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Medical myths (*BMJ* 2007;335:1288)

THIRSTING FOR EVIDENCE

Margaret McCartney examines the facts behind the claims by bottled water companies that we all need to drink more water

Water, water everywhere. Should doctors be telling people to drink more water as a public health issue? Hydration for Health, an initiative to promote drinking more water, held its annual scientific meeting in Evian, France, last week. The initiative has shown its fervour for water with recent adverts in the medical press, including the *BMJ*. The website states that its mission is “to establish healthy hydration as an integral part of public health nutritional guidelines and routine patient counselling so people can make informed choices.” It believes that “Healthcare professionals should be encouraged to talk with patients about the calorific content of SSBs [sugar sweetened beverages] when discussing lifestyle modification to manage overweight and/or obesity . . . Consumption of water in preference to other beverages should be highlighted as a simple step towards healthier hydration.” And healthier hydration is? “recommending 1.5 to 2 litres of water daily is the simplest and healthiest hydration advice you can give.”

Hydration for Health has a vested interest: it is sponsored and was created by French food giant Danone. This company produces Volvic, Evian, and Badoit bottled waters. The initiative’s website is bold and strident. Under a section entitled “We don’t drink enough water,” it states, “many people, including children, are not drinking enough . . . Children can be at greater risk than adults of feeling the effects of not drinking enough because of their smaller size . . . Elderly people often have a decreased sensation of thirst, which can lead to a higher risk of dehydration [and] evidence is increasing that even mild dehydration plays a role in the development of various diseases.”¹

The “we don’t drink enough water” idea has endless advocates. Schools often insist that pupils bring a water bottle to school and tell pupils that they should drink eight glasses a day. Drinking eight glasses of water a day is recommended by all kinds of organisations, including the NHS, which says on the NHS Choices website: “Try to drink about six to eight glasses of water (or other fluids) a day to prevent dehydration.”² This is not only



Young minds: do children drink enough?

The claim by Hydration for Health that children do not drink enough is referenced to an article in *Nursing Times*, written by the coordinator of the Water is Cool in School campaign.⁸ This feature article makes the important points that some children do not have free access to fluids at school (drinking “more” as Danone would have it, is different from drinking as needed or when thirsty) and that school toilets can be unpleasant. However, this article goes further and says that “mild dehydration of 1-2% loss of body weight (the level of dehydration when we first feel thirst) results in a measurable decline in mental performance.” The claim is, in turn, referenced to a review article by Rogers and colleagues. This study, however, found that “when thirst was low, the impact of water intake was detrimental rather than neutral or beneficial, showing that mental performance can be very sensitive to physiological perturbation.”⁹ In other words, there is still no evidence that we need to drink more than we naturally want, and there may be unintended harms from an enforcement to drink more water.

Reports made by the BBC in 2000 that increased water intake in children led to an improvement in test results created widespread media excitement.¹⁰ However the research has not been published in a peer reviewed journal, and the water intervention seems to have been part of a raft of changes in school. The *Nursing Times* article mentioned a three year research project in schools by the School of Health Sciences at Leeds Metropolitan University looking at the “effects of access to water for pupils and the links between water and learning,” after anecdotal reports from schools that attention spans, concentration, and behaviour are “noticeably improved by frequent intakes of small amounts of water.” This study has also not been published. One randomised cluster controlled trial has related water drinking to a reduction in children being overweight.¹¹ However, the authors note that they may have been at risk of selection bias, due to some schools and some children choosing not to take part, and the study was done as part of a larger educational programme about weight and diet. It seems, therefore, that water is not a simple solution to multiple health problems.

nonsense, but is thoroughly debunked nonsense. In 2002, Heinz Valtin published a critique of the evidence in the *American Journal of Physiology*. He concluded that “Not only is there no scientific evidence that we need to drink that much, but the recommendation could be harmful, both in precipitating potentially dangerous hyponatremia and exposure to pollutants and also in making many people feel guilty for not drinking enough.”³ In 2008, an editorial in the *Journal of the American Society of Nephrology* reached much the same conclusion, stating that “There is no clear evidence of benefit from drinking increased amounts of water. Although we wish we could demolish all of the urban myths found on the internet regarding the benefits of supplemental water ingestion, we concede there is also no clear evidence of lack of benefit. In fact, there is a lack of evidence in general.”⁴

Hydration for Health claims that drinking more will benefit us in all kinds of ways. It supports its claim that “many people still may not drink enough fluids” with two references. One is a 2006 discussion paper about mineral rich water from *Clinical Nutrition*.⁵ The authors make the statement that “the elderly consume insufficient liquid amounts, and they often drink when dehydration has already appeared,”⁵ which is supported by Italian government guidelines rather than primary research. The second paper, from the *Journal of Gerontological Nursing*, is a retrospective notes based study and does not distinguish between iatrogenic causes of dehydration such as diuretics and primary causes such as illness.⁶ In other words, Hydration for Health has presented no quality evidence supporting its initial assumption. The claims that mild hydration is linked to conditions such as stroke and gallstones are backed up mostly by level III evidence (descriptive or correlation studies rather than randomised controlled trials). Of the few instances where higher quality evidence was cited, for example, signs of mitral valve prolapse on echocardiogram relating to dehydration, this is of dubious clinical importance.⁷

No evidence

Professor Stanley Goldfarb, physician and nephrologist at the University of Pennsylvania, was coauthor of the 2008 editorial in the *Journal of the American Society of Nephrology*, mentioned above, that concluded there is no clear evidence that drinking more water is beneficial. After he wrote his article, he was contacted by Danone, and taken out to dinner by two of its representatives. They didn't try to dissuade him from his views, but they did show him a graph intimating that sales fell after the editorial was published.

Professor Goldfarb told me: “The current evidence is that there really is no evidence [for drinking extra water]. I agree, if children drank more water rather than getting extra calories from soda,

that's good for weight loss, and self evident. As far as reducing the amount of calories in adults, that's been looked at many times and there is no evidence that drinking water before meals reduces appetite during a meal. However if you flavour it, you can reduce calorific intake,” possibly by altering appetite perception.¹²

Kidney health

What about adults? The other claim being made by Hydration for Health in a press release for its conference is of a “recently published study from Dr Strippoli of the University of Sydney identifying a positive relationship between low fluid intake and the occurrence of chronic kidney disease.”¹³ This cross sectional study, published in *Nephrology* in 2011 found an association between high fluid intake and lower risk of chronic kidney disease (CKD).¹⁴ The authors conclude that “higher intakes of fluid appear to protect against CKD.” However, the finding is only an association and is prone to confounding, and the study did not investigate whether more fluid intake can prevent chronic kidney disease.

Additionally, there is more research in this area than that cited by Hydration for Health. Professor Goldfarb is aware of other studies that do not show a link, or even show the opposite. A study from Canada, part of the Modification of Diet in Renal Disease study, found that high urine volumes and low osmolarity were related to faster decline in kidney function.¹⁵ Professor Goldfarb does not tell his patients with other types of kidney disease to drink extra water, saying that many people are relieved about this.

“It's a complicated story” he says. “One definitely benefits from it if there are recurring kidney stones. Will it reduce kidney stones in people who have never had them? It's really just speculation. The other disease where increased fluids can be recommended is in polycystic kidney disease. This suppresses anti-diuretic hormone, which decreases the risk of development of cysts in people with a genetic risk. The downside of that with drinking all day, you are likely to have to get up in the middle of the night; so you have to factor in sleep deprivation.”

What about the medical old favourites, such as drinking plenty to ward off urine infections?

“Well, if young women have repeated urine infections, drinking lots probably reduces lower urine infections. But it may have an adverse effect on upper urine infections—excess water may reduce the concentration of inhibitory factors which would otherwise help with infections.”

In other words, this is a complex situation not easily remedied by telling everyone to drink more.

What does he think of the bottled water industry telling us to drink up? “If anyone is selling anything . . . they don't have a right to make claims that are not substantiated but have a right to sell their products. Here in the US, gallon for gallon, bottled water is more expensive than oil. And the other concern is all the debris that goes along with the bottles—so from a societal point of view it's kind of silly—municipal water supplies are so carefully monitored.” Indeed, in the UK, the British bottled water industry website describes a year on year rise in bottled water consumption which now exceeds 33 litres annually per person.¹⁶

Examination of the evidence presented by Danone shows it to be weak and subject to selection bias. Danone says we need “informed choices,” but its evidence does not support its call to action. There are many organisations with vested interests who would like to tell doctors and patients what to do. We should just say no.

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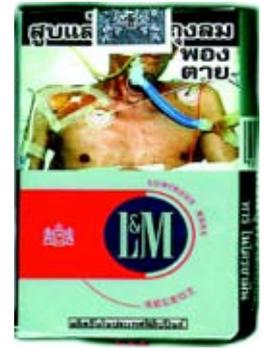
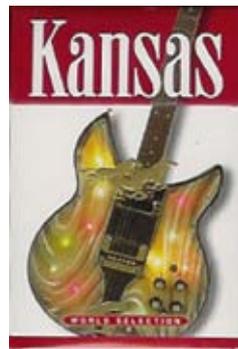
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From brand to bland—the demise of cigarette packaging

Neutering the appeal of the once glamorous cigarette package has become a powerful weapon in tobacco control’s arsenal. And Australia is about to take the boldest step of all, find **Simon Chapman** and **Becky Freeman**



Marlboro from Mexico (above). Clockwise from top left: Late 1940s advertisement for Camel cigarettes; one of nine package designs which US regulators are enforcing from 2012; Thai cigarettes; Portuguese health warning on the Lucky Strike brand; Indonesian packaging before the introduction of health warnings



Cigarette packs were the site of the world’s first tobacco control policies, when the first health warnings appeared in Britain and the United States from the mid-1960s. Tobacco companies have ever since sought to guard the integrity of the box—the “silent salesman” that is displayed to others many times each day—as their primary promotional vehicle.¹ Industry has resisted every attempt to substitute bland, general cautions with explicit warnings, references to “addiction” and “kill,” and efforts to increase the size of the lettering.² When Canada set the pace by being first to introduce graphic, pictorial warnings in 2001, the industry turned its resistance to images. Some 43 nations now have graphic warnings.³

Last week, the Australian government opened the next chapter in the regulation of tobacco packaging by introducing a bill that will see all packs in identical “olive brown” livery, with the front and back panels given over to graphic pack warnings, and each brand distinguishable only by the brand name in a standard font (figure).⁴ For the first time in the world, a government has mandated the entire packaging for a consumer

good, sending an unambiguous message that tobacco is unique in the marketplace as an exceptionally hazardous product.

All three political parties support the bill, as does a large majority of the public.⁵ Only 17% of adults smoke in Australia, and some 95% of those regret starting.⁶ The tobacco industry ranks poorly on trust in the Australian community.⁷ The bill will therefore soon become law, with full implementation from mid-2012.

To describe the industry’s reaction to the plan as apoplexy would be an understatement. It has spent an estimated \$A20m (£13.5m; €15m; \$21.6m) in advertising against the bill,⁸⁻¹⁰ rallied international business interests, and threatened legal action—a threat now realised by Philip Morris. Legal analysis suggests that the government has little to fear either legally¹¹ or from posturing by tobacco growing nations in the World Trade Organisation.¹²

The industry argues that there is no evidence that plain packaging will reduce use because no nation has ever implemented it. However, considerable experimental and smoker preference data exist.¹³ Tobacco industry trade magazines



This page clockwise from top left: Turkish Marlboro; Brazilian packaging; graphic warnings on Australian products; the proposed shrinking of the brand logo in Australia; Player's from Canada; and health warnings on South American tobacco

run candid advertising from packaging companies talking about the central role of packaging in differentiating what are essentially homogeneous products which many smokers cannot differentiate under blinded test conditions. In 2008, a *Tobacco Journal International* cover story was headlined "Plain packaging can kill your business," which is of course a collateral goal of tobacco control.

The industry has also forecast that in future it will need to compete only on price, an admission that without packaging to differentiate brands, consumers will find little to distinguish between them.¹⁴ But if price falls, the government can rapidly increase tobacco tax, as it did in April 2010 by 25%. No Australian aged under 19 has ever seen a tobacco advertisement other than on the internet or abroad, following the advertising ban in 1992. The next generations of Australians will

now grow up without seeing a product that kills half its long term users being sold packaged in highly attractive colours.

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CAN WE AFFORD THE NHS IN FUTURE?

If England keeps on spending on health at the current rate, the NHS will be unaffordable in 20 years' time, says the health secretary. Not necessarily, finds **John Appleby**

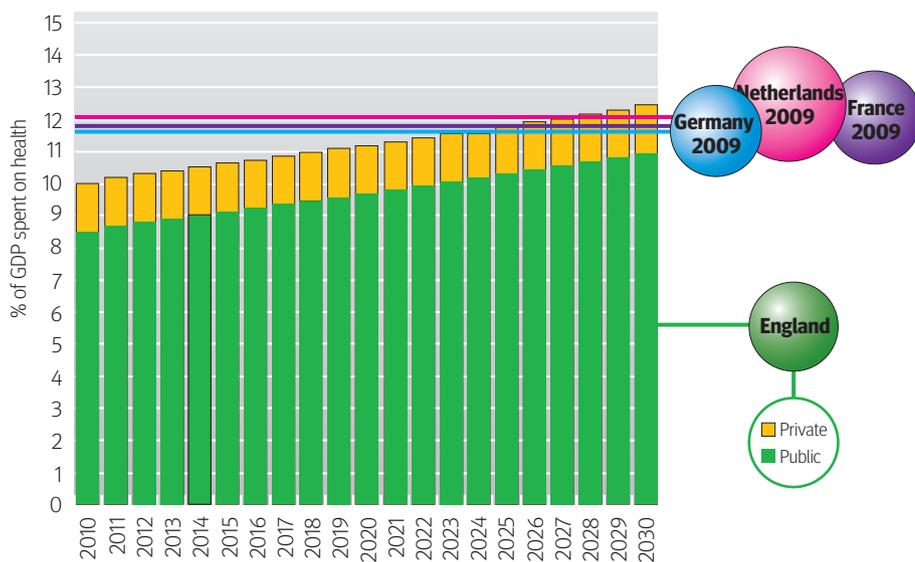


Fig 1 | Possible future English healthcare spending 2010-30 as proportion of GDP.³ Figures are hypothetical and assume English private spending is 1.5% of GDP

In an article for the *Daily Telegraph* in June, Andrew Lansley, England's health secretary, made an interesting prediction. By 2030, he said (referring to England), "If things carry on unchanged, this would mean real terms health spending more than doubling to £230 bn." He also stated that, "This is something we simply cannot afford."¹ It is of course then a short step to an argument that the NHS must change (because unchanged equals unaffordable) and that the change it needs are the secretary of state's reforms. This is a version of the "politician's syllogism":

- 1 The NHS must change (otherwise it is unaffordable)
- 2 This (the reforms) is change
- 3 Therefore we must do this (the reforms).

As the "pause" and subsequent changes to the NHS reforms have shown, such logic is debatable. But perhaps the premise is also questionable. £230bn (€260bn; \$379bn) is certainly a lot of money—as Mr Lansley points

out, that's equivalent to spending at a rate of over £7000 a second. But in what sense is it actually unaffordable?

If the NHS in England were currently consuming £230bn then as a proportion of (England's) gross domestic product (GDP) this would amount to 18% of GDP devoted to health. That compares with the actual figure of 8.5% of GDP. But the £230bn is not spending now, but what spending might be in 20 years' time. It is equivalent to average real increases in spending of just over 4% a year—a bit more than the long run average for the NHS since 1948.

Crucially, however, the country's capacity to afford higher spending will change over time. Over the next 20 years it is likely that the economy will grow in value. Between 2011 and 2015 for example, the UK economy is forecast to expand by nearly 30% in cash terms—around 14% in real terms and an average of around 2.5% a year.² It is not unreasonable to assume that this real growth will continue

for the next 20 years such that GDP (at today's prices) will rise from £1.5tr this year to £2.5tr in 2030.

Assuming England's share of this remains the same (at around 84%), then £230bn as a proportion of GDP in 2030 will amount to 10.9%. This is certainly more than is currently spent—2.4 percentage points of GDP more—but is it "unaffordable"? Adding private spending on health care to NHS spend (to enable better comparison with other countries), total spend in 2030 could be around 12.4% of GDP (up from around 10% this year). This would make England the highest spending country in the Organisation for Economic Cooperation and Development bar the United States—but only assuming no other country increased its spending on healthcare (fig 1). Even in 2009, seven of the EU-15 countries spent over 10% of GDP on healthcare. The highest spender—the Netherlands—devoted 12% of its GDP to healthcare (fig 2).

Spending on health will be a matter of choice, not affordability. The real question to ask about health spending is what we think we might get in return as a result of forgoing the benefits of spending increasing amounts of our wealth on other things. For example, is the two year increase in life expectancy at birth we might possibly enjoy as a result of higher health spending (fig 3) worth the benefits we will not get to enjoy from spending more on education, food, or housing?

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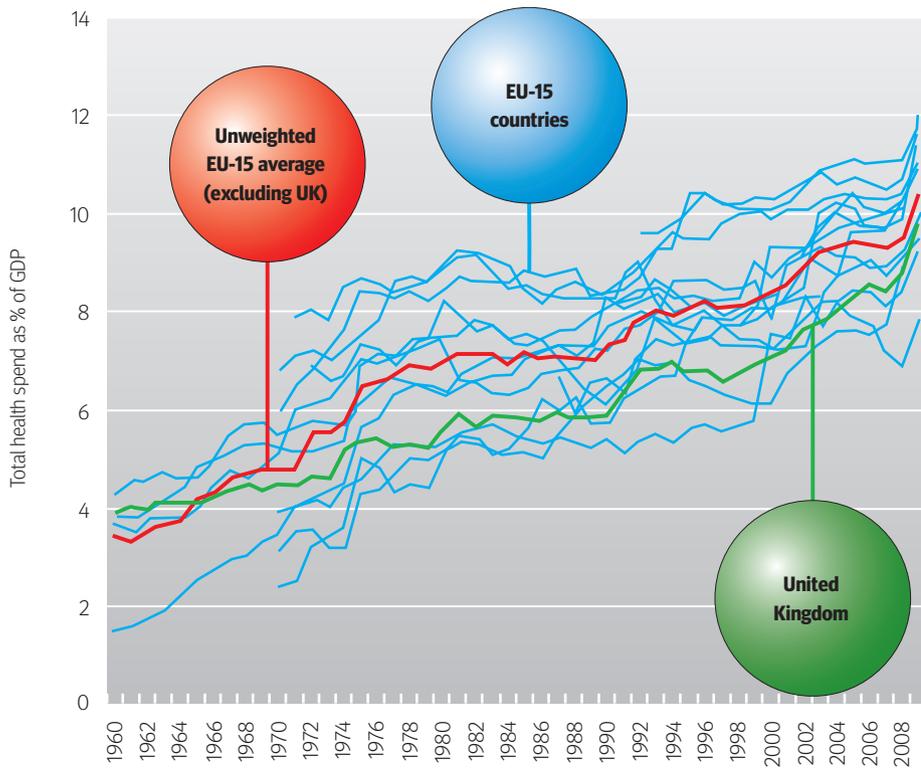


Fig 2 | Total healthcare spending of EU-15 countries (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and UK) as proportion of GDP, 1960-2008.³ Unweighted average=sum of percentages/number of countries submitting data in each year

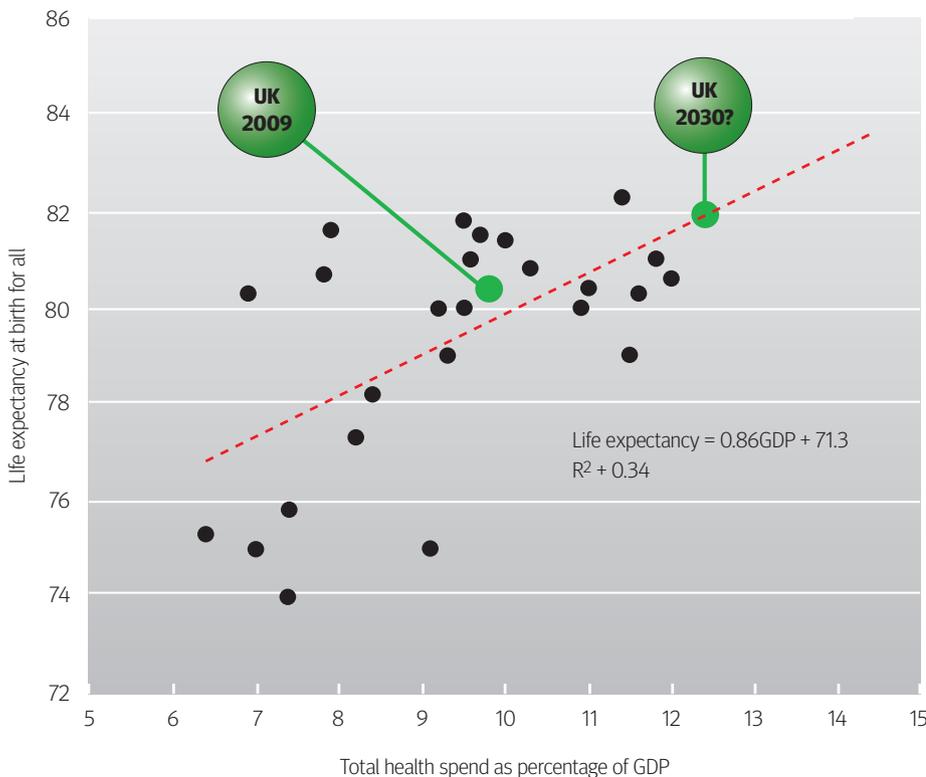


Fig 3 | Higher health spending, longer lives? Data on the relation between spending and life expectancy from OECD countries³

BMJ BLOGS

Ollie Ellis: Health records in the cloud



On my first ever hospital placement, the thing that most struck me was just how antiquated the records system was. Junior staff were writing with pen and paper; the grander ones used a tape (an actual magnetic tape!) to dictate letters to a secretary. To find something in a patient record you couldn't type a few terms into a search box, you had to flip through the pages and decipher scrawl.

It just didn't seem very 21st century. So I've been following the emergence of electronic healthcare record systems (EHRs) and the NHS National Programme for IT (NpfiT) with a great deal of interest.

I was especially interested to read recently that one London NHS trust is testing out a new cloud based system for storing patient records. Meanwhile, news has leaked that other parts of the NHS are looking at getting cloud computing.

In the past, if you wanted to create an EHR system you had to buy expensive hardware (a server or servers) and software. During quiet times the expensive server would be sitting almost idle. And during peak times it might get overloaded with too many users, making it slow and unresponsive.

Enter cloud computing. It's a service provided by companies (cloud hosts) that own big rooms full of servers. A healthcare provider can pay for the use of those servers on a timeshare basis. Doctors and other healthcare professionals can then access them over the internet.

An all-in package could provide everything that's needed for a complete EHR. The cloud host saves all the data, makes sure everything is backed up, and supplies a web browser based interface that healthcare workers can use from any computer.

If they suddenly double the number of patients on their list, the cloud host can automatically give them more resources. If they are having a quiet day, they aren't paying for computer time they don't need.

Oliver Ellis is the departing student editor of *Student BMJ*

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