Eradicating polio will require changing the current public health strategy, say experts

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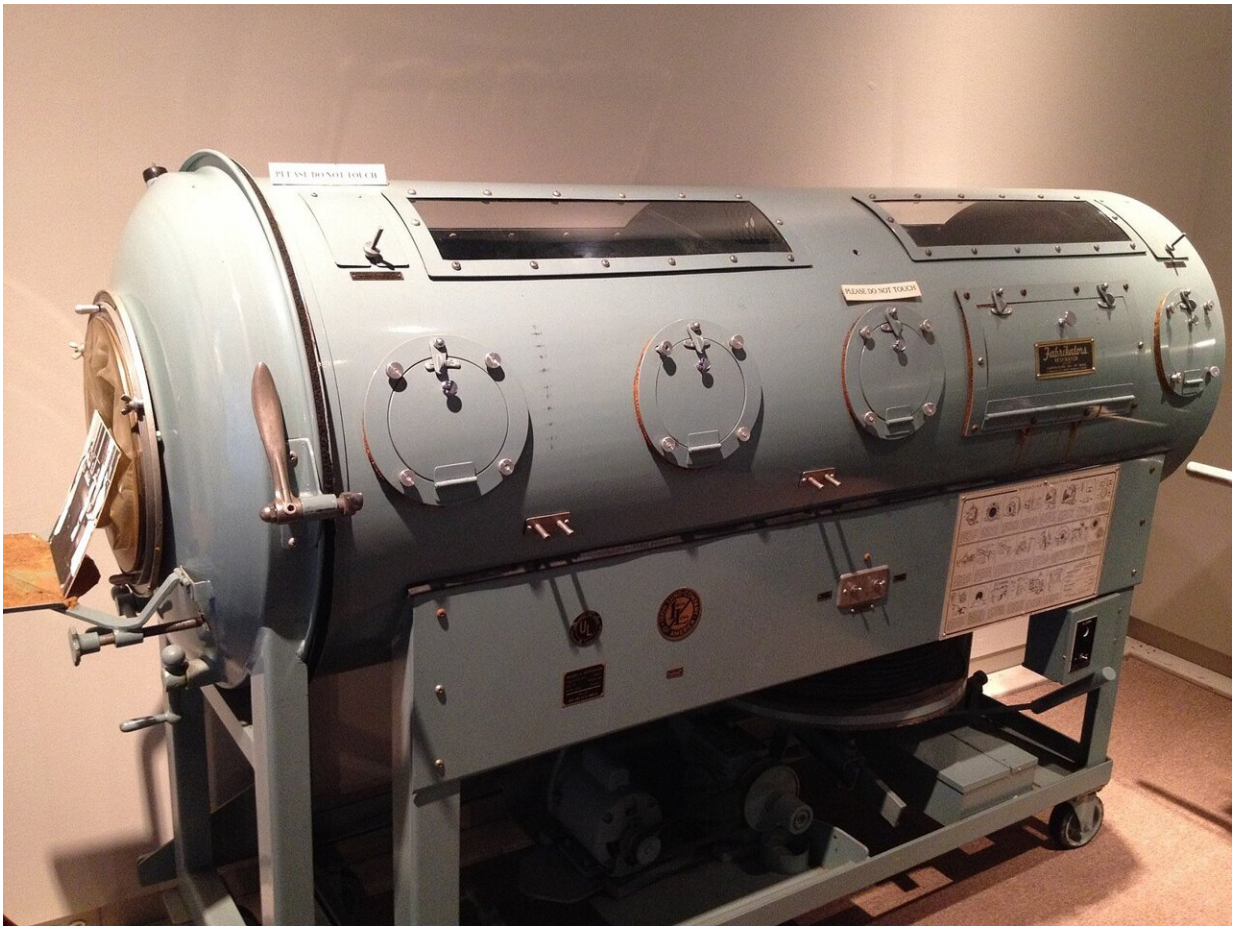

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The recent public health emergency declarations in New York and

London due to polio infections and detection of the virus in these cities' wastewater strongly indicate that polio is no longer close to being eradicated.

Now, four members of the Global Virus Network (GVN) proposed changes in global polio eradication strategy to get the world back on track to one day eliminating polio's threat.

Authors of the recommendations included University of Maryland School of Medicine Institute of Human Virology's Director and Co-Founder Robert C. Gallo, MD, The Homer & Martha Gudelsky Distinguished Professor in Medicine, and Co-Founder and Chair of the Scientific Leadership Board of GVN; two of the world's most prominent poliovirus experts, Konstantin Chumakov, Ph.D., DSci, Adjunct Professor at the George Washington University and the University of Maryland, and Stanley Plotkin, MD, Scientific Advisor of the Coalition for Epidemic Preparedness Innovations (CEPI); and GVN's President Christian Bréchot, MD, Ph.D., Professor of University of South Florida.

They suggested that eradication is possible only through ensuring the highest possible vaccination coverage worldwide and maintaining it indefinitely. Vaccination policies must be tailored individually for different regions of the world and use both the polio vaccine made of inactivated virus (in combination with other vaccines), as well as improved novel oral polio vaccines that use live, weakened virus.

The experts also urged reconvening a scientific group advising the World Health Organization on poliovirus eradication that can respond as needed and adapt policies in the face of newer data or public health emergencies.

The infectious disease experts published their views in a perspective in the *New England Journal of Medicine* on February 16, 2023.

The Global Polio Eradication Initiative (GPEI), which formed 34 years ago, aimed for a goal of polio eradication by 2000. This group developed the original polio eradication plan and formed a scientific advisory group, which was later disbanded before the projected goals were reached.

According to the authors, this led to some decisions that were not based of solid science, including no longer immunizing against one of the three kinds of poliovirus while a weaker version of this poliovirus was still present in communities. The resulting resurgence of poliovirus circulation continues until this day, and the virus reappeared in the U.K., U.S., and other countries after decades when it thought to be eradicated.

"The Initiative based their guidelines on the strategy that was used to eradicate smallpox. However, poliovirus is trickier in that for every person paralyzed by infection, hundreds have no symptoms at all, meaning the virus can silently circulate in communities without anyone knowing it," said Dr. Gallo. "It was premature to assume that plans would run their course smoothly. These recent outbreaks confirm the need for an active scientific advisory group that can council, mobilize, and adjust the polio eradication plan in real-time as needed."

Over the last few decades, there has been an increase in global travel, which can allow infections to migrate from developing nations where they are more common to communities in industrialized nations where they can spread undetected becoming the greatest danger to the unvaccinated and people with weakened immune systems.

With most people in the U.K. and the U.S. vaccinated against polio, how did this recent outbreak in two major international cities happen? As with other viruses once thought rare in more developed countries, such as measles or mumps, some communities chose not to vaccinate. Also, the nature of the polio vaccines in industrialized nations may have

allowed asymptomatic infections to circulate undetected for a while now.

There are two main types of polio vaccines: the injectable version uses noninfectious virus particles to generate immunity (IPV) or the oral polio vaccine (OPV) that uses a live, weakened version of the virus.

"The injectable 'killed' polio vaccine protects from paralysis, but unlike the live version it does not generate robust immunity in the intestinal tract needed to prevent virus circulation. This means that asymptomatic cases can circulate in vaccinated individuals. So then, why do we use not the live version instead?" said Dr. Chumakov.

"The live, attenuated version can revert to virulence (a more an infectious version) and spread to people who are unvaccinated or who have compromised immune systems and occasionally cause paralytic disease. In fact, mutated versions of the oral polio vaccine are what are currently circulating in London and New York. It's a Catch-22, but there may be a way out: recently a new version of the vaccine was developed that does not convert to virulent vaccine-derived poliovirus. In combination with the injectable polio vaccine, this novel oral polio vaccine can become an effective tool to safely create comprehensive immunity that can stop the spread of the disease."

The current polio eradication planned for phasing out the live, oral polio vaccines three years after the last wild or natural poliovirus case is documented, replacing it with the injectable polio vaccine.

"As history has recently shown us with COVID vaccines, just because we would like these vaccines to be available, it does not mean they will be. There may be a scramble and the richer countries will secure vaccines before the others," said Dr. Plotkin.

"Therefore, we at the GVN propose that the group institute a policy

change not based solely on milestones, but rather whether there is an appropriate supply to compensate for the increased demand. Better yet, incorporate a strategy for ensuring there will be available injectable polio vaccines to support the world supply when the time comes."

Once the world converts entirely to injectable vaccines, the GEPI's plan was to remove all polio vaccines ten years after this transition.

"The biggest problem in the way of polio eradication is to do it safely through the combined use of inactivated and live oral vaccines. The former would prevent paralysis from both wild and vaccine-derived poliovirus, whereas the latter would eventually prevent circulation of both forms of poliovirus and paralysis," said Dr. Bréchot. "The vaccine industry is capable of making both if they are given the order to do so."

More information: Konstantin Chumakov et al, Choosing the Right Path toward Polio Eradication, *New England Journal of Medicine* (2023). DOI: 10.1056/NEJMp2215257

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