

Preventing and responding to pandemics via digital health: a key to world health security?

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ABSTRACT

To set the stage, digital health technologies have greatly improved world health security via the following: the ability to gather and analyse data in real-time; the ability to detect patterns in infectious diseases; and the reduction of infection risk through remote services.

The purpose of this research is to evaluate digital health's contribution to global health security response and pandemic readiness. It takes a look at how digital health may be used for patient care data management, early detection, and surveillance. Our methodology included a literature review of academic papers published in 2019–2024 (searchable via PubMed, Science Direct, Google Scholar, and the Web of Science), as well as reports from the World Health Organization and case studies of previous pandemics. The usage, advantages, and challenges of digital health technology are some of the topics covered. We were very careful to collect the well-informed views of experts from a variety of sectors, such as government, technology, and public health. The commentary provides a summary of the results and recommendations for how digital health might be included into future pandemic plans and responses.

The results show that digital technologies help with communication, fighting false news, and reaching the public, but there are still problems with data privacy and public health. Governments and the commercial sector must work together and do substantial research in order to achieve integration.

The COVID-19 pandemic proved, in conclusion, that digital technology is crucial for managing outbreaks, providing medical care, communicating, and exchanging data. Building on these breakthroughs and preparing for the difficulties ahead will fortify healthcare systems for future pandemics as the globe transitions into the post-pandemic era.

THEME OF THE WORK

Essential components of pandemic planning and response include digital health technology services such as mobile health, big data analytics, and artificial intelligence.

New information: This commentary takes into account what we learned at COVID-19 and looks at how digital health has evolved within the framework of global health security, drawing attention to both its strengths and its weaknesses as well as potential avenues for future research.

This article argues for the need to invest in infrastructure, workforce, and technology access while also highlighting objectives for digital health in public health preparedness, all of which have global health implications for policy and action. In order to tackle global health challenges and advance a collaborative, fair plan for pan-demic preparation, international cooperation is crucial.

KEYWORDS: Digital health technologies; COVID-19; telehealth; pandemic preparedness; health surveillance

Introduction

The extreme need of robust, well financed strategies to anticipate and react to pandemics has been shown by the COVID-19 pandemic [1]. The innovative ways that digital health technologies are transforming global health security are putting them at the forefront of discussions regarding repercussions and dangers [2]. Thanks to digital health tools, we can do things like conduct compassionate early illness diagnosis and surveillance, which used to require relying on outdated approaches. New trends in infectious illnesses may be better identified with the use of real-time data analysis made possible by mobile health applications, wearable devices, and electronic health records (EHRs). Utilising big data analytics, early warning systems may identify unusual patterns linked to epidemics, enabling swift public health interventions [3,4]. Technologies such as contact-tracing applications and syn-dromic surveillance systems have played an essential role in monitoring and controlling the COVID-19 pandemic [5]. While on lockdown or otherwise socially isolated, telehealth has been an absolute godsend. It has decreased the likelihood of infection transfer, allowed for distant consultations, and relieved strain

on overburdened healthcare institutions. By connecting underprivileged communities to healthcare providers, telehealth has helped close the healthcare equity gap. We learned from the pandemic's quick uptake of telemedicine that it may help make healthcare more resilient in crisis and beyond [6].

Combating the spread of the COVID-19 pandemic in Africa has relied heavily on digital health technologies. For the purposes of disease screening, monitoring, and virtual healthcare services, South Africa made use of technology including SMS-based solutions, mobile health apps, telemedicine, and artificial intelligence [7]. To guarantee continuity of treatment in the face of mobility restrictions, telehealth modalities including tele-consultation and tele-medicine have been increasingly used in Uganda [8]. All over Africa, these digital technologies have the potential to improve pandemic readiness, reaction, and recovery [9]. They promote fair vaccine distribution and help with the rapid detection and treatment of COVID-19 patients [9]. However, problems still exist, including those related to infrastructure, technology, and regulations [7]. Digital health technologies provide exciting new opportunities to improve healthcare delivery and pandemic management in Africa, despite these constraints.

The use of digital health tools has been essential in developed nations' responses to the COVID-19 epidemic. In their analysis of the COVID-19 pandemic control efforts, Kalhori and colleagues looked at the results in 10 high-prevalence countries: Italy, Spain, USA, France, UK, Iran, China, the Netherlands, Germany, and Belgium. They found that telemedicine was the most widely used technology, with EHRs, AI, big data, and the Internet of Things following closely after [10]. Patient screening and management, exposure reduction, illness simulation, and healthcare provider help were among the many goals listed by Tilahun et al. [11], who conducted a scoping review of the literature, as using these technologies. There were also notable contributions to the containment of the COVID-19 pandemic from digital learning modules, geographic information systems, and mobile apps for self-care and patient monitoring [10]. In their study, Vargo et al. [12] discovered a total of 28 unique technology gadgets that were used for 32 different tasks by eight different demographics, the majority of whom were healthcare workers. There were 35 separate outcomes from the use of these devices, including better patient outcomes and lessening the effect of outbreaks [12].

During a pandemic, communication is crucial. Public health officials may now convey information

to the public in real time, combat disinformation, and encourage compliance with health rules all thanks to digital platforms. Officials in charge of public health have updated the public on the pandemic situation, provided information on vaccines, and encouraged people to take preventative steps via social media, websites, and mobile applications. Additionally, community participation has been made possible via these channels to address public concerns and give feedback [13]. In order to better respond to pandemics, digital health technologies have aggregated data from a variety of sources. Multiple fields, including medicine, public health, and academia, may benefit from the exchange of patient records made possible by interoperable health information systems. Coordinated reactions, resource distribution, and well-informed decisions all depend on this [14]. Integrated data systems were useful for monitoring hospital capacity, vaccine delivery, and epidemiological trends during the COVID-19 pandemic.

The promise of digital health isn't without its obstacles and ethical questions. Security and privacy of personal information are growing concerns as our reliance on digital technologies increases. The security and privacy of individuals' medical records is a major issue [15]. Because differences in digital skills and infrastructure may exacerbate preexisting health inequalities, ensuring equal access to digital health technology is another major concern. Also, we shouldn't put all our eggs in the digital basket and neglect to fortify the tried-and-true public

health infrastructure and the skills of our workers.

Health security initiatives on a global scale should include digital health. Investment in research, capacity development, and infrastructure will allow these technologies to reach their full potential. Innovation and resource sharing in digital health should be a priority for public, commercial, and international entities. Financial, regulatory, and infrastructural barriers impede the widespread use of digital health solutions. In order to be more successful during pandemics, experts suggest creating guidelines, standardising deployment processes, and fostering public-private collaborations [7]. To guarantee the long-term viability of digital health technologies in patient care, it is essential to establish standards for data governance, interoperability, and other areas that have lately come to light, such as ethics. Ethical supervision and informed consent procedures, data protection via access controls, sustainability of ethical data usage, and adherence to relevant

legislation were the four essential domains proposed by Tiffin and colleagues within this framework for using digital health data governance to safeguard vulnerable populations in low- and middle-income countries [16]. These frameworks should take into account patient privacy rights, data security, and inclusive accessibility for all in order to establish public confidence and fully use digital health. When it came to monitoring, managing patients, communicating, and reaching out to people via data integration, digital health proved a lifesaver during the COVID-19 epidemic. As people all throughout the world move into a post-

Conclusion

To ensure that health systems can endure future pandemics, it is essential to accelerate these advancements and address the problems that have resulted from them in the COVID-19 period. The success of a digital health technology is dependent on the usefulness of the data it provides with respect to the context in which it is used. The safe and successful implementation of digital health technologies in response to COVID-19 and future pandemics depends on adherence to assessment using evidence-based medicine and complex systems paradigms. Because it makes future pandemics less likely to occur and far more controllable if one does, digital health is an essential tactic for guaranteeing global health security.

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