Syndromic Surveillance in Puerto Rico During the COVID-19 Response: An Alternative Approach to Scarce Molecular Testing

See also the *AJPH* COVID-19 section, pp. 1344–1375.

On January 30, 2020, the World Health Organization officially declared COVID-19 a public health emergency of international concern. As of May 15, 2020, 188 countries and regions have reported more than 4 500 000 COVID-19 confirmed cases and 313 000 deaths.[1] Countries have implemented public health prevention measures, including physical distancing, isolation, and quarantine. Currently, governments and public health authorities are identifying which indicators are most useful for evaluating prevention measures.

Public health emergency (PHE) dynamics require immediate intervention to reduce possible morbidity and mortality. Public health decision-makers face massive challenges during and after emergency scenarios, including how to effectively collect comprehensive systematic data. Given the traditional challenges facing public health authorities, the lack of accurate data can promote detrimental decisions. The scarcity of reliable information is even more salient in developing countries because of limited infrastructure.[1]

Since 2016, Puerto Rico, a territory of the United States, has faced four PHEs, including the COVID-19 pandemic. Despite the lessons learned from these PHEs, and the concomitant physical, emotional, and financial consequences, the governmental data-collection infrastructure is inadequate for making evidenced-based decisions. Throughout the emergencies, public health decisions in Puerto Rico were often made without data that was scientific or reliable. An example of this data is the diverse conclusions regarding the death rates from Hurricane Maria (2017) reached by various groups conducting epidemiological studies that used dissimilar methodologies.[2]

PUBLIC HEALTH CHALLENGE

In early March 2020 in Puerto Rico, local authorities confirmed the first COVID-19 case with a tendency to continue to increase. On March 12, 2020, Puerto Rican authorities issued an executive order to establish a lockdown as a preventive measure—the first to be placed under US jurisdiction. Almost two months later, Puerto Rico has reported more than 2500 confirmed cases. Puerto Rico's hospitalization rates are within their health care system's capacity,[3] which may serve as an initial proxy indicator of the effectiveness of the lockdown measure. Further rigorous assessment using valid data should confirm this observation, particularly as a long-term preventive measure.

During this ongoing PHE, increasing access to molecular testing is still the primary challenge for Puerto Rico's COVID-19 response. Without adequate testing, the estimates for SARS-CoV-2 infection rates are limited, reducing the ability to understand viral spreading and contact tracing and hindering the assessment of preventives measures. The limits of the epidemiological data available during this PHE are evident. Thus, efficient monitoring, in the context of limited epidemiological data infrastructure and a socioeconomic and political crisis (e.g., bankruptcy, administration instability), poses a difficult public health challenge.[4]

PUBLIC HEALTH APPROACH

In March 2020, a public health initiative was launched to establish the Epidemiological Syndromic Surveillance System (ESSS) as a collaboration between academia and nonprofit organizations. This tool offers prediagnostic data for public health decision-making.[5] The ESSS was developed in response to COVID-19 in Puerto Rico as a novel online crowd-based and geocoded passive strategy using the Survey123 for ArcGIS (ESRI, Redlands, CA) platform to overcome the dearth of local island-wide infrastructure for testing, tracing, and confirming cases. The ESSS platform asks participants to share the signs and symptoms of COVID-19 that they have experienced in the past 24 hours. This self-reported ESSS was swiftly implemented when only five COVID-19 cases were confirmed in Puerto Rico. Trends of signs and symptoms

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can be tracked, as responders enter their own information daily. By collecting zip code information, the system allows the detection of areas of high symptoms or clustering symptoms across Puerto Rico municipalities.

The ESSS Web-based design makes it unique for its simplicity, acceptability, and timeliness of the data. Real-time aggregated data are continuously posted on a Web-based dashboard for the rapid dissemination of signs and symptoms collected by the ESSS. To ensure systematic data collection and analysis, the form-centric platform allows rapid and valid data capturing, sharing, and analysis. Once molecular tests become available, further analyses will include the ESSS's specificity and sensitivity evaluation of COVID-19 at community levels.

To date, more than 40 000 surveys have been registered. The data gathered are expected to identify potential incidence areas using self-reported COVID-19 signs and symptoms. This information is a cost-effective way to establish priority communities for testing.[6] Collecting general information on sociodemographic characteristics and preexisting conditions also allows the identification of priority subgroups. Data visualization using heat maps facilitates rapid and easy results, particularly for the lay audience. Figure A (available as a supplement to the online version of this article at http://www.ajph.org) shows a preliminary heat map of Puerto Rico with data visualization capabilities that can assist in the identification of high-priority areas to aid the public health decision-making process for COVID-19 testing.

PUBLIC HEALTH ALLIANCES

Public health alliances are crucial for identifying available resources and maximizing them during a PHE. A multisectoral approach is necessary, especially in countries with limited data-collection infrastructures, for generating reliable data. In the context of a fragmented health care system, systematically collecting data requires the collaboration of diverse private and public entities unified to provide a focus on health policy. This collaborative public health approach through trusted academic–research partnerships stimulates community-based participatory research when communities actively collect systematic data to identify their needs.

In scenarios in which limited access to molecular testing, deficient data-collection infrastructure, political barriers, and uncertainty hinder the emergency response, public health alliances can support decision-making with reliable data. Taking into account these challenges, and recognizing that the gold standard of massive molecular testing for epidemiological surveillance is often complicated, we suggest the following activities for enhancing data-driven policy: (1) ESSS activities at the population level, as well as for specific vulnerable populations (e.g., health care facilities, elderly home care), to identify COVID-19 outbreak areas early on; (2) enhanced hospitalization statistics focusing on respiratory disease diagnosis to monitor health care system capacity; and (3) analysis of current influenza and dengue surveillance systems to actively monitor influenza and dengue-like illness. Openness from the local authorities is critical for ensuring the successful integration of these activities into the COVID-19 response. The quick and effective collaboration of multiple public health practitioners with the private, public, academic, and community sectors is necessary to successfully overcome the epidemic challenges and prevent negative outcomes at the population level. AJPH

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

HUMAN PARTICIPANT PROTECTION

This study was approved by the Ponce Health Sciences University institutional review board (study protocol no. 2003032026) and the Harvard T.H. Chan School of Public Health (study protocol no. IRB20-0519).

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