Science & Society

Communicating science and protecting scientists in a time of political instability

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The coronavirus disease 2019 (COVID-19) pandemic will change how we communicate biomedical science to reflect the new realities of increasing politicization of vaccines or therapeutics, as well as targeted attacks against prominent US scientists. The stakes are high, given how thousands of Americans are losing their lives by refusing vaccinations or demanding unproven treatments.

A new battlefront for molecular medicine

As experts in molecular medicine, we have a lot to offer to a general public hungry for accurate and timely scientific information during the current COVID-19 pandemic. For example, we are well positioned to describe how COVID-19 vaccines and therapeutics work and maximize their effectiveness. We can explain why boosting is essential to induce virus-neutralizing antibodies, the role of T and memory B cells in long-term immunity, or why antiviral drugs work best early during the course of viral illness. We can also report on the latest developments in the molecular pathogenesis of COVID-19 or long COVID-19 [1].

At the same time, we hold the knowledge to debunk claims about the harmful effects of vaccines or unproven treatments, or gain-of-function experiments in generating the severe acute respiratory syndrome (SARS)-2 coronavirus. However, effectively transmitting our knowledge and

expertise to the public or using our voices to change public perceptions about biomedical interventions and approaches is another matter. Our scientific training did not include instructions for public engagement or navigating communications in a complex web of disinformation coming from multiple sources.

Ultimately, transmitting our scientific knowledge to an increasingly skeptical public requires us to understand why individuals or groups hold beliefs that are not supported by scientific evidence. In parallel, we must be mindful that some groups that promote disinformation are now working to discredit not only the science, but also the scientists themselves [2]. Many of us now endure personal attacks from disinformation groups, news outlets, or elected public officials. Here, I aim to help our community of biomedical and translational scientists to both understand the sources of COVID-19 disinformation, especially around vaccine and therapeutics, and the steps one might take to combat it. It reminds us that we must prepare for the emotional toll in going up against expanding, well-organized, well-funded, and increasingly politicized, antivaccine campaigns.

Why should we care?

Before embarking on a discussion to communicate science or combat antivaccine claims and groups, some may ask, 'why bother?'. For me, the answer is relatively straightforward: the antivaccine movement is a killer [3], and we have the knowledge, intellectual heft, and humanitarian obligation to confront it.

First, the killer part. During the second half of 2021, ~200 000 Americans lost their lives to COVID-19 according to the Institute of Health Metrics and Evaluation of the University of Washington[i]. Almost all of those deaths were among the unvaccinated, that is, individuals who largely declined to get immunized despite the

widespread availability of vaccines. For example, according to the Texas Department of State Health Services (DSHS), during a major delta variant wave across the state throughout September, the unvaccinated were 20 times more likely to die from COVID-19 compared with someone who was fully vaccinated[ii]. Similarly, the US Centers for Disease Control and Prevention found a 14-fold risk[iii]. Therefore, we must come to terms with the fact that ~200 000 Americans needlessly lost their lives to COVID-19 because they trusted the disinformation more than the science or biomedical scientists. They became victims of what I often term 'antivaccine aggression'.

Next, our humanitarian obligations. While most biomedical scientists or physician-scientists pursue their careers for the joys of exploration and inquiry, many also feel a moral imperative to use our knowledge to save lives. I believe this now includes combating antivaccine aggression. In his 1956 book entitled *Science and Human Values* [4], the mathematician, theoretical biologist, and science historian, Jacob Bronowski, looked at our world following the 1945 atomic bombing of Nagasaki and the liberation of Holocaust victims to report on how science and scientists should be front and center in combating evil forces. For me, pursuing humanitarian goals through science is an essential element of molecular medicine and translational sciences, as I deeply engrain the motto of the Rockefeller University, where I did my PhD; *scientia pro bono humani generis*, science for the benefit of humanity.

However, we now also face a grim reality that the losses of human life from those who defy COVID-19 vaccinations are mounting. Something terrible has happened to reverse public acceptance of vaccines, especially in North America and Europe, but increasingly across the Southern Hemisphere, including Africa [5]. Vaccine defiance has further escalated

into threats or aggression targeting individual scientists, including attacks by far-right news outlets and major political parties; in other instances, we are even portrayed as enemies of the state [2]. Perhaps the greatest personal shock in my 40-year career as a physician scientist has been the stark realization that making vaccines for the world's poor would invite calumny.

An antivaccine universe and ecosystem

In its modern form, the antivaccine movement began during the late 1990s and early 2000s following claims that the measles–mumps–rubella (MMR) vaccine caused pervasive developmental disorder, now known as autism spectrum disorder [6]. Ultimately, the lead publication making this claim was retracted by *The Lancet* (in which the paper was published in 1998), but this did not stop a succession of alternative claims that thimerosal preservative, aluminum, or closely spaced vaccines were responsible [6]. The discovery of dozens of new autism genes involved in early fetal brain development [7] helped to provide a powerful alternative narrative to vaccines; however, claims that vaccines cause autism persist.

As a vaccine scientist with an autistic daughter, I thought my advocacy in countering false vaccine links would be very powerful and began publicly defending vaccines [6]. However, my public stance invited a wave of aggression from antivaccine groups, most notably those identified by the Center for Countering Digital Hate as the 'disinformation dozen'[iv]. However, this paled in the face of what followed.

After the retraction of *The Lancet* article in 2010, the antivaccine movement in the USA re-energized by becoming a political movement and aligning itself with far-right groups or the Republican Tea Party, especially in Texas [8]. Doing so increased the number of people willing to become antivaccine adherents, while affording new opportunities for funding and organization. The rallying cry was 'health freedom' and it gained a strong following, even forming political action committees (PACs) to promote vaccine exemptions with state legislatures [8]. With the COVID-19 pandemic, 'health freedom' expanded to protest COVID-19 prevention measures, including masks and alternative treatments, such as hydroxychloroquine or ivermectin, both drugs shown in most studies to offer no benefit in COVID-19 cases or that could even be harmful.

In 2021, 'health freedom' provided a common thread to COVID-19 vaccine defiance from the political right. It produces a strong partisan divide with respect to low COVID-19 vaccination rates and COVID-19 cases and deaths across the red states[v]. Those leading efforts to discredit the effectiveness and safety of vaccines or promote ivermectin as equivalents included a coalition of far-right members of the US Congress and other elected officials, conservative news outlets, and even a group of contrarian intellectuals from think tanks and universities [2]. More recently, these activities have extended across the border into Canada and now Western Europe[vi].

Understanding this dynamic is essential in combating antivaccine misinformation and communicating the safety and effectiveness of COVID-19 vaccinations and other preventive measures (Box 1). Here is why: there are at least a dozen commonly used talking points used by antivaccine groups to discredit vaccines or to raise doubts by those sitting on the fence to get vaccinated. They range from the seemingly plausible (the vaccine development timelines were rushed or the side effects are dangerous[vii]) to outright conspiracies or outlandish claims (e.g., vaccines contain microchips [9]). However, it is unclear whether refuting each of these points or beliefs will persuade the vaccine hesitant. Instead, vaccine refusal in America now runs very much along a partisan divide [10]. For example, 26% of Republicans refuse to get vaccinated for COVID-19 versus only 2% of Democrats[viii]. Beyond this partisan divide in COVID-19 immunization rates is the reality that our community of biomedical scientists is now targeted by the same far-right members of the US Congress, red state governors, conservative news outlets, and think tanks [2]. They accuse us of contributing to the origins of COVID-19, exaggerating the benefits of vaccinations, or conspiring to silence others to generate revenue for big pharma and hospitals.

Box 1. Key considerations for communicating science for COVID-19 vaccines and other interventions

Antivaccine aggression kills: 200 000 unvaccinated Americans needlessly lost their lives to COVID-19 during the second half of 2021.

Those refusing COVID-19 vaccinations are victims to disinformation.

While social media is widely touted as the culprit, Facebook and other platforms are not generating the disinformation content.

Instead, the disinformation arises from three major sources: (i) The 'disinformation dozen' nongovernmental organizations identified by CCDH; (ii) State actors including the Russian Government; (iii) and political extremism from the far right.

In America, the far right has the greatest influence, and originates from the US Congress and other elected officials, conservative news outlets, and think tanks.

There are about a dozen major talking points why people refuse to get vaccinated, but these can be easily refuted. The real culprit are political groups and others generating antivaccine content.

The hardest science communication ever

Confronting the antivaccine aggression and converting vaccine opponents represents a formidable undertaking. We face a reality in which an entire segment of the US population has refused vaccines out of allegiance or political identification. How can we begin uncoupling the antivaccine attitudes from the political right?

From my viewpoint, openly discussing a partisan political divide in vaccines or antivaccine aggression has itself become an extraordinary science communication challenge. There are several reasons for this. First is my observation that our biomedical science training implicitly or sometimes explicitly states how our activities should transcend politics. Speaking about Republicans versus Democrats or Conservatives versus Liberals is at best impolite and generally derided as unscientific. To point out that Republicans are refusing vaccines or how antivaccine aggression comes predominantly from far-right news sources or prominent members of the GOP does not really have much precedence in our daily activities as biomedical scientists.

It is also perilous. Speaking out in this manner invites further attacks from far-right groups in the form of threatening communications by telephone, e-mail, and social media, or even outright stalkings. Still another issue is that some of our scientific societies and academies are uncomfortable in the political arena or in giving the appearance of taking political sides. As a result, they are often silent in the face of attacks against prominent US scientists.

Accordingly, I have even proposed a science or scientist equivalent of the Southern Poverty Law Center to seek advice when we are under attack [11].

It has become clear that communicating science while both combating antivaccine aggression and defending biomedical scientists requires navigating a complex political landscape and minefield. There is not much of a roadmap beyond what climate scientists have faced over the past decade. Yet, it is imperative that we chart a path to communicate science, advocate for scientists, and do so without fear of reprisals. Otherwise, the massive losses in human life due to preventable diseases, such as COVID-19, could continue.

Declaration of interests

P.H. is an inventor on a COVID-19 vaccine technology owned by Baylor College of Medicine that was recently licensed nonexclusively to several companies committed to low- and middle-income countries, including Biological E (India), BioFarma (Indonesia), Incepta (Bangladesh), and ImmunityBio (South Africa), for producing a low-cost recombinant protein vaccine. He is also an inventor on non-revenue-generating patents for parasitic disease vaccines. He also co-leads a Lancet Commission on Vaccine Refusal, Acceptance, and Demand in the USA.

Resources

[i]https://covid19.healthdata.org/united-states-of-america?view=cumulative-deaths&tab=trend

[ii]www.dshs.texas.gov/immunize/covid19/data/vaccination-status/

[iii]https://covid.cdc.gov/covid-data-tracker/#rates-by-vaccine-status

[iv]www.counterhate.com/disinformationdozen

[v]www.npr.org/sections/health-shots/2021/12/05/1059828993/data-vaccine-misinformation-trump-counties-covid-death-rate

[vi]https://globalnews.ca/news/8187962/the-u-s-anti-vax-movement-is-contaminating-canada/

[vii]www.kff.org/coronavirus-covid-19/poll-finding/kff-covid-19-vaccine-monitor-june-2021/

[viii]www.kff.org/coronavirus-covid-19/dashboard/kff-covid-19-vaccine-monitor-dashboard/

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