increased, and many vaccine manufacturers shut down production. In response, the US Congress passed legislation that included a mandate to the Institute of Medicine to determine by scientific review whether childhood vaccines can cause any of a broad array of adverse events. The institute's conclusions have been used to guide a compensation process, litigation, and public education and pointed to needed research.²

The best way to monitor the safety of population-wide interventions required by governments should be considered during the initial decision making. When serious safety concerns arise, as with the MMR and pertussis vaccines, governments have to investigate vigorously the proposed causal relationship. The analysis must be based on review of existing scientific data, and if these data are inconclusive, on new research. The United States has given responsibility for such analysis to the Institute of Medicine, which uses multidisciplinary committees of experts selected for their objectivity and freedom from conflict of interest. Whatever body is used to rule on safety, its conclusions must be the result of critical, open minded analysis based on science and reason.

Conclusions

Effective preventive medicine often requires population based measures that limit individual choice. Research will undoubtedly produce more examples in which prevention can best be achieved by government action. Policy makers should start with an unbiased, reasoned analysis of the best available scientific evidence, then consider the practical realities of cost, public acceptance, and political risk. The policy decision may prove a difficult, discomforting challenge. The rewards, however, could be substantial, as shown by the great public health successes of the past.

Contributors and sources: GPO is a paediatric epidemiologist who was director of the division of birth defects and developmental disabilities at the Centers for Disease Control when the MRC study was published proving that oral synthetic folic acid would prevent most of the cases spina bifida. GPO and his group provided the scientific rationale and the policy guidance and energy that led to mandatory fortification of "enriched" grains with folic acid in the United States. As medical director of the March of Dimes Birth Defects Foundation, FBJ gathered for the US Food and Drug Administration the judgments of the professional medical organisations regarding the benefits and risks of folic acid fortification of grain products. He has chaired or served on a series of US Institute of Medicine committees that have assessed causal relations between vaccines and various putative adverse events, including autism.

Commentary: silent prevention

Nicholas J Wald

Oakley and Johnston correctly criticise Britain's failure to fortify flour with folic acid. But the interventionist principle in nutrition and other areas of public health goes beyond folate. Contrary to current perception, the key to effective public health is not individual choice but collective action linked to public trust in its value.

Most of the main determinants of health vary little among people in a community. The scope for

Summary points

The most effective way to get preventive interventions to the whole population is through government legislation

Such legislation inevitably restricts personal choice

Decisions to legislate should be based on an unbiased analysis of scientific evidence

Governments have a responsibility to monitor safety and carefully investigate any concerns that arise

Competing interests: GPO is a co-inventor on a patent that would cover putting folic acid in oral contraceptives. If there is income, it will be under the rules of the Centres for Disease Control, where he worked at the time of the invention. GPO is a paid consultant to Johnson and Johnson on this issue.

- 1 Oakley GP Jr. Inertia on folic acid fortification: public health malpractice. *Teratology* 2002;66:44-54.
- 2 Johnston RB Jr. Do vaccines cause harm? The need for open-minded analysis based on science and reason. *Adv Pediatr* 2003;50:231-44.
- 3 MRC Vitamin Study Research Group. Prevention of neural tube defects: results of the Medical Research Council vitamin study. *Lancet* 1991;338:131-7.
- 4 Czeizel AE, Dudas I. Prevention of the first occurrence of neural-tube defects by periconceptional vitamin supplementation. *N Engl J Med* 1992;327:1832-5.
- 5 Raats M, Thorpe L, Hurren C, Elliott K. *Changing preconceptions: the HEA folic acid campaign, 1995-1998*. London: Health Education Authority, 1998.
- 6 De Walle HE, De Jong-Van Den Berg LT. Insufficient folic acid intake in the Netherlands: What about the future? *Teratology* 2002;66:40-3.
- 7 Food and Drug Administration. Food standards: amendment of standards of identity for enriched grain products to require addition of folic acid. *Fed Regist* 1996;61:8781-807.
- 8 Honein MA, Paulozzi LJ, Mathews TJ, Erickson JD, Wong LY. Impact of folic acid fortification of the US food supply on the occurrence of neural tube defects. *JAMA* 2001;285:2981-6.
- 9 Lawrence JM, Pettiti DB, Watkins M, Umekubo MA. Trends in serum folate after food fortification. *Lancet* 1999;354:915-6.
- 10 Association Heart Association. *Stroke deaths reduced by folic acid fortification*. Meeting report, 5 Mar 2004. www.americanheart.org/presenter.jhtml?identifier=3019554 (accessed 11 June 2004).
- 11 Institute of Medicine. *Dietary reference intake: folate, other B vitamins and choline*. Washington, DC: National Academy Press, 1998.
- 12 Committee on Medical Aspects of Food and Nutrition Policy. *Folic acid and the prevention of disease*. London: COMA, 2000.
- 13 Boushey CJ, Beresford SA, Omenn GS, Motulsky AG. A quantitative assessment of plasma homocysteine as a risk factor for vascular disease. Probable benefits of increasing folic acid intakes. *JAMA* 1995;274:1049-57.
- 14 Mark SD, Wang W, Fraumeni JF, Li JY, Taylor PR, Wang GQ, et al. Lowered risks of hypertension and cerebrovascular disease after vitamin/mineral supplementation: the Linxian nutrition intervention trial. *Am J Epidemiol* 1996;143:658-64.

(Accepted 1 June 2004)

individuals to choose healthy and safe foods, drinks, transport, or buildings is limited; the similarities in exposure are greater than the potential differences. To differ significantly from the collective norm we would have to isolate ourselves from the mainstream of society. It is glib and disingenuous to say that we are all consumers exercising choices, when most of the options are essentially similar. For example, most

Wolfson Institute of Preventive Medicine, Barts and the London, Queen Mary's School of Medicine and Dentistry, London EC1M 6BQ
Nicholas J Wald
director

n.j.wald@qmul.ac.uk

people in developed countries consume about 35% of their energy as fat, about 10 g/day of salt, and about 0.2 mg/day of folate, and nearly everyone is exposed to the risks of road injuries.

The chief merit of the increasingly popular convenience foods is their convenience. Individuals have little influence over their composition. Even foods that are described as being healthy can be high in sugar and salt, counterbalancing any benefit from added micronutrients, such as folic acid. But discouraging the use of convenience foods is not practical; we need collective action to reduce the amounts of salt, sugar, and saturated fat in foods, and a sensible policy on portion sizes in restaurants.

Of course, individuals have some choice, but for most people safety and health are minor determinants—value for money, convenience, and fashion rank much higher. Safety and health have to be part of the fabric of society, determined by experts with specialist knowledge, and translated into policies by governments, acting on our behalf. For years we have unquestioningly accepted the addition of iodide to table salt, to prevent thyroid disease; the prevention is

silent. Charges of paternalism and pejorative labels such as “nanny state,” with the false innuendo that we are being controlled against our wishes, are unhelpful because effective public health needs to be integrated into the infrastructure of society. We depend on governments and professionals to ensure that our lives are as healthy and as free as possible. Governments have the main responsibility and authority for maintaining public health, through education, regulation, legislation, and taxation. Not all decisions will be right, but it is not hard to ensure that most are and, given new knowledge, to correct those that are not.

An advisory role is not enough. Public health in countries such as Britain needs a stronger executive role, relatively free of short term political considerations. Watching our children (and ourselves) becoming overweight and claiming that it is all about choice is a denial of everything that public health and preventive medicine is about, and a denial of what makes a society civilised and worth belonging to. Public health and individual choice can flourish together, but the former should not be driven by the latter.

Competing interests: None declared.

Detection, verification, and quantification of adverse drug reactions

Bruno HCh Stricker, Bruce M Psaty

The current system of verifying and quantifying adverse reactions to new drugs is too disparate. Epidemiological studies for testing a hypothesis have a part to play in protecting the public from the harmful effects of new drugs

Pharmacoepidemiology Unit, Department of Epidemiology and Biostatistics, Erasmus Medical Center, PO Box 1738, 3000 DR Rotterdam

Bruno HCh Stricker
professor of pharmacoepidemiology

Cardiovascular Health Research Unit, Departments of Medicine and Epidemiology, University of Washington, Seattle, USA

Bruce M Psaty
professor of medicine, epidemiology, and health services

Correspondence to: B HCh Stricker
b.stricker@erasmusmc.nl

BMJ 2004;329:44–7

Although some will question the use of the term experiment on formal grounds, most experts will likely agree that the widespread marketing of a new drug is in fact a large experiment on a population. This is especially the case when it concerns a novel molecular entity with potentially a new set of clinical experiences. As the marketing of new drugs includes the discovery of adverse effects, the public's health would be best protected by a complementary set of techniques for the detection, verification, and quantification of safety issues. Yet the current approach to this is scattered and disappointing. We discuss why healthcare professionals are not aware of all safety problems of a drug at its introduction and why pharmacoepidemiology should complement the indispensable observational method of case reporting.

Sources and selection criteria

Our review is based on a search of PubMed using the terms adverse effect, adverse reaction, ADR, adverse event, adverse reaction monitoring, pharmacovigilance, cohort study, and case-control study. This yielded several thousand papers from which we excluded individual case reports and case series. From a list of cohort and case-control studies, we picked some recent examples of pharmacoepidemiological studies of

adverse events with databases. We used the references from 50 of the most recent reviews, to gather the most important papers on this subject.

Limitations of clinical trials

Before drugs are marketed, they are extensively tested in animals and in clinical trials in humans. These tests tell much about the drug's efficacy but for several reasons relatively little about safety (box).

P+ Systems for drug safety research and references w1-w10 are on bmj.com