COMMENTARY◦CORONAVIRUS

To avoid the next coronavirus, we need a vaccine before the outbreak

BY
SETH BERKLEY
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As the number of people infected with the coronavirus (which causes the coronavirus disease 2019, or COVID-19) continues to rise, the full extent and severity of this outbreak still remains unclear. Will it continue to escalate into an even more deadly global pandemic, or will it burn itself out and prove to be more of a severe dress rehearsal for the next really big one?

Whatever the outcome, this outbreak has shown once again that we are not prepared for this kind of global threat. Even if a coronavirus vaccine were available today, demand would almost certainly outstrip supply, so who would get access to it? Those most at risk or those who can most afford it? If we truly want vaccines to play a role in preventing major global pandemics, then we need to invest more in their development before outbreaks occur.

This is particularly the case with influenza. With flu the fear is that one day a strain will emerge so virulent that it will be capable of causing an outbreak on the scale of—or worse than—the 1918 Spanish flu pandemic, which infected more than a quarter of the world's population, killing between 50 and 100 million people.

Such virus strains are rare, but it is an evolutionary certainty that one will emerge again at some point. They are far more likely than, say, a nuclear war, which governments spend tens of billions of dollars preparing for. If the speed at which this coronavirus has spread is anything to go by, then the need for a universal flu vaccine has never been greater.

That is not to say that the threat posed by flu is not well understood. For nearly 70 years the Global Influenza Surveillance and Response System has existed to monitor new strains as they emerge and identify those most likely to spread and cause human suffering in the coming flu season. Because of this—in stark contrast to coronaviruses—outbreaks of flu can be largely anticipated so vaccines can be made available in a timely fashion. In the event of a potential pandemic strain emerging, this global vaccine manufacturing infrastructure would be used to rapidly produce global supplies of a pandemic flu vaccine.

That's the theory at least. But given that seasonal flu still causes severe illness in 3-5 million people and respiratory deaths in 290,000-650,000 people annually, what does this say about our ability to actually prevent a pandemic?

First there is the issue of capacity. One of the key features of Spanish flu was that unlike seasonal flu strains, which tend to mainly kill elderly people, infants, and other high-risk groups, it also killed healthy young adults. Given that seasonal flu vaccines quantities are manufactured mainly with high-risk groups in mind, even with an aggressive scaling-up of manufacturing, it is questionable whether sufficient quantities of vaccine could be produced at short notice to protect a much larger population. In other words, it is unlikely we would have enough.

Taking this into consideration, then there is the issue of access. Between 2004 and 2015, only 5% of flu vaccine supply reached the World Health Organization's Africa, Eastern Mediterranean, and Southeast Asia regions, which collectively make up 50% of the world's population. The cost of providing an annual vaccine to populations, year over year, and the logistics required to deliver it is partly to blame for this. In low- and middle-income countries, where funds are scarce and competing threats to health are many, influenza vaccination can easily slip down the list of public health priorities.

Yet these same countries bear a disproportionate share of the global flu disease burden, the size of which remains uncertain because most of these countries have insufficient public health infrastructure to track the disease accurately. This can drastically hinder the ability to detect and respond to viral outbreaks, leaving people even more vulnerable. With Africa's first case of COVID-19 in Egypt confirmed earlier this month, and Nigeria becoming the first country in sub-Saharan Africa to have a confirmed case this week, there are now concerns of a broader undetected spread of the virus elsewhere on the continent.

But another reason why so few influenza vaccine doses reach poorer countries is that access to available vaccines is not equal to all countries and can often come down to purchasing power. In the event of a pandemic flu and the inevitable vaccine supply constraints that will follow, poorer countries are least likely to get access to a vaccine. This is precisely what happened in 2009 with the H1N1 swine flu pandemic, where wealthy countries placed large advanced orders, effectively buying virtually all the vaccine doses manufacturers could supply.

The development of a universal flu vaccine, one which protects against every influenza virus—including novel strains with pandemic potential—is the only real solution to these challenges and our best shot at preventing a pandemic. By making it available to everyone through existing routine childhood immunization programs, the need to produce large volumes of vaccine at short notice in an emergency situation would be precluded, as would some issues relating to inequitable access to vaccines. And by ensuring everyone is protected, we stand a much better chance of preventing pandemics before they occur.

But while a universal influenza vaccine has been on the agenda for many years, there is still a need for greater scientific understanding of the virus, how the human immune system responds to it, and what characteristics makes it more virulent. Similarly, research efforts and funding for a universal vaccine remain fragmented, with a lack of a clear goal-oriented coordination. All of this creates barriers that are now hindering the development of a universal vaccine.

The Sabin Vaccine Institute and the Aspen Institute have proposed the creation of an independent entity to coordinate initiatives to overcome the obstacles to developing a universal vaccine, such as funding to encourage more data and asset sharing among involved entities, as well as to incentivize original research and collaboration among scientists, vaccinologists, and product developers. The entity would also work to build support—both within the universal vaccine research community and with the broader public—for more rapidly achieving the end goal.

But none of this will be possible without bold and coordinated action on a global scale, building on the strong and innovative scientific foundations and uniting the efforts of governments, industry, and philanthropy. That needs to happen now. Because if COVID-19 has highlighted anything, it is that waiting until an outbreak occurs before developing a vaccine costs lives.

Seth Berkley is CEO of Gavi, the Vaccine Alliance. Article retrieved here.