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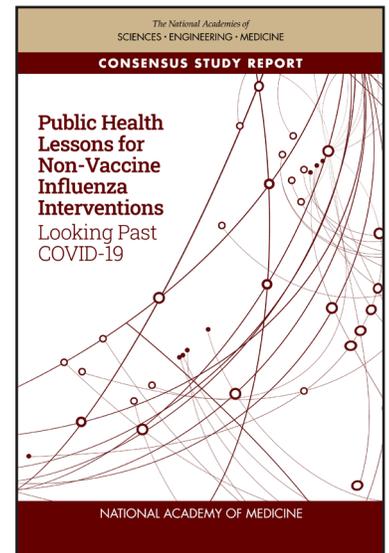
Public Health Lessons for Non-Vaccine Influenza Interventions: Looking Past COVID-19

For nearly 2 years, as the world has focused on combating coronavirus disease 2019 (COVID-19), seasonal and pandemic influenza have remained imminent global health threats. Seasonal influenza causes 250,000 deaths globally each year, and influenza is the circulating pathogen most likely to cause a pandemic. Non-vaccine public health control measures can combat emerging and ongoing influenza outbreaks by mitigating viral spread. This report provides conclusions and recommendations from an expert committee—convened under the auspices of the National Academy of Medicine within the National Academies of Sciences, Engineering, and Medicine—on how to leverage the knowledge gained from the COVID-19 pandemic to optimize the use of public health interventions other than vaccines to decrease the toll of future seasonal and potentially pandemic influenza.

The committee concluded that preparedness efforts should include investments to expand holistic surveillance strategies such as One Health, to improve data-collection accuracy and harmonization, and to research the effectiveness of non-vaccine countermeasures. Preparedness measures should also include stockpiling drugs with proven safety and potential effectiveness against respiratory viruses. Before—and even after—vaccines are developed, public health control measures are effective means of responding to future seasonal and pandemic influenza events. Response efforts should deploy a combination of harm-minimizing measures with rigorous data collection and monitoring. Preparation for clinical trials should include establishing international adaptive trial platforms, which will permit rapid and rigorous research to compare the effectiveness of therapeutics, individually and in combination.

SURVEILLANCE AND DATA COLLECTION

Current disease surveillance tools and strategies are primarily designed to monitor expected disease trends, such as seasonal influenza. In order to more rapidly identify diseases that may spillover to humans, a more holistic and comprehensive approach to surveillance is needed. Countries, with the support



of intergovernmental bodies, should adopt a shared commitment to bolstering national and international surveillance capacities to encompass animal and environmental as well as human health.

Recommendations for surveillance and data collection:

- The World Health Organization (WHO), the World Bank, and regional public health organizations should work collaboratively with countries to build sustainable capacity for routine surveillance in animals, and develop and support interagency One Health platforms.
- National authorities should establish more robust surveillance systems, involving public hospitals and academic medical centers, manufacturers of diagnostics, and social network platforms.
- Epidemiologists should help avert biases in data and seek support to achieve representativeness and sufficient geographical coverage.
- National public health agencies should strengthen the capabilities of local and provincial authorities to report data about novel agents and strains, and improve their own reporting of data to regional organizations and global bodies such as WHO and the One Health Tripartite.
- WHO and regional disease control agencies should work with countries and national governments should work with subnational entities to harmonize, coordinate, and optimize surveillance activities, data collection, and sharing.

EFFECTIVENESS OF NON-VACCINE CONTROL MEASURES

Respirators and face masks are the most effective non-vaccine control measure in reducing the spread of COVID-19. Physical distancing can be effective, but the measurement of 1–2 meters (6.56 feet) does not account for viral spread in exhalation and airflows. Thus, ventilation is important in closed indoor public places. Government mandates to keep people physically apart helped reduce viral spread during COVID-19, but had other social, economic, political, and health effects. Mass- and risk-based testing and contact tracing may be less effective for influenza because those viruses have shorter incubation periods than SARS-CoV-2.

Recommendations for non-vaccine control measures:

- The World Health Assembly should amend the International Health Regulations (IHR) to allow countries to use border measures during a pandemic of influenza or other respiratory viruses.
- Global, state, and local public health agencies and other entities should mandate WHO-compliant face masks when justified by the incidence and severity of influenza.
- In collaboration with other expert bodies, WHO should develop, disseminate, and promote technical recommendations on how to assess and create ventilation conditions in various settings.
- WHO, national centers for disease control, and other health authorities should recommend against using clear plastic barriers and face shields without appropriate face masks.
- Funders should incentivize more integration of research in scientific and medical fields to inform investigations of transmission, prevention, and treatment of influenza and other respiratory viruses.

IMPLEMENTATION OF NON-VACCINE CONTROL MEASURES

The effectiveness of non-vaccine control measures ultimately depends on strong leadership, coordination from governments, and robust public engagement and partnership with communities.

Recommendations for implementing non-vaccine measures:

- Global and regional public health agencies and national governments, including local and state health agencies, should adopt policies tailored to each affected population.
- Leaders of governments and departments of health at local, state, and national levels should:
 - Take into consideration race and socioeconomic disadvantages and leverage behavioral health research and marketing tactics in public health interventions.
 - Demonstrate adherence to non-vaccine measures to promote public trust and compliance.
 - Engage communities and local leaders in making and communicating decisions about health.

- Choose words to convey communications positively.
- Funding agencies should create mechanisms to support the rapid application of data and implementation frameworks during an influenza pandemic and between epidemics.
- National governments—and local, state, and global public health agencies—should develop intervention plans for outbreaks of influenza and other diseases that are readily implementable.

THERAPEUTICS

Pandemics spur the need to rapidly identify, manufacture, and distribute therapeutic drugs, especially early in an outbreak when there are few proven treatments.

Recommendations for therapeutics:

- National governments should mandate that public health authorities:
 - Regularly evaluate stockpiles of therapeutics and other articles needed for care delivery.
 - Secure sources that can reliably supply all items needed during an influenza pandemic.
 - Assess and establish local production capabilities for all such items where possible.
- Government agencies responsible for public health guidance should develop a framework to guide the use and prioritization of treatments during a respiratory viral pandemic, which should identify:
 - Who will evaluate the guidance to inform treatment guidelines.
 - How guidelines for treatment selection and delivery will be communicated to health agencies in states, provinces, and regions and to frontline health care facilities.
 - How suitable places to administer care will be selected.
 - Which populations should be the focus for therapeutic delivery with scarce resources, who will make those determinations, and how community interests will be incorporated.
 - How to distribute a treatment modality equitably throughout the country and among patients, including when health systems have moved to crisis standards of care.
- Global and regional health organizations should collaborate to determine how therapeutics and the resources needed for delivery are shared among countries.
- Intergovernmental organizations, government agencies, foundations, pharmaceutical and biotechnology companies, universities, and research institutes should focus efforts on research strategies that were effective during COVID-19. These include screening potential antiviral drugs for safety and efficacy, evaluating therapeutic approaches that target host responses and viruses, developing and maintaining national and international research collaborations, and building the capacity for rapid adaptive therapeutic evaluation during a pandemic to inform evidence-based treatment guidelines.

CONCLUDING REMARKS

Policy makers and other stakeholders should give concerted attention to non-vaccine control measures for seasonal and pandemic respiratory viruses. The process to develop and deploy a vaccine can take years, so until an effective vaccine is widely available, nonpharmaceutical public health interventions are the first line of defense for mitigating virus transmission. They are simple, cost-effective, and an essential part of any effort to end an outbreak. When infections do occur, therapeutics are the last line of defense to avert the effects of a virus among those infected. Therefore, the research to develop and test non-vaccine control measures should be a priority, particularly in low- and middle-income country settings. Strategic prioritization of non-vaccine control measures at the global, regional, and local levels is needed, now.

This is one of four studies conducted under the **Advancing Pandemic and Seasonal Influenza Vaccine Preparedness and Response Initiative**, which explores how the scientific and technological breakthroughs throughout the COVID-19 pandemic could inform and advance future pandemic and seasonal influenza vaccine preparedness and response efforts.

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