COVID data system highlighted as model for public health preparedness, population health surveillance

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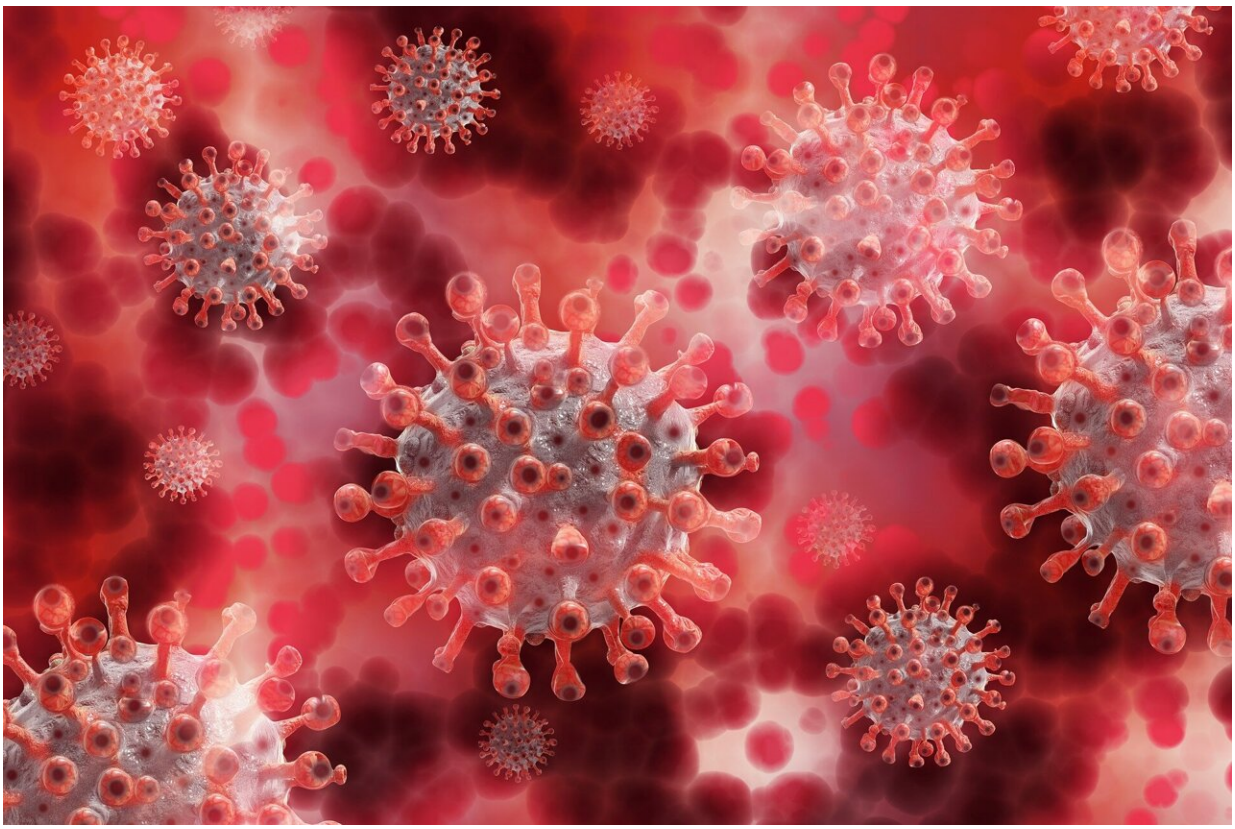

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When COVID-19 hit the Mid-South in 2020, researchers at the University of Tennessee Health Science Center quickly saw how

Memphis was struggling to keep pace with the rapid advance of the pandemic. So, they got to work.

In a report recently published in *Disaster Medicine and Public Health Preparedness*, senior authors David Schwartz, MD, FACR, professor and chair of the Department of Radiation Oncology in the UTHSC College of Medicine, and Arash Shaban-Nejad, Ph.D., MPH, associate professor and director of Population and Precision Health in the UTHSC-ORNL Center for Biomedical Informatics, outline how they helped to lead a multi-disciplinary team at UTHSC and the University of Memphis to create a unique, community-focused COVID-19 data registry intended to serve as a model to guide public health policies and interventions or community campaigns nationwide.

The registry, called the Memphis Pandemic Health Informatics System (MEMPHI-SYS), is a direct offshoot from the drive-through COVID-19 testing site at Tiger Lane at the Mid-South Fairgrounds, an initiative led by Dr. Schwartz in collaboration with the Shelby County Health Department and the City of Memphis to make COVID testing available to the public for free.

"Dr. Shaban-Nejad and I had worked together in the past to look at data science's role in cancer treatment," Dr. Schwartz said. "Since we were collecting clinical data, such as symptoms and patient employment status, from the Tiger Lane testing site, we decided to leverage clinical and data science expertise here at UTHSC in Memphis to start answering questions as to the epidemiology and patterns of the spread and presentation of COVID in the early days of the pandemic."

As the report, titled The Memphis Pandemic Health Informatics System (MEMPHI-SYS)—Creating a Metropolitan COVID-19 Data Registry Linked Directly to Community Testing to Enhance Population Health Surveillance, explains, the testing sites required patients to schedule an

appointment over the phone or using an online chatbot.

Each patient provided their demographic information, geographic locations, medical history highlights, COVID exposure history, and risk factors for COVID complications. MEMPHI-SYS provided a platform for that patient information to be collected, analyzed, and compiled on a HIPAA-compliant dashboard where healthcare providers, community partners, public officials, and other stakeholders can access it.

According to the authors, a system like MEMPHI-SYS was desperately needed in Memphis. Dr. Schwartz said, when COVID hit, the region was lacking in resources to respond to large public health events.

"We had to do a crash course in metropolitan-level infectious disease response in the middle of the first large-scale public health emergency in our generation's lifetime," Dr. Schwartz said. "There's no way to be able to respond with appropriately resourced and localized testing and intervention without data. We didn't have that in 2020, so we were pretty much just making our best guesses as to where to put these resources and how to properly size and scope these resources."

While it was created in response to COVID, MEMPHI-SYS was designed prospectively. Because of the registry, Dr. Shaban-Nejad said leaders will be able to make better informed decisions in the future. "The platform is data agnostic, so it is readily available to be changed to any other public health disaster," he said. "We can use this system to guide public leaders and inform policy-making and decision-making regarding resource allocation."

"I am so very proud of the incredible work of Dr. Schwartz and Dr. Shaban-Nejad," said Scott Strome, MD, executive dean of the College of Medicine. "Not only were they leaders of our initial strategy to combat COVID-19, but their work also resulted in a robust tool to combat

infectious threats in the future."

According to the report, the registry will also serve as a data warehouse to help improve population health surveillance and reduce health disparities and social risks in disadvantaged neighborhoods. The UTHSC College of Medicine's Office of Community Health Engagement plans to continue using the geographical and demographic data in MEMPHI-SYS to prioritize outreach and direct distribution of medical, behavioral, and social resources toward neighborhoods most in need.

The data can also be used to anticipate, detect, and monitor health issues that may arise in certain local areas. "If you collect historical data for a patient, you can potentially predict a patient's future health status. Now, we can do pretty much the same thing for the entire Memphis population," Dr. Shaban-Nejad said.

MEMPHI-SYS isn't contributing to only the field of public health. According to Dr. Shaban-Nejad, it also helps in the advancement of artificial intelligence (AI) and data science technologies. Dr. Schwartz touted his counterpart's work in pushing the boundaries of cutting-edge AI technologies.

"A big problem with AI is that human users cannot easily see how a particular algorithm is functioning inside of its black box," Dr. Schwartz said.

"The trailblazing aspect of Dr. Shaban-Nejad's work is that we're able to look under the hood. His platform can display a 'dashboard' that's understandable to the human mind, showing how our AI got to its answer in the first place. What we are aiming to do is to digest a huge amount of social, economic, and epidemiologic data in a transparent, explainable way that providers, patients, and policy leaders can quickly understand and act upon, even in the thick of a public health emergency. That's the

level of preparation Memphis needs and should expect. We will lead the country in this."

More information: David L. Schwartz et al, The Memphis Pandemic Health Informatics System (MEMPHI-SYS) —Creating a Metropolitan COVID-19 Data Registry Linked Directly to Community Testing to Enhance Population Health Surveillance, *Disaster Medicine and Public Health Preparedness* (2022). DOI: 10.1017/dmp.2022.284

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