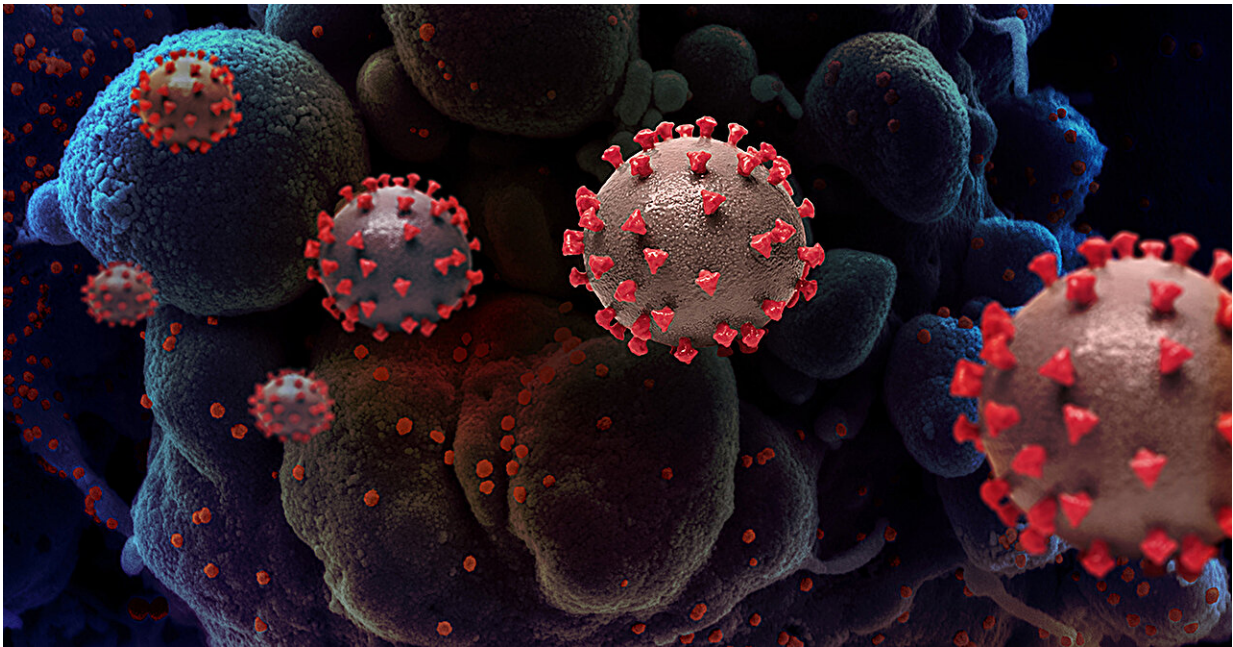


# Innovative COVID-19 analysis supports prevention protocols in health care settings

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Researchers found in a novel study that the transmission of SARS-CoV-2, a pathogenic virus that causes COVID-19, could be prevented using simple measures in the health care setting at UC San Diego Health. Credit: NIAID-RML

In early 2020, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a highly contagious and pathogenic virus, made its alarming debut and quickly spread worldwide, causing the novel coronavirus (COVID-19) pandemic that threatened human health and public safety.

While the world was brought to a standstill, hospitals and [health care](#) systems entered uncharted territory and quickly adapted to the evolving health crisis to care for their community and keep potentially [sick patients](#) and health care workers from spreading the virus.

The magnitude of response involved the reinforced universal masking of health care workers and patients at the hospital and regular SARS-CoV-2 testing of all health care workers and patients upon admission, regardless of symptoms, and strict isolation protocols for those infected with the virus.

Approximately four years after the pandemic was declared, researchers at University of California San Diego School of Medicine used high-end technology and an innovative approach to evaluate the effectiveness of those prevention measures implemented in the health care setting during the last three waves of the pandemic.

The study, published in the January 16, 2024, online edition of *Clinical Infectious Diseases*, was a first of its kind to use information from [electronic health](#) and contact tracing records to closely analyze the genetic makeup of the virus combined with the comparison of how the diverse strains were physically being spread among patients and health care workers in the hospital.

Researchers found that the implemented infection prevention parameters in the health care setting, including ventilation standards of at least five clean air changes per hour, combined with universal masking, prevented most SARS-CoV-2 transmissions. In patients who tested positive for the virus, personal protective equipment (PPE) shielded and virtually eliminated health care–associated transmission.

"When the pandemic started, it was scary because initially we did not have rapid diagnostic nor treatments available, and we did not fully

understand how the virus was transmitted or if our infection prevention protocols were adequate," said Francesca Torriani, MD, senior author of the study, and program director of Infection Prevention and infectious disease specialist at UC San Diego Health.

"Therefore, the potential implications of the virus and the welfare of our workforce and patients was an utmost concern. I witnessed health care workers fearful of contracting the virus at work and potentially infecting their loved ones at home."

Torriani adds that limiting the spread of infection and blocking the virus at the source became the highest priority.

"In response to the progressing pandemic and with the trust and support from executive leadership at UC San Diego Health, we learned many life-saving lessons and strengthened infection prevention control measures to reduce the risk of transmission between patients and health care workers. The swift adoption and modification of infection prevention protocols in health care were felt to be an opportunity for deeper exploration of the effectiveness of our procedures."

The researchers took an innovative approach never used before to evaluate the different variants of the samples to identify if they were temporarily or physically near one another, suggesting health care transmission.

Electronic health record data of patients, whose identities were protected throughout the study, and metadata about staff access and movement to these records, accompanied by a robust contact tracing program, were used to classify, isolate and assess individuals exposed to specific strains of the virus.

"While the virus strains were very distinguishable in the second and third

wave of the pandemic, during the explosive and homogenous omicron wave, we found that we could not rely on [genetic data](#) alone," said Christopher Longhurst, MD, co-author of the study, executive director of Jacobs Center for Health Innovation, and chief medical officer and chief digital officer at UC San Diego Health.

"We had to dive deeper into the electronic documentation and [social network analysis](#), such as individuals with similar virus strains, and considering their physical interaction in the hospital, to determine what really happened and how the virus was being spread."

Researchers examined the genetic makeup of SARS-CoV-2 during three consecutive waves and compared how closely a person's genetic variant was related to another's.

The study involved the collection of 12,933 virus samples from 35,666 patients and health care professionals from November 1, 2020 to February 27, 2022.

"Even when hundreds of health care workers were becoming infected every week during the peak of the omicron wave, we found that they were no more likely to acquire the [virus](#) in the hospital system," said Joel Wertheim, Ph.D., co-senior author of the study and associate professor at UC San Diego School of Medicine. "The outcomes reveal the hidden patterns of viral transmission."

The results from both the genetic and social networking analysis showed that while universal masking was key to prevent transmissions, airborne negative pressure rooms, universal N95 respirator masks or even closing the door of a patient's room were not essential elements to protect against transmission in the health care setting.

In fact, most transmissions occurred outside of the health care setting,

physical contact in the community, between households or when universal masking was not followed in the setting of unrecognized SARS-CoV-2 infection. Viral transmission was more likely to occur in shared spaces, such as break-rooms or lobbies.

"Our analysis really highlights that our health care system, with its safety measures including ventilation standards, robust viral testing, and early implementation of universal masking, was able to protect [health care workers](#) and patients during the pandemic," said Shira Abeles, MD, co-author of the study, associate professor in the Department of Medicine at UC San Diego School of Medicine and infectious disease specialist at UC San Diego Health.

Longhurst adds the type of technological approach used can be a model for future studies and a tool deployed for epidemics of highly contagious infectious diseases.

"The pandemic has shown us what's at stake. This novel methodology, combining a digital social network derived from electronic health record data with genomic analysis of viral strains, can be used again in the future to model spread of health care associated infections," said Longhurst.

**More information:** *Clinical Infectious Diseases* (2024).

Provided by University of California - San Diego

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