



National Health Security: The Role of Academic Health Centers and GIS

In previous blog posts, I outlined how healthcare organizations can use some of the tools of the intelligence community (IC) to better prepare for and help to mitigate the effects of a pandemic. Specifically, geospatial intelligence (GEOINT) tools can be used to assess information gathered from publicly and commercially available sources for strategic analysis. Structured data such as imagery and fixed asset data such as the locations of hospitals and clinics can be visualized and assessed for preparedness. In addition, unstructured data such as news reports, documents, and social media posts can be assessed and visualized using mapping software. The recent surge in the seasonal flu, the on-going SARS-CoV-2 pandemic, and the emergence of Respiratory Syncytial Virus (RSV), the so-called “triple-demic,” has negatively impacted healthcare organizations and raised the importance of infectious disease pandemic preparedness. By extension, this surge in infectious diseases at the local level is a signal that local health emergencies are a national health security issue.

In this post, I widen the perspective to analyze how academic health centers can play a role in national health security. Over the past several months, The Biden Administration has published several documents that indicate that the administration is focused on raising the importance of infectious disease pandemic preparedness as a priority for the nation’s security strategy. In September 2021, the White House published “American Pandemic Preparedness: Transforming Our Capabilities¹.” From that document:

“New infectious diseases have been emerging at a quickening pace due to increased zoonotic transmission from animals, driven by population growth, climate change, habitat loss, and human behavior, and these diseases are spreading faster with increased global travel.”

In September 2022, the White House Steering Committee For Pandemic Innovation published “First Annual Report On Progress Toward Implementation Of The American Pandemic Preparedness Plan².” From that report:

“Ensuring Situational Awareness about infectious-disease threats, for both early warning and real-time monitoring.”



“Strategically, two core themes include leveraging and exercising capabilities in addressing current infectious diseases threats, and utilizing an across-the-government-portfolio-approach to maximize the ability of the U.S. Government to foster private sector innovation.”

In October 2022, the Administration published the “National Biodefense Strategy And Implementation Plan³.” From that report:

“Biological threats can affect humans, animals, plants, and the environment, resulting in significant health, economic, social, and national security impacts. It is therefore important to address biological threats using a One Health approach that recognizes the interconnections among people, animals (domestic and wildlife), plants, and the environment. Infectious disease threats do not respect borders. Urbanization, climate change, habitat encroachment, economic interdependence, and increased travel, coupled with weak health systems, increase the ability of infectious diseases to spread rapidly across the globe. Novel infectious diseases, the resurgence and spread of once geographically limited infectious diseases, zoonotic diseases, and antimicrobial resistance can overwhelm response capacities and make outbreaks harder to control. As we have seen with the COVID 19 pandemic, an infectious disease outbreak—even in the most remote places of the world—could spread rapidly across oceans and continents, directly affecting the U.S. population and its health, security, and prosperity.”

Also in October 2022, the Administration published the “National Security Strategy⁴.” From that report (page 46, Sharpen Our Tools of Statecraft sidebar):

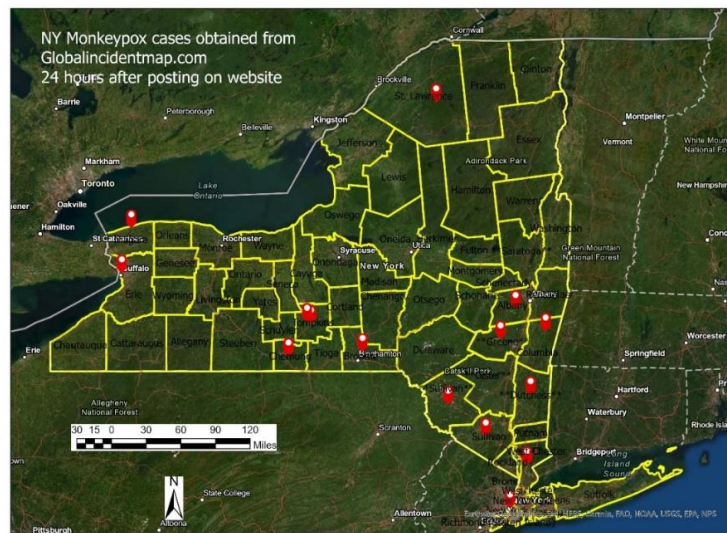
“Enhancing U.S. and global early warning and forecasting for infectious disease threats and pandemics by increasing support for the Centers for Disease Control and Prevention’s (CDC) Center for Outbreak, Forecasting, and Analytics and foreign assistance for global health security.”

How can geospatial analysis contribute to national health security efforts and how can healthcare organizations, specifically academic health centers, benefit and contribute to the nation’s efforts to understand and help mitigate the current infectious disease environment and prepare for the next pandemic?

Geographic information is a crucial part of a nation’s planning for public health emergencies and pandemics, response to those events, and recovery. Accurate location data is essential to identify assets that play a role in those three phases of event. In addition, because geographic information can be analyzed within a geographic information system (GIS), visual displays of large areas can be used for

effective and efficient resource allocation at scale. Also, the creation of dashboards displaying near real-time data to monitor progress can be a valuable tool.

Geographic information typically exists as structured data; points, lines, polygons, and raster data. This data can be imported into and be analyzed easily in a typical GIS. Now, some systems allow the analysis of unstructured data; word documents, emails, web pages, and increasingly, social media posts. This helps with near-real-time analysis of location data which helps to facilitate faster response times to the event. An example of this type of data is the ProMed emails distributed by the International Society for Infectious Diseases⁵. The information is in the form of an email and contains important location data, the nature and cause of the infectious disease outbreak, and if it occurred in humans, animals, or plants. It is an example of unstructured data that can now be analyzed utilizing GIS tools. In addition, in a previous blog post, some sites contain spatial data in the form of place names and/or latitude and longitude coordinates. An example of this is from the GlobalIncidentMap.com⁶ website:



This map shows the locations of monkeypox outbreaks in New York state. The data was obtained from [Globalincidentmap.com](https://globalincidentmap.com) 24 hours after it was posted. The spatial data contained in the text of the story (in this case latitude and longitude) was geocoded and visualized.



How can healthcare organizations, especially academic healthcare centers (AHCs), benefit from the current Administration's elevated emphasis on national health security? To the extent that this new emphasis translates to increased federal research funding will help. Agencies with the Department of Health and Human Services that support national health security include the Office of the Assistant Secretary for Preparedness and Response (ASPR), CDC, NIH, CMS, FDA, the Administration for Community Living, HRSA, SAMHSA, and others. For those centers that include schools of veterinary medicine, it may help to diversify the funding stream especially for the study of zoonotic disease transmission. Research funding support from the United States Department of Agriculture, the FDA, the Education Department, the Department of Defense, and the National Science Foundation support for animal health research may now be available in addition to philanthropies and individual donors. Additional funding can also help to attract faculty researchers and scholars to those centers seeking to create academically-based interdisciplinary national health security centers and institutes. Finally, as the number of algorithms for disease detection using structured and unstructured data become available, the inventory of deep learning tools for geospatial use will increase. This will assist with advanced geospatial analysis as well as bringing advanced learning modalities (AI, ML, Deep Learning) into the curriculum.

References:

- ¹ <https://www.whitehouse.gov/wp-content/uploads/2021/09/American-Pandemic-Preparedness-Transforming-Our-Capabilities-Final-For-Web.pdf?page=29>. Accessed December 19, 2022
- ² <https://www.whitehouse.gov/wp-content/uploads/2022/09/09-2022-AP3-FIRST-ANNUAL-REPORT-ON-PROGRESS.pdf>. Accessed December 19, 2022
- ³ <https://www.whitehouse.gov/wp-content/uploads/2022/10/National-Biodefense-Strategy-and-Implementation-Plan-Final.pdf>. Accessed December 19, 2022
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