

## EDITORIAL

## The precautionary principle, the AstraZeneca COVID-19 vaccine and mixed messaging

In March 2021, anecdotal reports circulated of vascular thromboses, such as deep venous thrombosis causing pulmonary embolism, in association with the AstraZeneca COVID-19 vaccine. Despite assurances from the World Health Organization and the European Medicines Agency that the rates of thrombosis were lower than would be expected without the vaccine, suggesting a chance association, European countries suspended use of the AstraZeneca vaccine, followed by other countries round the world in a 'domino effect'.<sup>1</sup> This action, taken by countries where the rapid spread of COVID-19 poses a far greater risk than the mooted risk from the vaccine, will shake confidence in the vaccine worldwide. This inappropriate application of the precautionary principle will cause great harm.

The concept of the 'Precautionary Principle', *Vorsorgeprinzip*, first arose in the 1970s, when Germany introduced laws as an environmental response to forest degradation and sea pollution. *Vorsorgeprinzip* actually translates as the 'foresight principle'. Two ideas underpin the precautionary principle:

- Decision-makers should anticipate harm before it occurs [with an implicit reversal of the onus of proof: under the precautionary principle someone proposing an activity should show the proposed activity will not or is very unlikely to cause significant harm]
- The concept of proportionality of the risk, cost and feasibility of any proposed action.

Some public health experts have advocated adoption of the precautionary principle in public health as a way of limiting harm from interventions. For example, in March 1999, Los Angeles policy makers introduced a new policy on pesticide use in schools,<sup>2</sup> prioritising non-chemical approaches to pest control. In establishing this policy, the school district invoked the Precautionary Principle, saying:

- 1 No pesticide product is free from risk or threat to human health, and
- 2 Industrial producers should be required to prove that their pesticide products demonstrate an absence of [human health risks] rather than requiring that the government or the public prove that human health is being harmed.<sup>2</sup>

Critics of the precautionary principle in public health warn that it may inhibit innovation; advocates say that may be wise. Examples of controversy about risk include genetically modified organisms, electromagnetic fields and mobile phones.

A hazard to public health may arise when a weak scientific study or even a rumour raises the possibility that an existing public health measure may be harmful. During the 1960s, over-enthusiastic dosing of newborns with synthetic vitamin K<sub>2</sub> to prevent haemorrhagic disease of the newborn caused haemolysis,

hyperbilirubinaemia and even kernicterus, which brought the practice of vitamin K prophylaxis into some disrepute.<sup>3,4</sup> Late-onset haemorrhagic disease was described from the 1980s, affecting up to 100 per million newborns, almost all breast-fed because formula contained supplementary vitamin K; half of the babies had devastating intracranial bleeding.<sup>3,4</sup> The introduction of intramuscular vitamin K<sub>1</sub> led to a marked reduction in both early- and late-onset haemorrhagic disease of the newborn.<sup>3</sup> IM but not oral vitamin K prevents late-onset haemorrhagic disease. However, in 1990, UK researchers published an epidemiological study on 'risk factors' for childhood cancer which found that children who developed cancer were approximately twice as likely as controls to have received IM vitamin K at birth.<sup>5</sup> While this association reached statistical significance, the study design was not strong and biological plausibility questionable. Public health authorities around the world considered what to do about IM vitamin K prophylaxis. The USA was sceptical about the association and did not change the recommendation for IM vitamin K prophylaxis. The Netherlands and Australia elected to recommend oral vitamin K as a 'safe compromise' to IM vitamin K pending better evidence, resulting in an increase in late-onset haemorrhagic disease of the newborn.<sup>3,4</sup> Little wonder that suspicion about the safety of IM vitamin K prophylaxis persists to this day. It is difficult to reassure parents of the safety of a recommended injection whose use you once suspended 'to be safe'.

The field of immunisation has been plagued (no pun intended) by comparable controversies. France introduced school-based adolescent hepatitis B immunisation in 1984 and universal neonatal hepatitis B immunisation in 1985. In the 1990s, case reports of multiple sclerosis possibly temporally linked to hepatitis B immunisation, raised concerns.<sup>6</sup> In 1998, the French Ministry of Health temporarily suspended the adolescent hepatitis B vaccine programme, while continuing universal infant immunisation.<sup>5</sup> The French decision was interpreted as a ban, resulting in a sharp decline in local rates of hepatitis B immunisation,<sup>6</sup> and generating concern in many other countries. People will probably die prematurely from preventable cirrhosis or liver cancer as a result. Similarly, in 2014, when rumours of human papillomavirus (HPV) vaccine-induced brain damage spread on social media, the Japanese Health Ministry immediately suspended the HPV immunisation programme pending investigations.<sup>7</sup> HPV immunisation rates in Japan plummeted from 70% to below 1% in less than a year. Preventable cervical cancer will be the cost paid by thousands of girls.<sup>7</sup>

In the late 1990s, rumours circulated that the preservative thiomersal (thimerosal in the USA), a mercury derivative, might cause mercury poisoning.<sup>7</sup> Although there is less mercury in any vaccine than when eating fish, newborns do not eat fish, and it is difficult to prove lack of harm. The US Institute of Medicine initially reported in 2001 that there was insufficient evidence to prove or refute whether thiomersal causes autism, attention



**Fig. 1** Mixed messaging (photo: Jeremy Segrott, Cardiff).

deficit hyperactivity disorder or speech and language delay. In 2004, the Institute reported that the evidence now favours 'rejection of a causal relationship between thiomersal-containing vaccines and autism'. Affluent countries in Europe and North America responded by trying to reassure people that thiomersal-containing vaccines were safe while simultaneously introducing measures to remove it from vaccines.

Some would argue that excessive school closures during the COVID-19 pandemic, despite evidence showing children are not major transmitters of SARS-CoV-2 and when closing schools harms children and their families,<sup>8–10</sup> is another example of excessive application of the precautionary principle.

These examples show the way in which the precautionary principle, although laudable in theory, may undermine trust and cause confusion in practice. In particular, invoking the

precautionary principle – especially temporarily whilst evaluating a risk – can send mixed messages (Fig. 1) with possible long-term harms. Trust is crucial in public health. How can we expect people to trust our reassurance about the safety of an intervention when our actions belie its safety? Taking a highly cautious approach may seem the safest option, when in fact it can have the opposite effect, resulting in massive, long-lasting harm. Common sense says that before making any momentous decision we should take care to weigh up the harms as well as the benefits of invoking the precautionary principle.

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