Integrating the results of at-home diagnostic testing with public health surveillance to better track COVID-19 and future public health threats

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In the United States alone, more than 755 million SARS-CoV-2 antigen self-testing kits for at-home use have been distributed since 2022.[1] The COVID-19 pandemic ushered in the largest at-home diagnostic testing program ever implemented and revolutionized rapid testing accessibility, empowering individuals to reduce the risk of transmitting to others and lowering healthcare system burdens.[1] Rapid test kits provide immediate information about infection status, thus enabling more effective management of one's own health. The results from such widespread testing, if reported accurately, in real-time, and integrated with other data, would significantly enhance disease surveillance efforts and provide critical evidence to inform public health policies.[2] However, the potential for self-testing to transform the public health surveillance landscape was not fully realized during the acute phase of the COVID-19 pandemic due to underreporting and unclear reporting processes.[2] Effective community-level surveillance, a cornerstone of public health, requires integrating at-home test results into existing disease reporting systems to generate a clearer picture of the changing epidemiology of the disease and facilitate timely response.[2,3] To fully realize the potential of at-home testing to benefit both individuals and communities, it is imperative to ensure that self-testing results are incorporated into public health surveillance reports seamlessly.

Self-testing kits give individuals the autonomy to report their infection status to public health surveillance systems directly. Simplifying the reporting process is essential for better integrating the results of self-tests with tracking diagnoses made in clinical settings. Digital tools are the obvious choice for streamlining results reporting; one study found that 75% of digital assistant users reported their COVID-19 rapid test results to health departments.[3,4] The optimal reporting route will differ based on the setting, but should consist of a variety of user-friendly options, aimed at minimizing the effort and time required for individuals to complete the reporting process. Available tools such as QR codes, photo uploads of results, self-tracking apps, and/or phoning healthcare providers should be prioritized to ease reporting. A diverse array of options ensures smoother integration into public health surveillance systems and facilitates broader participation by individuals.[4]

Establishing an efficient system for integrating patient-reported testing data with public health surveillance platforms requires widespread public awareness of the importance, a well-established framework for data reporting and sharing, stringent privacy protection, legislative support, and the standardization of reporting protocols.[5,6] Truly transforming this process for the benefit of both individuals and communities requires synergistic collaboration across multiple sectors, with a significant role for public health organizations and regulatory agencies. Standardizing data formats for seamless integration across diverse health information systems to contribute to centralized surveillance systems is critical to this approach. In addition, regulations must be enacted and enforced that not only ensure the privacy and security of all reported and collected data but also establish minimum standards for diagnostic test accuracy along with processes to ensure the validity of self-reported results.[5,7] This is essential in building and maintaining public trust.[5] Monitoring and evaluating the effectiveness of each step in the reporting process is of utmost importance given the complexity and so that evidence-based decisions can be made to adapt.

In addition, there is an urgent need to determine into how best to encourage individual reporting of self-test results via the adoption of digital health tools, the use of incentives, or other methods.[3,4] Furthermore, public education about the importance of self-testing for individuals and for communities plays a pivotal role in this context. Comprehensive awareness campaigns emphasizing the value of public health surveillance and the key role that individuals can play in contributing data to help characterize changing epidemiologic trends and community-level risk estimates combined with clearly highlighted reporting guidelines on testing kit packaging are vital.[8] A deep understanding of these elements not only enlightens the public about their role in data reporting but also empowers them to appreciate how their contributions can significantly aid in advancing public health goals.[8,9] As the demand for at-

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home testing for other pathogens continues to grow, developing infrastructure for individuals to report results becomes increasingly important, addressing a need that extends beyond COVID-19 and applies to a broad spectrum of infectious diseases.

Public health surveillance is one of the most powerful tools of infectious disease prevention and control available. With the growing acceptance and demand for at-home tests, we have a unique opportunity to better integrate these data into public health surveillance systems using the lessons learned during the COVID-19 pandemic to further innovate. By harnessing the potential of digital tools, enhancing data integration, and fostering a culture of proactive health reporting at the individual level, we can advance public health surveillance in ways that not only meet current needs but that are also well-prepared for future challenges. It is important to note that the feasibility of surveillance strategies requiring resources may be limited in low-resource settings, highlighting the need for innovative solutions that only require available resources and can be tailored to local infrastructure.[10]

Contributors

YZ: conceptualization; writing - original draft and writing - review and editing. NEB: conceptualization; writing - original draft; writing - review and editing; supervision; funding acquisition.

Declaration of interests

The authors have no conflicts of interest to declare.

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