

GETTING BACK ON TRACK

Vaccination, a keystone of public health throughout the world, faces a growing challenge of confidence. Parents and caregivers in many countries have doubts about the safety or value of vaccination (Facciola et al., 2019), and in some communities this breakdown in trust has resulted in vaccine rejection and delays that leave large groups of children vulnerable to sickness and death from vaccine-preventable illnesses. The World Health Organization (WHO) defines vaccine hesitancy as a “delay in acceptance or refusal of vaccines despite availability of vaccination services” (WHO, 2014) and in 2019 declared it one of 10 threats to global health (WHO, 2019d).

Lower-than-optimal vaccination rates arise from a variety of problems, including vaccine shortages, restrictions in the convenience and affordability of vaccines, diminished confidence in government authority structures, and ironically, the very success of vaccines in making vaccine-preventable illnesses less common and

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feared. Because the dimensions of hesitancy are complex and not fully understood, the medical and public health communities and their allies must rapidly expand their understanding of the problem and the actions needed to address it. A global resurgence of measles since 2018 has underscored the pressing need to bolster vaccine acceptance (“Vaccine hesitancy: A generation at risk,” 2019).

Vaccines are a remarkably safe and effective method of preventing deadly and disabling infectious diseases. With the assistance of governments, international and non-profit organizations, healthcare providers, researchers, and community immunizers, vaccination programs have expanded to protect a significant majority of the world’s population against diseases ranging from polio and tetanus to meningitis and pneumonia. Vaccines save some two to three million lives every year (WHO, 2020).

But millions of children—especially but not exclusively those living in areas of conflict and poverty—still miss out on lifesaving vaccines because of a lack of access. Despite the ample base of reassuring evidence behind it, vaccination requires an ongoing, high degree of social confidence and trust in the system that delivers it—including discovery and development;

manufacturing and distribution; and the clinic, nurse, or traveling vaccinator who administers the vaccines—as well as monitoring to ensure that when used broadly in the population, vaccines perform as expected.



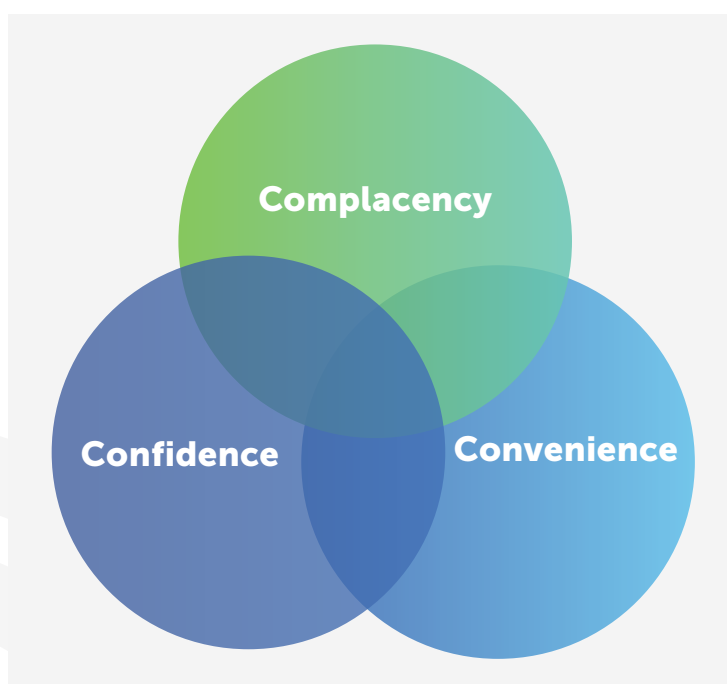
The Sabin-Aspen Vaccine Science & Policy Group (the Group) met at the Aspen Institute in Colorado in September 2019 to examine the trends and drivers of vaccination acceptance and devise approaches to counter the growing trend of hesitancy. Over 3 days, the Group heard from individuals with relevant expertise, including pediatricians with direct experience trying to effectively communicate with parents; officials from global vaccination organizations such as the WHO, UNICEF, the Bill & Melinda Gates Foundation, and the U.S. Centers for Disease Control and Prevention (CDC); scholars in the social and behavioral sciences; and experts on social media. These discussions led to a clear recognition of three points: (1) vaccination levels, after reaching record heights, have plateaued or even declined slightly in many countries (Paules, Marston, & Fauci, 2019); (2) various factors have undermined confidence in or contributed to complacency about vaccination (Wellcome Global Monitor, 2019); and (3) the vaccination enterprise needs new knowledge and tools to overcome challenges to vaccine acceptance.

FRAMING THE CHALLENGE

Vaccination rates are a key indicator of the strength of a country's health care system. Globally, vaccination is a success and has been established as a norm throughout the world. One indicator—coverage with three doses of the diphtheria, tetanus, and pertussis (DTP) vaccine—reached 86% of the world's children in 2018, up from 72% in 2000 and 20% in 1980. Another indicator is measles—a highly contagious infection that can be effectively prevented with two doses of a vaccine that has a long track record of safety and effectiveness—which declined 80% worldwide from 2000 to 2018, saving some 23 million lives. However, in some areas of the developed (Iacobucci, 2019; Paules et al., 2019) and developing worlds (WHO, 2019c), vaccination rates have fallen, setting up the potential for outbreaks.

The potentially catastrophic impact of a loss in confidence in vaccination is nowhere more evident than in the tiny Pacific island nation of Samoa, where a 2019–20 measles epidemic killed 83 people, mostly small children, and sickened more than 5,700 out of a total population of 200,000. The epidemic arose amid a crisis in vaccination confidence sparked by the deaths of two children who had received measles, mumps, and rubella (MMR) vaccines erroneously mixed with muscle relaxant instead of water (Clarke, 2019). Local

The 3 C's of Vaccine Hesitancy: Confidence, Complacency, and Convenience



vaccine skeptics, supported by foreign activists, helped fuel mistrust, contributing to a dismal 31% vaccination rate before the epidemic caught fire (Knowles, 2019).

Human errors such as the one that contributed to the Samoa tragedy directly affect confidence in vaccination programs and acceptance of vaccines, but mistakes of this severity are rare. Meanwhile, access problems—such as low-quality services, poorly designed vaccination campaigns, temporary vaccine shortages, and inconvenient vaccination hours—can stymie even the best-intentioned parents and lead the skeptical, ill-informed,

Source: World Health Organization, 2014; Report of SAGE.

or indifferent to avoid bringing children in for vaccination. A 2014 report by the WHO's Strategic Advisory Group of Experts identified the elements of vaccine hesitancy broadly as convenience, confidence, and complacency (WHO, 2014).

In a world where parents face many challenges in caring for their children, the importance of making vaccination easily accessible can't be overstated. The circulation of false information about vaccines, when combined with faltering trust in the institutions that deliver them, undercuts confidence in vaccination. In places where vaccination, and medicine in general, have lowered the deadliest risks of vaccine-preventable infectious disease, vaccination can come to seem less pressing. Such complacency stands in contrast to incidents such as the novel coronavirus (COVID-19) pandemic, in which the deadly threat of an infectious disease is all too real and immediate, leading to urgent and widespread calls to develop and deploy a vaccine rapidly.

The value of vaccination speaks for itself to those who understand the historical decline of the targeted diseases, but vaccines and vaccination have long attracted skepticism and generated conspiracy theories (Colgrove, 2006). Unlike climate change and evolutionary theory—other

areas where noisy polemics have engendered challenges to scientific fact—vaccination is a tangible and personal issue for every family. As with any complex subject, many people continue to rely on surrogate authority figures to inform their decisions. But in the information age, the internet and social media have brought crushing waves of vaccine misinformation to new parents, raising doubts among enormous groups of people who previously might have been unaware of any “controversy” over this eminently sensible activity.

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There are documented instances where misinformation has directly led to falling vaccine uptake; the publication of fraudulent evidence linking the MMR vaccine to autism, which contributed to a global measles epidemic, is the classic example (Paules et al., 2019). Yet the extent to which misinformation contributes to declines in vaccination is not always clear, in part because comprehensive data describing which communities are under-vaccinated, and why, is lacking.

This hampers an effective response to both the misinformation and the disease. A polarized, politicized, post-fact environment has an undeniable impact both on trust and

on vaccinations. But demand problems may also reflect poor experiences in the clinics of a failing public health system or real or perceived failures in immunization safety. Access, rather than demand problems—ranging from wars and refugee movements to limited clinic hours for two-job parents—can be a further cause of vaccination gaps that officials misattribute to parental hesitation.

While acknowledging these many challenges, the Group’s deliberations focused on improving demand for vaccines. The Group examined findings on why people accept or delay vaccines, or reject them altogether, and explored ways to shape education, communication, and methods of behavioral change to maintain vaccination as a social norm. It also discussed strategies to counter misinformation as it arises in different contexts.

| Trust: Community Immunity Versus Herd Mentality

Trust in vaccination depends not only on the nurse, doctor, or mobile team that administers the vaccine, but also on the authorities who enable and drive vaccination. Thus, vaccine uptake may be threatened in any country, region, or community where there is waning confidence in the government, doctors, or public health officials who recommend, oversee, and mandate vaccination, as Muhammad Ali Pate of the World Bank told the Group. In countries such as Nigeria, Sudan, Afghanistan, and Congo, conflicts and gravely polarized societies have led entire groups to identify vaccinators and their mission with their foes, and

therefore to consider them untrustworthy (Hussain, Boyle, Patel, & Sullivan, 2016). Scores of vaccinators have lost their lives while on the job in these countries (Smith, 2014)—including 95 in Pakistan alone since 2012 (Janjua, 2019). In countries where corruption and violence have created fear, mistrust, or open opposition to government-endorsed vaccination programs, the problem of trust may extend beyond the scope of vaccination policy. That said, public health authorities have managed to convince warring parties in countries such as El Salvador and Colombia in the 1980s, and more recently in Yemen, to give safe passage to vaccination teams (Ferguson, 2019).



Outside regions of conflict, similar trust issues arise in close-knit, semi-autonomous communities that tend to access information through more restricted sources. In some tribal regions in India, for example, a history of neglect has lowered confidence in government-run vaccination programs unless they employ local healers (Priya, Pathak, & Giri, 2020). In the United States, outbreaks of vaccine-preventable diseases have been reported among Amish (Gastañaduy et al., 2018), Somali immigrant (Dyer, 2017), and Orthodox Jewish communities (McDonald et al., 2019) in recent years—not because their religious beliefs or cultural practices are inclined against vaccination, but rather because influential individuals became lightning rods for the spread of anti-vaccine misinformation. Anti-vaccine groups can make inroads through such leaders; by the same token, leaders who are immune to such propaganda can reassure followers and tamp down the influence of falsehoods. During the 2018–19 measles epidemic, vaccine refusal spread quickly through certain Hasidic communities in New York, but an influential rabbi prevented other outbreaks in the area by speaking out for the value of vaccination (Boodman, 2019b).



Decades of assiduous vaccination campaigns have created herd immunity—where the percentage of a population immune to a disease is high enough to prevent its spread—in most U.S. communities, even during the 2018–19 measles epidemic. Smaller pockets of non-vaccinating families were often sheltered within larger, more fully vaccinated populations that kept out disease. However, because of its extreme contagiousness, immunization rates against measles must remain above 95% to provide this community-level protection, which is at risk in many U.S. communities. In

July 2019, Colorado reported that only 87.4% of its kindergartners had documented measles vaccination (Staver, 2019), well below the threshold for preventing an epidemic. In countries such as France and the United Kingdom—as well as Ukraine and Pakistan—the lack of herd immunity has enabled measles outbreaks in broad swaths of the population.

Social Networks and Social Norms

Developing strategies to counter vaccine hesitancy will require the public health community to engage with new disciplines, especially from the social and behavioral sciences, and to improve its communication strategies, building on a base of expanded research into the nature and volume of the hesitancy problem. While the WHO has labeled hesitancy

as a global threat, public health officials lack clear ways to measure it, assess upward or downward trends or their causes, or predict the social and cultural factors that shape hesitancy and how best to counter them.

Work in areas such as behavioral economics and cognitive psychology indicates that people frequently base difficult decisions less on rational processes than values and heuristics—that is, on cognitive shortcuts. The current peril in which vaccination programs find themselves results from the interaction of these basic human foibles with false and misleading information carried on massive social media platforms (DiResta & Wardle, this volume).

What's dangerous about widely broadcast vaccine debates, in a sense, is the debate itself: by putting out misleading information to people with little fundamental understanding of the performance and value of vaccines, the anti-vaccine movement and its social media echo chambers create doubt when, in fact, there is not a true scientific debate (Ropeik, 2013).

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Sociologist Damon Centola (2019) describes anti-vaccine sentiment as a “complex contagion” that requires reinforcement by multiple social peers to reinforce its legitimacy. This process takes place in real and virtual communities when people who don’t understand an issue wait for a subset of their peers to respond to it. Once ideas and images that aren’t supported by the weight of evidence have become accepted parts of a “controversy,” it legitimizes the notion that vaccines may be harmful and creates a bias toward inaction. People in general feel a greater moral responsibility for any harm that comes about through something they have done than for a task they have neglected, and the hypothesized harm from vaccination may appear more immediate than the danger of the pathogens against which vaccines protect. Depending on a person’s awareness of the diseases and confidence in the vaccination enterprise, a vaccination decision may be tilted toward “better safe than sorry” because individuals discount the future benefit of vaccination. Beyond that fundamental decision, external factors that impinge on behavior, such as convenience, incentives, costs, and mandates, also affect vaccination decision-making.

Since 2018, the Global Demand Hub—an international effort involving UNICEF, the WHO, GAVI, the Vaccine Alliance, and other organizations—has worked to improve coordination across the global immunization community. It has been sharing best practices, including gathering data on vaccine demand and hesitancy in low- and middle-income countries in

order to use this knowledge to nudge and support national programs (VaccinesToday, 2019). The Demand Hub also has begun to engage with social media companies to examine the vaccine-related content of searches and conversations.

The group hopes to anticipate problems with vaccine confidence, such as the collapse in measles vaccination in the Philippines after a dengue virus vaccination campaign was suspended. The suspension occurred after children vaccinated during the campaign died, some of them possibly as a result of complex immune responses to the vaccine and subsequent dengue infection (Wilder-Smith, Flasche, & Smith, 2019). The Demand Hub is also focused on the ongoing global polio eradication campaign. While the latter has successfully eradicated wild Type 2 and Type 3 polio strains, its endgame increasingly involves battling outbreaks linked to mutant viruses from the live attenuated polio vaccine and the communication challenges that surround this phenomenon.

| The Mechanization of Doubt

Changes in how people gather and digest science and health information have fed vaccination hesitancy. As local and regional newspapers disappear, internet sites of varying intent and quality provide an increasing percentage of the public's news intake. While newspapers once presented a relatively unitary—and therefore unifying—version of basic political and health facts, the internet fragments information. Search engines and social media companies target readers based on their previous selections under the assumption that they will click on information that interests them already, or perhaps, that confirms their biases (Del Vicario, Scala, Caldarelli, Stanley, & Quattrociocchi, 2017; DiResta, 2018).



While news coverage has always trended toward topics that stimulate fear, doubt, outrage, and polarizing attitudes, journalistic principles of fairness and accuracy, if unevenly achieved, have had a salutary impact on the presentation of health news. A recent survey found that those who rely on social media for news are far more likely than traditional media consumers to be misinformed about the safety of vaccines (Stecula, Kuru, & Jamieson, 2020). This is part of a larger problem of bias confirmation among consumers of social media (Self, 2016).

Anti-vaccine activists, small in number but robust and enduring, can draw on wellsprings of mythology and unease that go back centuries, revolving around ideas of purity and bodily integrity; distrust of science, industry, government, and media; and compelling accounts of childhood injury that parents blame on vaccines (Allen, 2007). For decades, public health essentially ignored the anti-vaccine movement and its theories, concentrating on presenting facts and fact-based information in response to any unsubstantiated theories of harm. But while the core of the movement remains small, the internet and social media allow its ideas to circulate much more broadly than in the past.

Foes of the vaccination enterprise generate fear by claiming that vaccines don't work as well as they are portrayed, contain harmful ingredients, or trigger pathologic processes leading to long-term physical and mental health problems, such as asthma, diabetes, and autism spectrum disorders. Some even claim that vaccines have been intentionally laced with ingredients that cause cancer or infertility. Anti-vaccine communications inevitably include testimony from people whose children have diseases or conditions allegedly brought on by vaccination. Since these maladies infrequently occur during a child's development, such assertions can trigger doubt about the safety of vaccines, leading to inaction or resistance.

Proponents of vaccination have generally been unable to resort to the same tactics when describing the risks of vaccine-preventable illness because vaccinations' very success has greatly diminished outbreaks of disease that would otherwise have provided fodder for powerful messages. Thus, the emotional battlefield is asymmetric—on the one hand, naive parents see serious infirmities that loud voices attribute to vaccines, while on the other, they hear gentle admonitions to continue a procedure whose benefits may be nearly invisible. Public health scientists have demonstrated little expertise in creating stories that generate emotion and engage popular attention, and vaccine foes have manipulated internet search engines to steer people toward false information—in the United States and Europe, as well as in Pakistan, the Philippines, Brazil, Egypt, India, and Nigeria (DiResta & Wardle, this volume).

In the past, social media and search engines generally ranked sites by popularity rather than any evaluation of their worth, meaning parents seeking information about vaccines for the first time were likely to encounter distorted information about their safety before arriving at reliable sources

(Centola, 2019). In addition, anti-vaccine activists on social media have found ways to

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expand their constituency by reaching out to groups with other unconventional, paranoid, or conspiratorial beliefs. As the California legislature moved to tighten restrictions on vaccine exemptions in 2015, for example, anti-vaccine activists repeatedly changed their messaging to attract people interested in tangential controversies and theories, as internet researcher Renee DiResta has reported (DiResta & Lotan, 2015).

Although their contribution to U.S. anti-vaccine messages is small, there are examples of Russian internet activists posting critical comments on social media from “both sides” of the vaccination “debate,” apparently with the intention of sowing further divisiveness in Western societies (Jenco, 2018). However, revelations about the clandestine use of social media to sway audiences, including the massive Russian campaign against the 2016 U.S. presidential election, have led social media companies to begin trying to limit the influence of disinformation on their platforms. Companies such as Facebook, Twitter, YouTube, and Google have recently devoted more resources to nudge viewers toward science-based health information. They have changed the way they present information on vaccination to highlight more legitimate sources, but do not ban or earmark verifiably false information (DiResta & Wardle, this volume; Schiff, 2019).

| Communication and Education

Research is under way to assess how people encounter and evaluate sources of vaccine information and to test communication strategies in different settings. This research is beginning to yield valuable information, but a great deal remains to be learned (Brewer, Chapman, Rothman, Leask, & Kempe, 2017).



Vaccine uptake is influenced by three realms, according to University of North Carolina behavioral scientist Noel Brewer and colleagues: (1) what people think and feel; (2) social processes, such as networks and social norms; and (3) direct behavior change. While thoughts and feelings motivate people to get vaccinated, research has shown that campaigns targeting thoughts and feelings may do little to increase uptake. Interventions affecting social networks and norms are promising but not yet proven. Messaging that reminds parents of the social pro-vaccine norm has had a modest impact, as have social network interventions in which promoters “hang out” with people from similar socioeconomic and educational levels. Interventions that reliably increase uptake focus on changing the behavior without changing what people think and feel or their social experiences. Techniques that have reliably improved uptake, at least modestly, target behaviors—for example, by mandating or incentivizing vaccination, crafting better experiences for first-time visits to providers, or providing reminders (Brewer et al., 2017).

As has been well-documented, the single most powerful way to increase vaccination is through provider recommendations (Smith, Kennedy, Wooten, Gust, & Pickering, 2006). In almost all regions of the world, people who trust doctors and nurses tend to believe vaccines are safe (Wellcome Global Monitor, 2019). In the United States, parents are largely trusting of the providers they encounter at well-child visits, making this an excellent opportunity to win people over to vaccines (Freed, Clark, Butchart, Singer, & Davis, 2011). Provider recommendations are most effective when they assume the parent is ready to vaccinate (Brewer et al., 2017).



However, there are few clearly effective ways to convince parents who have their minds made up before they enter the doctor’s office (Danchin et al., 2018). Because vaccination has dramatically reduced the incidence of vaccine-preventable illnesses in many communities, physicians are less able to vividly communicate their dangers. In addition, the constraints of a busy clinic can make it impractical for immunization providers to talk through parental skepticism about vaccination and allay concerns. These same pressures may increase mistrust if parents feel a physician or nurse is exasperated or impatient about a decision the parent regards as deeply significant.

Because few countries offer medical school students specific training in vaccine communication (Williams & Swan, 2014), each country's practice has its own approach to hesitant parents (Kimmel & Wolfe, 2005). There have also been broader attempts to identify effective communication strategies. Some countries, including the United Kingdom, have designated communicators, such as nurses, in clinic settings (Bell, Edelstein, Zatoński, Ramsay, & Mounier-Jack, 2019). Motivational interviewing—a communication technique that attempts to sway people to make positive decisions—has worked in some instances (Opel et al., 2013). In Quebec, an experiment placed a trained group of individuals in pediatric clinics to listen to parents' vaccination concerns and seek to gently lead them to accepting vaccination (Boodman, 2019a).

But there will be no magic-bullet communication strategy, as there is no proven way to sway hesitant parents or caregivers during clinical visits. No single intervention will convince people who have already made up their minds, nor will it move a

large percentage of hesitant persons to a clear “yes”

(Brewer et al., 2017). The best results will be obtained by framing the vaccination decision and focusing on vaccination uptake rather than philosophical transformation.

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Behavioral Change and Mandates

The most direct way to increase childhood vaccine uptake may be to require it. Vaccination mandates are nearly 2 centuries old, yet while they have been successful in many settings, there are also good reasons to employ them with caution.

Vaccination proponents are leery of mandates in countries where vaccine laws are associated with authoritarian regimes, such as the former Soviet bloc countries (Hoch, 1997), many of which have experienced low levels of vaccine confidence and broad opposition to vaccines as well as logistical failures in vaccination programs (Hadjipanayis et al., 2020). Clearly, mandates are also not appropriate in countries where steady and consistent supplies of vaccines are not always available. Democratic countries or regions that ban philosophical and religious opt-outs altogether are seen as morally bound to adopt correspondingly vigorous vaccine safety and injury compensation programs; to the degree that vaccination is required, there must be guarantees that everything is being done to assure safety and make whole those who suffer adverse events (MacDonald et al., 2018).

To date, the United States has had a relatively positive experience with mandates, which have significantly aided uptake since they began being rigorously imposed in the late 1960s to battle recurrent measles outbreaks in school settings (Hinman, Orenstein, & Papania, 2004). While anti-vaccine activists have increasingly engaged state legislatures, no significant state vaccination mandate has been weakened in nearly 2 decades (Wang, Clymer, Davis-Hayes, & Buttenheim, 2014). To the contrary, outbreaks of vaccine-preventable disease over the past decade inspired legislative efforts to tighten school-entry requirements in at least 24 states. Efforts to loosen strictures failed in Texas (Byrne & Cheng, 2019) and Arizona, while California, Maine, and New York have each tightened vaccine exemption laws since 2015, joining West Virginia and Mississippi as the only states that no longer have religious or philosophical exemptions (National Conference of State Legislators, 2020). States with tighter vaccine exemptions, in general, have fewer outbreaks of measles and whooping cough (Phadke, Bednarczyk, Salmon, & Omer, 2016).

However, efforts to limit exemptions in an era of resurgent measles in the United States have not been an unalloyed success. In Oregon, Colorado, and New Jersey, states where legislative efforts failed, the anti-vaccine groups that turned out in strength to defeat them added to their numbers in the process. The apparent popularity of messages that stressed parental autonomy and libertarian views of public health struck a chord among Republican state legislators. Most of them voted against tighter vaccination restrictions, pointing to a disturbing partisan divide over vaccination mandates. Fortunately, mandates still enjoy nearly unanimous bipartisan support in the U.S. Congress (Allen, 2019).



A group of researchers who have studied hesitancy, mandates, and their impact have put forward what Yale University's Saad Omer calls a "Goldilocks" approach in the form of model legislation: Salmon and colleagues (2005) suggest that states remove laws that specify religious or philosophical objections to vaccination and replace them with policies that allow opt-outs for all parents who strongly object to vaccination. At the same time, these researchers urge the tightening of laws in states where currently it is easier to opt out of vaccination than to take a child to a pediatrician for repeated vaccinations. Evidence from European countries shows that selective mandates for specific vaccines lead people to shun vaccines that aren't mandated (Betsch & Böhm, 2015), while uptake is higher in European countries and regions that have imposed mandates (Vaz et al., 2020).

The segregation of non-vaccinating families poses a quandary on a community-wide scale because it may push them to outlier practices where anti-vaccine opinions and behaviors may become further entrenched.

Some pediatricians in the United States have resorted to dismissing families that refuse vaccination. Practitioners may see it as morally untenable to have an unvaccinated child in their care, or view their removal as necessary to prevent the spread of vaccine-preventable illnesses within their practice.

The American Academy of Pediatrics has acknowledged the right of its members to dismiss families, but urged that any such decision not be taken lightly (Edwards, Hackell, Committee on Infections Diseases, & Committee on Practice and Ambulatory Medicine, 2016). The segregation of non-vaccinating families poses a quandary on a community-wide scale because it may push them to outlier practices where anti-vaccine opinions and behaviors may become further entrenched, while sharpening the risk of vaccine-preventable illnesses among these groups.

Building a Movement for Vaccines

Before engaging in the effort to bolster vaccine confidence, clear objectives are needed. Campaigns to counter hesitancy must consider whether their aim is to blunt the reception of anti-vaccine messages; strengthen the number, type, and volume of pro-vaccine voices; or simply bypass negativism or skeptical voices about vaccination and push to increase uptake in communities where vaccination is still the trusted norm among large majorities. Research has shown that social movements rarely succeed, according to Stanford University sociologist Doug McAdam (this volume), although there are certainly examples of those that have. One highly successful health-related social movement, fostered by the grassroots activist group ACT UP, employed bottom-up pressure to push the U.S. Food and Drug

Administration and the drug industry to speed up the availability of effective HIV medicines, and eventually joined with institutional actors that shared its objectives (Bryant, 1991). The ACT UP experience demonstrates that vaccination advocates need to find the right allies and messengers for sharing their messages.

When the non-profit Public Good Projects (PGP) was organizing a campaign to encourage influenza vaccination for patients in the Kaiser Permanente health system, it found that the adults most enthusiastic about vaccination viewed it as an altruistic act to protect others, as Joe Smyser, PGP's CEO, told the Group at its 2019 meeting. The non-profit drew from among the 5,000 "influencers" it has recruited, who fashioned messages in their own words that were broadcast during influenza season in low-vaccination communities, highlighting the value and impact of peer-to-peer influence.

One way to address the emotional asymmetry in vaccination messages available to parents may be to create media campaigns that include parents of children who have suffered severe illness or died as a result of vaccine-preventable infections. However, such cases are thankfully not plentiful in countries with effective vaccination campaigns, and parents whose children have suffered as a result of their poor decisions may not wish to serve as public exemplars. Media campaigns might also pursue other individuals put at risk by unvaccinated populations, such as cancer patients (Shelal et al., 2019) or children with compromised immune systems, who rely on herd immunity for protection. There is suggestive but incomplete evidence that hearing or reading relevant narratives can drive people to affirm vaccination, and not just to avoid it (Winterbottom, Bekker, Conner, & Mooney, 2008).



The Group discussed the degree to which public health officials should contest and debunk anti-vaccine messages as part of efforts to reach vaccine-hesitant caregivers. Research has shown that debunking parents' anti-vaccine beliefs does not increase their likelihood of having their children vaccinated and may even make it less likely (Nyhan, Reifler, Richey, & Freed, 2014). By the same token, McAdam (this volume) notes that any movement intended to rouse public support for vaccination must be wary of unintended consequences, such as stirring up further resistance.

Online research has shown that a small number of people are responsible for most anti-vaccine posts (DiResta & Lotan, 2015), although their influence can seem larger. Researcher Renee DiResta told the Group that while only a few hundred people were responsible for social media messages opposing a 2015 move to eliminate philosophical and religious exemptions to requirements for school-age vaccination in California, they were the dominant voice in the debate. However, some 85% of voters supported the measure, and it passed with the support of concerned parents and their allies in the California legislature.



PRINCIPAL FINDINGS

The Group has put forward a set of principles as the foundation for new efforts to counter vaccine hesitancy and strengthen the vaccination enterprise.

> Vaccine hesitancy is a troubling global phenomenon.

Evidence from around the world shows that hesitancy, in combination with access problems, is affecting vaccine uptake in disconcerting ways. One person at the Group meeting described the global vaccination endeavor as a beautiful Victorian house, built with care over decades, that now stands at risk of an encroaching fire.



> There is an urgent need to better understand the causes and dimensions of vaccine hesitancy.

Countries and communities need to intensify their surveillance of vaccine hesitancy to understand how to address it. Better ways of measuring hesitancy are needed at the community level, as is an understanding of the degree to which hesitancy is affecting vaccination coverage rates. Countries and communities also need to fully understand the threat itself, the “signal-to-noise” ratio of anti-vaccine propaganda and its actual impact on vaccination uptake. Without validated metrics and a clearer understanding of the underlying problems and their root causes, efforts to shore up vaccination endeavors may be misguided and fail.

Efforts should be made to gather a body of experience from the community of practitioners who have developed innovative ways to help patients, parents, and guardians move from hesitance to acceptance, using communications as well as behavioral approaches derived from social science (sociology, anthropology, and economics) and psychological research. In this nuanced field, context is supremely important.

➤ | **Efforts are needed to address hesitancy even as efforts to understand it are incomplete.**

The Group highlighted the imperative of developing evidence-based approaches to hesitancy in a range of settings, particularly in lower- and middle-income countries where those insights are severely lacking. There was consensus that the primary end objective is to increase vaccination; the means to achieve this outcome include efforts to reinforce the value of vaccination and highlight the fact that it is an overwhelmingly accepted social norm. At the same time, the Group stressed that erroneous social media messages cannot go unchecked and that monitoring and rapid-response actions are needed, as is research on communication strategies; educating parents, providers, and children; and addressing value systems to reinforce vaccination norms.



These approaches must be multipronged and targeted. Solutions for overcoming hesitancy should include testing and adoption of approaches that address the values, feelings, and emotions of the audience, as well as communication methods and talking points. While many of the issues are context-dependent, the goal should be to identify scalable approaches to implementation.

➤ | **Focus on improving vaccination services and reducing access barriers.**

Efforts to address vaccination hesitancy should be aimed at hesitant parents rather than the foes of vaccination. Trying to convince people with entrenched views is ineffective, and countering anti-vaccine narratives aggressively each time they arise may be further polarizing. While contesting misinformation with facts will be a component of any solution, ultimately the objective is to halt vaccine-preventable diseases by increasing vaccination, especially in vulnerable communities. In part, this means taking care to ensure vaccines can be obtained in a convenient and affordable way so that logistical obstacles do not contribute to dissatisfaction or disengagement with the vaccination enterprise. More public health work is needed to identify pockets of under-immunized children and adults, and care must be taken to understand the distinction between “hesitant” communities and those where poor-quality services are the real obstacle to getting vaccinated.

➤ **A dedicated media strategy—targeted on the role and impact of social media—is needed.**

The increased availability of detailed vaccine-questioning narratives, concentrated through effective manipulation of social media (DiResta & Wardle, this volume), poses new challenges to the defense of vaccination.

Public health officials need a media strategy targeted—though not exclusively—to social media platforms and the people who use them. The vaccination enterprise must bring in grassroots and “influencer” allies who believe strongly in vaccination and have the means to spread the word. Finding and activating these partners in countries and communities around the world is a key objective of this strategy, one which must focus on traditional and social media in a way that is both flexible and global. Some 4.4 billion people gather information on the internet (We Are Social, 2019), yet the concerns that provoke mistrust or doubts about the vaccination enterprise often vary, even within countries.

The community needs to establish local networks of data, vaccine champions, and playbooks for effective engagement while finding new messages that resonate with different publics. A global engagement center for vaccines might be able to monitor, weigh, and if appropriate, counteract such traffic.

➤ **Vaccine use should be viewed as a key, lifelong component of a healthy lifestyle.**

Educational efforts focused on the value of vaccination must be targeted at different age groups to promote lifelong reminders and understanding (WHO, 2019b). Promoting vaccines, along with explanations of their value in training the immune system to fight diseases, will help bolster understanding of the role they play in good health, with the objective of establishing vaccination as a sensible norm. Lessons may be drawn from teaching experiences establishing the primacy of environmental awareness and climate change.

People who adhere to social norms on vaccination deserve and need more reinforcement from public health and medical communities. If the vaccination enterprise can support and applaud their behavior, giving them the sense they are contributing to an activity that helps their families and communities, it may strengthen their commitment to vaccination.

➤ | **Use vaccine mandates carefully.**

Mandates, incentives, and other measures aimed at directly affecting behavior should be used with care. While requirements may be an expeditious means of increasing vaccine uptake with the stroke of a pen, the social and historical context of each country is important, and tighter mandates should not be used reflexively in response to the challenges of declining vaccination.

➤ | **Efforts to boost vaccination coverage and reduce hesitancy must be coordinated.**

The work of the Global Demand Hub to improve vaccination rates in lower- and middle-income countries is a necessary start but it is not enough. Such efforts must be supported and extended so that other parts of the world with similar challenges can benefit from improved coordination and a dedicated focus on improving vaccine acceptance and uptake. reinforcing vaccination as a social norm. While the appropriate strategies will differ by country, everything learned along the way through research, practice, and social media endeavors should be shared as part of a global effort.



THREE BIG IDEAS

Based on its findings and principles, the Group proposes the following three big ideas to help reverse the trend toward vaccine hesitancy and reestablish full uptake of vaccines as a social norm.

- **Structure.** The creation of a new media collaborative to serve as an interface between the vaccination community and social media platforms.
- **Knowledge.** A research agenda to create ample evidence-based knowledge about the sources of vaccine hesitancy and the best ways to counter it.
- **Strategy.** Building a new narrative to shift the conversation around immunization to one that focuses on its achievements and promise and helps build resiliency in the vaccination enterprise.

Structure

A new media collaborative, recognizing the growing influence of the internet and social media on vaccination decisions, would catalyze research on the best ways to use these platforms to enhance vaccine uptake through intelligent education and communication strategies. The collaborative would:

- Consist of a consortium of global and local public health institutions, with non-traditional allies coming from sectors as diverse as tech, marketing, entertainment, and the social sciences. Together, they would develop new approaches on social media and other information platforms, creating rapid-response teams to identify and help social media companies deal with misinformation. Efforts that include grassroots proponents of vaccination in combination with established public health actors may be more effective than official efforts given the mistrust of government in many countries. The Group heard conflicting views about whether the work on social norms should be seen as “creating a social movement.” While some see



this as an important vehicle for the agenda of solidifying vaccine norms, others cautioned that the idea of a social movement creates expectations which may be unachievable and risks a backlash.

- Help develop coherent and aligned positive communications on vaccination that can be used by social media networks, health professionals, and educators. The collaborative would also conduct pilot programs and share best practices.
- Assist public health authorities with the development and evaluation of targeted messages for vaccination campaigns. These should involve the activation of local and national vaccination proponents, influencers whose messages can reach under-vaccinated communities. Key opinion leaders would bring back timely information on local issues (such as lagging immunization rates or particular anti-vaccine messages) and take information and messages from the collaborative to deal with these problems. This structure would allow for a rapid social media response in real time to crises in the field that are affecting vaccine uptake at a local or national level.
- Support and enhance the Global Demand Hub's existing efforts to use its organizational capacity and strategies in helping countries and regional officials improve vaccine uptake.

The media collaborative's organization—whether centralized or decentralized, and how it might be staffed and funded—remains to be determined, as does its relationship with other organizations, such as the CDC and WHO.

Knowledge

Build a knowledge base adequate to launch an effective fight against vaccine hesitancy, with a comprehensive yet focused research agenda supported by additional funding. Steps should include:

- Encourage funders—government and philanthropic—such as the National Institutes of Health (NIH), CDC, Gates Foundation, Wellcome Trust, and WHO—to expand social science portfolios aimed at studying the mechanisms of vaccine demand creation, including the impact of social media, clinical encounters, national/state/regional messaging, and regulations and laws on vaccine uptake.

- Explore the deployment of research methodologies used in the private sector, such as understanding the mixture of rational choice and emotional or intangible associations that drive decision-making on immunization. Before starting social media campaigns, deploy assessment tools to understand how the groups being targeted engage with social media and who their trusted sources are.
- Seek deeper understanding of the factors that feed into vaccination decision-making (beliefs underlying vaccine hesitancy) in order to inform education and outreach activities.
- Build an evidence base for innovative approaches to vaccination uptake by analyzing current approaches, testing and piloting new ideas and approaches, and intensifying the development of demonstrably effective interventions that win over hesitant parents and caregivers.
- Intensely deploy demonstrably effective interventions while studying their impact in different settings as part of an ongoing learning approach to immunization science.

Strategy

Shift the conversation to focus on the achievements of vaccination. Through education and outreach, activate awareness and support of vaccines and immunity-related health. These approaches should include doctors and nurses, medical students, and other health care providers, and give voice to a “silent majority” with positive beliefs about vaccination. Toward this end, research should be undertaken as to the value of earlier educational interventions, ranging from conversations with pregnant mothers to teenage visits for HPV as well as meningitis vaccinations to middle-school classes.



This strategy involves reaching beyond traditional public health and vaccine advocacy groups to non-traditional players, including local activists, entertainers, politicians, patients, and members of disease advocacy groups.

The focus of the conversation should be the positive attributes of vaccination and a lifelong awareness of the need to protect individuals from vaccine-preventable disease. The proposed structure and research initiative are built upon a strategy of changing the conversation around immunization.

The community strategy should include a concerted effort to find and engage local influencers as well as people who are passionate about the value of vaccination for personal reasons. These influencers could include parents of children who have died or suffered serious sequela from (1) vaccine-preventable illnesses; (2) patients or parents of patients with immunological problems that preclude them from vaccination and render them especially vulnerable to vaccine-preventable diseases; (3) teachers or school principals who must struggle with outbreaks of disease like whooping cough that originate in under-vaccinated children attending their schools; and (4) pediatricians who struggle with whether to dismiss non-vaccinating families from their practices.



MOVING FORWARD

Vaccine hesitancy poses a serious threat to vaccination's success in preventing life-threatening and crippling infections around the world. It stems in part from parental and community-wide attitudes and beliefs that are specific to vaccination and are interwoven in complex, context-specific ways with supply issues, such as the convenience and affordability of vaccines, as well as trust and confidence in authority structures. Precisely because the dimensions of the hesitancy problem are not fully understood, the public health community and its allies need to act now to expand their understanding of the problem and identify the best ways to resolve it.

While the COVID-19 pandemic focuses the world's attention on the creation of a safe and effective vaccine that will allow us to get back to normal, we must insure that any such vaccine is accepted by those who need it. The COVID-19 crisis brings with it a powerful reminder of the essential value of vaccination, yet it must not distract us from the fight against currently vaccine-preventable illnesses.

The gravity of the global measles epidemic and evidence of faltering confidence in vaccines underline the need to act now to reignite vaccine acceptance on a variety of fronts. The reasons for declining vaccine uptake in a given community or country will vary; what is key is to gain an understanding of them and take action. This moment offers a solemn opportunity to confront the problem of mistrust in a resolute way so that the lifesaving achievements of vaccination continue to serve current and coming generations.

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