

Date: Wednesday 5 December 2001

Venue: Committee Room 3, National Assembly for Wales

Title: Fluoridation of water supplies in Wales

Purpose

1. To provide the Committee with further briefing on fluoridation to update and expand on the paper to note submitted to the Health and Social Services Committee meeting on 25 October 2000.

Summary/Recommendation

2. The Committee is invited to note the paper to assist it in reaching a decision on programming a discussion. The paper has been copied to the Clerk of the Environment, Planning and Transport Committee which also has an interest in the fluoridation of water supplies.

Timing

3. The Committee asked that this paper be submitted to its meeting on 5 December.

Background

4. The paper [HSS-18-00\(p.5\)](#) sets out the background to fluoridation of drinking water in this country. Members should refer to this for :

- Background: legal, water industry, public opinion
- the conclusions of the York University Review
- the health advantages and disadvantages
- and other options for fluoride treatment.

5. This paper covers:

- dental health in Wales

- National Assembly oral health initiatives
- the ethics of fluoridating water supplies
- fluoridation - world view
- fluoridation in Wales: practical and technical issues
- cost benefits
- health restructuring
- competition in the water industry
- further research
- conclusions

Dental Health in Wales

6. Wales has relatively poor dental health. Annual childhood dental surveys by the British Association for the Study of Community Dentistry (BASCD) measure dental decay by the number of decayed, missing or filled teeth (dmft). The BASCD surveys demonstrate wide variation in the prevalence of dental caries across the UK. The surveys show that :

- dental health in Wales is poor by comparison with England - see graph 1 at Annex A.
- the prevalence of dental decay in Wales are similar to the worst area of England while deprived areas of England with fluoridated water supplies have lower prevalence of decay than less deprived areas in Wales – see Graph 2 at Annex A.
- considerable dental health inequalities exist in Wales, closely linked to deprivation – see graph 3 at Annex A which compares mean dmft in the 5 best dental planning areas with mean dmfts in the 5 worst e.g., in Tredegar and Dolgellau they are 7 times higher than in Rhiwbina, Cardiff.

7. The 1999/2000 BASCD survey shows that 52% of children in Wales have tooth decay by the time they are 5 years old and on average those children have 4 decayed or missing teeth. Levels of decay at this age are an indicator of future decay. The latest evidence shows that at age 14, 63% of children surveyed have suffered dental disease.

8. The Welsh Office set health gain targets, reiterated in Better Health Better Wales, October 1998, for reducing the levels of decay in 5 and 14 year olds:-

" to reduce the proportion of children experiencing dental caries (decayed, missing or filled teeth (dmft) of one or more) by 5 percentage points, as measured in BASCD co-ordinated surveys, from 53% 5 year olds in 1995 to 48% by 2002."

The target set for 14 year olds is to reduce to 59% the proportion of 14 year olds with dental decay. Although there has been some modest progress, it is improbable that even these targets for improving dental health will be met.

9. The results of the 1998 UK Adult Health Survey show that more adults in Wales are retaining their

natural teeth. However, there are differences between the four UK countries - the proportion with no teeth was 17 % in Wales compared to 12% in England. As fluoride acts on the surfaces of the teeth after eruption, there is a potential for the dental health of adults to benefit from fluoridation.

Other Oral Health Initiatives

10. This year Health Authorities have been allocated recurrent funding from the Health Inequalities Fund, for a 3 – year dental fissure sealant programme targeted on the deprived areas identified for the Communities First programme. This programme will be delivered by the Community Dental Service through schools in those areas and once the programme is established, further consideration will be given to the possibility of involving general dental practitioners. The programme will cost about £0.5m per year. The target population for 2001-2 is approximately 18, 000 children.

11. The fissure sealants will be provided as part of an overall health promotion package to those children whose first teeth have suffered from a significant level of dental decay e.g. children who have experienced dental caries in two or more molar teeth. The aim is to prevent dental decay in the secondary molar teeth of these children by treating the surface of four teeth and by education.

12. This programme is not a substitute for fluoridation and education packages have not been demonstrated to be effective. It is generally accepted by dental public health professionals that fluoridation is the basis upon which other preventative programmes should be built.

Ethical issues

13. The ethical debate on fluoridation of water supplies is a highly contentious one. On the one hand, it is argued that fluoridation involves a loss of individual freedom of choice and the provision of mass medication (medication is generally seen as an important area for personal choice). On the other, the argument is about depriving those most at risk of dental decay of the known benefits of fluoridation.

14. It could be argued that enforced medication constitutes a breach of Article 8 of the Convention i.e. the right to respect for private life and therefore a breach of the Human Rights Act 1998. The Article provides for exception to this right where a public authority is acting "in accordance with the law and is necessary in a democratic society" for the protection of health.

15. The principle of proportionality is an important theme in Convention case law. The Court has reminded that

"inherent in the whole of the Convention is a search for a fair balance between the demands of the general interest of the community and the requirements of the protection of the individual's fundamental rights"

(Eur Court HR *Soering v UK* , judgement of 7 July 1989 Series A no 161, 11EHRR 439)

16. The principle of proportionality recognises that human rights are not absolute and that the exercise of an individual's rights must always be balanced by the broader public interest.

17. Most naturally occurring water supplies have some level of fluoride present. In some areas, such as Hartlepool, the natural concentration of fluoride occurs at the optimal level and benefits dental health. In view of this, it is difficult to argue that the right to a fluoride-free water supply is a basic civil right. The purpose of artificial fluoridation is to replicate the beneficial effects observed in communities receiving water with fluoride naturally present within the range 0.7 to 1 ppm.

18. It has been argued that fluoridation itself can cause harm to health. The conclusions of the York University Review of fluoride and health are set out in the previous paper, para 16 and 17, and the health advantages and disadvantages discussed in paragraphs 18-22. The evidence to date confirms that there is no major proven health risk but dental fluorosis, a mottling of the teeth is known to occur in a small proportion of people living in fluoridated areas.

19. It has further been argued that there are other equally effective methods of preventing dental decay. Behavioural change through education is, however, difficult, slow and expensive with children from disadvantaged backgrounds being least likely to benefit. There is very little evidence that education is effective.

20. On the other hand it can be argued that a public authority has an ethical responsibility to make available those measures which can achieve significant health gain. Why should those who insist on their individual freedom of choice be permitted to impose the pain and suffering of dental disease on others, and in particular the most disadvantaged ?

Fluoridation - World-wide

21. In 1958, a World Health Organisation (WHO) Expert Committee on Fluoridation summarised its findings by stating *'the effectiveness, safety and practicability of fluoridation as a means of preventing dental carries, one of the most prevalent and widespread diseases in the world, is now well established'*¹

22. Today, there are 40 countries world wide with national water fluoridation programmes, with an additional 40 million people served by water which is naturally fluoridated at equivalent levels.² In the United States alone over 10,000 communities and 145 million Americans are served by fluoridated water supplies. One of the most recent U.S cities to fluoridate was Los Angeles with a population of 3.5 million.

Fluoridation in Wales: Practical and Technical issues

23. There are 3 water companies providing mains drinking water in Wales. Dwr Cymru Welsh Water

(DCWW) covers most of Wales and most of Herefordshire, a population of about 3 million. See the map at Annex B. Dee Valley Water supplies water in parts of North East Wales and Chester. The remaining area in central Wales is supplied by Severn Trent. Severn Trent already operate fluoridation plants for fluoridation schemes in England. Discussions would need to be held with the companies on any proposal to fluoridate and the areas to be covered. Welsh Water's policy has for a number of years been as follows:

"Welsh Water's principal role is to provide supplies of wholesome water. We believe that any proposal to increase levels of fluoride does not contribute to the wholesomeness of the supply and currently we have not entered any agreements with health authorities to fluoridate water. However, if changes are made to legislation which requires the addition of Fluoride and provide appropriate indemnification we would clearly comply with our legal requirements."

24. Following an approach in the Spring of 1997, from the All Wales Fluoridation Steering Group of the Welsh Health authorities, Hyder Consulting has undertaken a study into the technical implications of fluoridating water supplies in the Dwr Cymru Welsh Water (DCWW) supply area in Wales and Herefordshire. This study has been provided to the National Assembly, courtesy of the Welsh health authorities, and the following is drawn from its conclusions.

i) Water Supply

25. In DCWW's supply area there are 204 water supply zones, 128 water treatment works and 5 bulk supplies from Severn Trent Water. The water supply zones are discrete areas throughout which the water quality is dependent on the same source or sources ie there are no cross-connections with other zones. Most areas are supplied by more than one water treatment works. To provide fluoridated water to a zone the fluoride must be added at all the water treatment works supplying the zone. The most complex relationship between a water supply zone and water treatment works is the Southern Conjunctive Use scheme serving Cardiff and the surrounding areas. To supply fluoridated water to any of the water supply zones in Cardiff, all water sources supplying the area would need to be equipped with a fluoridation plant.

26. Any proposal to fluoridate the bulk water supplies provided by Severn Trent Water would need to be considered by that water undertaker. A detailed investigation would be required to check on the feasibility to install a fluoridation plant on the pipelines that supply this area.

27. DCWW's 128 treatment works range in capacity from those serving 10 people to populations of about 700,000. They range from small springs and boreholes with simple chlorination as the only water treatment to others with complex processes. The equipment and space requirements for a fluoridation plant are similar at all installations regardless of the size or complexity of the supply to be fluoridated.

ii) cost

28. The cost of any fluoridation scheme can be broken down into capital costs for plant and for each water treatment works and operational costs of chemicals, electricity, equipment maintenance, monitoring, sampling analysis and reporting.

29. The estimated capital costs of fluoridating all the water in the DCWW area through each of its 121 water treatment works were £21.7 million with annual running costs of £1.3 million. Equivalent figures at current prices would be £24.3m capital and £1.5m running costs.

30. However, since the cost of installing fluoridation plant is the same for each water treatment works regardless of the size of population it serves, the cost of supplying fluoridated water in some areas would be high relative to others. If plant were only provided at treatment works with a larger capacity (more than 2 megalitres (mld) per day) then the estimated capital costs would be £12.6m with annual operational costs of £1m. Equivalent figures at current prices would be £14.1m capital and £1.1m running costs.

iii) Fluoridation process

31. The report takes account of the Code of Practice on fluoridation although it notes that this now needs updating. As far as the process is concerned, the report points out that many chemicals are used widely in the water industry, for example sulphuric acid, phosphoric acid, quick lime. Such chemicals present similar process problems to those associated with fluoride. These process problems include special requirements for handling and storage and high levels of reliability and accuracy in dosing and monitoring. The levels of technology are such that the risks of overdosing fluoride should be negligible if the installation is operated and maintained according to established guidelines. There are a number of precautions that can be taken against the accidental spillage or leakage of fluoridation chemicals, and to ensure the safety and protect the health of staff.

32. At a concentration of 1mg/l fluoride is completely soluble and remains constant throughout the distribution system. The taste, colour and odour of the water are not affected.

Cost Benefits

33. The University of York Health Economics Consortium reported in 1998 on the costs and benefits of water fluoridation. It concluded :

- studies comparing the cost-effectiveness of water fluoridation and other strategies for reducing caries carried out in many countries always conclude that water fluoridation is the most cost effective approach;
- calculating the costs of fluoridation is straightforward; calculating the benefits is less so but using population projections and knowledge of the underlying oral status it is possible to calculate the numbers of decayed teeth, fillings and extractions that will be prevented for children born after

fluoridation. This calculation would, however, underestimate the benefits by excluding adults and children born before fluoridation;

- in areas where the average number of decayed, missing and filled teeth for 5 year olds is 2 or more and where the local treatment works serve populations of at least 200,000 people, the benefits of water fluoridation are likely to be significantly greater than the costs. Such areas include most or all of Wales, Scotland and parts of England.
- Even in areas where the costs and benefits are similar, or where the costs exceed the benefits, water fluoridation may be the most cost effective way to reduce caries.
- Local studies comparing the costs and benefits can confirm these conclusions.

34. To give an indication of current expenditure on primary dental services dental treatment, the cost of the General Dental Service for adults in 2000/2001 is £60.8m, of which £24.6m is paid by patients. The cost of services to children is an additional £24.5m. In addition NHS Trusts in Wales reported expenditure of £17.2 million on dental specialities and a further £8.7 million on dental paediatric community services in 1999-2000.

Health restructuring

35. The Water Industry Act 1991 provides for Health Authorities to request a water undertaker to increase the fluoride content of the water supplied by the undertaker. Before making or withdrawing such a request health authorities must give due notice to the local population and consult the relevant local authority or authorities. Restructuring of the health service, as announced on 15 November will result in the abolition of health authorities in March 2003. From then, these powers will be exercisable by the National Assembly for Wales either directly or through delegation to Local Health Boards.

36. In my announcement on 15 November, I made clear that public health capacity will be strengthened in Wales. I said that

"At Assembly level this will be achieved under the leadership of the Chief Medical Officer, and thereafter NHS public health services will be organised on an all-Wales basis, located within an NHS Trust but with accountability to the Chief Medical Officer. Responsibility for the health of the population and for meeting statutory and operational requirements will be at the local health board level."

37. This new structure would permit progress to be made in the further work needed at a national level to establish an all-Wales fluoridation programme with Local Health Boards closely involved in the plans and the consultation arrangements. The benefit of an all-Wales programme would lie in targeting the worst areas of dental ill-health first in order to maximise benefits and tackle the worst cases of disadvantage.

38. A number of issues would, however, need to be tackled, specifically

- the issue of statutory powers to require fluoridation if the water industry maintains its current position;
- the updating and implementation of a revised technical code of practice;
- the provision of indemnities to water undertakers in respect of fluoridation schemes.

Competition in the Water Industry

39. Earlier this year central Government announced its proposals for boosting opportunities for competition in the water industry. A consultation paper giving further details of its proposals is awaited. Further consideration will need to be given to the possible impacts of competition and of ‘common carriage’ (the shared use of supply pipes and other infrastructure of an existing water supplier by a third party to enable the third party to provide water services in the supplier’s area) on any fluoridation scheme.

Further Research

40. In the light of the York review the Department of Health has asked the Medical Research Council to consider what further research might be required to improve the evidence base in the area of fluoride and health. The working group is likely to report early next year.

Environmental Impact

41. As indicated in the previous paper to the Committee, further work is needed on the impact on fresh waters.

Conclusion

42. In view of the poor dental health in Wales, the introduction of water fluoridation has the potential to deliver significant health gain and address health inequalities.

43. The recent study by Hyder Consulting, commissioned by the All Wales Fluoridation Steering Group of the Welsh Health Authorities suggests that a scheme or schemes in Wales are practicable and technically feasible. Cost benefit work suggests Wales would benefit significantly. Discussions with the water industry and further studies would be needed to take this work forward.

44. The structural changes to the NHS announced recently will facilitate an all-Wales approach to fluoridation in consultation with Local Health Boards.

Financial implications

45. There are currently no plans to introduce fluoridation in Wales and no financial reserves within the provision of the Health and Social Services Main Expenditure Group for fluoridation. There are no additional financial implications for the Assembly as a result of this paper. Any decision to take forward further work on the possible introduction of fluoridation is subject to a successful bid through the annual budget planning round.

Compliance

46. The Health and Social Services Committee can consider the issues in the paper under Standing Order 9.7.

References

1. World Health Organisation 1958. Expert Committee on Fluoridation.
2. World Health Organisation. Fluorides and Oral Health: Report of a WHO Expert Committee on Oral Health Status and Fluoride Use. WHO Technical Report, Series 1994; 846.
3. British Association for the Study of Community Dentistry carries out childhood epidemiology programme targeted at different age groups each year, five-year-old children are surveyed in alternate years and 12 and 14 year-olds are surveyed every fourth year.
4. This paper has been drafted drawing on information contained in a Hyder Consulting " Water Fluoridation Technical Feasibility Study for Wales and Hereford" commissioned by Welsh Health Authorities and "Water Fluoridation and Public Health" published by Dental Health Foundation in Association with the Faculty of Public Health Medicine, The Royal College of Physicians of Ireland.

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Annex A

Graph 1

Mean dmft survey of five year olds, Wales compared with England



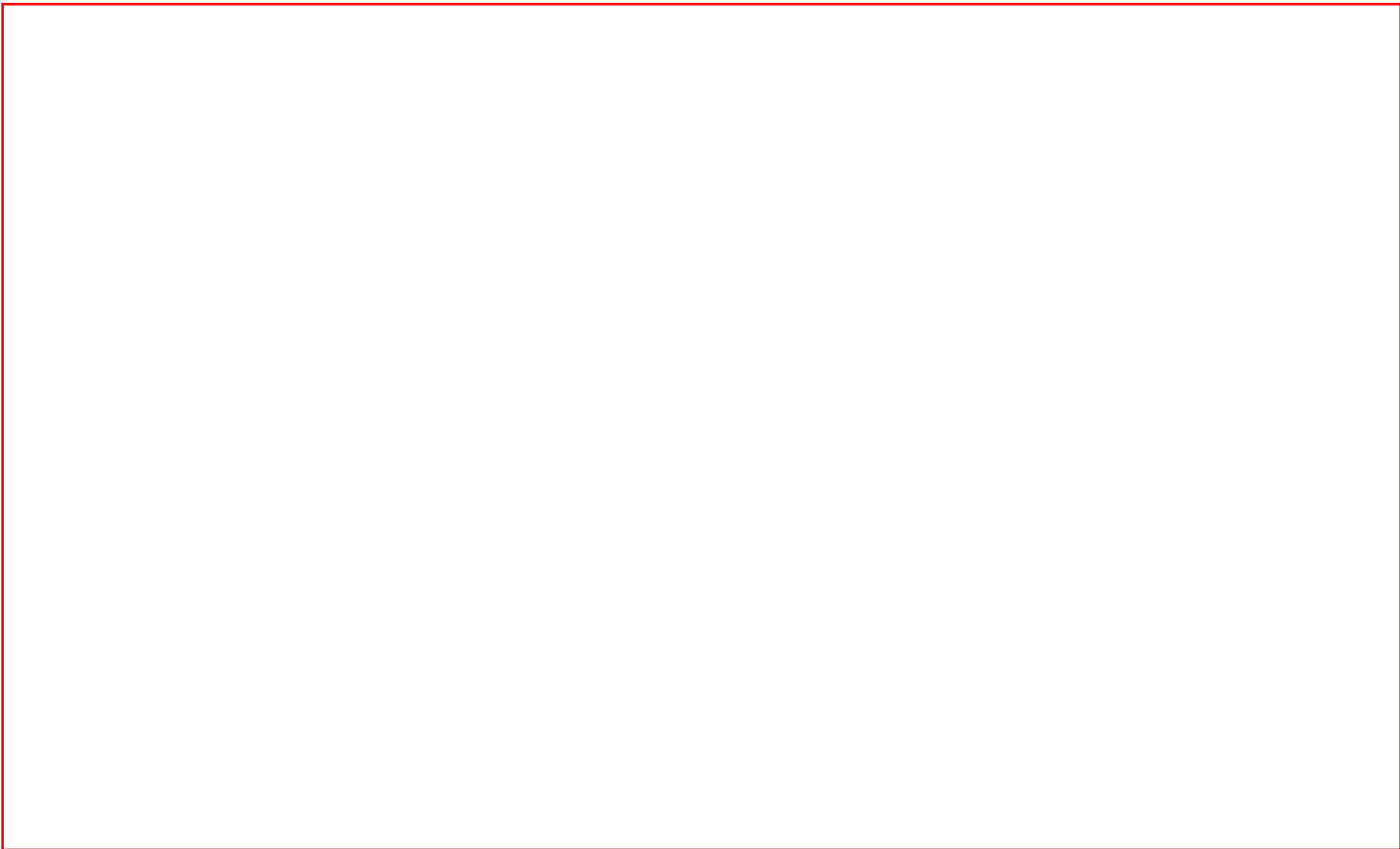
Graph 2



Graph 3

Survey of five year olds 1999/2000 Mean dmft Dental Planning areas

Mean dmft 5 year olds 1999/2000, 5 best dpas, median dpa, 5 worst dpas



Annex B

