Executive summary

In January 2011 the United States Department of Health and Human Services proposed to revise the optimal level of fluoride used in water fluoridation programs in the US. While this may be appropriate for the US, it is not appropriate for Australia due to:

- the widespread use of low-fluoride children’s toothpastes in Australia, which has markedly reduced the prevalence of dental fluorosis (mottling of tooth enamel) in Australia (the unavailability of these toothpastes in the US is a significant reason for the US proposal to reduce the fluoride level in water fluoridation programs in the US)
- emerging evidence from Australia of an increase in dental decay rates in Australian children (while not firmly established, any possible increase in dental decay requires extreme caution before reducing fluoride levels in Australian water fluoridation programs)
- the presence of naturally low fluoride levels in almost all Australian water supplies, unlike the US where a number of water supplies are high in natural fluoride
- Australian dental health researchers’ concerns about the methodology used by the US Department of Health and Human Services in developing the proposal to reduce the fluoride level in water fluoridation programs.

The recommendations for fluoride levels in Australian water fluoridation programs should comply with those set out in the National Health and Medical Research Council’s public statement The efficacy and safety of fluoridation 2007.

The US proposal to revise fluoride levels in water fluoridation programs

In January 2011 the United States Department of Health and Human Services proposed to revise the optimal level of fluoride used in water fluoridation programs in the US to a single level at the lower end of the existing range. This proposal set out to reduce dental fluorosis prevalence, which was reported as increasing in the US.

Australian dental health experts have questioned the appropriateness of the US proposal. There are some significant differences between fluoride exposure in the US and that in Australia. Dental health data in Australia supports continuing with current fluoride levels in water fluoridation programs.

Low-fluoride children’s toothpastes

In the early 1990s low-fluoride children’s toothpastes were introduced in Australia for children aged under six years. These were introduced to reduce the prevalence of dental fluorosis (mottling of tooth enamel), which can sometimes occur if too much fluoride is ingested. Since their introduction, low-fluoride children’s toothpastes have significantly reduced the prevalence of dental fluorosis in Australia, so that now, if dental fluorosis does occur in Australia, it is almost always very mild or mild. Awareness raising of appropriate toothpaste use by children (using it under supervision, using a pea-sized amount smeared over the brush, spitting out and not swallowing) has also played a part in reducing dental fluorosis in Australia.

Importantly, these low-fluoride children’s toothpastes are not available in the US. Dental fluorosis is not a public health issue in Australia because of the very high proportion of children using low-fluoride children’s toothpastes.
High naturally occurring fluorides in some US water supplies

All water supplies contain some natural fluoride.\(^6\)
In Australia most water supplies have low levels of natural fluoride that do not confer dental health benefits.\(^7\)
In the US, however, a small but significant number of people consume water that is naturally highly fluoridated\(^8\) – sometimes several times the level used in water fluoridation programs in Australia.

The low levels of fluoride in Australian drinking water supplies is another reason why dental fluorosis is not a public health issue in Australia.

Emerging evidence of increasing dental decay prevalence in Australia

Since the 1960s Australia has achieved significant reductions in dental decay rates.\(^9\) In the mid 1950s, Australian 12-year-olds experienced an average of more than nine decayed teeth.\(^10\) Older children experienced higher levels of tooth decay.\(^10\) Following the introduction of water fluoridation and fluoridated toothpastes, this tooth decay experience fell dramatically so that, by the late 1990s, the average Australian 12-year-old experienced just one decayed tooth.\(^9\) This reduction in tooth decay experience has been a significant public health achievement.

In recent years some Australian studies have identified an increase in dental decay experience in children.\(^5,11\) While further studies are required to document this across the population, it is plausible that as Australian children are becoming increasingly obese,\(^12\) they are consuming greater amounts of energy-dense foods and beverages that also cause dental decay\(^9\) or that the increased consumption of non-tap water in total fluid intake has reduced the protection afforded by fluoridated water.\(^13\) While this issue remains unresolved, it is prudent to continue fluoridating Australian water supplies at current levels to ensure that dental decay experience does not rise significantly.

Concerns about the US Department of Health and Human Services’ proposal

Significance of toothpastes in the development of dental fluorosis

While the US Department of Health and Human Services has proposed a revision to the fluoride level in water fluoridation programs, as a means of addressing a reported increase in dental fluorosis, it is important to note that studies reveal that development of dental fluorosis is more closely related to fluoride toothpaste and tooth brushing practices than to water fluoridation.\(^14,15\) In other words it is more important to address toothpaste and tooth brushing issues, rather than reducing fluoride concentration in water fluoridation programs, in order to tackle a reported increase in dental fluorosis.

Australia successfully did this with the introduction of low-fluoride children’s toothpastes in the early 1990s.\(^4\) In this way the higher than expected prevalence of dental fluorosis was addressed without reducing the benefits of water fluoridation programs.

It is also important to note that the risk of developing dental fluorosis is in the early years of life,\(^16\) while the risk of developing dental decay is lifelong\(^17\) – people can develop dental decay at any age. Public health officials therefore need to ensure people have lifelong exposure to optimal fluoride levels in water fluoridation programs while at the same time working to minimise the prevalence of dental fluorosis initiated in childhood.

Air temperature and fluid consumption

Traditionally, fluoride levels in water fluoridation programs are set according to the average maximum daily air temperature.\(^7\) The fluoride level in water fluoridation programs in cooler climates is higher than that in warmer climates because people in cooler climates consume fewer fluids than people in warmer climates.\(^7\) The hottest climates had fluoride in water fluoridation programs set at 0.6 mg/L; the coldest climates had fluoride set at 1.2 mg/L.
The current US proposal states that with the advent of widespread temperature control, this differentiation between cooler and warmer climates and the fluoride level used in water fluoridation programs is no longer required.\textsuperscript{1} If this was the case, it would seem more appropriate to select the midpoint fluoride level from the current range of 0.7 – 1.2 mg/L, rather than at the lowest end of the range.

Another concern with this part of the US proposal is the lack of discussion about the type of fluid consumed. There is evidence that people are consuming greater amounts of non-fluoridated bottled water and beverages made with distilled (non-fluoridated) water.\textsuperscript{13} While fluid consumption may not be strongly associated with higher average maximum daily air temperature, the US proposal fails to address the evidence that a significant amount of fluid consumed is non-fluoridated.\textsuperscript{2}

**US dental fluorosis studies**

The current US proposal states that fluoride in water fluoridation programs should be revised due to increasing prevalence of dental fluorosis in the US.\textsuperscript{1} Australian dental health researchers have questioned the studies used to justify this claim.\textsuperscript{2} There is concern that the US Department of Health and Human Services has relied on data that reflect children’s exposure to fluoride some decades ago and has also disregarded a recent indication of lower prevalence of dental fluorosis in young children the US.\textsuperscript{18}

**Dental decay experience in the US**

Australian dental health researchers have also questioned the omission of recent studies that have identified an increase in dental decay experience in young children in the US.\textsuperscript{18}

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**Advice for Australian public health officials**

The current proposal by the US Department of Health and Human Services to revise the optimal level of fluoride in water fluoridation programs is specific for the US. Significant differences between the US and Australia mean that current water fluoridation policy in Australia remains appropriate for Australia. This does not preclude possible changes to water fluoridation policy in Australia in the future. Ongoing research into dental health outcomes is essential to ensure that the balance is correctly struck between reducing dental decay experience and limiting the prevalence of dental fluorosis.

**The recommendations for fluoride levels in Australian water fluoridation programs should comply with those set out in the National Health and Medical Research Council’s public statement *The efficacy and safety of fluoridation 2007.***
References


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