Fluoride Varnish Program in High Risk Elementary Schools

TO: Chair and members of the Board of Health
MEETING DATE: November 2, 2016
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Recommendations

It is recommended that the Board of Health:

1. Receive this report for information.
2. Approve funding the cost of materials to allow the continuation of the Fluoride Varnish Program (FVP) in seven elementary schools.
3. Approve funding to expand the FVP to five additional high risk elementary schools.
4. Approve funding to expand the FVP to include all students in JK and SK in all schools in the County of Wellington and County of Dufferin.

Key Points

- Fluoride varnish is effective for reducing tooth decay among high risk children.
- This program is targeted to high risk schools as determined by oral health screening in elementary schools.
- The application of fluoride varnish is cost effective and reduces the need for expensive dental treatment such as fillings, crowns and root canal therapy.
- Facilitating and supporting the application of fluoride varnish in primary care settings forms a strong foundation for a comprehensive, effective, multi-pronged prevention strategy that has the potential to significantly improve the oral health status of all children in Wellington, Dufferin and Guelph (WDG).
Discussion

Fluoride varnish is an evidence-based practice that is recognized as safe and effective for reducing the risk of tooth decay.¹

Varnish is a temporary adhesive which contains 5% sodium fluoride. Fluoride varnish is not permanent; it only adheres to the tooth surface for a period of hours. The uptake of fluoride into tooth enamel (outer layer of tooth) helps to make the tooth stronger and more resistant to tooth decay. It can also repair tooth surfaces where very early tooth decay has occurred. It is applied directly to tooth surfaces using a small brush with a disposable tip. The procedure is well tolerated by young children and takes between one and five minutes per child depending on the number of teeth in the mouth and the child’s level of cooperation.

Wellington-Dufferin-Guelph Public Health (WDGPH) currently provides fluoride varnish applications to students in seven high risk elementary schools. These schools were selected because a high proportion of children were identified with urgent dental needs during oral health screenings by WDGPH.

The FVP began as a pilot during the 2007-2008 school year at Centre Peel Public School in response to high levels of tooth decay in the predominantly Low German Speaking Mennonite student population. Over 30% of children had urgent dental needs. Since implementing the FVP at that school, the proportion of children with urgent needs has fallen to 5%.

Based on this significant impact, the program was expanded to four additional schools as part of WDGPH’s original Healthy Smiles Ontario (HSO) business case submission in 2010. In 2013 and 2014, two more schools were added under the HSO program. To date, the seven schools currently participating in the FVP are:

- Centre Peel, Drayton (since 2007)
- Brant Avenue, Guelph (2010)
- Priory Park, Guelph (2010)
- Westwood, Guelph (2010)
- Princess Margaret, Dufferin (2010)
- Victoria Cross, Mount Forest (2013)
- Hyland Heights, Shelburne (2014)

Students in all grades are screened and offered fluoride varnish to reduce the stigma of accepting preventive services for those most vulnerable and to enable children who might not otherwise receive preventive services to participate.

Research shows that there is a significant cost to the health care system related to untreated and preventable dental caries in children. More advanced treatment is needed for certain cases in hospitals. For example, children who experience early childhood caries (ECC), a severe form of tooth decay that is largely preventable, often require day surgery to treat their condition. Day surgery for ECC is the leading cause of day surgery among children five years and under, with 19,000 surgery operations performed each year across Canada.² The public cost associated with just one aspect of day surgery for ECC (hospital care) is $21.2 million per year in Canada ($6.5 million for Ontario) for children age one to less than five years, while the average cost per child is $1,408 in Ontario.² This does not include costs associated with dental treatment provided In a
hospital setting and travel costs for families who often travel great distances for this care. Day surgery rates for dental care are 3.9 times as high for children from the least (versus the most) affluent neighbourhoods, and are 3.1 times as high for children from rural (versus urban) neighbourhoods. Between 2010 and 2012, 387 children aged one to less than five years of age in the Waterloo Wellington LHIN received day surgery for ECC, a rate of 5.5 per 1,000 children. Day surgery for severe tooth decay is just one example of the immense cost associated with treating urgent dental needs, which for the most part is largely preventable.

A cost-benefit analysis, conducted by a Masters of Public Health candidate completing a student placement at WDGPH in 2014, suggested that at Centre Peel Public School considerable savings were being achieved for government funders as well as individual families in terms of payments to dental providers for fillings. The analysis concluded that since the implementation of the initiative at Centre Peel in 2008, between 670 and 780 cavities have been prevented in the student population. If costs of treatment were divided between private (60%) and public (40%) dental programs, savings of between $132,000 to $155,000 are estimated to have been achieved. These immediate savings do not include the lifelong benefits of avoiding replacement fillings that can turn into more complicated and expensive treatments such as crowns and root canal therapy or the additional costs to the acute healthcare system for many chronic health conditions linked to poor oral health. Additionally, oral health problems can impact the acute healthcare system and are linked to overall health. These are three examples:

- In 2012, there were 58,000 visits to hospital emergency rooms in Ontario for oral health problems with an estimated cost of $30 million to the acute care system.
- In Ontario, from 2010-2012, there were 9,610 day surgeries performed due to early childhood tooth decay with an estimated hospital cost of $13 million over the 2-year period.
- Dental decay can lead to pain, infection, abscesses, chewing problems, poor nutritional status, and gastrointestinal disorders. In serious cases, this can damage a child's self-esteem and affect school performance, ability to learn and potential to thrive.

Findings from the 2015-2016 school-year oral health screening indicate that there are currently five high risk schools (not currently participating in FVP) in the WDG area. These five schools do NOT include the original seven schools participating in the FVP. Of those original seven fluoride varnish schools, two are now considered moderate risk and five are low risk. However, the original fluoride varnish schools are still considered “high risk” from a program planning perspective in order to maintain the positive oral health improvements that have been achieved.

Note: In the Ontario Public Health Standards, a high risk school, or high screening intensity school, is defined as one where 14% or more of Grade 2 students exhibit two or more decayed teeth. A moderate risk school is defined as one where > 9.5% but < 14% of Grade 2 students exhibit two or more decayed teeth. A low risk school is defined as one where fewer than 9.5% of Grade 2 students exhibit two or more decayed teeth.

The costs to expand the current FVP to include these five high risk schools is $16,751 (Recommendation #3).

Program Funding

There have been significant changes to the funding model for oral health programs at WDGPH over the last number of years.
Historic/CINOT/Original HSO Program (2010-2015)

The application of fluoride varnish in high risk schools was initially supported by the original HSO program with 100% provincial funds. During the 2014-2015 school-year, the total cost to provide fluoride applications (three applications per year or 2,711 applications) in the seven participating schools was approximately $19,884. Material costs were $5,426; approximately $2 per application. Staffing costs ($13,533) and mileage ($925) were paid through the HSO budget as part of the preventive oral health services funded by the original HSO program and in conjunction with oral health screening at elementary schools.

HSO-2 Program/Current School Year (2016-2017)

As a result of the amalgamation of government-funded dental care for children into the “new HSO” in 2016, the activities originally funded by HSO were reduced and population-based or universal interventions such as FVPs were no longer included as eligible expenses. As stated in the HSO Program Protocol, 2016: “Other oral health services delivered by public health units (e.g. universal FVPs, services to non-HSO eligible clients) can continue to be delivered at the discretion of the board of health. These initiatives are not specified as part of the Healthy Smiles Ontario Program Protocol.”

One reason for this change is that most other health units do not have population-based preventive initiatives and the Ministry of Health and Long-Term Care wanted greater consistency in the core services funded by HSO across Ontario. There were no increases to the HSO budget; in order to maintain a cost neutral change services that were not offered by all health units couldn’t be included as “core services”. Note: Preventive oral health services in public health clinics are still covered by HSO if families complete an enrolment application and meet financial eligibility criteria for HSO.

For this current school year (2016-2017), the dental team will provide two fluoride varnish applications per child per school year (a change from the previous model of 3 applications) to participating children in the seven original fluoride varnish schools. According to a recent Cochrane systematic review, two applications of fluoride varnish per year is clinically effective.¹ Based on this new model, the estimated number of applications per year is 2,690 (based on changing student enrolment, Table 1). Through efficiencies, the cost of staffing and mileage has been allocated to the Child Health portion of the cost-shared budget. The additional funding needed to continue this work in the seven original fluoride varnish schools is estimated to be $5,380 per year which covers the cost of materials (approximately $2/application). The additional time required and the mileage associated with the extra trips to provide the fluoride varnish can be absorbed by existing resources. This is reflected in Recommendation #2.

Expansion of the FVP

In a 2012-13 school year survey of JK, SK and Grade 2 children in all publicly-funded WDG schools, it was found that about 20% of JK children already had at least one decayed tooth or one filled tooth due to tooth decay and 30% of SK children had at least one decayed or filled tooth. Among Grade 2 children, 50% had experienced tooth decay.

Clearly an opportunity for prevention exists and fluoride varnish applications are proven to be a relatively low cost intervention with significant long term savings. To help further prevent and reduce dental disease among young children, it is necessary to expand the FVP to include all children in JK and SK grades in all elementary schools (Recommendation #4).
Table 1 provides a summary of the number of children and associated costs of delivering the FVP universally in the seven original and five additional elementary schools which are now classified as high risk for tooth decay.

**Table 1. Options for FVP in elementary schools**

<table>
<thead>
<tr>
<th>Population</th>
<th>Number of children enrolled</th>
<th>Number of children likely to be treated*</th>
<th>Number of applications per year (2 per participant)</th>
<th>Cost of materials per year</th>
<th>Additional Staffing Costs &amp; Mileage</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Program in 7 schools (2015-16 Actuals)</td>
<td>2,129</td>
<td>904</td>
<td>2,713 (3 applications)</td>
<td>$5,426</td>
<td>0</td>
<td>$5,426</td>
</tr>
<tr>
<td>Current Program in 7 schools (2016-17 ongoing Estimates)*</td>
<td>2,242</td>
<td>1,345</td>
<td>2,690</td>
<td>$5,380</td>
<td>$0</td>
<td>$5,380</td>
</tr>
<tr>
<td>5 Additional High Risk schools (2016-17 ongoing Estimates)*</td>
<td>2,094</td>
<td>1,256</td>
<td>2,513</td>
<td>$5,026</td>
<td>$16,751</td>
<td>$21,777</td>
</tr>
</tbody>
</table>

Table 2 provides a summary of the number of children and associated costs of delivering the FVP to all children in JK and SK across WDG.

**Table 2. Application of Fluoride Varnish in Licensed Child Care Settings**

| JK and SK children in all WDG schools | 4,581 ** | 2,749 | 5,498 | $10,996 | $33,652 | $44,648 |

* Assuming 60% uptake of program. Parents or guardians will have to provide positive consent.
** Enrollment does not include JK and SK children from seven currently fluoride varnish schools and five additional high risk schools.

**Developing a Multi-pronged, Comprehensive Oral Health Strategy in WDG**

Given that we know many children are entering their JK year already with cavities, it seems reasonable and prudent to reorient prevention activities to well before that time. Capturing children in licensed childcare programs is a practical way to reach children before school entry. Based on an estimated 60% rate of uptake, the costs associated with delivering fluoride varnish applications in all licensed childcares in WDG are:

- $20,278 for 1678 children enrolled in licensed child care centres in Wellington County including the City of Guelph
- $5,495 for 542 children enrolled in licensed child care centres in Dufferin County.

The recommendations above reflect to some extent a “reactive response” to a current problem. To effectively address this problem, our efforts much be focused more upstream; providing a universal preventive strategy to young children. Developing, implementing and supporting a multi-
pronged, comprehensive oral health strategy for children has the potential to significantly impact
the oral health (and thereby the general health) of all children living in WDG.

In addition to the recommendations above, partnering with primary care to facilitate and support
the delivery of fluoride varnish applications during the eighteen month well baby check up will
allow us to provide preventive care to the majority of children living in WDG. Added to offering
fluoride varnish in licensed child care settings and in the JK and SK years, this will dramatically
impact the troubling number of children who currently experience dental caries before Grade 2.
For high risk children the ongoing applications of fluoride varnish will be required necessitating a
long term school-based prevention approach.

In WDG, children are often not seen by a dentist early enough and 30% of children entering
Kindergarten in our region have dental caries.5 As most parents take their young children to
publicly-funded well baby and immunization appointments at their primary care provider, this is a
key time to intervene and provide oral health resources to young families. WDGPH currently
provides support and resources to primary care providers for the 18-month Enhanced Well Baby
Visits. Primary care providers are well positioned to educate families with young children on the
importance of oral health care and to apply the fluoride varnish. By orienting oral prevention
activities to the early years, we can assist in addressing early barriers to dental care and
improving oral health outcomes for children prior to school entry.

WDGPH is currently working in partnership with Guelph Community Health Center (GCHC) to
pilot the provision of fluoride varnish in a primary care setting. This partnership is based on
evidence that recommends primary care clinicians apply fluoride varnish to the primary teeth of all
infants and children five years and under, starting at the age of primary tooth eruption and
continuing every six months.6

The Canadian Rourke Baby Record is a structured, evidence-based validated tool used to
support clinical decision making for health supervision of children from birth to five years of age in
primary care and pediatrician practices across Canada. It recommends fluoride varnish be
considered based on caries assessment at the 18-month well baby check-up.7

The application of fluoride varnish is not a controlled act and can be taught to our primary care
partners. Current planning with GCHC includes one day of WDGPH Dental Hygienist time to
teach the GCHC Registered Practical Nurses (RPN’s) to apply the varnish, to competently
answer parent questions and then observe the first few applications by each RPN on the same
day. GCHC currently has 260 child clients between 6-48 months of age. The rate of positive
consents for the fluoride varnish pilot is estimated to be 60%, which would see approximately 156
children receiving an application of fluoride varnish over the span of the one-year pilot.

The initial cost of the fluoride applications will be covered by WDGPH with GCHC assuming this
cost at the end of 2017. Fluoride varnish can be stored for 1.5 years and does not need to be
refrigerated. At a cost of $1 per application, the total cost based on a unit price of $1/application
(x2 applications) will be $312 for materials plus $363 for one day of WDGPH Dental Hygienist
time for a total cost of $675 for this one year pilot. Should families require dental navigation
supports or further dental assistance for their children, a warm hand off from GCHC to WDGPH
will occur. The fluoride varnish pilot between GCHC and WDGPH will be evaluated at the end of
the pilot (Dec 2017) and future expansion into our seven local Family Health Teams will be
contemplated at that time.
Conclusion

The FVP at WDGPH has been effective in reducing tooth decay among the elementary school-aged children in those schools that received the intervention. Due to provincial funding changes, this population-based intervention can no longer be supported by the HSO-2 program and it is necessary to fund this program locally. If the program is not continued, it can be anticipated that levels of tooth decay will increase to the same levels as previous in these seven schools and the opportunity to change the trajectory for many young children in WDG will be lost.

Our recommendation to the Board of Health is to support funding the cost of materials needed for the continuation of the current FVP (annual cost of $5,380 for materials). Given the positive results of the program, it is also recommended that Board of Health consider expanding the program to include, at a minimum, the five additional schools which are high risk (total annual cost of $21,777); and to consider providing fluoride varnish applications universally to JK and SK grades in all elementary schools (total annual cost of $44,648).

Ontario Public Health Standard

Population-based programs, such as FVPs in elementary schools, are not part of the OPHS. Note: Preventive oral health services in public health clinics are included in the HSO protocol. HSO is Requirement #12 under Child Health.

WDGPH Strategic Direction(s)

Check all that apply:

☐ Building Healthy Communities
   We will work with communities to support the health and well-being of everyone.

☐ Service Centred Approach
   We are committed to providing excellent service to anyone interacting with Public Health.

☒ Health Equity
   We will provide programs and services that integrate health equity principles to reduce or eliminate health differences between population groups.

☐ Organizational Capacity
   We will improve our capacity to effectively deliver public health programs and services.
Health Equity

Public health programs, such as the FVP, help to address health inequities by targeting preventive interventions towards high risk populations. Children in these schools have difficulties accessing regular dental care and by providing this service in schools barriers to access can be overcome. Day surgery rates for dental care are 3.9 times as high for children from the least (versus the most) affluent neighbourhoods, and are 3.1 times as high for children from rural (versus urban) neighbourhoods.

Appendices

None.

References