

What's Behind the Fear of Vaccines?

A closer look at the social, cultural and political issues influencing immunization

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than 3 million childhood deaths worldwide from diphtheria, tetanus, pertussis and measles, to name a few. Vaccines, such as those for HPV and Hepatitis B, have extended those preventative benefits for young and mature adults. And now a new generation of vaccines, ones that harness a body's immune system to treat disease rather than prevent it, are moving through clinical trials and into the marketplace.

Yet for all their existing benefits and future potential, vaccines are still bedeviled by problems of perception and adoption. Patients can be suspicious of vaccines or confused by them, or they can fall into complacency, believing that certain diseases are no longer a threat. Regardless, the overall efficacy of vaccines is largely dependent on coverage, so when coverage dwindles, outbreaks occur. Take for example the recent measles outbreak in Minnesota, which began in a community that was suspicious of vaccines. Vaccine hesitancy also has a subtler and more insidious implication. It dampens the appetite for new vaccines, stifling innovation and robbing patients of better solutions.

"We must help people better understand the enormous impact that vaccines have on the health of the population and we must continue to improve our ability to keep terrible diseases in check through the use of this tool," says William Hearl, the CEO of Immunomic Therapeutics, a clinical stage biotechnology company that is developing its nucleic acid immunotherapy platform to treat cancer, allergies and animal health issues. Immunomic has developed what it calls LAMP-Vax™ technology (lysosomal-associated membrane protein), which has the potential to improve the efficacy of nucleic acid vaccines. And while a LAMP-based vaccine based on Immunomic's technology, which could treat peanut allergies, could hit the market within the next couple of years, Hearl says that vaccine hesitancy is an ever present concern for all those working in his field.

In June, Scientific American Custom Media and Immunomic convened some 40 scientists, policymakers and executives in Washington, D.C. to discuss the promise of new vaccines, along with threats to their development. Below are some of the major takeaways from the evening's forum.

LOOKING BEYOND THE ROOTS OF FEAR

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The first step to improve vaccine uptake is to address the fear that prevents it. But that is more complex than it sounds. "It's not like people fear all vaccines for the same reasons. Throughout history, it was common to believe that vaccines were violating God's way or perhaps violating the sanctuary of the body," says Arthur Allen, author of *Vaccine: The Controversial Story of Medicine's Greatest Lifesaver*. For example, fears can arise from practical concerns, say the modern vaccine schedule, which requires children to receive up to 24 shots before the age of two. Or they can arise from scientific or moral misgivings, as is the case with MMR and HPV.

Not only has the number and complexity of vaccines grown, and with that the possibility of confusion and misperception, but patients are left to sort through that information in an increasingly fractured media environment. In an age of self-publishing and alternative facts, "anyone can go into that rabbit hole and grasp onto the bits of information that fits into other aspects of their belief system," Allen explains. The challenge, then, is to reach across those many groups to address their fears directly. At the same time, healthcare professionals need to ensure that those hesitant or simply complacent about vaccines have access to them, and the incentive to get them.

ACKNOWLEDGING THE ROLE OF INFORMATION

For decades, the communication of reliable, accessible information about vaccines—backed with sound, scientific data—has been central to the strategy of addressing fear and inspiring action. Yet that strategy does not seem to be working as well as it once did. Even with an increase in the amount of information shared—by some counts up to four times more—a national survey of healthcare providers in 2009 found that 43% thought parents' level of concern had greatly increased while 28% thought it had moderately increased compared with levels five years prior.

One solution could be a communications campaign targeted to doctors. According to Phyllis Arthur, Managing Director of Infectious Disease and Diagnostics Policy for the Biotechnology Innovation Organization (BIO), “Patients' parents often cite the recommendation of their health care provider as one of the most important factors in their decision whether to vaccinate.” Doctors need to be incentivized to stand up for vaccines—even with patients that might disagree. They also need to be told how to communicate about them in a way that works.

More and more, communicators are relying on behavioral science to ensure their messages are heard. For example, the Academy of Pediatrics recently published a [guide for pediatricians](#) to discuss vaccines with patients and parents, which emphasizes that vaccines are rigorously tested, safety is continually monitored and the risks associated with skipping or delaying vaccines—yet challenges persist.

Arthur offers an example. “What we've seen, historically, is that if a physician walks in and says, ‘you're going to receive the Hepatitis B shot and the DTP vaccine, and you can also receive the HPV vaccine,’ then there's an implication that one shot is more important than another. A better approach would be stating, ‘these are the recommendations I make for your child or teen today and this is why.’” Arthur adds that following up with a phrase like ‘I had my own children vaccinated’ or ‘I've had the vaccine’ can go a long way when comforting parents or patients.

While such changes can seem nuanced, pursuing communication without a strong methodological approach can actually do more harm than good. A [2014 study](#), for example, found that when parents who are hesitant about vaccines are given more information, their concerns and misperceptions about vaccines increased and they were less likely to immunize their children.

Brian Harvey, executive vice president of scientific and regulatory affairs at the Global Liver Institute, agrees that sound scientific data is key for relaying information and encourages the industry to find creative ways to educate the general public with data. “We need to fundamentally change the way we share scientific information,” he explains. “Most people aren't looking to scientific journals for information, but to Netflix and Hollywood. It's our job to educate the folks in Hollywood, the television script writers, the Kardashians and others who influence our culture with sound scientific evidence so that they can share it accurately,” he says.

WEIGHING PUBLIC GOOD OVER INDIVIDUAL INTEREST

While communication is one lever to address vaccination coverage, public policy is another. Lately

While communication is one lever to address vaccination coverage, public policy is another. Lately, more and more states and countries are pursuing public health policies that aim to increase vaccination rates. Amid measles outbreaks, Italy earlier this year declared that vaccines are mandatory for children as a condition of school registration, and Germany announced it would penalize parents with fines for not vaccinating children. Australia's "No Jab, No Pay" bill mandates that only parents of immunized children can receive credits such as the Child Care Benefit, the Child Care Rebate and the Family Tax Benefit. In the U.S., states like California, Vermont and Washington have recently tightened requirements for using the personal belief exemption, calling for medical exemptions from a doctor for students to skip vaccinations.

This approach has worked. By and large, vaccine coverage increases as mandates are put in place. That has some calling for greater reliance on mandates as a way to short circuit the shortcomings of communication. But Bruce Gellin, President, Global Immunization for the Sabin Vaccine Institute in Washington, D.C. and the former Deputy Assistant Secretary for Health and Director for the National Vaccine Program, cautions against relying too heavily on policy alone. "It is a double-edged sword. Insisting on a mandate can be polarizing, and we're pretty polarized already," he says. Mandates could, for example, work for a while but then inspire a more robust anti-vaccination movement as individuals fight for their right to choose.

CLEARING THE PATH FOR A NEW ERA OF VACCINES

Despite immunization hesitancy, "there will never be a lesser need for vaccines," says Michael Vajdy, president of EpitoGenesis and Director of Vaccines R&D Innovation at the Trudeau Institute. "New pathogens are constantly popping up and older pathogens are changing surface proteins," he explains.

That is why vaccines are undergoing such a swift evolution. Among the many approaches that scientists are exploring, DNA and RNA vaccines are showing particular promise. When foreign DNA or RNA is taken up by a cell and translated into a given antigen protein, it elicits an immune response. If that antigen is associated with cancer or HIV or some other chronic condition, you could train the immune system, in essence, to treat it with a learned immune response.

Immunomic Therapeutics' investigational LAMP-Vax technology, which was developed by Tom August at the John Hopkins University School of Medicine, may improve the body's immune response to nucleic acid vaccines. It is believed that LAMP-Vax diverts target antigens directly to a major histocompatibility complex (MHC II) on antigen-presenting cells, such as dendritic cells, which helps the immune system recognize foreign molecules. "It's a very direct way to teach the immune system about, say, an allergen, virus or bacteria and to then tell the body to attack that molecule," Hearl explains. In the past, during nucleic-based immunotherapy, DNA could get lost in the shuffle. LAMP-Vax is designed to point it in the right direction.

"We started with a focus on allergies as a simple way to show that we could activate the immune system with the LAMP platform, but we've always had our eye on the oncology immunology space," Hearl says. LAMP-Vax is currently being employed in Phase II clinical trials as a cancer immunotherapy.

"These new vaccines show an immense amount of promise, although additional study is needed to confirm the benefits," Hearl says. But to realize that promise, patients, regulators, and clinicians need

to recognize it first.

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