

# How society should respond to the risk of vaccine rejection

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While vaccine acceptance remains high in general, fear of vaccines has grown dramatically in the past several years in many developed countries. In some communities, this fear has led to significantly increased rates of vaccine refusal which are associated with increases in illness and death from vaccine-preventable diseases, and large economic costs for health care and society. Despite overwhelming evidence supporting the safety and benefits of vaccination, this fear has proven resistant to information campaigns, a phenomenon well-explained by psychological research which has established that risk perception is subjective, a product of both the facts and how those facts feel. Given the innately emotional and instinctive nature of risk perception, and the risks to public health these perceptions produce, and consistent with well-established legal principles supporting government action to protect the common good, society has the right and responsibility to establish laws, regulations, and choice frameworks that discourage vaccine refusal.

What does society do when people take risks that put not only themselves but others in danger? Drunk drivers. Smokers in theaters. People who know they are infected with sexually transmitted diseases but have unprotected sex anyway. Sometimes we try education campaigns, which has some effect, but when these fail to fully eliminate the threat, we pass laws or establish regulations or create economic incentives that, in essence, declare that in the name of the greater common good, enough is enough. It is time to take such steps with declining rates of vaccination.

The case for such a seemingly blunt suggestion rests on three points. First, declining vaccination rates facilitate the spread of illness and death from vaccine-preventable diseases, and not just among those who have declined vaccinated. Those too young to be vaccinated, those who are immunocompromised, and many in whom vaccines have varying degrees of efficacy, are also at risk. Second, vaccine refusal costs society billions of dollars, both in direct health care costs and indirectly in lost productivity and public health spending to curtail disease outbreaks. Finally, because of the inherently subjective nature of the psychology of risk perception, the fear of vaccines is relatively impervious to information about the evidence of vaccine safety. What follows

are just a few details to support each point, and the broader case that it is time for society to act.

In most places around the world where vaccination has been well-established, inoculation rates remain high. But in many communities, vaccination rates, particularly for children, have dropped below thresholds necessary to maintain herd immunity. In a growing number of places there aren't enough vaccinated people to curtail the spread of measles or whooping cough or other diseases should individual cases of those infectious diseases arise.

This contributes to sustained disease transmission, illness, and death. Pertussis sickened more than 9000 Californians in 2012, and killed ten infants, the worst outbreak in 60 y. This followed a decline in DTaP vaccination rates in some communities in California for the previous several years.<sup>1</sup> The same thing, declining pertussis vaccination rates and a dramatic increase of people suffering or dying from the disease, is happening in many states and communities.

And there is evidence directly linking declining vaccination rates to disease outbreaks. A 2008 study in Michigan<sup>2</sup> found that areas with "exemption clusters" where more parents chose not to have their kids vaccinated were three times more likely to have outbreaks of pertussis than where vaccination rates matched the state average.

Measles is another vaccine-preventable disease that is re-emerging as inoculation rates decline. The Centers For Disease Control reported<sup>3</sup> that in the United States there were 220 cases of measles, and 17 outbreaks (three or more cases in a limited location and period of time) in 2011 compared with a median of 60 cases and four outbreaks over the preceding decade.

Fortunately, while the increase in relative risk is worrisome, the absolute number of people who have gotten sick or died from outbreaks of measles and pertussis is still small, though the tragedy for those who have lost infants to pertussis has been enormous. But the threat to society from the spread of preventable diseases is not just about the numbers of victims. Disease outbreaks cost enormous amounts of money. A 2008 measles outbreak in San Diego triggered by an unvaccinated boy infected during a visit to Switzerland exposed 893 people, only 75% of whom had purposefully declined vaccination. 48 children too young to be vaccinated had to be quarantined. Controlling the outbreak, which required quarantining dozens of people, cost the community close to \$900,000.<sup>4</sup> A similar case that year in Tucson Arizona affected 14 people, including seven children, with measles. The outbreak cost two hospitals nearly \$800,000,

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and tens of thousands more were spent by the state and local health departments to track down the cases, quarantine and treat the sick cases, and notify the thousands of people who might have been exposed.<sup>5</sup>

The San Diego and Tucson outbreaks demonstrate that the economic benefit to society of childhood vaccination can be dramatically jeopardized by vaccine refusal. At the national level, that benefit is huge. A 2001 analysis<sup>6</sup> of what the United States saves through standard childhood vaccination found that, after the costs to deliver the vaccines, and the health care costs for the rare side effects that vaccines do cause, society saves nearly \$10 billion in direct medical costs, and \$47 billion in indirect costs like lost worker productivity and permanent disability from disease (That study did not even include the costs to the government's public health system when disease outbreaks occur). Unfortunately, it is clear that most of those who decline vaccination for themselves or their children are immune both to the evidence of the safety of vaccines (save for rare side effects) and to the moral case that their behavior, while it may feel right to them as individuals, selfishly imposes health risks on society in general. Despite education campaigns, the number of parents using philosophical or religious exemptions to avoid having their children vaccinated is small, but increasing.<sup>7</sup> A growing number of pediatricians and family care physicians are struggling with whether to dismiss families from their practices after repeated unsuccessful efforts to educate them about vaccines, in part to protect other sick children in their care from potential disease transmission from unvaccinated children.<sup>8</sup>

It is valuable to explore in a bit of detail what research into the psychology of risk perception<sup>9</sup> tells us about this phenomenon, because it establishes that the perception of risk is inescapably a subjective combination of the facts and, more importantly, how those facts *feel*, which limits how effective any educational effort about the facts of vaccine risk can be. Risk perception research has identified several emotional characteristics that bear directly on fear of vaccines;

- Risks to children, the core of the current fear of vaccines, evoke much more concern than the same risk to adults.
- People intuitively weigh risks against benefits, and the benefit of vaccines has gone down precisely because they have been so effective. With vaccine-preventable diseases now uncommon, the risks from vaccines (real or purported) have become more emotionally compelling. (This will of course shift dramatically should uncommon diseases become more widespread, but that would be a destructive way to reverse the way people feel about vaccination.)
- Risks that are imposed evoke more worry than risks we take voluntarily. Many who oppose vaccines frequently say they object, in part, because vaccination feels imposed, despite the many options people have for opting out. You can hear this in the remark from anti-vaccine leader Barbara Loe Fisher, "The battle we are waging will determine what both health *and freedom (my emphasis)* will look like in America."<sup>10</sup>
- Risks that are human-made worry us more than risks that are natural. Many opponents of vaccines, particularly in more affluent and educated liberal communities where

environmentalism is strong, say they're willing to accept the natural risk of the disease to avoid the human made risk of the drug. One parent in a recent documentary said "As a parent, I would rather see my child get a natural illness and contract that the way that illnesses have been contracted for at least 200,000 years that homo sapiens have been around."<sup>11</sup>

- The less control we feel we have over a specific risk, or over our lives in general, the more worried we are likely to be. The desire for control helps explain the passion of powerless parents with permanently disabled children who are understandably desperate for any explanation for why their kids have autism, information that might promise treatment or even a cure, which means something could be done.

- Risks produced by people or institutions we don't trust evoke more worry. Trust is inherently low in for-profit organizations like vaccine manufacturers, and in government, who some feel have selfish interests in allaying public concern about vaccination. Further, we are naturally mistrustful of those who imply that our fears are 'irrational' or wrong, or that people whose fears don't match the facts are just being ignorant. This is often implicit, and frequently explicit, in the messages of many vaccine advocates.

Many in the vaccine community claim that the fear of vaccines is caused by the news media. There is certainly some truth in this. Modern concern about vaccines is tied to a paper by Dr Andrew Wakefield in *The Lancet*<sup>12</sup> (since retracted, but available at the website of a journalist who has written a history of Wakefield's paper<sup>13</sup>). But that paper in fact found no link between MMR vaccine and autism, as is widely believed, stating "We did not prove an association between measles, mumps, and rubella vaccine and the syndrome described." In fact, it was widespread media coverage of some claims Wakefield subsequently made to reporters that set this fear in motion, creating a controversy the press magnified and repeated for years. (The Columbia Journalism Review published a critique of the role of press coverage of Wakefield's claims in fueling the fear of vaccines.)<sup>14</sup>

But this coverage did not create the fear of vaccines. It only spread and magnified an intrinsic fear that is historic, and rooted in the psychological characteristics described above. What the news media really do is not create fear but magnify it by emphasizing the emotional characteristics that make the risk more alarming; in the case of vaccines, the danger to children, the apparently greater risks than benefits, mistrust of pharmaceutical companies and government. That makes the risk more alarming and any story about it more likely to attract people's attention, the goal of reporters who want their stories on Page One, and of editors and owners who want to sell tomorrow's Page One.

So the fear of vaccines is contributing to the transmission of vaccine-preventable diseases and raising the risk of illness and death for many more people than those who have declined vaccination for themselves or their kids. It is costing society tens of millions of dollars. And it is impervious to education. It is therefore justifiable in the name of public health for society to act. The question then becomes, how. Below are a few potential solutions, each with pros and cons and details that require careful reflection and open democratic debate.

• Perhaps it should be harder for parents to opt their children out of vaccination, Several states have taken or are considering just this step. Vaccination is mandatory for school children, but parents can easily get around these requirements by claiming either religious or philosophical objections. In most cases this involves no more than simply signing a form. Some states are considering what California has already done, making things a bit more difficult by requiring parents who claim these exemptions to document that they have spoken to a medical provider about vaccines. Other steps might include requiring parents to provide documentation that supports their religious or philosophical claim. In the case of religious exemptions parents might be required to provide a letter from their faith community leader explaining the conflict between that faith's beliefs and vaccination. For philosophical exemptions parents might be required to provide a full letter of explanation justifying the philosophical grounds for their choice (Some argue for the abolition of a philosophical objection. The literature on the psychology of risk perception suggests this would be a mistake, because denying people choice about a risk often makes the fear of that risk greater. Complete elimination of philosophical grounds is like to inflame anti-vaccine passion and fuel greater mistrust in the public health community). There is evidence that making it just a bit harder to opt out may have an impact. A study in the United States found that in places where it is harder to opt out, fewer people do.<sup>7</sup>

• Economic incentives can play a role. Perhaps there should be higher healthcare/insurance costs for unvaccinated people, or "healthy behavior" discounts for people who *do* get vaccinated, paid for societal savings from vaccination." This concept is already followed to encourage other behaviors, e.g., health insurance discounts for people who don't smoke or who exercise, automobile insurance discounts for drivers with good safety records.

• There could be restrictions on the community/social activities in which unvaccinated people can participate. For example, communities might want to consider limits on the participation of unvaccinated students in multiple-day field trips in which classmates share close quarters, increasing the likelihood of spreading communicable diseases. This could be done with something as simple as requiring parents to have their unvaccinated children medically examined just before such a trip to certify that they are free of vaccine-preventable infectious disease. The parents of children who travel with their classmates regularly, such as those on sports teams or in extra-curricular clubs or groups, might be required to verify more frequently that their unvaccinated children are free of vaccine-preventable infectious disease,

• Mandatory vaccination policies might be expanded for adults, particularly for those who work in certain fields, certainly including health care workers who have direct contact with patients (It is remarkable that this is not already the default, but it is beginning to become more common, such as mandatory seasonal influenza vaccination for employees who have direct patient contact in hospitals). Other workers who might be required to be vaccinated might include transit workers who have regular and

close contact with the public, employees who prepare or serve food, and teachers. Such requirements are consistent with other health mandates such workers already face in order to get and hold their jobs.

None of these ideas are onerous. They don't completely eliminate the choice of parents to decline vaccination for their children. Vaccination requirements for certain workers builds on well-established practice. That can be instituted with flexibility that recognizes the unique nature and clinical specifics of each vaccine-preventable infectious disease. These ideas are all well within the norms of what government and employers already do to protect worker and public health and safety. In fact, these suggestions are far more flexible than many more stringent legal and employment sanctions that already ban other risky behaviors people take that endanger not only themselves but those around them (cell phone use while driving or operating dangerous equipment, smoking in public areas, for which some employees can be terminated).

Nor is this a call for bigger or more intrusive government. This is about calling on government to do no more than what it is there for in the first place: to play its part in protecting us from the actions of others when as individuals we can't protect ourselves, just as public health departments (and police departments, and the legal system, and regulations on business) already do in so many ways.

Certainly all of these ideas would have to be considered in more detail than can be presented here. They are proposed not as a specific plan of action, but to offer suggestions and spark discussion in support of the larger case. The fear of vaccines has become entrenched due to the inherently subjective nature of the psychology of risk perception. It has proved resistant to education and support programs, and it is now contributing to the resurgence of vaccine-preventable diseases, and to the spread of illness and death, as well as significant economic costs. It is time for society to take concrete action to reduce the threat to all of us posed by the growing number of people whose choices about vaccines are putting the rest of us at risk.

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#### Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

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