

## More pandemic reflections

More than a year ago I wrote some reflections on the pandemic, primarily from a personal point of view. Many lives have been lost as the pandemic continues its devastating toll. We scientists have been generally lucky, being able to work from home isolated from the raging infection around us. Nevertheless, the disruption to our regular lives will surely make the pandemic one of the most remembered events in our lives, on a par with the previous century's world wars and the 1918 flu pandemic. What have we learned?

We have learned the power of science to step up to the plate and slam a vaccine home run. We have learned that science and public health policy can be fallible, and that initial reactions and recommendations can be wrong. And then we learned that the advice could change to reflect new data and insights. One example of this is the attitude of the medical establishment towards the public wearing of masks. We were initially told it was unnecessary, but when it became clear that the primary vehicle for contagion was by droplets in the air, we pivoted to wearing masks.

One of the most interesting lessons we have learned is that the world's policy of globalization and lean inventories has rendered our supply chains vulnerable. One of the reasons the public was discouraged from wearing masks in the initial stages of the pandemic was that the supply of personal protective equipment for the medical professionals treating those who were ill with Covid-19 was lacking. Hoarding of scarce personal protective equipment by people without an immediate need would have exacerbated the difficult situation in hospitals. Strategic stockpiles of important supplies doubtless will be accumulated in the future.

Another consequence of global interconnection was the frightening speed with which the stealthy SARS-CoV-2 virus encircled the globe from its beginnings in the autumn of 2019. Every country will have to be much more vigilant in the future. It is not clear how to implement vigilance when the contagion is not previously known. Testing for novel viruses and variants will have to be much more streamlined, and medical centers will need to be alert to new clusters of cases. Communication

must be transparent. It is encouraging that after initial missteps, the world's public health communities in general rallied together and shared the sequence of the virus at an early stage.

For me as a scientist, one of the most uplifting events has been the rollout, in record time, of a brand-new technology for vaccine design and production. It's amazing to me that the highly successful RNA-based vaccines were conceived, designed, and manufactured in such a short time. This circumstance is a resounding vindication of our science policies, where investigator-initiated projects are funded to proceed, even when there does not seem to be any immediate prospect of a practical use. Although experts have been warning for years that there was a high likelihood of a pandemic involving new viruses, no one could predict the exact form that it would take. We needed to have in place a toolbox of strategies to apply to the new problem: the tools were in place only because members of the scientific community had been working on them for years. The urgency of the Covid-19 problem has jump-started the introduction of a new strategy for vaccine design that promises to accelerate the future process from identification of a new threat to the development of a successful treatment. This strategy is already being applied to flu vaccines.

Yes, we have learned a lot, and Covid-19 will continue to force lessons on us. The United States has had the humiliating record of the world's worst case numbers and the highest number of Covid-19 deaths. Sobering facts have come to light on the inequality of health care outcomes between rich and poor, and the general disarray of the public health infrastructure in this country. Even more shocking to me is the low uptake of the Covid-19 vaccines, which fueled a resurgence of the pandemic. Despite all the concern about "breakthrough" infections in fully-vaccinated people, the vast majority of the new cases are in unvaccinated people. With a lifesaving medical intervention available, in quantities that are the envy of the rest of the world, American citizens are, inexplicably, squandering their chance. Truly, the most important item lacking in our country seems to be science literacy.

Finally, I want to congratulate and thank the organizers of and contributors to our two highly successful *Biophysical Journal* Special Issues on the SARS-CoV-2 pandemic:

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Biophysicists Address Covid-19 Challenges Part I (Volume 120, Issue 6) and Part II (Volume 120, issue 14). I want to mention Eric J. Sundberg, Susan J. Schroeder, M. Madan Babu, and, most particularly, Tamar Schlick, for their tireless work in soliciting, reviewing, editing, and organizing

these two outstanding issues, which I predict will become classics!

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