



# An unhealthy obsession with fluoride

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Justification for a state policy on water fluoridation is found in the authoritarian approach to public health. The strategies employed to choose interventions are consistent with strictly utilitarian determinants that in practice rely on inadequate risk cost–benefit analysis, inflating the perceived benefits to the State whilst ignoring private sector costs when the socio-economic benefits to the State and the community are judged to justify abrogation of individual rights. This promotes reliance on the concept of proportionality in public health interventions, obstructing appropriate review of the ethical acceptability and legitimacy of water fluoridation. It is proposed that the underlying drive to retain fluoridation is mainly directed at preserving the power base of the dental profession; its persistence is reliant on collusion between the legislature itself and its regulatory and implementing agencies, and the tactics employed to maintain the *status quo* are everywhere dependent on a legal fiction, as well as on scientific fraud and deliberate misrepresentation. It appears, then, that the objective is to persuade key public sector influence groups to recruit the lay public’s support through the engineering of misinformed consent to the practice. This new cross-disciplinary analysis examines the underlying ethical and legal issues raised by fluoridation, and the role of the public sector and professional elites in manipulating the judiciary and State (including local authorities) to endorse the preservation of the expiring fluoridation paradigm.

**Keywords:** inequalities, fluoridation, fluorosis, health belief model, law, public health, statistics

## 1. Introduction

From the perspective of the general public, fluoridation of piped potable water is the embodiment of an authoritarian State wielding its police powers.<sup>1,2</sup> Proponents of fluoridation have become increasingly alarmed at the rejection of new projects by local communities, and at

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<sup>1</sup> Balog, D.A. Fluoridation of our public water systems: Valid exercise of state police powers or constitutional violation? *Pace Environ. Law Rev.* **14** (1997) 645–690.

<sup>2</sup> Cross, D.W. and Carton, R.J. Fluoridation: A violation of medical ethics and human rights. *Intl J. Occup. Environ. Health* **9** (2003) 24–24.

the discovery that if the public is allowed to engage in lengthy debate and referenda, the adoption of any new proposal is less likely.<sup>3</sup> A powerful, well-organized international backlash against fluoridation has emerged, which is forcing proponents to adopt increasingly extreme measures to defend both the practice's and their own reputations. This recent development was made possible by the expansion of the Internet and social media, and is mirrored by similar lay opposition campaigns challenging what are seen as uncontrolled releases of other toxic chemicals into the environment. Whilst the dental public health sector's slogan has long been that "fluoridation is completely safe and effective", the new public response is that it is unacceptable "mass medication".

## 2. The boundary between public health and medical law

State public health policies target communities, not individuals, and the strategies adopted include a wide range of interventions. Some, such as garbage collection, sanitation and pest control, target environmental threats to health, but others include invasive interventions, such as vaccination programmes, that involve medical intervention at the personal level, which really falls within the remit of medical practice.

Consequently, the jurisprudence that regulates public health practice at the community level has the potential to be in tension with that applying to specifically medical interventions at the personal level. This can lead to defective governance: as Gostin et al. have pointed out, "[e]ven the most powerful public health agency cannot exercise direct authority over the full range of activities that affect health. Many of the determinants of health, as it applies to individuals, are the province of other agencies".<sup>4</sup>

In a number of autonomous federations and supranational organizations, such as the European Union (EU), the United States of America (USA) and Australia, federal jurisdictions mandate that any product for which a medicinal attribute is claimed be registered and regulated under medicinal law. In the EU, as elsewhere, such legislation applies even to foods<sup>5</sup> and other products that have no demonstrable therapeutic properties: the simple assertion that a product has such a medicinal attribute is sufficient.<sup>6,7</sup>

However, states within these federations often pass legislation that authorizes fluoridation as a public health measure, even though it is in consequence in tension with medicinal restrictions. Judiciaries around the world have confirmed that public fluoridation law cannot operate in isolation. In Australia, Biscoe recently ruled that fluoridation law cannot be "unfettered",<sup>8</sup>

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<sup>3</sup> Chadwick, A., Lamia, T. and Zaro-Moore, J. *Exploring Factors Associated with Fluoridation Referenda Outcomes*. Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention (2008).

<sup>4</sup> Gostin, L.O., Burris, S. and Lazzarini, Z. The law and the public's health: a study of infectious disease law in the United States. *Columbia Law Rev.* **99** (1999) 59–128.

<sup>5</sup> Court of Justice of the European Union. Case C227-82, 30 November 1983 re. van Bennekom. *European Court Reports* 1983:3883.

<sup>6</sup> Court of Justice of the European Union. Case C219-91, 28 October 1992 re. Ter Voort. *European Court Reports* I:5485.

<sup>7</sup> Court of Justice of the European Union. Joined cases C-211/03, C-299/03 and C-316/03 to C-318/03. 9 June 2005 re. HLH Warenvertriebs and Orthica BV.

<sup>8</sup> *Oshlack v Rous Water* (2011) NSWLEC 73. Biscoe, J.

echoing an earlier decision by Gillard in 1963.<sup>9</sup> In Britain, Jauncey declared that fluoridated water is a medicinal product under the definition included in §130 of the Medicines Act 1968.<sup>10</sup>

English fluoridation legislation is in direct tension with medicinal, food and water law in, and derived from, EU legislation. Recently, Shaw has confirmed that “Water fluoridation is currently permitted by the Water Act 2003, but this appears to contradict legislation and regulations governing food and healthcare in the UK and the EU. It is concluded that the *status quo* rests on the legal fiction that fluoridated water does not constitute a medication”.<sup>11</sup>

This tension between federal and member state law has come to dominate recent debate, in both the courts and in council chambers and public fora. This has stimulated considerable expert assessment of the relevant federal and State jurisprudence of fluoridating states.<sup>12</sup> If federal medicinal jurisprudence were to be enforced at state level, this would compel member states to abandon the practice, and attempts to evade this stricture has caused the legal status of fluoridated water to become a central issue in confrontations before the courts.

Public administrations contrive increasingly extreme, and even bizarre, legislative gymnastics in order to try to preserve the flimsy *status quo*. In the UK, Lord Jauncey’s ruling is resolutely ignored by the Medicines and Healthcare Products Regulatory Agency (MHRA),<sup>13</sup> lending a spurious pseudolegitimacy to domestic jurisdiction authorizing fluoridation in tension with the Medicines Act. The Irish Medicines Board in the Republic of Ireland similarly abrogate their duty; such abrogations or evasions of statutory duty essentially form the sole argument on the basis of which the practice persists.

Such political manipulations are not confined to the EU, however. In a recent action in New Zealand<sup>14</sup> the government hastily exempted “all chemicals containing fluoride from being considered medicines if they are delivered via the public water supply”, thus obstructing any further attempts to prohibit fluoridation through enforcing the New Zealand Medicines Act.<sup>15</sup> However, fluoride delivered in pills, tablets and drops remains a medicinal substance, and these products are licensed as medicines.

A common feature in adjudications on the legitimacy of fluoridation is that skilled misdirections of the judiciary by proponents has diverted hearings into arguing over the proportionality of the alleged benefits of fluoridation as a prophylactic intervention. For reasons indicated below, the weight of evidence tendered by proponents has overcome contrary

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<sup>9</sup> Supreme Court of Victoria, *Kelberg v. City of Sale*. Gillard, J. (March 1964).

<sup>10</sup> Opinion of Lord Jauncey in *causa Mrs Catherine McColl v. Strathclyde Regional Council*. The Court of Session, Edinburgh (1983).

<sup>11</sup> Shaw, D. Weeping and wailing and gnashing of teeth: The legal fiction of water fluoridation. *Med. Law Intl* **12** (2012) 11–27.

<sup>12</sup> Barnett-Rose, R. Compulsory water fluoridation: Justifiable public health benefit of human experimental research without informed consent? *Wm & Mary Environ. Law Policy Rev.* **39** (2014) 201–241.

<sup>13</sup> Lord Howe, in response to a question from Earl Baldwin on the classification of fluoridated water as a medicine: “The authority for our judgement is the Medicines and Healthcare Products Regulatory Agency’s (MHRA) view that fluoride added to drinking water is not a medical product.” *Lords Hansard* 10 Jan 2012: column WA33.

<sup>14</sup> *New Health New Zealand Inc. v. South Taranaki District Council* [2014] NZHC 395 (2014) 10 HRNZ 1.

<sup>15</sup> On 27 January 2015 Minister of Health Dr Coleman signed into law the *Medicines Amendment Regulations 2015/7 Order in Council*. Wellington, New Zealand (27 January 2015).

evidence even from the most expert professional scientists, persuading the judiciary to conclude that the benefits to State and society outweigh the disbenefits to individuals.

This has led to courts repeatedly failing to consider that a decision on the proportionality of an intervention can only be addressed once the legitimacy of its medicinal use has been established. But if the test of legitimacy fails, then the product's safety and efficacy are irrelevant. Indeed its use, and even endorsement or recommendation, may invoke examination under the criminal code, as medicinal jurisprudence generally mandates that the use of an unlicensed product with medicinal intent is prohibited, except under special rules relating to individual treatments provided when no alternative is available.

### 3. The ethical framework of public health practice

Public health policy in the Western cultural framework is essentially paternalist in nature, with states adopting a utilitarian approach to policy selection and implementation.<sup>16</sup> It is founded on strictly *teleological* (goal-oriented) grounds, which assert that if the result of an action is judged to be good, then the action is morally right. In essence, an action is considered to be ethically acceptable if it is aimed at producing the most good for greatest number of people, even if a few suffer personal disadvantage as a result.

Contrary to this approach, the *deontological* approach to public health policy emphasizes the protection of the right to personal autonomy enshrined in medicinal jurisprudence and medical codes of practice. Coughlin notes that “Deontological theories (sometimes referred to as Kantian theories) hold that people should not be treated as means to an end and that some actions are right or wrong regardless of the consequences”.<sup>17</sup> This is the basis for international agreements, such as the Council of Europe's *Convention on Human Rights and Biomedicine*,<sup>18</sup> Article 5 of which prohibits any intervention in the health field for which free and informed consent has not been given, and from which the individual cannot withdraw at any time. The fluoridation of public water supplies clearly violates this principle, but the UK is not a signatory of, nor has it ratified, the Convention, on the grounds that it is “too restrictive”.<sup>19</sup>

Within such a socio-economically biased utilitarian framework, public health policies are often both politically directed and financially constrained. and must deliver the required outcomes in compliance with tangible measures of financial efficiency. This is strongly reliant on the process of risk–cost–benefit analysis (RCBA), but open to serious abuse: as Buchanan observed, “[t]his school of thought frequently leads into protracted debates about the apparent costs and benefits of an intervention”.<sup>20</sup>

The weakness of RCBA methodology is that it assumes that financial values can be allocated in trading off a limitation of personal liberty through a reduction in health risks.

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<sup>16</sup> See Barnett-Rose on the application of Brainerd's balancing approach in fluoridation decisions.<sup>12</sup>

<sup>17</sup> Coughlin SS.(2006) Ethical issues in epidemiologic research and public health practice. *Emerging Themes Epidemiol.* **3** (2006) 16.

<sup>18</sup> *Council of Europe Convention on Human Rights and Biomedicine*. Oviedo (4 April 1997).

<sup>19</sup> Coughlin's discussion of the ethical challenges of public health research and practice provides an excellent general introduction to the subject of public health ethics.

<sup>20</sup> Buchanan, D.R. Autonomy, paternalism, and justice: Ethical priorities in public health. *Am. J. Public Health* **98** (2008) 15–21.

Personal perceptions of the tolerability of a risk are, however, highly cost-sensitive, leading to the conclusion that it is false reasoning to express risk in mainly monetary terms.<sup>21</sup> In addition, this focus on economic balancing has facilitated widespread malpractice in fluoridation studies, as the equation is invariably heavily biased in favour of the intervention by ignoring the social costs of the common adverse outcome of fluoridation, namely dental fluorosis. In most of the anglophone countries where fluoridation is practised, the dental profession has a rigid monopoly for providing dental treatment. The profession's endorsement of fluoridation supports a serious vested financial interest, since it confers direct financial benefit to its members by generating a demand for an otherwise avoidable form of dental defect the treatment of which they alone are authorized to provide. This private cost is invariably excluded from proposal RCBA's when governments are considering new interventions. Were it to be included, then as Ko and Thiessen show the true costs to both the public health sector and the public outweigh the economic benefits to the State.<sup>22</sup>

#### 4. Nudge, nudge—Monty Python meets Big Brother

Public resistance to this paternalist approach to public health has persuaded the British government to adopt the “nudging” techniques recently proposed by Thaler and Sunstein.<sup>23</sup> “Nudging” is the sophisticated application of psychologically-informed techniques to manipulate the public into voluntarily adopting new health-promoting behaviour that, it is supposed, will be beneficial to them and help them to obtain the health goals preferred by the public authorities.

A document issued by the British Cabinet Office Behavioural Insights Team outlined the goal as being to “enable people to make better choices for themselves”.<sup>24</sup> But since these “better choices” are predetermined by the policy itself, they provide no mechanisms to empower the dentally disadvantaged to escape the underlying socio-economic inequities that are at the heart of their problem. As Burgess warns: “nudging is caught between the utility of unconscious disguised direction and the need to allow some transparency, thereby choice. Further, it assumes clear, fixed “better outcomes” but encourages no development of capacity to manage problems, contradicting a wider policy intent to build a more responsible and active citizenry”.<sup>25</sup>

This new, “soft”, libertarian approach has not been universally welcomed.<sup>26</sup> Hankering for a continuation of the “hard” paternalism of previous years, a contemporary editorial in *The Lancet*

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<sup>21</sup> John, S. Risk and proportion. In: *Public Health Ethics: Key Concepts and Issues in Policy and Practice* (ed. A. Dawson), p. 82. Cambridge: University Press (2011).

<sup>22</sup> Ko, L. and Thiessen, K.M. A critique of recent economic evaluations of community water fluoridation. *Intl J. Occup. Environ. Health* **21** (2015) 91–120.

<sup>23</sup> Thaler, R. and Sunstein, C. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New Haven, Conn.: Yale University Press (2009).

<sup>24</sup> *Applying Behavioural Insights to Health*. Cabinet Office Behavioural Insights Team, London (2010). Retrieved from [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/60524/403936\\_BehaviouralInsight\\_acc.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60524/403936_BehaviouralInsight_acc.pdf) on 8 October 2015.

<sup>25</sup> Burgess, A. “Nudging” healthy lifestyles: the UK experiments with the behavioural alternative to regulation and the market. *Eur. J. Risk Regulation* **3** (2012) 3–16.

<sup>26</sup> For an assessment of the legitimacy of the implementation of the nudge concept in public health policy, see the excellent review of Thaler and Sunstein's thesis by Karen Yeung: Nudge as fudge. *Modern Law Rev.* **75** (2012) 122–148.

warned: “If people are ‘nudged’, they still believe that they have made a personal choice, but Government has made it easier for them to ‘make the right choice’ ... Effective, evidenced-based public health measures do not include nudging people into healthy behaviours or getting NHS staff to lecture patients on healthy lifestyles. ... The government should show true leadership and make effective legislation the cornerstone of their public health strategy. Focusing on other approaches is foolish. The nudge and nag approaches need one thing: the firm elbow”.<sup>27</sup>

### 5. Inequalities, inequities and the underprivileged child

Ignoring the lack of reliable evidence that fluoridation is effective, proponents assert that it is particularly efficacious in preventing dental decay amongst disadvantaged children. This relies on the false assumption that low socio-economic status (SES) is the cause of children having a high level of dental decay. This is an unjustified assumption. As Wilson warns: “correlation is not causation. It does not follow logically from the fact that people with low SES tend to have worse health and lower life expectancies that having a low SES causes ill health. For all that we have so far seen, it might be ill health that causes low SES, or it might be that there is some further factor that causes both low SES and ill health, while neither low SES nor ill health cause one another”.<sup>28</sup>

For example, smoking is more prevalent in deprived sectors of communities, and adversely influences infant dental health. The prevalence of smoking is related to both individual characteristics and to neighbourhood effects.<sup>29</sup> Exposure to passive smoke at four months of age is associated with doubling the risk of dental caries, irrespective of maternal smoking during pregnancy. There is also a 50% higher risk of dental caries in other (nonsmoking) members of the family when at least one person smokes.<sup>30</sup> This alone may account for much of the inequality in childhood oral health in deprived communities, and there is no evidence that adding fluoride to the public water supply might prevent this effect.

So whilst poor oral health may indeed be regarded as a social inequality, this does not mean that it is thereby inevitably an inequity. We are all, in some fashion, unequal. Wilson makes a crucial distinction when he says that “a concern with health equity is purely and simply a concern for justice in the distribution of health achievement. So a health inequality is a health inequity if and only if it is an inequality which a just society would seek to counteract. The key question then is, which health inequalities are unjust?”<sup>31</sup>

I argue that fluoridation, far from addressing the cause of the dental health inequality within a relatively small group—the “disadvantaged children”—actually converts it into an inequity that oppresses the entire community. The initial inequality in oral health within the

<sup>27</sup> Editorial. Public health in England: from nudge to nag. *The Lancet* **379** (2012) 194.

<sup>28</sup> Wilson, J. Health inequities. In: *Public Health Ethics: Key Concepts and Issues in Policy and Practice* (ed. A. Dawson), p. 217. Cambridge: University Press (2011).

<sup>29</sup> Duncan, C., Jones, K. and Moon, G. Smoking and deprivation: are there neighbourhood effects? *Social Sci. Med.* **48** (1999) 497–505.

<sup>30</sup> Tanaka, S., Shinzawa, M., Tokumasu, H., Seto, K., Tanaka, S. and Kawakami, K. Secondhand smoke and incidence of dental caries in deciduous teeth among children in Japan: population-based retrospective cohort study. *BMJ* **351** (2015) h5397.

<sup>31</sup> Wilson, J. *Ibid.* at 28 *supra*, p. 228.

deprived sector of the community is present because the State's priorities *allow* it to persist. The dental health inequality that *exists* amongst the poor becomes an injustice only when the State chooses to impose an intervention knowing that, when *done to* the community, it will cause irreversible adverse effects that indiscriminately affect children of all social classes.<sup>32</sup> Moreover, since fluorosis affects all classes equally, including those with low SES, many of the underprivileged children with bad primary dentition will contract fluorosed secondary (permanent) teeth when, but for fluoridation, they would otherwise not have experienced this condition during their adult lives.

Disparities of socio-economic status can be addressed by reducing the causes of the social gradients that lead to health disadvantages but, again, the issue of hard paternalism lies close below the surface. Rice proposed redistributing resources which, he says, “trumps the notion of individual autonomy, in order to ensure that individuals who are at a disadvantage have an equal probability of attaining good health”.<sup>33</sup> Undeniably, flattening socio-economic gradients should relax the socio-economic constraints that prevent those who are worst off from improving their condition.<sup>34</sup> But identifying which goods need to be redistributed, and how, in order to improve dental health is entirely a matter of context—what works in one community may not in others. As Friedman warns: “regulators should pursue all solutions open to them—but they should do so with a cost–benefit rationalization that includes the likelihood that paternalism will present an obstacle to implementing the solution”.<sup>35</sup>

## 6. Manipulating people

Once a public health policy is selected, reliable strategies have to be devised and appropriate tactics devised that will make its implementation effective. The common view amongst professionals—that the public is prone to act irrationally—implies that people's individual perceptions may need to be persuaded, or even nudged, towards adopting a more positive belief in personal relevance and ability to achieve the outcome. The trusty “man in the white coat” has come to dominate public relations management in this field.

In his 1947 essay “The engineering of consent”,<sup>36</sup> Edward Bernays identified medical sector professionals as a respected elite whose opinion could be manipulated to influence both the lay public and government into endorsing whatever intervention was planned.<sup>37</sup> Interviewed in 1993, Bernays boasted that selling the fluoridation idea had been easy: “You can get practically any idea accepted. If doctors are in favor, the public is willing to accept it, because a

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<sup>32</sup> John, S. Ibid. at 21 supra, p. 73.

<sup>33</sup> Rice, T. Individual autonomy and state involvement in health care. *J. Med. Ethics* 27 (2001) 240–244.

<sup>34</sup> Wilson, J. Ibid. at 28 supra, p. 228.

<sup>35</sup> Friedman, D.A. Public health regulation and the limits of paternalism. *Conn. Law Rev.* 46 (2013) 1687–1770.

<sup>36</sup> Bernays, E.L. The engineering of consent. *Ann. Am. Acad. Political Social Sci.* 250 (1947) 113–120.

<sup>37</sup> In his original essay Bernays warned against misuse of his approach by the unscrupulous for antidemocratic purposes and the possibilities of subversion. The consultant, he said, should reject assignments for clients he considers antisocial. Yet he then accepted Ewing's invitation to work on the fluoridation campaign. This suggests that his own techniques may have been used by Ewing, an experienced lawyer, to subvert Bernays into supporting fluoridation, making him an unwitting victim of his own expertise!

doctor is an authority to most people, regardless of how much he knows, or doesn't know".<sup>38</sup> The dental profession constitutes the key interest group within the fluoridation movement, and its perceived status is central to the continued support of the practice.<sup>39</sup> To maintain this dominance, dissenting opinion, both from within the profession and from independent experts has to be silenced: as Martin observes; the proponents of fluoridation have been highly successful in stigmatizing critics as reactionary, irrational, confused, and unscientific, and even in claiming that fluoridation is so well verified that there is no scientific debate.<sup>40</sup>

Vladimir Lenin and Joseph Stalin referred to the compliant professional authority figure as the *poleznyi idiot* (the useful idiot), a prime asset whose value lies in his or her perceived social respectability and not his scientific or medical credentials. Such people generally form the upper echelons of the professional "in-group", by whom both government and the public is most easily persuaded.

### **7. The "ten percent" factor: How many "useful idiots" does it take to fluoridate a water supply?**

In a recent study, Xie et al.<sup>41</sup> show that in cohesive social groupings the majority opinion can be switched quickly by a comparatively small but consistently inflexible minority of randomly distributed committed agents. Like religious fundamentalists, they are immune to influence, tirelessly recruiting converts from opposing opinion groups. The tipping point seems to be when these comprise around 10% of the group. Once the group's consensual opinion flips, its members adopt the self-protective "groupthink" mentality described by Janis,<sup>42</sup> if necessary engaging in extreme measures in order to protect their new belief.

When the national campaign to promote fluoridation was introduced in the 1950s USA, Oscar Ewing, director of the US Public Health Service (PHS), recognized that the dental profession provided a perfect target for such evangelism. He persuaded his committee to award the American Dental Association (ADA) very substantial research grants, after which the ADA reversed its previously strongly voiced objection to fluoridation; it thereupon persuaded its members to publicly endorse the newly declared policy. Ewing also purchased additional support elsewhere: by 1963 the PHS had provided the British dental sector with at least 3.9 million USD (worth around 34 million USD today) to carry out poster campaigns in hospitals, schools, health surgeries, factory canteens and libraries. A further 16,000 USD went to the Republic of Ireland, and yet more to Australia and New Zealand.

The profession was able to persuade State administrations to accept the fluoridation paradigm, but as Xie et al.'s recent study suggests,<sup>41</sup> the numbers of members in the

<sup>38</sup> Bryson, C. *The Fluoride Deception*. New York: Seven Stories Press (2004).

<sup>39</sup> Martin, B. Suppression of dissent in science. In: *Research in Social Problems and Public Policy* (eds W.R. Freudenburg and E.I.K. Youn), vol. 7, pp. 105–135. Stamford, Conn.: JAI Press (1999).

<sup>40</sup> Martin, B. The sociology of the fluoridation controversy: a reexamination. *Sociological Quarterly* **30** (1989) 59–76.

<sup>41</sup> Xie, J., Sreenivasan, S., Korniss, G., Zhang, W., Lim, C., Szymanski, B.K. Social consensus through the influence of committed minorities. *Phys. Rev. E* **84** (2011) 011130.

<sup>42</sup> Janis, I.L. *Victims of Groupthink: a Psychological Study of Foreign-Policy Decisions and Fiascoes*. Boston: Houghton Mifflin (1972).



professional associations were too small amongst the millions who comprise the general public to provide the critical ten percent needed to swing public opinion in favour of fluoridation. Therefore, in both the USA and UK the campaign targeted socially respected local representative bodies—the Local Authority Councils—in order to construct an intermediary level within the overall hierarchical command-and-control structure, well placed to manipulate the grass-roots loyalties and beliefs of the general public. In England this structure was recently reinforced by the Health and Social Care Act in 2012, which led to the formation of a national agency, Public Health England (PHE). Part of its objective was to embed dental health professionals much more intimately within the field of influence of local authorities, and all of these public health professionals appear to be committed to adhere to PHE’s fluoridation policy.

### **8. The role of the Health Belief Model in fluoridation strategy**

Whilst the administrative framework necessary to support fluoridation was established from the early days, Ewing needed to identify an appropriate strategy and a working methodology to implement the national campaign. Around the time of publication of Bernays’ essay in 1974, social psychologists, including those working within the PHS itself,<sup>43</sup> were attempting to understand why people fail to adopt disease prevention strategies recommended by medical professionals.<sup>44</sup> In developing the Health Belief Model (HBM) they proposed that four driving factors (“constructs”) affect the outcome of attempts to persuade the public to engage in rational health behaviour. These were the targets’ own perceptions of: (1) personal *susceptibility* to a health threat; (2) its potential *severity*; (3) the *benefits* that could be expected from acting to avoid the threat; and (4) *barriers* to carrying out the recommended action.

To manipulate these constructs, specific *cues to action* could be used to influence the subjects into behaving in ways that were goal-oriented. But to be successful the subjects also needed to be confident in their own ability to complete the recommended action. This *self-efficacy* could be strengthened if the desired health-improving action was made easier to achieve.<sup>45</sup>

Bernays’ work on engineering public consent suggested suitable practical tactics for manipulating public perceptions to overcome the barriers to adopting the required health response, “drink fluoridated water”; it seems probable that Ewing’s fluoridation strategy derived from both the HBM and Bernays’ insights. But whilst such stratagems may indeed engineer consent for an intervention, if the intervention is itself illegitimate, or if false arguments are used for the purpose of obtaining consent for it, then in the medical and health contexts this consent has been obtained through deception, and is itself illegitimate. An examination of the tactics used to persuade British Local Authority Councils to endorse fluoridation reveals that the public health sector’s campaign to recruit them has long been, and still is, reliant on ethically unacceptable professional malpractice, and that any supposed

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<sup>43</sup> Hochbaum, G., Kegels, S. and Rosenstock, I. *Health Belief Model*. United States Public Health Service (1952).

<sup>44</sup> Rosenstock, I.M. Historical origins of the health belief model. *Health Education Monographs* 2 (1974) 328–335.

<sup>45</sup> For a review of the relationships of the Health Belief Model with subsequent developments in social psychology see Rosenstock, I.M., Strecher, V.J. and Becker, M.H. Social learning theory and the health belief model. *Health Education Quarterly* 15 (1988) 175–183.

consent expressed by the councils or the public, whether by debate in council chambers or through community referenda, is invalid.<sup>46</sup>

### **9. The evidence factory: how the British public health sector manufactures false evidence to promote fluoridation**

It is important to bear in mind that the primary targets of fluoridation are legally incompetent minors—the children. To reach them, proponents target their legal guardians through influencing community organizations such as maternity and dental clinics, although children are specifically targeted through campaigns within schools. The legitimacy of the latter is an issue that merits scrutiny, since it might be regarded as an attempt to coerce the children, in abrogation of the authority of their parents.

The majority of councillors are unskilled in law, as well as in science, medicine or statistics. The tactics adopted by proponents of fluoridation to influence council decisions are aimed at manipulating the perceptions of councillors, and through them the public, in the manner postulated by the Health Belief Model. First, they inflate councillors' alarm over the apparent *susceptibility* of children to contract dental decay in the absence of fluoridated water. Secondly, they exaggerate the potential *severity* of the risk, relying on improper statistical descriptions that are impenetrable to most councillors. Thirdly, they emphasise the *benefits*, particularly to the emotively described but obscurely defined “underprivileged children” within the community. Finally, they evade the most recalcitrant barrier to compliance, inadequate perceptions of *self-efficacy*, by abolishing personal choice altogether, administering the therapeutic remedy in virtually unevadable public water supplies. It is the legal and ethical issues raised by the last action that give rise to such vehement objections from the public, and which have persuaded the MHRA to conspire with the public health sector to evade its statutory duty to register the product as a medicine.

### **10. Selection bias: concealing inconvenient evidence**

The evidence on which fluoridation is founded is extremely unreliable. In a widely-cited systematic review in 2000 (the “York Review”),<sup>47</sup> McDonagh et al. reported that they found no high quality evidence that confirmed the claims that drinking fluoridated water prevented tooth decay. They also rejected the claim that it is particularly effective as a therapeutic treatment for hard-to-reach disadvantaged children, again because of the absence of reliable evidence. However, they did find clear evidence of a substantial increase in both the prevalence and severity of dental fluorosis, a defect in the structure of the tooth enamel exclusively caused by overexposure to fluoride.

Around one in eight children in fluoridated communities liable to develop “dental fluorosis of aesthetic concern”, while in 2011 the European Union's expert SCHER group warned that

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<sup>46</sup> In *McCrystal v. Minister for Children*, the Irish Supreme Court ruled that the government had breached the Constitution by using public funds to publish and distribute biased information in order to improperly influence the result. *McCrystal v. Minister for Children and Youth Affairs & ors* [2012] IESC 53.

<sup>47</sup> McDonagh, M.S. et al. Systematic review of water fluoridation. *BMJ* **321** (2000) 855–859.

“Systemic exposure to fluoride through drinking water is associated with an increased risk of dental and bone fluorosis in a dose-response manner without a detectable threshold”.<sup>48</sup>

Proponents of fluoridation have persistently misrepresented the inconvenient results of the York Review.<sup>49</sup> In 2014, only 14 months before the latest Cochrane study,<sup>50</sup> PHE published its own assessment of fluoridation,<sup>51</sup> primarily targeted at professionals, declaring that its analysis: “provides further reassurance that water fluoridation is a safe and effective public health measure”. This conclusion is entirely inconsistent with both the preceding York Review of 2000 and that of the subsequent nonpolitical Cochrane collaboration (a related article, expanding on PHE’s review,<sup>51</sup> was subsequently published in a journal<sup>52,53</sup>).

PHE’s monitoring report<sup>51</sup> cherry-picked data from the York study to reassure its readers that fluoridation is not responsible for a range of potentially serious diseases. In fact, the York study found an absence of reliable evidence of causation of diseases such as cancer and endocrine disorders (amongst others), and not that no causative relationship existed, as PHE implied. This appeal to ignorance (*argumentum ad ignorantiam*) is a common fallacy in informal logic, persistently relied upon in the misrepresentation of scientific data by proponents of fluoridation. As John warns: “Such confusion can have grave consequences for action ... [and] can lead us to act on false beliefs”.<sup>54</sup>

## 11. Sampling inadequacies of national surveys of children’s oral health

Since its formation in 2013, PHE has published a review of the evidence on the state of children’s oral health in England<sup>51</sup> and on the effects of fluoridation on it.<sup>55</sup> The sources of the raw data on the prevalence and severity of dental decay in English children, on which PHE relies, are periodic national statistical surveys, commissioned by the Health and Social Care Information Centre. Although widely cited, these surveys contain serious statistical anomalies, but are nevertheless extensively cited by the dental public health sector in deciding national and local policies on oral health protection.

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<sup>48</sup> Scientific Committee on Health and Environmental Risks (SCHER). *Critical Review of Any New Evidence on the Hazard Profile, Health Effects, and Human Exposure to Fluoride and the Fluoridating Agents of Drinking Water*. EU Directorate General for Health and Consumers (2011).

<sup>49</sup> A copy of Prof. T. Sheldon’s published complaint about misrepresentation can be obtained from [http://www.nofluoride.com/york\\_report\\_chairman.cfm](http://www.nofluoride.com/york_report_chairman.cfm) (accessed 6 October 2015).

<sup>50</sup> Iheozor-Ejiofor, Z. et al. Water fluoridation for the prevention of dental caries. *Cochrane Database of Systematic Reviews* (2015) CD010856.

<sup>51</sup> *Water Fluoridation: Health Monitoring Report for England 2014*. Public Health England (2014).

<sup>52</sup> Young, N. et al. Community water fluoridation and health outcomes in England: a cross-sectional study. *Community Dentistry Oral Epidemiol.* **43** (2015) 550–555.

<sup>53</sup> Of the nine authors, eight are employed by PHE. The new article relied on ecological studies ‘from standard small areas and administrative districts in England’, using ‘the comprehensive data sets available in England’ to come to similar conclusions, suggesting a degree of academic respectability in the original data on which PHE had relied.

<sup>54</sup> For example, John, S. (2011) *ibid.* at 21 *supra* (p. 79): when scientific results are transferred from journals and laboratories to the context of policy and decision-making, failure to show a link is often treated as proof of no link.

<sup>55</sup> *Child Dental Health Survey 2013, England, Wales and Northern Ireland [NS]* (<http://www.hscic.gov.uk/catalogue/PUB17137>). Health and Social Care Information Centre (2015).

The published raw data do not reveal the distribution of the data, but do show that the distribution of counts of defective teeth in individual children in all English populations is extremely strongly skewed. The majority of children—as much as three quarters of 5 year-olds, for example—have no decay at all. The reliance on apparently precise mean values to describe such populations is highly misleading, since it inflates the apparent severity of the “average” oral health decay problem, thus confusing most councillors. In all cases I have examined, both the median and mode values for decayed teeth in these samples are zero. In an apparent attempt to lend credibility to the adequacy of the data, the proportion of children in the population who were examined is reported as the percentage of the subsamples of children “selected” as subjects in each population, and not of the actual population, giving the impression that around ten times the proportion of children were examined during the surveys.

Approximately 324 local authorities in England participated in the recent surveys. For sampling purposes, the National Protocol stipulates that a minimum of 250 children in each local authority area should be examined to ensure a meaningful estimate of the state of their oral health.<sup>56</sup> The Protocol states that larger sample sizes are needed if the data are to be used to justify oral health policy-making at this administrative level (which indeed they are in promoting water fluoridation), but fails to specify how large they should be.<sup>57</sup>

In recent surveys, insufficient children have been examined in many local authority areas to provide adequately robust statistical analysis of the data. For example, in the 2008 survey of 12 year-olds, 16% of all local authorities in England each failed to muster the required 250 children for dental examination. In the 2012 survey of 5 year-olds, the noncompliance rate increased to 68%, whilst in the 2013 survey of 3 year-olds an astonishing 91% of all local authorities were unable to provide a sufficient number of children for examination, even though the Protocol was reduced (without explanation) to specify a minimum sample size of only 200 children.

## **12. Ignoring uncertainty—errors and omissions in data presentation**

The raw data in these surveys are simply counts of the numbers of children in the population with bad teeth, and the numbers of decayed, missing and filled teeth that they have. Both sets of counts are subject to sampling error, so are only approximations, with in-built error margins. Secondary (derived) data, such as the population mean values and 95% confidence intervals for the prevalence of decay and its severity amongst those children with bad teeth, are estimated from the mean values of the primary data sets. However, the uncertainties of the sampling errors are ignored, and the apparently precise mean values of the secondary (derived) estimates are invariably used to impress councillors with the apparent inequalities in the dental health of their children compared with that of children in more fortunate areas close by. On occasion this descends into statistical nonsense, as when the derived values are cited to three significant figures, even though they are obtained by examining far fewer than 100 infants.

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<sup>56</sup> *National Dental Epidemiology Programme for England: Oral Health Survey of 5 Year-Old Children in England 2012*. London: Public Health England.

<sup>57</sup> This mandatory minimum sample size is, of course, absurd anyway: the same-age cohort populations of local authorities differ greatly. A sample of 250 children may be far too small for large councils and too large for small ones.

However, if the secondary data are recalculated with regard to the sampling errors, the resulting ranges of the estimates of the derived data are so wide that virtually all the estimates for every local authority area in each of the main regions overlap. Put simply, the data are not sufficiently characterized for any meaningful distinction to be made between children's oral health in many, or indeed, most local authority areas.

In its published reports relying on these data, PHE specifically warns against comparing the severity and prevalence of dental decay between different areas when the 95% confidence intervals overlap. Yet, in every case I have investigated, these ranges have overlapped those in at least some, and often in many, of those in other local authority areas within the region, many or most of which were in any case themselves derived from apparently inadequate samples.

Despite this, local dental public health staff, and even those at more central levels of government, invariably ignore this warning. No mention of the underlying uncertainty in these estimates is ever made, allowing this pseudo-analysis to be used by PHE in its attempts to justify its fluoridation policy. It cherry-picks individual communities with and without fluoridated water supplies, warning councillors that the children in the unfluoridated community "have the worst teeth in the region" (or even in the entire country), when such an interpretation is statistically unjustified.

This statistical malpractice has been operated by the dental public health sector for many years without remedy. Commenting on official "league tables" of oral health derived from surveys carried out in the 1990s, Jeffers, a highly regarded professional statistician, advised that "they are excellent examples of how not to present information—unless you are determined to distort that presentation in favour of a particular argument. I often use studies of this kind as case studies [of malpractice] for my students".<sup>58</sup>

### 13. Sweetening the pill: fluorosis makes your teeth look better!

Excessive exposure to fluoride during infancy disrupts normal enamel formation and leads to a condition known as dental fluorosis. This is exclusively caused by fluoride, and although the use of dental preparations such as fluoride drops and tablets can cause it, drinking water is the most common cause. The extent to which the condition is evident is measured on the Thylstrup-Fejerskov Index (TFI), with a TFI of zero representing none and TFI 9 the worst.<sup>59</sup> A number of authors have reported that children find the appearance of teeth with a fluorosis index of TF2 and greater increasingly unacceptable;<sup>60–63</sup> this is what the York Review referred to as "dental fluorosis of aesthetic concern".<sup>47</sup> Fluorosis occurs in both primary and permanent

<sup>58</sup> Jeffers, J. Letter to E. Vaughan, Cumbria, dated 19 February 1997. Case study no 226. 9 pages, mimeo.

<sup>59</sup> Connett, M. Diagnostic criteria for dental fluorosis: the Thylstrup-Fejerskov (TF) Index ([http://fluoridealert.org/studies/dental\\_fluorosis08/](http://fluoridealert.org/studies/dental_fluorosis08/)) (2012).

<sup>60</sup> Marshman, Z. et al. The impact of developmental defects of enamel on young people in the UK. *Community Dentistry Oral Epidemiol.* **37** (2008) 45–57.

<sup>61</sup> Edwards, M. et al. An assessment of teenagers' perceptions of dental fluorosis using digital stimulation and web-based testing. *Community Dentistry Oral Epidemiol.* **33** (2005) 298–306.

<sup>62</sup> Hawley, G.M. et al. Dental caries, fluorosis and the cosmetic implications of different TF scores in 14 year-old adolescents. *Community Dental Health* **13** (1996) 189–92.

<sup>63</sup> Alkhatib, M.N. et al. Aesthetically objectionable fluorosis in the United Kingdom. *Br. Dental J.* **197** (2004) 325–328.

dentition<sup>64</sup> and its presence is widely reported by examining the front upper incisors. But, since it also affects molars that erupt between 5–13 years of age,<sup>65</sup> its prevalence amongst younger children is liable to be underestimated.

Councils are becoming increasingly concerned at the risks of dental fluorosis caused by fluoridation, so PHE goes to extraordinary lengths to try to dismiss its significance. Ignoring all other sources including, notably, the York Review,<sup>47</sup> it relies on a single study by McGrady et al.,<sup>66</sup> noting that “As fluorosis severity increases (TFI 2 or greater), the rating of images (and perhaps the level of acceptance) declines”. But in an attempt not merely to downplay the problem but to actually present this adverse effect as a preferred condition compared with normal teeth, PHE notes that “there was a trend for teeth with fluorosis to be ranked more favourably in the fluoridated community; for TF 1 and TF 2 this preference was significant ( $P < 0.001$ )”. Other authors have found to the contrary, but even if it were true this could reflect a raised level of tolerance to very low level fluorosis where it is more prevalent, through habituation.

But in misdirecting its readers, PHE selects a more extreme level of severity of fluorosis. In its 2014 publication it adopts a TFI of 4 (“mild to moderate” fluorosis) as the level at which it suggests may give rise to reasonable concern, noting that in the McGrady study<sup>66</sup> “the prevalence of TF scores *greater than 3* was less than 1% in both areas” (present author’s emphasis). In fact, PHE also manipulates and miscalculates the original data (Table 4 of its 2012 report<sup>51</sup>) effectively concealing a tenfold greater prevalence of fluorosis of TFI>2 in fluoridated Newcastle-upon-Tyne than in unfluoridated Manchester.

#### **14. Tell a large enough lie and it will be believed: big numbers hide big deceptions**

Fluoridation proponents have recently begun warning emotively of a rising epidemic of infants admitted to hospitals in order “to have their diseased body-parts removed under general anaesthetic”.<sup>67</sup> In the PHE report, estimates of the hospital admission rates for dental treatment are quoted as the “median rate of admission per 100,000 person-years at risk (pyar)” (not, in this case, the mean) for all one to four year-olds in England. The difference between fluoridated and unfluoridated areas (again, ignoring the wide error margins) is an apparent very large decline from 400 cases to 221 per 100,000 pyar or approximately 179 fewer annual admissions in fluoridated areas; this is presented as an impressive fall in admissions in fluoridated water areas of 45%.

This may be statistically significant nationally, but it is not important at the local administrative level. Most local authorities have far fewer than 100,000 children in the one to

<sup>64</sup> Warren, J., Levy, S.M. and Kanellis, M.J. Prevalence of dental fluorosis in the primary dentition. *J. Public Health Dent.* **61** (2001) 87–91.

<sup>65</sup> Anthonappa, R.P. and King, N.M. Enamel defects in the permanent dentition: prevalence and etiology. In: *Planning and Care for Children and Adolescents with Dental Enamel Defects. Etiology, Research and Contemporary Management.* (eds B.K. Drummond and N. Kilpatrick), pp. 15–30. Springer (2015).

<sup>66</sup> McGrady, M.G. et al. Adolescents’ perceptions of the aesthetic impact of dental fluorosis vs. other dental conditions in areas with and without water fluoridation. *BMC Oral Health* **12** (2012) 4.

<sup>67</sup> This is not an exaggeration. I have heard this hyperbolic description of tooth extractions given to councils by members of the British Fluoridation Society on a number of occasions.

four-year age cohort—the average number of children in each single year cohort is approximately 2000 across the country, with many local authorities having only half as many, and some far fewer. So, for the average council, the number of person-years within this age cohort at risk is approximately 8,000. The apparently impressive 45% reduction in admissions due to fluoridation whittles down to around 15 fewer referrals each year in the average council area, or around one child fewer each month.

This hardly represents the major public health calamity of which the public health sector attempts to persuade councillors.<sup>68</sup> In comparison, the authors of the York Review<sup>47</sup> noted that an average of 12.5% of children develop “fluorosis of aesthetic concern” after fluoridation is introduced. So whilst around 15 more 1–4 year-old children each year in the average council area may need extractions under general anaesthetic, 250 of the children born each year will eventually need to pay the dental profession’s members to conceal the “cosmetic” disfigurement that results from their promotion of fluoridation.

## 15. Conclusions

At the centre of the water fluoridation controversy is the crucial issue of its legitimacy. International conventions are founded on the deontological principle of respect for personal autonomy, a primary requirement in medical practice. However, public health law operates under a different and occasionally incompatible ethical framework. As Gostin notes, “Public health law is concerned with the tradeoffs entailed in the exercise of government power. ... Rather than using ethical discourse to resolve these conflicts, the law uses the language of duties, powers, and rights”.<sup>69</sup> Since public health law is aimed at supporting socio-economic trade-offs, the judiciary is constrained to apply the relevant principles when the policy is challenged. Inevitably, this directs attention away from impeachment of individuals whose actions cross the boundary between medical and public health practice when attempting to engineer misinformed consent.

Misbehaviour by individual health professionals and other bureaucrats *within* the system is distinguishable from the inadequacies *of* the ethical framework underlying the public health system itself. Not all individuals engaged in improper or unethical activities do so knowingly. Many are simply ignorant of the issues and of how they are themselves being manipulated. But they can be exploited by a relatively small number of over-zealous officials, and by more materialistic commercial vested interests. Gostin warns that “Public health professionals may earnestly believe that their mission requires vigorous interventions to prevent risk behaviors (e.g., smoking) or encourage health-promoting behaviors (e.g., screening and treatment). To achieve these beneficent objectives, public health professionals may exaggerate the risks or benefits or make claims that are insufficiently grounded in science”.<sup>70</sup>

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<sup>68</sup> Extractions under general anaesthetic by dentists have now been prohibited to avoid fatalities during operations in dental surgeries.

<sup>69</sup> Gostin, L.O. *Public Health Law and Ethics: A Reader*, p. 9. Berkeley and New York: University of California Press and Milbank Memorial Fund (2002).

<sup>70</sup> Gostin, L.O. *Ibid.* supra at 69, p. 12.

Failure to deal with aberrant individual behaviour inevitably places the system itself at risk of corruption. Inappropriate ideologically-driven choices prevent soundly justified remedial measures being implemented to address the socio-economic constraints that give rise to inequalities. If this injustice is not eliminated, then naturally occurring inequities in community health may be transformed into a more serious and widespread public inequity. In this instance, it manifests itself as a substantial prevalence of “dental fluorosis of aesthetic concern” that provides a potential financial advantage to those professionals with a vested interest in providing treatment.

The development of psychological competence in manipulating public perceptions by Bernays and others, linked to the insights of the emergent Health Belief Model, enabled the fluoridation ideology to become dominant as a dental public health policy in a number of states, even where existing medicinal jurisprudence rendered it illegitimate. The status interests of a professional elite have been strengthened by support from politically influential individuals, resulting in self-serving control over public health policy, implemented by unprincipled administrative agencies, and constraining even the judiciary itself.

This central power base has been extended by inserting inflexible public health service believers into local government, seemingly establishing, or aiming to establish, a national “command-and-control” hierarchy that penetrates the heart of the local authority system. By this strategy, the perceptions of key figures within each level of governance have been manipulated to strengthen the influence of the fluoridation cult’s belief system, from government right down to community level.

The tactics employed to engineer consent to fluoridation are dependent on propaganda constructed from evidence obtained by selection bias and misrepresentation, and could be regarded as scientific fraud.<sup>71</sup> But this raises the question of whether they might also constitute a more specific criminal act, that of obtaining financial advantage through deception.

A recent analysis of fraud within the UK’s National Health Service (NHS), commissioned by the Association of Chief Police Officers (ACPO), seems to imply that it might. Adopting the victim-centric approach, it notes that “Fraud is the obtaining of financial advantage or causing of loss by implicit or explicit deception; it is the mechanism through which the fraudster gains an unlawful advantage or causes unlawful loss”.<sup>72</sup> In including “causing of loss” as a consequence of fraud, this emphasises the need to protect the vulnerable victims of deceit, even if they do not experience a direct financial loss at the time of the fraudulent action. A lifetime’s treatment of dental fluorosis can cost a very substantial sum to a person afflicted by it.

Whilst ill-advised use of other fluoridated prescriptions, and even of fluoridated toothpaste, may cause some dental fluorosis, it is overwhelmingly the direct result of water fluoridation. In persuading Parliament and the regulators to permit the practice, the dental profession’s endorsement of it results in a greater prevalence of fluorosis in communities, generating a financial advantage to its members. The primary victims of fluoridation are those

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<sup>71</sup> It is certainly unethical. See Altman, D.G. Statistics and ethics in medical research. I. Misuse of statistics is unethical. *Br. Med. J.* **281** (1980) 1182–1184.

<sup>72</sup> Levi, M., Burrows, J., Fleming, M.H., Hopkins, M. and Matthews, M. *The Nature, Extent and Economic Impact of Fraud in the UK*. Report for the Association of Chief Police Officers’ Economic Crime Portfolio (2007).



those who develop “fluorosis of aesthetic concern”. The profession has the exclusive authority to provide remedial treatment. This incurs a private cost, the (high) costs of which are not attributable to the public sector, and are therefore improperly excluded from inclusion in the risk cost–benefit analyses with which the State justifies its fluoridation policy. Despite the exclusion of the private costs, the National Health Service itself becomes a secondary victim, since it picks up the bill for implementing water fluoridation in England.

Confrontations over water fluoridation have moved on from simple stand-offs between opposing scientific camps. Fluoridation has become a belief system more akin to a cult, in which some converts—on both sides—use evidence in whatever manner they feel will sway the balance between opinions. Fact and fiction have become interchangeable, and are used purely as tools to manipulate emotions; the battle has reached a condition of stalemate.

In the background, commercial interests are beginning to distance themselves from the debate—manufacturers of fluoridated toothpaste, for example, no longer mention fluoride in their televised advertisements, and some are quietly developing fluoride-free toothpastes. But ultimately, only enforcement of mandatory designation of fluoridated water as a medicine, subject to the stringent conditions imposed on the manufacture, licensing and use of medicinal products, will bring an end to this unhealthy obsession with fluoride.