


1



Community Water Fluoridation

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www.snohd.org

Acknowledgements to the New York State Department of Health, Bureau of Dental Health for parts of this presentation.

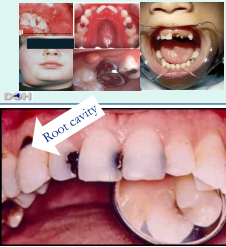
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- Fluoridation is effective.
- Fluoridation is safe.
- Fluoridation is legal.

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3

Dental caries (tooth decay) is the single most common chronic childhood disease




Root cavity

- Infection
- Extreme pain
- Difficulty in chewing
- Poor weight gain/nutrition issues
- Difficulty concentrating
- Crooked teeth
- Missed school hours
- Predictor of caries in later life
- Costly treatment

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Problem is tooth decay

4



- In Snohomish County, over 50% of all third grade children still have cavities.
- Between 2 and 3 out of 10 adults older than age 65 have lost all of their permanent teeth.
- The 2011 Human Services Needs Assessment identified oral health care as the greatest health care need in Snohomish County.

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Problem is local

5

Major disparities exist by race, income, & language

Tooth Decay		
Race	Income	Language
White 50%	Higher 54%	English 60%
Minority 72%	Low 76%	Not English 76%

Smile Survey, 2010
Snohomish County, 3rd grade

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Tooth decay is inequitable

6

How Fluoride Benefits Adults and Children

Systemic
tooth development

Topical
tooth surface

HOW FLUORIDE WORKS

When fluoridated water is consumed while the bones and teeth are still growing, fluoride works in two ways.

Fluoride mixes with saliva to neutralize acid produced by bacteria found in the mouth. Fluoride heals teeth and protects them from further decay.

Fluoride is absorbed into the bloodstream through the stomach, and enters the teeth and bones.

Fluoride combines with the phosphate and calcium to create a strong barrier to protect teeth from cavities. Fluoride makes teeth stronger and able to withstand the acid produced by bacteria found in the mouth.


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7

- Adjustment and monitoring of fluoride in drinking water to ensure that it stays at a desired level
 - Allowed up to 4 ppm only in non-adjusted systems
- 0.8 ppm in Snohomish County
- EPA has proposed 0.7 ppm (requires change to state law)

What is fluoridation?

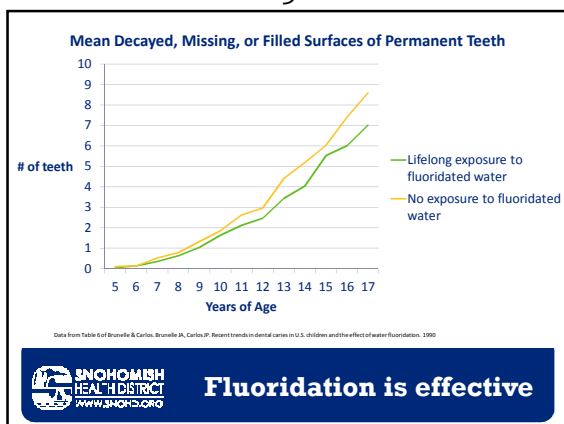
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- Fluoridated communities have 18-40% less tooth decay (depends upon other fluoride sources)
- Single most effective intervention
- Saves money: every dollar spent on water fluoridation avoids on average \$38 - \$42 in dental care
 - Fewer fillings, smaller fillings, longer lasting teeth
- Equitable: age, income, race, language, ethnicity
- Benefits last a lifetime

Fluoridation is effective

9



10

US Guide to Community Preventive Services: 21 Systematic Reviews

- Decay rates measured after water fluoridation only: median 50.7% lower among children ages 4 to 17 years when compared with control groups.
- Decay rates measured before & after water fluoridation: median decrease of 29.1% among children ages 4 to 17 years when compared with control groups.
- Fluoridation decreases tooth decay across communities with varying decay rates & children of varying socioeconomic status.

Fluoridation is effective

11

Safety means that adverse effects will not be caused by some agent under defined conditions

- Fluoride is the 13th most abundant element and found in all food and water.
- Water is safe to drink when meeting regulatory standards.
- Everett is in compliance with ANSI 60 Water Quality Standard.
- There is no known allergy or sensitivity to fluoride.

Fluoridation is safe

12

National Research Council Review 2006

- Examined potential for adverse health effects of fluoride at 2-4 ppm (not lower level found in public water supplies)
- No or unlikely adverse health effects of low levels of fluoride:
 - Severe fluorosis
 - Skeletal fluorosis
 - Bones or hip fracture
 - Reproductive or development outcomes
 - Neurotoxicity and neurobehavioral effects
 - Endocrine system, thyroid, parathyroid, pineal, glucose
 - GI, kidney, liver, immune system
 - Cancer, osteosarcoma

Fluoride safe up to 4 ppm

13

- ⇒ EPA Six Year Review of Drinking Water Standards, Fluoride (2011)
- ⇒ Health Canada Report on Fluoride and Human Health (Dec 2010)
- ⇒ Australian Review of Efficacy and Safety of Fluoridation (2007)
- ⇒ National Research Council, USA (1993, 2006)
- ⇒ World Health Organization (1994, 1996, 2006)
- ⇒ Agency for Toxic Substances and Disease Registry, US Public Health Service (1991, 2003)
- ⇒ U.S. Guide to Community Preventive Services (2002)
- ⇒ International Programme on Chemical Safety, WHO (2002)
- ⇒ Forum on Fluoridation, Ireland (2002)
- ⇒ Medical Research Council, UK (2002)
- ⇒ University of York, UK (2000)
- ⇒ U.S. Surgeon General's Report (2000)
- ⇒ Institute of Medicine, USA (1999)



**Multiple reviews support
efficacy & safety**

14

- Fluorosis occurs with swallowing fluoride
- Only occurs while teeth are developing
- Depends on amount & length of time consumed
- Occurs in BOTH fluoridated & non-fluoridated communities
- Describes range of cosmetic changes in teeth



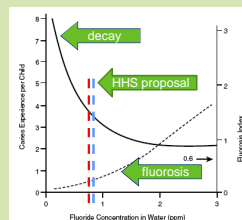
What about fluorosis?

15



What fluorosis looks like

16



**Fluoridation is a balanced
approach**

17

Source	Parts per million (PPM)
Drinking water- Adjusted	.7 – 1.2
Drinking water- Allowed	≤ 4
Water – not allowed	>4
Ocean water	1
Fluoride toothpaste	1,000-1500
Fluoride rinses	230 daily rinse 900 weekly rinse
Fluoride treatments	9,040 foam 12,500 APF gel 22,500 varnish
Fluoride supplements (pill form)	.25 – 1.0

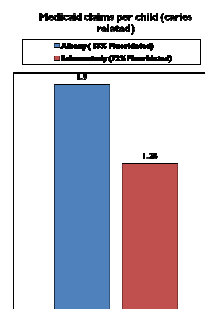


**Fluoridation is the
safest fluoride**

18

The cost to fluoridate in Snohomish County is approximately .54 cents per person per year.

For low income: community water fluoridation reduces family & state's costs for dental treatment



Low cost

19




Endorsed for efficacy and safety by majority scientific and professional organizations:


- US Public Health Service
- American Medical Association
- American Dental Association
- World Health Organization
- International Association for Dental Research
- American Water Works Association
- ... and many other scientific and professional organizations concerned with oral health and overall health.

 **Health organizations support fluoridation**

20




- The majority of the 6.3 million health professionals and scientific organizations in the US alone support fluoridation!
- Gallup poll: 70% of public said water should be fluoridated
- 73.9% of the US population on public water systems drink fluoridated water.

 **Health professionals & public support fluoridation**


21

▪ Statutory requirements-referendum


- 1990 referendum 51% approval
- 1991 referendum 65% approval
- 1992 Fluoridation began

 **Everett residents support fluoridation**

22




- Adjustment of fluoride in drinking water in multiple US communities >40 years → >70% of US population served.
- EPA has authority & sets safety standards.
- HHS recommends minimum levels.
- State regulates local implementation.
- Washington State's courts have held that cities have the authority to fluoridate drinking water to prevent disease:
 - A.P. Wilson v. City of Mountlake Terrace, 417 P.2d 632, 632-635 (Washington Supreme Court, 1966)
 - Clallam County Citizens for Safe Drinking Water v. City of Port Angeles, 151 P.3d 1079, 1079-1086 (Washington Court of Appeals, 2007)

 **Fluoridation is legal**


23

- Fluoridation is effective.
- Fluoridation is safe.
- Fluoridation is legal.

 **Fluoridation in Snohomish County**

24

Extras




25

Snohomish Health District supports the adjustment of fluoride in community drinking water for the prevention of tooth decay.

Water fluoridation is proven to be safe, effective, low cost and equitable.

Snohomish Health District, Board of Health, May 9, 1989

Snohomish County policy supports fluoridation




26

In 2010, 73.9%—204.3 million Americans
75% - Snohomish County > 500,000

United States
Percentage of state PWS population receiving fluoridated water - 2006

Washington: 64.6%



Fluoridation percentage
0 - 24
25 - 44
45 - 64
65 - 84
85 - 100
Data not available

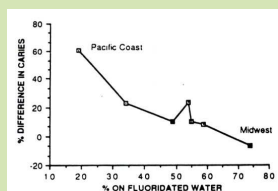
Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, October 16, 2007. URL: <http://nccdp.nccd.cdc.gov/fluoridation>

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Department of Health and Human Services
Centers for Disease Control and Prevention
National Center for Chronic Disease Prevention and Health Promotion

27

Effectiveness of water fluoridation
Difference in Caries Prevalence by U. S. Region according to % on fluoridated water. (1986-87) Children 5-17 year-olds



Explained by

- Halo or diffusion effect
- The more fluoridation in a region, the less difference between fluoridated and non-fluoridated areas

"Non-FDA's Current regulations and recommendations concerning water fluoridation, fluoride supplements, and topical fluoride agents." J Dent Res. 1992 May;71(5):123-45.
(Quoted from: Brunelle JA, Caries JP. Recent trends in Dental Caries in U.S. Children and the Effect of Water Fluoridation. Journal of Dental Research. 1995 Feb; 74 (Special Issue): 723-727.)

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Fluoridation is effective.

28

National Research Council, U.S.A. (2006)
Fluoride in Drinking Water: A Scientific Review of EPA's Standard

- The findings of the NRC report are consistent with CDC's assessment that water is safe and healthy at the levels used for water fluoridation (0.7 - 1.2 mg/L). CDC reviews the latest scientific literature on an ongoing basis and maintains an active national community water fluoridation quality assurance program. CDC promotes research on the topic of fluoride and its effect on the public's health. CDC's recommendation remains the same; that community water fluoridation is safe and effective for preventing tooth decay.
- Water fluoridation should be continued in communities currently fluoridating and extended to those without fluoridation.

http://www.sboh.wa.gov/Meetings/2010/06-09/docs/Tab16-Fluoridation_CDC_Statement.pdf

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NRC 2006 – Fluoridation should be continued and extended

29

CDC Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States

- Continue and Extend Fluoridation of Community Drinking Water
- Counsel Parents and Caregivers Regarding Use of Fluoride Toothpaste by Young Children, Especially Those Aged <2 Years
- Target Mouthrinsing to Persons at High Risk
- Judiciously Prescribe Fluoride Supplements
- Apply High-Concentration Fluoride Products to Persons at High Risk for Dental Caries

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2001 CDC Fluoridation is Safe and Effective

30

GUIDE TO COMMUNITY Preventive Services

Recommendations for Preventing dental caries

- Community water fluoridation
(strongly recommended)
- School-based sealant programs
(strongly recommended)

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2002: US Guide to Community Preventive Services

31

ADA 2006**LOW CARIES RISK**

- Fluoridated water and fluoride toothpastes may provide adequate caries prevention
- Whether or not to apply topical fluoride is a decision that should balance this consideration with the practitioner's professional judgment and the individual patient's preferences.



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31

32

Medical Research Council (U.K.) working group report: Water fluoridation and health. 2002

- Evidence to date suggests that fluoride has no effect on hip fractures
- There is currently no firm evidence linking water fluoridation to cancer in general, or to specific cancers
- The group considered suggestions that water fluoridation may be implicated in various other health effects and concluded that there was no evidence for these suggestions
- The only effects of fluoridation are
 - Decreased tooth decay and very mild fluorosis

**MRC 2002 : Fluoridation is Safe**

32

33

No negative environment concerns

- Environmental concerns have been investigated in literature reviews
 - Tacoma Pierce County Health Department, Washington State (August 2002)
<http://www.tpchd.org/files/library/476dfaa7219ff8f.pdf>
 - City of Port Angeles, Washington State (October 2003)
- No negative impact of water fluoridation on the environment has been established

Pollock HF. Water fluoridation and the environment: current perspective in the United States. Int J Occup Environ Health. 2004 Jul-Sep;10(3):343-50

**Fluoridation is safe**

33

34

- There is no negative effect on the health of plants, animals, or humans
- There is no effect on corrosion of pipes.
- There is no measurable increase in lead and arsenic.
- There are no emissions of fluoride into the air outside the well houses.
- There is no release of toxic or hazardous substances.
- There is no noise production.
- There is no measurable increase in the fluoride concentrations in rivers downstream of the discharges due to adding fluoride to the water supply system.
- There is no concentration of fluoride in groundwater.



Fluoridation is Safe

34

35

ADA Infant Formula Recommendations

- Continue use of liquid or powdered concentrate infant formulas reconstituted with optimally fluoridated drinking water while being cognizant of the potential risk for enamel fluorosis.
- Use ready-to-feed formula or liquid or powdered concentrate formula reconstituted with water that is either fluoride-free or has low concentrations of fluoride when the potential risk for enamel fluorosis is a concern.

Reing J, Greenwell C, Inghel P, King R, Kist D, Kumar J, Levy S, Pollock H, Whitford GM, Stock S, Anandamurthy K, Frontino-Hewley J, Mayall DM. Evidence-based clinical recommendations regarding fluoride intake from reconstituted infant formula and enamel fluorosis: a report of the American Dental Association Council on Scientific Affairs. J Am Dent Assoc. 2011 Jan; 142(1):79-87.
<http://pubs.aad.org/content/142/1/79.full>

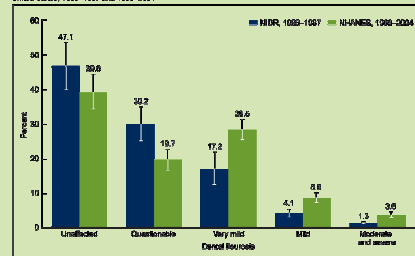


Fluoridated water is safe for babies!

35

36

Figure 4. Change in dental fluorosis prevalence among children aged 12-15 participating in two national surveys: United States, 1989-1997 and 1999-2004



ADA 2006: Dental fluorosis is mild and is being very rarely, mild, moderate, or severe for no one is based on the ADA Fluorosis Index. Prevalence data refers to 1989-1997 and 1999-2004. Other than represent ADA guidelines for fluoride.

ADA 2006: ADA's National Health and Nutrition Examination Survey, 1989-1997 and National Institute of Dental Research, National Survey of Oral Health

ADA's National Oral Health Survey, 1989-1997

**Fluorosis rise in fluoridated AND non-fluoridated communities**

37

Benefits of water fluoridation

TABLE 1
MEAN DMFS OF U.S. CHILDREN WITH PERMANENT TEETH BY AGE AND WATER FLUORIDATION EXPOSURE

Age	Drinking Water Fluoridation Exposure Mean DMFS*	No Water Fluoridation Exposure Mean DMFS*	Percent Difference
5	0.03	0.10	70
6	0.04	0.14	67
7	0.06	0.15	59
8	0.04	0.20	59
9	0.06	0.23	55
10	0.04	0.25	55
11	0.03	0.25	59
12	0.04	0.27	57
13	0.03	0.40	73
14	0.05	0.18	72
15	0.03	0.20	87
16	0.02	0.21	79
17	0.03	0.20	79
All Ages	0.03	0.20	84

*All means adjusted to age and gender distribution of total U.S. population ages 5-17.

Data from Table 6 of Brunelle & Carlos, Brunelle JA, Carlos JP. Recent trends in dental caries in U.S. children and the effect of water fluoridation. 2000

Fluoridation is effective

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38

2011 HHS/EPA/CDC proposal

Change recommended due to

- additional sources of fluoride
- increasing prevalence of enamel fluorosis
- no difference in water consumption by climate
- lowest end of current temperature-based range
- demonstrated dental caries preventive benefit
- to lower overall fluoride ingestion by children

- 1945: 1.0 ppm
- 1962: 0.7 – 1.2 ppm depending on climate
- 2011: 0.7 ppm (Proposed by HHS)

<http://www.epa.gov/epahq/fluoride/2011/2011fluorideproposal.pdf>

2011 Fluoridation is Effective

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39

- Are the teeth weakened? It seems my patients that do have some fluorosis don't get decay.
 - Teeth with dental fluorosis are more caries resistant.
 - Severe dental fluorosis may be accompanied by increased caries risk due to pitting.

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40

Caveats on the research

- 1986-87 NIDR school-based
- 1999-2004 NHANES - household
- # of Examiners (14 vs 2-4)
- Questionable vs very mild NIDR – combined 47.4%; NHANES – combined 48.2%
- Combined moderate and severe (NIDR – 1.3%; NHANES - 3.6%)**
- less than 1% had severe enamel fluorosis**
- Oversampled ethnic minorities
- Unknown Residence Histories?
- Fluoride sources? Water fluoride concentration? Swallowing toothpaste?
- Inappropriate fluoride supplements?
- 1992-94 changes in recommended personal fluoride exposure – cannot be evaluated until after 2004

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41

Prevent Fluorosis

- Know the fluoride level in drinking water
 - Children under 2 years:
 - Do not use fluoride toothpaste unless advised to do so by your doctor or dentist
 - Children 2-6 years:
 - No more than a pea-size amount of fluoride toothpaste
 - Do not give fluoride rinses, unless recommended by your doctor or dentist
- Do not give children fluoride tablets or drops when living in or near to fluoridated communities
 - Use fluoride drops or tablets, or other concentrated fluorides, as recommended.

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42

Questions

- If I use fluoridated toothpaste, am I getting enough fluoride to protect against decay?
- How many times a day? Twice a day is good.
- Depends on caries risk level.
- Low risk – yes - if in a fluoridated community.

Fluoridation is safe.

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43

Questions

- There has been a lot of controversy regarding fluoride because of fluorosis. I know it causes spotting of the teeth but unless it is severe, what other negative consequences does it cause?
- None when exposed to fluoride at recommended levels.
- EPA –
 - 4 ppm in water
 - 2 ppm – secondary standard. May be revised.

<http://www.dimensionsofdentistry.com/cdtright.aspx?id=737>



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43

44

By wide margins, Everett's drinking water is below the minimum acceptable standards for lead, arsenic, and other trace elements, before and after the addition of fluoride.



Everett water is safe!
(and legal)

45

Questions

- I understand the source of the fluoride used for water fluoridation is industrial waste. Surely there must be an alternative to waste material???
- From time to time opponents of fluoridation allege that fluoridation additives are byproducts of the phosphate fertilizer industry in an effort to infer the additives are not safe. Byproducts are simply materials produced as a result of producing something else – they are by no means necessarily bad, harmful or waste products.

- ADA Fluoridation Facts, Question 45, Page 43

http://www.ada.org/sections/professionalResources/pdfs/fluoridation_facts.pdf

- CDC, Water Fluoridation Additives

http://www.cdc.gov/fluoridation/fact_sheets/engineering/wfadditives.htm#1



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45

46

The Centers for Disease Control & Prevention (CDC) identifies community water fluoridation as one of 10 great public health achievements of the 20th century.

Fluoridation prevents tooth decay safely and effectively.



Public health community supports fluoridation

47

What levels of fluoridation are currently being used by our local water companies (serving Edmonds, Mount Lake Terrace, Lynnwood, Everett, etc.)?

		Fluoride Concentration in Drinking Water	
Water District	Year	Average	Range - ppm
Seattle Public Utilities	2010	1.0 ppm	(0.7 - 1.2)
Edmonds	2010	0.9 ppm	(0.7 - 1.1)
Everett	2010	0.9 ppm	(0.7 - 1.1)
Lynnwood	2010	0.9 ppm	(0.7 - 1.1)
Mountlake Terrace	1966	0.9 ppm	(0.7 - 1.1)
City of Port Angeles	2010	1.0 ppm	Not available
City of Port Angeles	2011	0.8 ppm	Not available

Water quality reports: Consumer Confidence Reports.

As of January 31, 2011, the City Everett has lowered the amount of fluoride in your drinking water from 1 part per million (ppm) to .8 ppm. This is in response to a change in guidelines concerning fluoride levels expressed by the Federal Government. The final standard will be determined later this year and, be assured, we will bring our application levels into compliance with the standard when we receive notification.



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47

48

Conclusions

Benefits	Less tooth decay for children and adults; Cost effective
Health	No health concerns
Environmental safety	No negative effect
Scientific Reviews	16 reviews since 1990
Regulatory Standards	Meets the standards (wide margins)
Total intake	Water fluoridation safest



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48