Vaccine Policy and Practice in the U.S.

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Vaccines have been tremendously successful in reducing both morbidity and mortality, particularly among young children. Government-sponsored vaccination programs have eliminated smallpox – once a devastating communicable disease – and they have nearly eradicated polio. In the U.S., cases of measles, tetanus, mumps, and polio are now rare, and there has been a substantial reduction in the incidence and mortality of almost all vaccine-preventable diseases. The combination of vaccines and antibiotics along with improved therapies, nutrition, and sanitation nearly doubled Americans’ average expectancy over the course of the twentieth century, and they have substantially reduced childhood illness and death.¹

Despite their demonstrable efficacy, vaccines and particularly compulsory vaccination laws have long aroused anxiety and resistance among some Americans, and there has been organized resistance to compulsory vaccination in the United States since at least the late nineteenth century. For most of this time, resistance has been limited to a few relatively small religious sects or political ideologies, and both state legislatures and state and federal courts have upheld the importance of state-ordered vaccination against certain communicable diseases. However, over the last two decades, the emergence of anxieties about unintended consequences from vaccines has spurred a much more diffuse and widespread resistance to compulsory vaccination in the United States.

The modern vaccination schedule

By the late twentieth century, the modern vaccination schedule had evolved to include two lists of vaccines: the state-mandated vaccines and the federally recommended vaccines. The list of state-mandated vaccines, was smaller and varied slightly by state. State legislatures require these vaccines for children enrolled in K-12 schools and, in most states, children who under the care of a licensed daycare provider. The recommended vaccine schedule is presented by the U.S. Centers for Disease Control (CDC) and includes all of the state-mandated vaccines plus a handful of additional recommended vaccines. The CDC’s recommendations help inform state policies on the adoption of new vaccines onto the state-mandated lists and they guide the day-to-day practice of pediatricians and family practitioners in recommending vaccines to patients and parents. Combined, these two lists make up the modern childhood vaccine schedule.²

Over the last twenty years, the routine childhood vaccination schedule has grown considerably. In the 1980s, most American children were expected to be vaccinated with three vaccines (DPT, MMR, and the oral polio vaccine) against seven diseases (diphtheria, pertussis, tetanus, measles, mumps, rubella, and polio). In the latter half of the 1980s, vaccines against hepatitis B and haemophilus influenza type b were added to the routine vaccination schedule. The 1990s saw the introduction of vaccines against rotavirus and the chickenpox as well as the replacement of the oral polio vaccine with the inactivated polio vaccine. In 2002 and 2003, authorities added the annual influenza vaccine, the pneumococcal conjugate vaccine, and a vaccine against hepatitis A to the schedule. So, between 1985 and 2007 the routine vaccination schedule increased dramatically: in the 1980s, a fully vaccinated six-year-old child received six or seven vaccinations. Twenty years later, a fully vaccinated six-year-old received about three dozen vaccinations, most of them in the first 18 months of life. Today’s vaccine schedule calls for as many as six vaccinations at the two month check-up and five more at the four month checkup.

Opting out

As the modern vaccine schedule has evolved, so too have avenues for exemptions. By the beginning of the twenty-first century, parents had as many as three different ways to opt out their children from

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¹ See, for example, “The Necessity of Vaccines,” Nature Reviews Microbiology 8 (2010).

state-mandated vaccines. Every U.S. state allows parents, with doctors’ authorization, to forego state-mandated vaccinations if a doctor determines that one or more state-mandated vaccines are medically inappropriate for a given child. Some children have medical conditions or allergies to vaccines or certain components in vaccines that cause adverse reactions. Other children’s health may be too compromised to tolerate routine vaccinations. In these cases, a parent can receive a medical exemption from mandated vaccines for a child. Over the last decade, and increasing number of so-called “vaccine-friendly” doctors have emerged who are more willing than other physicians to exempt children from routine vaccinations. The Internet has made it much easier for parents to identify and patronize these physicians in order to have more control over their children’s vaccination schedule.³

All but two U.S. states – Mississippi and West Virginia – allow parents to apply for religious exemptions to allow their children to avoid state-mandated vaccines. In the past, there were a handful of religions – most with relatively small membership – that had theological justifications for avoiding vaccination. The largest among these was Jehovah’s Witnesses, which had a theological prohibition on blood transfusions that led some members to forego vaccines. Any formal prohibition for members of the faith, if there ever was one, no longer exists. Other religious groups – such as the Amish and followers of Christian Science – likewise have no pronounced theological opposition to vaccination, but the cultural norms of many of the groups’ members lead them to forego at least some vaccinations. In 2005 the Vatican’s Pontifical Academy explored the theological dilemma of the use of vaccines that were researched or manufactured with the use of cells from aborted fetuses. After analysis, the Vatican urged followers to avoid vaccines that were produced using products derived from aborted fetuses by asking their medical providers to use vaccines that were produced without the use of morally problematic products. Fourteen different commonly used vaccines were researched or produced using cell lines that originally came from aborted fetuses. Unfortunately, only seven of the fourteen vaccines have acceptable alternatives. The Vatican concluded, “it is right to abstain from using these vaccines” only “if it can be done without causing children, and indirectly the population as a whole, to undergo significant risks to their health.”⁴

The third and the newest type of vaccine exemption available to American parents is the philosophical exemption. Nineteen U.S. states – including some of the most populous states like California and Texas – allow parents to claim a philosophical exemption to state-mandated vaccines. A philosophical exemption does not rely on theological, scientific, or medical justifications for a parent’s refusal to vaccinate their child with a state-mandated vaccine. Moral and personal beliefs are typically enough to justify a philosophical exemption. In some states, these exemptions are easily obtained by completing a simple form. In others, the form must be notarized or submitted to appropriate authorities. It appears that the easier it is for a parent to obtain an exemption, the more likely their child will be undervaccinated.⁵

Over the last two decades, as the routine vaccine schedule has grown longer, increasing numbers of parents have opted to take advantage of exemptions


from state-mandated vaccines. Reports vary, but it appears that somewhere between 10% and 15% of American parents have sought exemption from one or more state-mandated vaccines. About 40% of parents report that they have consciously chosen to refuse or delay one or more vaccines from the recommended list. The increasing number of non-compliant parents worries health officials, especially because parents seeking exemptions tend to cluster in certain communities. For example, about 18% of the children on Vashon Island in Washington state, which is located in the Puget Sound between Tacoma and Seattle, are under-vaccinated. Similar clusters can be found in Boulder, Colorado and Ashland, Oregon, where exemptions for some vaccines are as high as 66%.

**Roots of vaccination anxiety**

Historically, the increasing rates of non-compliance have corresponded with the growing number of state-mandated and recommended vaccines. Shortly before the turn of the twenty-first century, concerns about vaccines left the handful of relatively isolated natural health, libertarian, and religious communities that had long harbored vaccine resistance and were taken up by mainstream Americans. Concerns about adverse side effects to vaccines made the leap from the fringe to the mainstream in the late 1990s when two entirely separate issues emerged: Thimerosal and the MMR vaccine, both of which were alleged to cause or trigger the symptoms associated with autism.

Concerns about Thimerosal arose in 1997, when the reporting requirements of the 1997 Food and Drug Administration Modernization Act revealed that many of the routinely administered childhood vaccines contained Thimerosal, a mercury-based preservative that had been routinely used in vaccines since the 1930s. After decades of public service campaigns that informed parents of the dangers of heavy metals like lead, mercury, and nickel, the revelation that doctors were intentionally injecting mercury into children was shocking. There was, however, no scientific evidence that Thimerosal was hazardous in the same way that the mercury released by coal-fired power plants and found, for example, in some fish. Closer study revealed that the mercury in Thimerosal was of an entirely different nature than the mercury released with the burning of coal. Nonetheless, in 1999 the CDC and the American Academy of Pediatrics advised that vaccine manufacturers begin producing mercury-free formulations of childhood vaccines with the goal of entirely phasing out Thimerosal from the vaccines routinely given to children.

Emerging at the same time as the number of children diagnosed with autism spectrum disorders was rapidly increasing, the realization that many childhood vaccines contained the mercury-based preservative lead to widespread concern that vaccines were somehow involved in causing or triggering autism in children. The symptoms of mercury poisoning shared many similarities with the constellation of symptoms associated with autism, and the diagnoses of autism was often made in children in the months or years after they had received the bulk of their childhood vaccinations. Published scientific studies over the last decade have failed to find any causal association between Thimerosal and autism spectrum disorders, and the rate of diagnoses of autism has continued to rise even after Thimerosal was removed from childhood vaccines. Nonetheless, the initial surprise of learning that childhood vaccines contained mercury combined with the correlations in time among vaccinations and the onset of symptoms as well as the
similarities in the symptoms of mercury poisoning and autism, led to widespread public concern about the safety of childhood vaccines.

The second issue that emerged in the late 1990s that heightened concerns about potential adverse side effects to vaccines began when British researchers reported finding evidence of the measles virus in the intestines of some children diagnosed with colitis. Most of these children, the researchers reported, also had developmental disabilities that were classified as autism. In a 1997 article in the Lancet, Britain’s premier medical journal, the researchers offered an early report of a potential link between measles-induced gastrointestinal ailments and developmental problems in the dozen children they had studied. In a press conference that accompanied its release, the article’s lead author, Andrew Wakefield suggested that the only possible way in which measles could have found its way into these children’s intestines was through the combined measles-mumps-rubella vaccine that they had received. He suggested that as a precautionary measure, parents might consider separating the three vaccines and giving them one at a time rather than in the combined form. His comments and his subsequent actions ignited a widespread public and professional debate about the safety of not just the measles-mumps-rubella vaccine, but all childhood vaccines. Over the last decade, Wakefield has been vilified by the American and the British medical communities, convicted of medical misconduct and stripped of his medical license. The article that started the debate has been retracted by the journal and most of its authors have admitted it was in error.9

Since the early 2000’s, biomedical researchers and public health officials have published dozens of studies discrediting the alleged association between autism and vaccines. One of the earliest and most widely cited was a 2002 study that examined the medical records of more than a half-million children in Denmark to determine if there were differences in the rate of diagnoses of autism in fully vaccinated children as compared to children who were partially vaccinated or unvaccinated. It found no higher rates of autism diagnoses in fully vaccinated children, and it found that there was no temporal clustering of diagnoses in the time periods following vaccination. The Danish study was followed by others that generated the same conclusion: there is no evidence that a particular vaccine or any combination of vaccines causes or triggers the symptoms associated with autism. Nonetheless, concern by parents that vaccines may cause harmful unintended side effects remain and appear to motivate increasing numbers of parents to refuse to allow their children to be vaccinated.10

**Addressing vaccination anxiety**

Wakefield and the occasional Hollywood celebrity who wandered into the public controversy over the safety and efficacy of vaccines are routinely blamed for causing parents’ anxieties about vaccines. But, in fact, they merely give voice to the fears of a large and apparently growing number of American parents about the modern vaccination schedule. There are a myriad of reasons why parents might feel anxious about allowing their children to be vaccinated, many of them perfectly reasonable. The rapid growth in the number of mandated and recommended vaccines is often cited by parents as a reason for their concern, as are the high number of vaccines administered at a very young age. The occasional revelation about ethical misconduct by pharmaceutical companies and concerns about inappropriate relationships between vaccine researchers, policy-makers, and drug companies have likewise increased parents’ anxieties about the

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safety of vaccines. In the midst of these broader issues are the day-to-day frustrations that many patients and parents experience with the American medical system, which many people believe is badly broken. These issues, and not the social authority of an otherwise unknown British researcher or the beliefs of a B-movie actress, are why authoritative statements about the safety and efficacy of vaccines has done little to calm vaccine-anxious parents.

The path forward to a vaccine policy and practice in which as many American children are vaccinated against as many vaccine-preventable diseases requires direct engagement with the issues that animate parents’ anxieties. Regardless of whether or not parents’ anxieties about vaccines are reasonable or well-founded, it is difficult to get around the tremendous amount of evidence that asserts that vaccines are both safe and effective at preventing illness and death from a number of communicable illnesses. Nonetheless, their actual concerns – and not a caricature of them or allegations that they are motivated by unstated anti-science sentiments – must be individually and directly addressed to maintain the high level of vaccine compliance that we enjoy and that we depend upon to keep vaccine-preventable diseases at bay.

**Highlights**

- Despite tremendous evidence that the evolving routine childhood vaccination schedule has led to substantial health improvements, an apparently growing number of American parents are increasingly concerned about allowing health care providers to inoculate their children.

- Recent fears that vaccines, either particular vaccines or vaccines in combination with one another, may cause significant unintended side-effects emerged in the late 1990s in Britain around the assertion that the measles-mumps-rubella vaccine might lead to neurological damage and in the United States around concerns about a mercury-containing preservative, thimerosal, in childhood vaccines.

- The modern vaccination schedule has grown significantly in the last twenty years, and today a fully-vaccinated six-year-old child will have had nearly three-dozen inoculations, most of them in the first 18 months of life.

- State legislatures have responded to rising public concerns about unintended consequences from the increasingly large vaccine schedule by easing the process by which parents can obtain exemptions for their children, which has led to increasing numbers of children who have not received their full complement of vaccines.

**About the author**

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