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EDITORIAL

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COVID-19 needs a Manhattan Project

Seth Berkley*

Seth Berkley is the chief executive officer of Gavi, the Vaccine Alliance, in Geneva, Switzerland. sberkley@gavi.org

There is an unprecedented race to develop a vaccine against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). With at least 44 vaccines in early-stage development, what outcome can we expect? Will the first vaccine to cross the finish line be the safest and most effective? Or will it be the most well-funded vaccines that first become available, or perhaps those using vaccine technologies with the fewest regulatory hurdles? The answer could be a vaccine that ticks all these boxes. If we want to maximize the chances for success, however, and have enough doses to end the coronavirus disease 2019 (COVID-19) pandemic, current piecemeal efforts won't be enough. If ever there was a case for a coordinated global vaccine development effort using a "big science" approach, it is now.

There is a strong track record for publicly funded, large-scale scientific endeavors that bring together global expertise and resources toward a common goal. The Manhattan Project during World War II didn't just bring about nuclear weapons quickly; it led to countless changes in how scientists from many countries work together. The Human Genome Project and CERN (the European Organization for Nuclear Research) engaged scientists from around the world to drive basic research from their home labs through local and virtual teamwork. Taking this big, coordinated approach to developing a SARS-CoV-2 vaccine will not only potentially save hundreds of thousands of lives, but will also help the world be better prepared for the next pandemic.

An initiative of this scale won't be easy. Extraordinary sharing of information and resources will be critical, including data on the virus, the various vaccine candidates, vaccine adjuvants, cell lines, and manufacturing advances. Allowing different efforts to follow their own leads during the early stages will take advantage of healthy competition that is vital to the scientific endeavor. We must then decide which vaccine candidates warrant further exploration purely on the basis of scientific merit. This will require drawing on work already supported by many government agencies, independent organizations like the Coalition for Epidemic Preparedness Innovations, and pharmaceutical and biotech companies to ensure that no potentially important candidate vaccines are missed. Only then can we start to narrow in on those candidates to be advanced through all clinical trial phases. This shortlist also needs to be based on which candidates can be developed, approved, and manufactured most efficiently.

Trials need to be carried out in parallel, not sequentially, using adaptive trial designs, optimized for speed and tested in different populations—rich and developing countries, from children to the elderly—so that we can ultimately protect everyone. Because the virus is spreading quickly, testing will be needed in communities where we can get answers fast—that means running trials anywhere in the world, not just in preset testing locations. Working with regulators early in the process will increase the likelihood of rapid approvals, and then once approved, a coordinated effort will ensure that sufficient quantities are available to all who need the vaccine, not just to the highest bidder.

All of this will require substantial funding, which is the big ask of big science. Late-stage clinical trials are not cheap, nor is vaccine manufacturing. Although new modular manufacturing methods may speed up the process and cut costs, a single vaccine facility can cost half a billion dollars. Distribution comes at a cost, too. So, to guarantee sufficient production of SARS-CoV-2 vaccines, incentives are needed to engage manufacturers for large-scale capacity. As for dissemination, those organizations with experience in global vaccine distribution, like Gavi, will be at the ready.

Ideally, this effort would be led by a team with a scientific advisory mechanism of the highest quality that could operate under the auspices of the World Health Organization (WHO), for example. But none of this will be possible without political will and a global commitment from leaders of the G7 and G20 countries and multilateral organizations, like the WHO and the World Bank. A pandemic of this magnitude, affecting so many lives, livelihoods, and economies, demands this.

In many ways, COVID-19 is more like the Manhattan Project than other big science efforts, not just because it involves the application of science and not just in terms of scale, but because it is a global security issue. In the race to develop a SARS-CoV-2 vaccine, everyone must win.

*Hear more from the author about a vaccine for SARS-CoV-2 at go.ted.com/sethberkley.

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