on fluoride such as how it works, how its benefits were discovered and its importance as a public health strategy; the process for fluoridating and monitoring London's water and the cost of this process; and the benefits and safety of water fluoridation.

Background

It is increasingly recognized that oral/dental health is an important component of total health. Cavities (also known as tooth decay or dental caries) are holes in the teeth that if left unchecked can lead to pain, infection in the mouth and occasionally in the body, and loss of the tooth. To prevent or alleviate the pain, the hole in the tooth must be filled or the tooth extracted. Despite significant declines in tooth decay over the past decades, it remains a very common chronic childhood disease. A survey of dental indices among Ontario Health Units from 1979 to 2008 revealed that 34% of 5-year-olds had evidence of decay, with even higher rates in older children. Similarly, results from Middlesex-London in 2007-2008 indicated that 35% of 1,264 5-years olds had evidence of ever having tooth decay.

Fluoride is a naturally occurring mineral that has been proven to prevent tooth decay. Fluoride affects the enamel of the teeth such that it stops, or potentially reverses the tooth decay process. Fluoride's main effect occurs after the tooth has erupted into the mouth, as small amounts of fluoride in saliva frequently bathe the tooth. Ingesting high levels of fluoride when the teeth are being formed may cause fluorosis, a cosmetic condition where the teeth have white spots, and in severe cases the teeth can be pitted or have brown stains.

The benefits of fluoride in preventing tooth decay were discovered in the 1930s and 1940s. It was noted that communities with high rates of fluorosis also had low rates of tooth decay. Both the fluorosis and lack of decay were attributed to high levels of natural fluoride in the drinking water. In the 1940s, studies were conducted to assess the effect of low levels of fluoride in drinking water on tooth decay. When comparing cities with fluoride added to the water and non-fluoridated water, it was determined that cities receiving fluoridated water had 50-70% lower rates of tooth decay. Based on amounts of water consumed, a safe level of fluoride was determined that decreased tooth decay without increasing the risk of fluorosis.

By the 1980s, the difference in decay rates between communities with fluoridated and non-fluoridated water had narrowed, in part due to the fact that non-fluoridated cities were also receiving fluoride through foods and beverages that are bottled and processed in areas with fluoridated water (referred to as the "halo effect") and also due to the widespread use of toothpaste with fluoride. Nonetheless, studies have still continued to demonstrate the benefits of fluoridation of the water, and studies where fluoridation is stopped demonstrate an increase in rates of tooth decay, approaching the levels in the non-fluoridated group. Fluoridation ensures benefit to all those who drink the water, regardless of socioeconomic status, age, ability to regularly brush teeth, or access to dental care.

The Ontario Ministry of the Environment (MOE) estimates that 70% of Ontario residents receive water that is fluoridated, either naturally or by adding fluoride to the water. As of 2005, community fluoridated drinking water was provided to 43% of Canadians. In the United States, approximately 67% of the population receives optimally fluoridated water. Fluoridation of drinking water is less common in European countries although some countries fluoridate their salt.

Fluoride has been recognized by the United States Center for Disease Control and Prevention as one of the ten great public health achievements of the twentieth century and is supported by numerous public health and oral/dental health organizations. It is estimated that for every $1 invested in community water fluoridation, $38 in dental treatment costs are avoided. In Middlesex-London alone, $596,045 was spent in 2009 to cover the cost of urgent dental treatment for children aged 0-17 years whose families could not afford the cost. For many individuals, particularly those over 17 years of age, financial limitations present a major barrier to accessing basic dental care, making strategies that focus on prevention of dental disease, such as fluoride, very important.

Fluoridation in London

The MOE stipulates that where fluoride is added to drinking water, the concentration be adjusted to 0.5 - 0.8 mg/L, the optimum level for control of tooth decay. The City of London receives its water from two sources – about 85 % from Lake Huron and 15% from Lake Erie. The natural level of fluoride in both these water sources is approximately 0.1 mg/L. This level is too low to prevent tooth decay. As per Ontario's Fluoridation Act, a plebiscite was held in London in 1966 through which residents voted to have fluoride added to the water. Beginning in 1967, Lake Huron water has been fluoridated at the Arva Pumping Station before distribution within London. In 1996, the City of London connected to the Lake Erie system which adds fluoride at the Elgin Area Water Treatment Plant. It should be noted that fluoride is not added to water in any jurisdiction in Middlesex County, although fluoride levels are naturally higher in the Thorndale area. Addendum: Fluoridated water from the City of London's water system is also provided to Arva, Ballymote and Delaware in Middlesex County.

The level of fluoride in London's water is maintained at 0.7 mg/L to provide optimal protection against tooth decay without increased risk of dental fluorosis. The level is continually monitored by the City of London and monthly summaries are provided to the Health Unit. Health Unit staff also provides advice to residents of Middlesex-London on other measures to prevent dental fluorosis such as: not using fluoridated toothpaste for the first two years of life and after that, using only a pea-sized amount of fluoridated toothpaste under adult supervision without swallowing and not using fluoride supplements such as pills or drops. A screening conducted by Health Unit staff in 2006 revealed that London had very

low rates of fluorosis of cosmetic concern; of note, the rate in London, where the water is fluoridated (5%), was similar to Strathroy, where the water is not fluoridated (4.6%).

To add fluoride to London's drinking water, hydrofluorosilicic acid is used. The source of this product is an ore that is mined and processed in Florida which is rich in fluoride and phosphorus. The processing involves separating the fluoride from the phosphorus, with the fluoride being used to create hydrofluorosilicic acid and the phosphoric acid being used to create chemical fertilizer. Any substance that is added to drinking water is required to pass rigorous testing to ensure that it meets the high standards that are legislated for the water industry such as the National Sanitation Foundation and American National Standards Institute (NSF/ANSI) Standards for purity. The NSF/ANSI Standards for fluoride products added to drinking water are even more stringent than the US standards that apply to fluoride products used in pharmaceuticals.

A detailed costing of the fluoridation of London's water was done by Mr. Dan Huggins, Water Quality Manager for the City of London. Including annual operating costs and amortized capital costs, the fluoridations of London's water costs approximately $133,000 per year, or about 38¢ per each London resident.

Benefits and Safety of Water Fluoridation

Many research articles have been written with regard to the benefits and safety of water fluoridation. Several systematic reviews (where experts review the scientific papers and draw conclusions based on the papers that are judged to be scientifically sound) have been published. These review papers provide strong support for the ongoing fluoridation of water for the prevention of tooth decay. A summary of the key findings of these reports and the position of credible scientific organizations can be found in Appendix B which is a memo from Dr. David Williams, the Associate Chief Medical Officer of Health for Ontario. Aside from fluorosis, which is very infrequent when levels of fluoride are kept at 0.7 mg /L as in the City of London, the papers also provide no evidence of harm from fluoridation of the water. To quote the most recent review entitled "Fluoride in Drinking Water," which was conducted by Health Canada and issued for public comment on November 27, 2010:

> *"The weight of evidence from all currently available studies does not support a link between exposure to fluoride in drinking water at 1.5 mg/L and any adverse health effects, including those related to cancer, immunotoxicity, reproductive/developmental toxicity, genotoxicity and/or neurotoxicity. It also does not support a link between fluoride exposure and intelligence quotient deficit, as there are significant concerns regarding the available studies, including quality, credibility, and methodological weaknesses."*

There is also no evidence that fluoride in water has any negative effects on the environment.

Conclusion

The scientific evidence strongly supports the fluoridation of water to prevent tooth decay. The evidence also provides reassurance as to the safety of this important public health strategy. It is recommended that the Board of Health endorse the recommendation to support the ongoing fluoridation of London's water supply as a public health measure to achieve optimal dental/oral health, which is an important component of total health.

This report was prepared by Dr. Bryna Warshawsky, Associate Medical Officer of Health and Director, Oral Health, Communicable Disease and Sexual Health Services.

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This report addresses the following requirement(s) of the Ontario Public Health Standards: Child Health