Tracking COVID-19 from the Amazon to Chicago

July 29 2022, by Marla Paul

Northwestern University scientists in Lima, Peru. Credit: Northwestern University

Northwestern Medicine scientists Ramon Lorenzo-Redondo, Ph.D., and Egon Ozer, MD, Ph.D., recently flew into the airport in Iquitos, a remote

Peruvian city in the depths of the Amazon jungle accessible only by plane or river boat. They wanted to meet with clinicians and scientists who provide care to the surrounding communities along the Amazon River.

The reason for the recent trip: Iquitos had a high incidence of COVID-19 at the start of the pandemic, and they wanted to understand how the large city's relative isolation affected the spread of viral variants in the region. Peru also has had the highest COVID-19 mortality rate during the entire pandemic, especially due to very high mortality observed during the first phases of the SARS-CoV-2 expansion.

The scientists' travels through South America, which also included Lima, Peru, and Santa Cruz, Bolivia, are an effort by Northwestern University's Robert J. Havey, MD, Institute for Global Health to expand the global network of SARS-CoV-2 sequencing in regions where there is low or almost nonexistent viral genetic information reporting. They want to help build capacity for South American scientists and public health experts to conduct local investigations.

Lorenzo-Redondo and Ozer, both assistant professors of Medicine in the Division of Infectious Diseases, are part of a team at the Center for Pathogen Genomics and Microbial Evolution (CPGME), which is part of the Havey Institute for Global Health. The team has been studying the virus in Chicago and globally since the start of the pandemic. Their team has previously worked with collaborators in Africa—in the countries of Nigeria, Mali and Guinea—to sequence hundreds of COVID-19 specimens from undersampled regions.

"If you look at the global public repository of all SARS-CoV-2 sequences, less than 1 percent come from the continent of Africa and less than 2 percent come from South America," said Ozer, director of the CPGME. "Compare that to North America or Europe where a vast

majority of sequences are being provided. This leads to huge disparities in knowledge of what is circulating in different parts of the globe."

Creating a global collaboration of COVID-19 scientists

The scientists met with doctors and researchers at hospitals in Peru and Bolivia to provide support for studying SARS-CoV-2 variants in their regions. This includes shipping some samples to the U.S. for sequencing, but also providing equipment, supplies and training to these South American institutions for scientists to follow COVID-19 in their countries.

The goal is to have a network of collaborations around the world so scientists can work together and share expertise and information to rapidly respond to new developments in the SARS-CoV-2 pandemic and to future emerging or re-emerging pathogen outbreaks.

"The emergence of a new variant any place in the world puts us all at risk," said Judd Hultquist, Ph.D., an assistant professor of Medicine in the Division of Infectious Diseases and the associate director of the CPGME. "Timely surveillance internationally is critical for us to be prepared when the next variant arises."

How South Africa's early warning of omicron helped the US

An example of this advance warning system working well is the early detection of omicron in South Africa, even before omicron was detected in most countries.

"Because South Africa was sequencing in a timely manner, they were able to sound the alarm a full month before Chicago saw its first case of

omicron," Hultquist said.

That additional time was critical for scientists to learn more about the variant, the risks it posed and to implement the proper treatment strategies before it even arrived in the U.S.

South African scientists had discovered that many of the monoclonal antibodies (specific antibodies given to severely ill patients to bind to and neutralize viruses) currently in use for COVID-19 patients weren't effective for omicron. With that early warning, U.S. doctors were able to treat patients with the most effective therapies.

The Northwestern team is now recapitulating the pandemic history in Chicago since the first COVID-19 case was detected in the city. "We will analyze clinical outcomes versus variants and demographic data," Lorenzo-Redondo said. "We want to put all the data together to see the drivers of the worse outcomes, differences in variants and how the virus spreads."

That study will inform other research projects being initiated in global health settings. The objective is to find similarities and differences on such drivers to help devise global and locally adapted effective COVID-19 prevention strategies, as well as other viral pathogens in the near future.

Provided by Northwestern University

provided for information purposes only.