


COMMENTARY



Finding a way to address a wicked problem: vaccines, vaccination, and a shared understanding

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ABSTRACT

A wicked problem is a complex one with innumerable causes, is difficult to describe, and does not have a right answer. Addressing vaccine hesitancy is a wicked problem that has existed since smallpox inoculation began in 1796. Spurred by a now-discredited and retracted paper by Wakefield, *et al.* in 1998 and facilitated by the ease of connectivity through social media, distrust in vaccination is highly publicized, currently contributing to the largest measles outbreak in the United States since 1994, threatening public health as more vaccine-preventable diseases may be on the rise. Research to address vaccine hesitancy has been focused on building vaccine confidence, understanding the effects of diseases themselves, who is trusted to make a recommendation (i.e. health-care professionals), the need for a strong recommendation, and characteristics of hesitant parents (e.g. values). Strategies focused on disease education and strong provider recommendations have had limited impact on increasing coverage rates and provide little insight into the underlying drivers to vaccination decision-making. With the goal of enhancing public trust and provider effectiveness in conversations between providers and parents, new frameworks are needed to build a richer understanding of provider-parent conversations around vaccination and vaccine decision-making.

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Proponents of vaccines often cry that vaccines are a victim of their own success. For the most part, a generation of children and adults has not witnessed a case of polio; physicians have not diagnosed a case of measles. We live in a time where the enormity and impact of vaccine-preventable diseases (VPD) is not felt by society. VPDs are almost a hypothetical academic case study easily dismissed. In evaluating trade-offs to vaccinate or not to vaccinate, consumers value staying healthy (through vaccination), proportionally to the perceived potential risks and consequences of the VPD and risks of vaccination (i.e. adverse event).¹ However, this calculus an individual makes in evaluating trade-offs in vaccine decision-making is confounded by whether or not there is a clear understanding of the risks of vaccine-preventable diseases and the likelihood of contracting one. This has created what is known as a wicked problem.

A wicked problem is a complex one with innumerable causes; it is tough to describe, and does not have a right answer.² The growing chasm around vaccination – to vaccinate or not to vaccinate – is a wicked problem. This problem, vaccine hesitancy, refers to delay in acceptance or refusal of vaccines despite the availability of vaccination services.³ Listed in 2019 by the World Health Organization (WHO) as one of the top 10 threats to global health, vaccine hesitancy is complex and context-specific, influenced by social complexities and interdependences involved in the motivations, context and reasons why individuals choose whether to vaccinate.⁴ This makes vaccine hesitancy difficult to solve as there is no one right answer and currently no clear path on how to proceed.

As with many wicked problems, there are numerous people and opinions involved with different perspectives. When the serious and sometimes fatal consequences (and costs) of a disease are felt by a community, the introduction of a new vaccine is often welcomed with anticipation and enthusiasm. Eventually, the impact of VPDs wane and the prevalence of disease decreases due to the effectiveness of vaccines and the success of vaccination programs. The medical (e.g. short- and long-term sequelae) and economic implications (e.g. hospitalizations, loss in work productivity) and impact begin to fade from memory.

Today varying views now exist on the timing of the vaccination schedule, the legitimacy of mandating vaccines, the concurrent administration of vaccines in young children, and the medical need for vaccination. Concerns about vaccine safety are relentless. Study after study demonstrating that vaccines are safe and do not cause autism, do not satiate concerns about autism and vaccines.⁵ More studies will not alleviate or solve the problem, particularly as conditions such as autism become clinically evident concurrent to when children receive recommended vaccines. Lastly, it is difficult to sort out the causes and effects of vaccine hesitancy.

The public health predicament

Vaccine hesitancy is a behavior that is influenced by a number of factors. The WHO model of vaccine hesitancy groups these factors into the three Cs: issues of confidence (lack of trust in vaccine or provider), complacency (do not perceive the need

for and the value of vaccines), and convenience (barriers to access for vaccination services).³ While the majority of individuals accept vaccines, some remain concerned about vaccines; some may refuse or delay some vaccines, but accept others; and some may refuse all vaccines. Many outbreaks are fueled by unvaccinated children and adults who are hesitant, reluctant, or refuse to be vaccinated. Among individuals undecided about vaccination is a mix and range of attitudes, beliefs, and behaviors about vaccines. In short, vaccine-hesitant individuals are a heterogeneous group who hold various degrees of indecision about specific vaccines or vaccination in general. These individuals comprise a much larger group than those who completely reject vaccines.^{6,7}

It is important to note that vaccine hesitancy has existed since the time of Edward Jenner in the 18th century, and arguably earlier. Two themes have resonated in the history of vaccines.⁷ The first is that those who oppose vaccination have a perception that vaccination causes more harm than good, questioning the science of vaccines and the balance of risk and benefit from vaccination. The second is that of compulsory vaccination. Opponents of vaccination have voiced for nearly 200 years, three principal objections to mandated policies requiring vaccination including: government intrusion on religious beliefs, general distrust of medical science, and infringement of personal liberty.⁸ These two themes have waxed and waned in the spotlight of the public stage, often associated with a cyclical pattern of disease prevalence.⁷

However, the means by which vaccine information is disseminated today has been radically transformed by the modern information age of the electronic Autobahn. On this superhighway, seemingly endless amounts of information are available instantaneously. The universal availability of the internet and the ease of connectivity through social media have transformed access to information, but also misinformation. Even more disconcerting is that the electronic age has democratized sources of information as equally credible.⁷ Social media platforms have become the means by which inaccurate information about vaccines can spread like wildfire, rapidly publicizing misinformation and creating a culture of distrust in vaccinations, primarily by highlighting scientifically unsound data and personal anecdotes. Efforts by social media platforms to address disinformation should be commended; these champions of public health have reworked algorithms and developed pop-up boxes to redirect users to credible sources of medical information.⁹ Some have also declined to advertise perceived anti-vaccine channels and videos.

The current research landscape

Research to address vaccine hesitancy has largely been focused on identifying barriers to vaccination, understanding the effects of diseases themselves, and building vaccine confidence.¹⁰ Research has also centered on characteristics (i.e. attitudes) of hesitant parents¹¹ and underlying behavioral intentions to vaccinate. In the provider domain, much focus has been to understand who is trusted to make a recommendation (i.e. health-care professionals) and the need for

a strong recommendation (presumptive versus participatory), framing questions in a more effective way through a proactive and a non-adversarial approach that guides patients. This approach serves an important role in stressing that vaccination is the norm, while building public trust in vaccination.¹² Overall, the focus in risk communication has been to disseminate accurate, timely, and scientifically sound information to the public.

Current strategies center on the provider–parent relationships. Newer strategies seek to empower local partners who work effectively in affected communities to influence vaccination behavior.¹³ Using partners that are known and accepted in targeted communities where misinformation runs rampant is critical to stopping the spread of information and has been shown to demonstrate some progress. Messages must be tailored to address the concerns of the community and be culturally appropriate (e.g. Orthodox Jewish community in New York, Amish communities in Ohio, Somali-American community in Minnesota, Russian-speaking communities in Washington) where outbreaks are occurring. However, these efforts are not entirely hitting the mark.

A number of frameworks have been used to better understand vaccine hesitancy. This includes the health belief model (to identify patient perceptions of disease and vaccination and predictors of vaccination), theory of planned behavior (patient and parental intentions to vaccinate and attitudes toward vaccination) and more recently moral psychology (moral values that resonate with vaccine-hesitant individuals).^{14–17} Models all have some limitations. For example, the health belief model does not account for non-health-related reasons for not vaccinating and assumes all individuals have access to equal amounts of information about a disease or a vaccine. Early research in moral psychology based on moral foundations theory (i.e. notions of care, fairness, loyalty, authority, purity) seeks to identify foundational values that underpin the attitudes (the way in which individuals apply or express their beliefs) vaccine-hesitant individuals hold about vaccines and vaccinations. Some criticism of moral foundations theory is the omission of some foundations.¹⁸ Moreover, application of this emerging research in messaging of vaccines has yet to be tested and validated and may or may not be the Holy Grail. Ultimately, the goal is to understand deeper motivations in decision-making for application to vaccine health decisions and to inform communication strategies.

State policies

In addition to significant efforts to develop and disseminate risk communication messages, all 50 states and the District of Columbia have school and daycare entry requirements and allow for medical exemptions. Recent state policies have been implemented to address increases in non-medical exemption rates that have been rising over the last two decades. New requirements include the additional administrative step of documenting health-care provider counseling in order to obtain nonmedical exemptions.¹⁹ Proponents of completely eliminating exemptions argue that parents who choose not to immunize their own children put other children at risk.²⁰ Others argue mandates violate parental autonomy (being

forced to do something they did not choose for themselves of their children).

The complexity of this issue is difficult to sort out as it cuts across domains of law, ethics, and public health. Vaccine-hesitant parents want to do what is best for their child. There is a “middle ground” of caring, pragmatic parents who do not reject vaccines outright, but worry about them because of what they have heard or read. There is only a small proportion of parents (estimated at 1–3%) who are against vaccines and whose children are unvaccinated.^{21,22} What the rise in nonmedical exemptions may represent is some proportion of the population that wishes to be “heard”, rather than having their concerns dismissed.

Further research: are we asking the right questions?

We know that vaccine-hesitant individuals are heterogeneous in their beliefs and often sophisticated in knowledge. For some individuals, efforts to increase disease education and assure providers strongly recommend vaccinations have been useful. For others, these efforts have resulted in little if any impact on behavior while providing no insight into how to address portions of the vaccine-hesitant community. Tackling this problem of vaccine hesitancy will require a richer understanding of these motivations in order to influence health decisions in a productive and meaningful way.

Communities function as cooperative social systems. Because the public health premise of vaccination and vaccine mandates is predicated on protecting communities, a framework that involves cooperative behavior may be useful to explore. The solutions to problems of cooperation have evolved over millions of years. Driven by biological and cultural mechanisms that provide motivation for cooperative behavior, which includes concepts like “help your family” and “help your group”, a framework based on cooperation may be applicable to vaccination decision-making.²³

We are at an inflection point and the question to ask is: are we asking the right questions and doing the right things to address the complexity and interconnectedness of the problem? Is more education needed or are tighter restrictions on school and day care entry policies the answers, and if not, how do we address the impasse?

Finding a path forward

Continued and growing visibility of distrust (in government, vaccines, vaccination) threatens public health and fuels public discourse over an increasingly polarizing conversation around the safety, effectiveness, and utility of vaccines; it is this distrust that is contributing in part to the largest measles outbreak in the United States since 1994.^{6,7,13,24} Spurred by a now-discredited and retracted 1998 paper by Wakefield, *et al.* published in the esteemed journal *The Lancet*, the claim of that vaccines (specifically the measles, mumps, and rubella vaccine) are associated with autism caused wide-spread panic among parents worldwide.²⁵ Vaccine hesitancy can also be targeted at specific vaccines. For example, acceptance by parents and adolescents of human papilloma virus (HPV) vaccine are influenced by attitudes and social norms related to the disease and the perceived risk of contracting HPV and related diseases.

Working to solve the public health Gordian knot of vaccine hesitancy requires a fundamental acceptance by all parties of shared responsibility. Vaccination works optimally only when the herd (i.e. the community) is vaccinated, protecting not only those who are vaccinated, but individuals in the community around them. By vaccinating a large enough proportion of the population, those who cannot receive vaccinations (i.e. those too young or immunocompromised) are indirectly protected from vaccine-preventable diseases. This inherent characteristic trait makes vaccination a shared responsibility, one that is intrinsically tied to every individual and every community.

The rationale for parental concerns, the attitudes individuals hold, and choices they make are grounded in beliefs and values that are important to understand to build trust in vaccines. Today, society is not able to “see” what vaccination prevents. Little progress has been made to address the concerns of vaccine-hesitant individuals, an educated and well-informed community of concerned parents and individuals. Exploring the core values that resonate with individuals (who do and do not vaccinate) may help shed light and shape a more productive provider-parent engagement beyond recommending vaccination according to the ACIP-recommended schedule and beyond facts and figures. The decision to vaccinate is based on deeper motivations, as health-care decision-making appears to run deeper than the facts on safety, efficacy, and effectiveness of vaccination.

Ultimately to make headway on our collective *wicked* problem a more effective way to focus a conversation is direly needed to engage those who are vaccine-hesitant. A conversation that focuses on the benefits of vaccination for the individual’s health and the low risk of harm will do little to help a parent primarily concerned about a mandate. The goal is to enhance public trust and provider effectiveness with productive conversations between provider and parent. The key is finding a way of getting there.

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