Has COVID Taught Us to be Better Prepared for the Next Pandemic?

The world has learned a lot from COVID-19, but when normality returns and politicians' memories start to fade, will the necessary investment be made in preparing for the next pandemic?

Jim Banks

Although it is too soon to say we have reached the end of the COVID-19 pandemic, scientists, politicians, and ordinary citizens are looking to the future and asking the same question—will there be another one? The simple answer is yes.

Climate change and an ever-growing global population mean that there is more contact between humans and animals, which is a key source of new viral threats. We already live with influenza, which has killed millions in past pandemics, and frequently mutates into new strains. In addition, we face the growing threat of antibiotic-resistant infections, which could alter our ability to respond to general health crises. Therefore, it seems the more relevant question is whether we will handle the next situation better.

"It is likely we will have more pandemics, as higher population and more proximity to animals puts pressure on the ecosystem and leads to an increase in diseases," says Hala Audi (Figure 1), former director of Strategy, Performance and Assurance at the U.K. Government's Infrastructure and Projects Authority, and currently CEO at Unizima, which delivers facilities, services, and expertise to meet local demand for biologics in low-to-middle-income countries. "We are putting incredible pressure on the planet and many epidemics and pandemics have come from diseases jumping from animals to humans," she adds. "So, the risk is only for an acceleration of their number, particularly in developing countries facing climate challenges."

Pandemic preparedness is, for now, a high priority on political, scientific, and social agendas, and preparation will be informed by the successes and the shortfalls in the world's response to COVID-19. Continued investment in key measures also helps ensure we can better meet today's health care needs.

Success stories

No U.S. or Western European politician hesitates to praise the rapid development of vaccines and their successful rollout. That message is often repeated,

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Figure 1. Hala Audi is the former director of Strategy, Performance and Assurance at the U.K. Government's Infrastructure and Projects Authority, and currently serves as CEO at Unizima, which delivers facilities, services, and expertise to meet local demand for biologics in low-to-middle-income countries. (Photo courtesy of Unizima.)

but it is worth remembering what an impressive feat was accomplished.

"It is all well and good to make a vaccine in peacetime but in wartime the scientists worked really hard to collect data extraordinarily fast," says Prof. Faith Osier (Figure 2), an expert on infectious disease immunology at Imperial College London (ICL). "We did that well and turned around a vaccine in record time. Another thing is that you then have to manufacture it at scale and at speed, and the translation of the idea into a good manufacturing practice (GMP)-qualified vaccine was done extremely well. So was the vaccine rollout."

Figure 2. Faith Osier is an expert on infectious disease immunology at ICL. (Photo courtesy of ICL.)

In her work for Unizima, Audi has seen firsthand the gaps in global response efforts and how the public and private sectors achieved great things together. "The power of science, the breakthroughs in vaccines, clinical research, vaccine development, and production—all of that should inspire younger generations," she remarks. "The power of partnership between the public sector, private companies, academia, and civil society was impressive."

Where things went wrong

Scientific innovation and the dedicated work of health care professionals in hospitals across the world should be sources of great pride. Nevertheless, the global response fell short in key areas. COVID-19 served as a stress test for global supply chains and international collaboration, and issues such as equitable distribution continue to pose hurdles.

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"The outcomes were not good enough," believes Audi. "I am an optimist and I believe in partnership between public and private sectors, but outcomes are inequitable for people without access to vaccines. No one is safe until we are all safe—we are a global community and we didn't go the last mile." Essentially, "there was apathy in providing access to vaccines across the global population," she adds. "It was difficult and expensive, yes, but the fact is we lacked global collaboration."

The Covax program, led by the World Health Organization, CEPI—a global partnership between public, private, philanthropic, and civil society organizations launched in Davos to develop vaccines against future epidemics—and international vaccine alliance Gavi, did attempt to make vaccines widely available, but Audi believes more could have been done.

"Covax is incredibly useful, but unfortunately it did not go all the way in providing equitable access to make us all safe," she remarks. "There were supply bottlenecks. We lacked the industrial set-up to provide the diagnostics, therapeutics, and vaccines

that were needed to respond to the pandemic, Protective equipment was affected, as were supplies of oxygen. These issues were problematic in nearly all countries."

To address issues like these, Unizima was founded to provide lower-cost and more flexible bioproduction facilities locally in developing countries to make medicines more accessible. Its production can be turned toward emerging threats, new biologics, vaccines, and much more. The aim is to remove obstacles from the supply chain through a more distributed system for biomanufacturing, as more sites producing smaller batches of vaccines create fewer bottlenecks and a more robust supply chain.

Limited manufacturing capabilities ultimately hindered vaccine distribution. "When it comes to international cooperation on vaccine manufacturing and distribution, there was too little capacity everywhere to manufacture on the scale that was needed," says Prof. Charles Bangham (Figure 3), co-director of the Institute of Infection at ICL. "That needs to be put in place before the emergence of the next virus, but it is hard to persuade governments to put funds in place to do this."

Vaccine nationalism, which sees governments prioritize inoculating domestic populations, has been criticized for its role in limiting global vaccine supplies, but the team at ICL believes there is no alternative. "Vaccine nationalism is not immoral—it probably makes sense—but you also need to look beyond your borders," notes Bangham. "It is important to have a preexisting international agreement to not only look after your own population but also to look after each other. The economic impact [of a pandemic] is in trillions of dollars worldwide, but the investment needed is only billions, so thousands of folds less."

Bangham, who has been working in the field of virology for 35 years, also believes that the approach to vaccine development could have been better targeted. "I was saying 18 months ago that second-generation vaccines need to look at not only spike proteins but other less variable internal proteins that evolve much more slowly," he states.

Lessons to learn

COVID-19 seemed to come out of nowhere, so a key question in preparing for the next pandemic is whether we can foresee and, therefore, prepare earlier for the next shock. As baseball player Yogi Berra

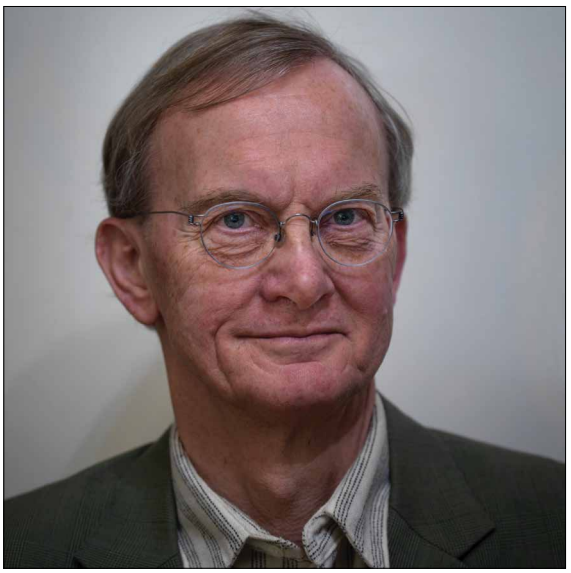

Figure 3. Charles Bangham serves as the co-director of the Institute of Infection at ICL. (Photo courtesy of ICL.)

one said, however, "it's tough to make predictions, especially about the future."

"You cannot predict, full stop," says Bangham. "The essential thing is to build a flexible and rapid system for response. For years, we have been expecting that the next pandemic would be influenza, but we have no idea how many viruses exist in the world, or how many have the potential to spread from animals to humans. Even if you know what a virus is, you cannot predict whether it will spread and cause a major problem."

The main problem is knowing where to look to spot a trend. More contact between humans and animals means that transmission vectors must be scrutinized, but even with precautions, another influenza pandemic is likely to strike in the future. Surveillance won't identify all threats with 100% accuracy, but it must be a key pillar in pandemic preparedness.

"Part of the response has to be a good system of surveillance to pick up spread, causes, new cases, and new variants. The public health laboratories in the UK were one of the best services for this but unfortunately that has been whittled away, reduced by 40% over the last ten years." Beyond national efforts, "you really need an international system for surveillance," Bangham adds.

Osier agrees that surveillance is one key approach. "People want a timeframe and to know what the threat is, and sometimes we have to admit

that we don't know," she says. "Surveillance is important, but it comes down to prioritization of the money that you have. Surveillance systems can be set up but if nothing significant happens for ten years and other emergencies arise, it is inevitable that the money gets redistributed."

In fighting a pandemic, data is another tool to reach for. Clinical and genomics data must be shared as early as possible, but public health is never just about clinical data, it is about social and economic data, too. In addition, it's vital to have geographical data to structure lockdowns, financial data to understand people's behavior, and much more information to track the spread of infection.

"Different data sets are not well linked," believes Audi. The current pandemic has opened up some collaboration and sharing of key data but there is still more to be done. "Data sets must be linked together when needed and different disciplines must work together to analyze that data. When this happens, economists and investors finally see the importance of global health."

The need for collaboration between different disciplines is the driving force behind ICL's Institute of Infection. Launched in October 2021, their mission is to break down the barriers between medics, engineers, natural scientists, and economists in the battle against infectious disease.

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"Academia puts us in silos from the outset," says Osier. "We are creating that space where people can meet and talk about their ideas. We need to persuade and induce each other to get off the hamster wheels and interact. It is about creating the interconnecting tissue between specific areas of specialism."

Viral threats are, inevitably, top of the agenda and initiatives such as the Global Virome Project are focused on cataloging as-yet-unknown animal viruses that could pose a threat to human health. In addition, collaborative initiatives must also target other threats, not least the growing problem of antimicrobial resistance (AMR).

The WHO has observed high levels of AMR in bacteria linked to common infections such as urinary tract infections, pneumonia, tuberculosis, and gonorrhea, in all regions. Furthermore, a recent landmark study by Global Research on Antimicrobial Resistance (GRAM) showed that more than 1.2 m people died in 2019 as a direct result of antibiotic-resistant bacterial infections—more than from HIV or malaria.

CARB-X, established in 2016, is just one of many organizations investing in the development of new antibiotics to fight drug-resistant bacteria. But AMR is having far-reaching consequences, even influencing changes in the design of hospital buildings to limit the spread of resistant diseases. As with all threats, however, much will depend on the willingness of governments to invest in preparedness programs. That could be the biggest hurdle of all.

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Short-term memory

In terms of consciousness and awareness, the world is better prepared than ever for the next pandemic, but governments still have to deal with on-going priorities that require funding, and in the political sphere, memories are notoriously short. This is evident in malaria control programs, for example. As soon as malaria cases go down the funding is diverted to other emergencies, then malaria cases rise again.

"The narrative is important," says Audi. "The global health community says you must invest billions to prevent the next pandemic, but we should speak about preparedness as societies and as businesses to show that investment has positive returns in a year, five years, ten years. By combatting the big three—malaria, HIV, and tuberculosis—and AMR, we can make the case for the facilities you invest in because they are useful now and will also provide resilience to the next pandemic."

For the ICL team, it is clear that prior investment in public health substantially benefited the response to COVID-19. "Of all the vaccines that have become available, none just jumped out of a hat," says Osier. "They were all built on previous investments that had been made in basic science research and in vaccine rollout. It requires skill and wisdom to keep the justification for research funding strong, without knowing exactly when you will cash in on it."

In the academic community, there is a firmly held view that any investment made now in preparing for

the next pandemic is also an investment in fighting current health issues and creating more resilient supply chains. The challenge is to persuade policymakers that investment is worthwhile. "This is where the case for investing starts for politicians and business leaders to put money on the line," says Audi. "Pandemic preparedness is not separate from treating current health sets. That investment is useful today."

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"I reject a narrative that says you should do this in case of future threats," she adds. "Investing in resilient distribution mechanisms for the bioproduction of vaccines and monoclonal antibodies helps us today with things like HIV."

THE BIGGEST TASK ahead, perhaps, is to persuade those in charge that investment made now is not only an insurance policy against future pandemics, but delivers tangible short-term health benefits. One of many lessons this pandemic has taught us that preparing for the next scenario by strengthening international collaboration and increasing local supply chains will lead to benefits in health care delivery today as well as tomorrow. ■

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