

The public perception of the value of vaccines - the case of Switzerland

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Abstract

Aim In this original article, we seek to analyse the environment in which immunisation policies are adopted and, more specifically, the way the public perception of vaccines influences decision-making, by looking more closely at the case of Switzerland.

Subjects and methods Historical and present-day examples of attitudes towards immunisation and specific vaccines, both on the part of the public and of health-care workers, are reviewed.

Results Decision-making with regard to vaccine policy implementation has been and is still most often driven by fear: fear of disease (when perceived as rampant and/or dangerous), but also fear of vaccine-associated adverse events (when the disease is less or no longer “visible”). However, methodology for introducing evidence-based immunisation policies exists and can be used by public health authorities, while vaccination information systems (such as the Swiss InfoVac) have proven their usefulness in providing trustworthiness, peer-based knowledge to health-care workers.

Conclusion Only information based on clear, evidence-based data gathered and analysed according to solid methodological criteria coupled with adequate information

of health-care workers (and thus patients) can ensure in future the implementation of scientifically coherent, publicly acceptable, and equitable immunisation policies.

Keywords Evidence-based medicine · Immunisation policy · Vaccine-associated adverse events · Vaccines

Background: public perception of vaccines based on fear

Whether we like it or not, the public acceptability of vaccines is largely dependent on fear. When a disease is perceived as dangerous, people are eager to be protected, even if a varying degree of opposition to immunisation as such has always existed. Many historical examples illustrate this fact. For instance, the ravages wrought by poliomyelitis was the main incentive for over 400,000 American children to take part in what was then (1955) the largest clinical trial of a vaccine (Salk’s inactivated polio vaccine, IPV) (Blume and Geesink 2000). Shortly before (1948–1951) nearly 14 million people were inoculated with BCG within the International Tuberculosis Campaign, despite debate surrounding the efficacy and safety of the vaccine. However, the willingness to use BCG cannot be separated from the dread of tuberculosis, particularly in the aftermath of the Second World War (Comstock 1994; Bryder 1999).

Fear, however, like all emotions, is a subjective and fickle feeling that may not (and indeed often does not) focus on the right target. Whereas the number of people killed in airplane crashes pales in comparison with those

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who lose their lives due to automobile accidents, more people are afraid of flying than of driving. Nor is science the answer to all: how many of us would jump out of an airplane without a parachute, despite the fact that no randomised controlled trial has “scientifically” proven the protection conferred by parachutes when falling through space (Gordon et al 2003)! The same is true in public health and in particular in the area of immunisation.

Following the “epidemiological transition” in most industrialised countries (i.e. chronic diseases come far before infectious diseases in terms of causes of death), the fear of vaccine adverse events now outweighs the fear of the diseases themselves, in large part because these diseases are no longer visible (paradoxically) thanks to vaccination. And yet if one considers the World Health Organisation (WHO) European objectives regarding vaccine-preventable diseases, even a country like Switzerland has reached only three goals out of eight (see Table 1).

Research has shown for instance that 4 months after 11 September 2001 over 65% of Canadian adults would have readily agreed to be immunised against anthrax and more than 50% against smallpox, regardless of the fact that their exposure to such diseases was nil. In contrast, only a little over 37% would have agreed to be vaccinated against HIV (Ritvo et al 2003), probably because they considered themselves as not exposed and/or because of treatments being available (regardless of their severe side effects, often underestimated or unknown to the larger public), HIV Aids is increasingly regarded as a chronic, non-fatal disease. Another variation on this theme can be seen in France where parents whose children were vaccinated against hepatitis B virus (HBV) during the 1994–1998 campaign as well as parents whose children were over 18 years of age in 2003 had a more favourable attitude towards the HBV vaccine than other parents. This can be attributed at least in part to the fact that they were not confronted with the dilemma of vaccinating or not their offspring following a nationwide scare that HBV vaccine caused multiple sclerosis and a variety of autoimmune diseases (Balinska and Léon 2007).

Table 1 Public health immunisation goals set for Switzerland and accomplishments (2007)

Diseases	Target	Result
Diphtheria	Elimination	Yes
Tetanus	Elimination neonatal	Yes
Poliomyelitis	Elimination	Yes
Pertussis	Incidence <1/100,000	No
Measles	No deaths	No
	Incidence <1/100,000	No
Rubella	Elimination pregnant women	No
	Elimination congenital	No
Mumps	Incidence <1/100,000	No

This again shows just how fickle fear is. In addition, our memory is short: need we remind ourselves that fear of bioterrorism (anthrax, smallpox...) following “9/11” was soon replaced by fear of SARS in 2003 and of pandemic influenza in 2005. Predicting which fear will come next is indeed challenging.

In Switzerland, over 90% of parents fear meningitis, tetanus, and polio because of the possibility of brain damage, but only 30 to 40% are afraid of pertussis, measles, mumps, or rubella for their children. As a result, over 96% of children are immunised against the first three diseases, whereas 15% of 2 year olds are not vaccinated against the four latter. In actual fact, the risk of brain damage in Switzerland is higher for measles than for meningitis, tetanus, or polio.

Fear can be useful, of course, because it helps in introducing a new vaccine - at least to begin with. For example, the implementation of *Haemophilus influenzae* type B (Hib) vaccine was very effective in Switzerland precisely because of the scariness of the disease. As a result, Hib incidence was brought down by 80% in less than 3 years (Mühlemann et al. 1996). But the same fear is associated with meningococcal C disease, whereas its extremely low incidence (only 0.5/100,000) hardly justifies the introduction of a full-fledged vaccination programme. Yet how can we *not* develop recommendations for this much demanded vaccine and how can a physician refuse its administration to the child of anxious parents, especially if the main reason is that the vaccine is “too expensive”? This type of situation raises above all *ethical* issues. In Switzerland, for example, paediatricians confirmed having administered meningococcal C vaccine to their own children while not being in a position to offer it to their patients (Postfay-Barbe et al. 2005).

As a result of the success of the Hib immunisation programme, parents and physicians have not been confronted with the disease in the past decade, and some of them “logically” conclude that vaccination is no longer necessary, or at least as necessary as it was. The question may be raised as to what will occur 20 to 30 years hence if we are effective in introducing human papillomavirus vaccine (HPV) immunisation programmes. It is perfectly reasonable to predict that it will be increasingly difficult to convince parents to have their adolescent girl immunised against cervical cancer, a disease which will have vanished, if not disappeared.

In contrast, rotavirus gastroenteritis is an extremely common form of diarrhoea in young children and therefore not perceived as dangerous. Although rotavirus constitutes an important disease burden throughout the world (with high mortality in developing countries), the actual number of ensuing deaths is negligible in privileged countries where access to medical care is as rapid as in Switzerland.

Nevertheless, the REVEAL study has estimated that 23.6 million children in the European Union are effected by rotavirus gastroenteritis (RVGE) every year, resulting in some 231 deaths, over 87,000 hospitalisations, and about 700,000 outpatient visits. Seasonal peaks of RVGE are an important cause of hospitalisation for small children, incurring heavy direct medical costs; thus, the introduction of an effective immunisation programme could greatly decrease both distress and costs (Gabutti et al. 2007).

It goes without saying that decisions based on fear are not always wise. In spring 2003, an outbreak of measles in Switzerland resulted in 671 cases, leading to 15% of complications, including 4 cases of encephalitis. In 2007, more than 1,000 measles cases were again reported in an outbreak that lasted for more than a year (Richard and Spicher 2007) and is still ongoing with more than 2,300 reported cases by March 2008. Switzerland is hardly an exception: measles outbreaks have been reported in the Netherlands (1999–2000, 3,292 reported cases in which 94% of the patients had not been vaccinated) (Van den Hof et al 2002), in Campania, southern Italy, (2002–2003, some 20,000 cases with more than 5,000 associated hospitalisations) (Filia 2007), France (2003, 89 cases in Marseilles with a shift to older persons) (Zandotti et al. 2004), and Germany (2003: 246 reported cases in the western part of the country with 52 hospitalisations) (Eurosurveillance Editorial Team 2006). Reasons for insufficient coverage may range from fear of adverse events (such as in the UK) to problems of accessibility (such as in southern Italy) or to a preference for “natural” medicine (the Netherlands, northeastern Switzerland, and southeastern France). And once again, we face not only an epidemiological problem, but an ethical dilemma, for as one author rightly put it: “unvaccinated clusters pose a risk to themselves and to surrounding vaccine-accepting individuals” (Van den Hof et al 2002). In addition, as time has shown, the use of effective vaccines reduces disease burden and thus the fear of those diseases.

In privileged countries where public health systems are able to offer a large range of preventive vaccines to almost all children, fears may select the wrong targets. Besides specific vaccine “panics”, such as HBV vaccine and multiple sclerosis in France, or Measles-Mumps-Rubella (MMR) vaccine and autism in the UK (spreading to other English-speaking countries), there is more and more talk about the possible relation between vaccines and various worrying conditions or concepts, most of which have been refuted or shown to be highly improbable on the basis of available scientific evidence. These fears include vaccines and “immune overload” (Gregson and Edeman 2003; Offit et al. 2002), vaccines and allergies (Sanchez-Solis and Garcia-Marcos 2006; Koppen et al. 2004), vaccines and autoimmune diseases (Mikaeloff et al. 2007a, b), not to mention suspicions raised

over adjuvants (such as mercury and aluminium) (Goriely and Goldman 2007; Siegrist 2007; Davies et al. 2002; Wolfe et al. 2002; Zimmerman et al. 2005) or AIDS (Elswood and Stricker 1994) and cancer. The more recent “epidemic” of obesity in children has also been related to vaccines. And yet the fact remains that the risk of severe adverse events with current vaccines is estimated at 1 to 10 per million. These include anaphylaxis (0.5/million), vaccine-attributed paralytic poliomyelitis (VAPP) due to oral poliomyelitis vaccine (OPV) (1.3/million), and acute demyelinating encephalopathy (1/million?) (Chen 1996). It has thus become clear that the public perception of vaccines challenges the health of the population at large.

We will still be working for at least another century on the problem of coincidental (or temporal) association between vaccine administration and disease states. Influenza vaccination was briefly suspended in Israel following four deaths temporally associated with the vaccine, until all causal relationship was ruled out [Influenza team (ECDC) 2006]. These kinds of problems will necessarily increase as the number of new vaccines rises.

One way of dealing with them is to develop statistics on background occurring diseases (number of cases, deaths, etc., expected in the target population regardless of intervention), as for example has been done in view of HPV vaccine introduction in Switzerland (Siegrist et al. 2007). By computing the use of medical resources one can monitor an entire range of illnesses affecting the target population, which remains beyond the reach of cohort studies. A more difficult challenge is how we, health professionals, should explain relatively complex notions such as time and space clustering, temporal associations - not to mention the difference between adverse events following vaccination (which may or may not be linked to the vaccine), and vaccine adverse effects (recognised undesirable effects usually affecting a very small minority of individuals). These questions are all the more crucial since a number of chronic diseases are on the rise for reasons unknown to us (diabetes mellitus, autoimmune diseases, etc.). Fears are often specific to countries and/or cultures, but are also perfectly capable of crossing frontiers, particularly with the growing phenomenon of information seeking on the Web.

Finally, over the past 50 years faith in religious and health authorities and trust in politicians has decreased importantly. This can be attributed to a number of reasons, including HIV-contaminated blood scandals, “mad cow” disease, “patient” status veering more and more towards “client” status, as well as the confusion between access to information, increasingly easily available on the Web, and appropriate validation and use of such information.

The one way forward thus remains evidence-based decision making.

The need for evidence-based public health decisions

New vaccines must be evaluated in a comprehensive and systematic way, based on available evidence. This is not as easy as it might seem. Decision-making regarding new vaccines needs to follow criteria that are not influenced by labile public fears, lobbying influences of profit-seeking industries, audience-seeking media, personal expectations from members of Advisory Committees, and competing political or financial priorities. The evaluation of new vaccines must be comprehensive, systematic, evidence-based, standardised, and reproducible. It must be capable of assuring the homogeneity and equity of immunisation programmes, taking into consideration societal factors such as acceptance and equity in access to health prevention measures. This is not an easy task.

Analytical frameworks for evidence-based vaccine recommendations have been developed and should be used. Health Canada provided a useful list of such recommendations, which was adopted and adapted by Switzerland in 2004 (see Table 2). Similar parameters are included in other frameworks, whether public or not. Different sorts of scenarios could be cited when describing the prevention of disease through the use of vaccinations. For the purpose of the examples being illustrated in the present article, we present three such scenarios.

In the first scenario, the public health benefit of vaccination is greater than or equal to the individual benefit. Four kinds of diseases enter into this scenario: severe diseases with high incidence (for example, polio in the 1960s or HPV-associated neoplasia nowadays), severe diseases with low incidence but no other effective means of prevention or treatment (for example, hepatitis B in certain countries), transmissible diseases currently controlled but requiring that a high vaccine coverage be maintained (for example, diphtheria), and transmissible diseases requiring a high vaccine coverage in order for society to benefit from herd immunity effects (for example, measles and pertussis).

Table 2 An analytical framework for evidence-based vaccine recommendations

Disease burden
Vaccine characteristics
Potential immunisation strategies
Cost-effectiveness
Acceptability of immunisation programme
Feasibility of immunisation programme
Capacity to evaluate the programme
Open research questions
Equity of the programme
Legal considerations
Conformity of the recommendations

In the second scenario, the benefit of vaccination is limited to certain well-defined high-risk groups. This means groups of individuals at greater risk of complications owing to their age or underlying conditions (immunodeficiency, certain chronic diseases, etc.) and consequently more likely to develop complications due, for example, to influenza. But there are also groups who are more exposed to diseases than others: for example, health-care workers (here again one can cite the examples of hepatitis B and influenza viruses), occupational risks (teachers, social workers, and tuberculosis), or people travelling from a specific disease-free country to a country where that disease is prevalent (for example, yellow fever).

Finally, in the third scenario, the individual benefit is greater or equal to the public health benefit. Such a scenario concerns severe diseases with low incidence (for example, meningococcal C disease), less severe diseases in that they very rarely cause permanent sequelae but occur at a high incidence in individuals without defined or controllable risk factors (for example, rotavirus gastroenteritis), and less severe diseases lacking alternative methods of prevention and/or treatment (for example, varicella in young children). This third scenario raises important ethical issues: if no official recommendations exist for these vaccines, parents will have at best partial information and, more likely, none. It follows that all effective and safe vaccines should benefit from specific evidence-based recommendations in order to ensure the right to information even in the absence of public health benefit - and even if the recommendation is that a vaccine is not “worth” administering to every one. Efforts should equally be made to ensure equitable access to prevention (principally through reimbursement schemes). However, simply to add such vaccines to routinely recommended vaccines that confer both public health and individual benefit carries the risk of seeing parents select vaccines based on the perceived risks of disease. In such a scenario, measles and pertussis vaccines would continue to rank after group C meningococcus vaccines, despite the evidence.

In the face of an increasingly complex context of vaccine preventable diseases, Switzerland felt the need to introduce a new category of recommendations.

1. *Recommended baseline vaccines.* Such vaccines are required for both individual and public health, conferring a level of protection required for the well-being of the population through herd immunity. These vaccines must be recommended by physicians to their patients.
2. *Recommended complementary vaccines.* Such vaccines confer optimal individual protection against well-defined risks without a major public health impact. Physicians must inform their patients of the existence of these vaccines (right to information and choice).

3. *High risk group vaccines.* Such vaccines provide sufficient benefit to certain well-defined patients to justify that physicians make appropriate efforts to identify high-risk individuals belonging to these groups and recommend them.

In order to facilitate this process at all levels, every one has a role to play. Health authorities are there to identify baseline vaccines as targets requiring specific programme objectives (minimal target coverage, surveillance) and facilitate the allocation of resources going beyond vaccines and vaccinators to include promotion. Health-care workers are in a key position to facilitate communication by indicating clearly where the emphasis should be put, i.e. measles-mumps-rubella (MMR) vaccine should come far before meningococcal C vaccine. As for hesitating parents, they naturally focus on issues of individual relevance when making their decisions. For them, their child's health will clearly be placed higher than public health interests. They also have choices to make around optimal protection and minimal injections.

Discussion: evidence-based implementation of vaccine recommendations

Evidence-based recommendations must evolve annually to adapt to an ever changing world. Evidence-based implementation of vaccine recommendations means essentially ensuring that recommendations are supported by the health-care workers (HCW) in charge of their administration. The question is how to gain, improve, and maintain HCW endorsement. In Switzerland, a survey showed in 2004 that 43% of paediatricians based their decision to vaccinate on their own judgement rather than on official recommendations. This illustrates a potentially dangerous situation and the need to support the endorsement of evidence-based recommendations by the HCW in charge.

At the initiative of the Vaccinology Chair of the University of Geneva, Switzerland has developed an expert information network called InfoVac, which was initiated in 2001 and subsequently “imported” and adapted by France (2003), Morocco (2006), and Hungary (2006). The principle and advantage of InfoVac is that it provides direct information to HCW by an *independent* network of immunisation specialists. It is supported and financed by the Federal Office of Public Health, the Swiss Paediatric Society, the Swiss Society of Infectious Diseases, and the Swiss Society of Allergology and Immunology. InfoVac runs an up-to-date website (www.infovac.ch), which has become a recognised direct source of validated information on vaccine-related issues. Physicians faced with a problem

or question regarding immunisation or a specific vaccine can contact InfoVac and are guaranteed an answer from a recognized specialist in vaccinology within 24 to 48 h. InfoVac is appreciated notably thanks to its newsletters to which health-care professionals can subscribe. Information includes newly licensed vaccines, new recommendations, updated epidemiological information (from the Federal Office of Public Health), and product information regarding availability, stock, and batch recalls. The network receives over 2,500 questions per year, around 10% of which concern vaccine safety or adverse events (Cohen and Siegrist 2006). InfoVac also conducts literature reviews on vaccine-related issues and publishes the responses to the most interesting questions it has received during the previous month. A small survey indicating that Swiss paediatricians “follow their own judgement” also revealed that 77% of them relied on InfoVac for the information they need concerning immunisation (Fig. 1). This is a much better score than that reached by official bodies, reflecting greater peer-based than authority-based confidence and suggesting that InfoVac is a model that might be usefully exported to other countries.

Despite the inevitable ups and downs of science and preventive medicine, vaccines have clearly shown their value since the time of Jenner. Future vaccines will not only concern the prevention of infections, but also of chronic diseases, cancer, and addiction. With such a scope for the improvement of public health, we must be able to meet the challenges in terms of research, production, and equitable access. In order to do so, we need to move on now from a fear-based public perception of immunisation to the implementation of evidence-based public health strategies.

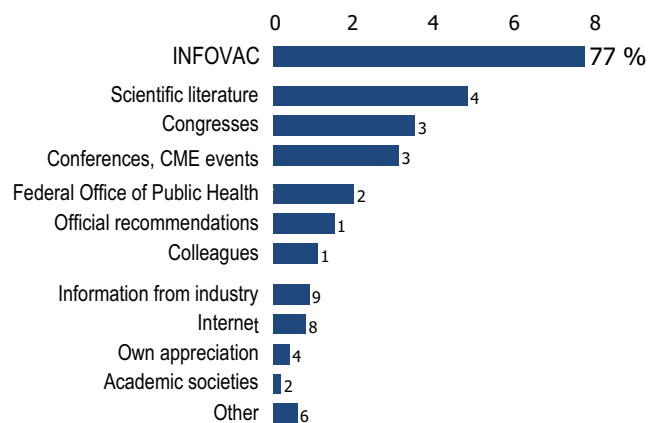


Fig. 1 Where do you get the information you need regarding immunisations? Source: Switzerland, independent telephone survey, November 2005 (n=71 paediatricians), multiple answer questions (Courtesy Wyeth 2006)

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Marta A. Balinska, as an independent consultant in public health, has accepted a contract for editorial work from SPMSD.

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