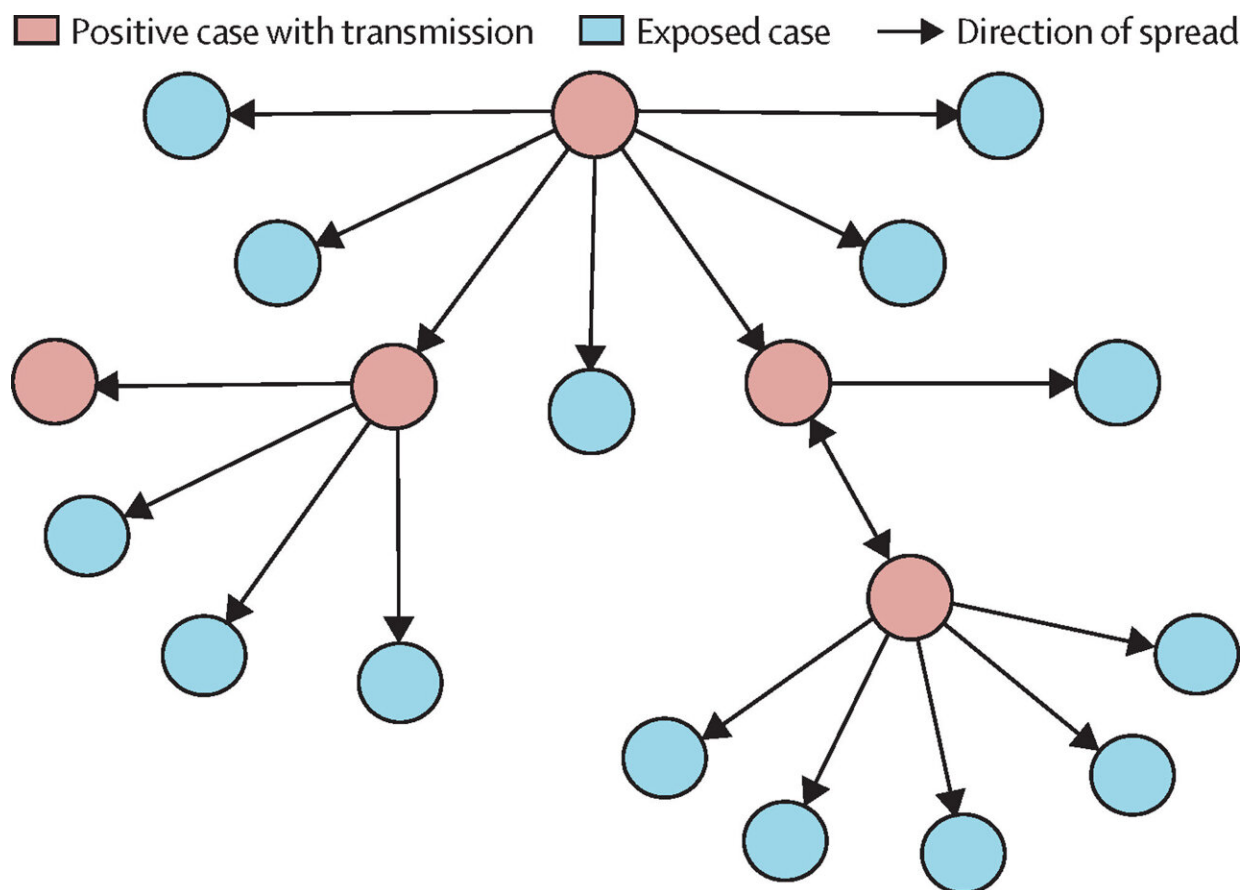


An employee health contact tracing database to mitigate COVID-19 spread and enhance safety

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SARS-CoV-2 transmission map. One symptomatic employee was able to expose seven colleagues, two of whom went on to test positive and lead to two more cases and an additional nine employees exposed to COVID-19. Credit: The Lancet Digital Health (2022). DOI: 10.1016/S2589-7500(22)00171-6

At the onset of COVID-19 in March 2020, New York City was the epicenter of the pandemic, with more than 6,000 cases daily and over 1,000 deaths per day. New York City health systems and hospitals faced increasing demands on staffing and resources, amid a rising number of employee COVID-19 cases.

To address the need for [contact tracing](#) and agile exposure investigations to mitigate the spread of COVID-19 among [hospital staff](#), Mount Sinai researchers created the Employee Health COVID-19 REDCap Registry—a cloud-based digital framework using the Research Electronic Data Capture web application—to track and reduce the spread of the virus across the Mount Sinai Health System including 8 hospitals and more than 400 outpatient practices.

The database was built with an "event-based" model, where every exposure or "event" was recorded uniquely without deliberately linking it to previous events for the same person or department. This ability allowed Mount Sinai to associate certain events where cluster investigations were necessary to identify the pattern of disease spread. This specific design choice for the digital framework also adjusted and responded to significant changes in the COVID-19 disease with the spread of the Delta and Omicron variants.

The Employee Health COVID-19 REDCap Registry provided: employee health data collection using secure and user-friendly online forms; contact-tracing information for employees monitoring workflow; qualitative analysis of employee interviews; analysis and genomic sequencing integration; and the potential for machine learning in future research on exposures.

To date, there have been over 50,000 employee interviews and more than 500 revisions to the framework. The evolving design of the platform has created dynamic flexibility to incorporate the evolution of

information and expertise around the virus transmission, and helped facilitate changes in clinical recommendations regarding COVID-19.

How:

The Employee Health COVID-19 REDCap Registry was available via internet-capable devices, such as [mobile devices](#) and [desktop computers](#), with remote access that allowed integration at all Mount Sinai Health System hospitals and clinics.

The web forms made prompt follow-up from employee health services possible because it could be completed on personal devices and submitted instantaneously. The employee health service contact-tracing interface captured information regarding employee demographics, quarantine length, personal protective equipment used, and recent COVID-19 testing.

Employee health services created an exposure matrix to assess the risk of reported exposure (low, medium, or high). The matrix outlines risk scores based on the type of exposure; the staff coded the exposure according to the scale. This scoring method may eventually serve as a classification model for supervised machine learning to predict exposure outcomes, the researchers said.

Results:

With the Employee Health COVID-19 REDCap Registry, Mount Sinai's employee health services was able to reduce case follow-up times from days to hours. For example, after an employee reported COVID-19 symptoms to their supervisor, employee health services was able to: follow-up with the employee's manager, conduct the initial contact tracing interview, and send the [employee](#) home for isolation within three hours.

Follow-up contact tracing of this case led to the detection of an emerging cluster within the department and directionality of transmission was determined by incorporating genomic sequencing data provided by Mount Sinai's genomics laboratory.

The development of this tool has provided a robust infrastructure for COVID-19 research. It assisted in the enrollment of employees during the earlier stages of the pandemic for immunogenic plasma donation, and allowed Mount Sinai to determine occupational and non-occupational risk factors for COVID-19 spread.

The Employee Health COVID-19 REDCap Registry provides an easily deployable framework for institutions around the world to successfully control a deadly disease during a pandemic, building upon a platform ubiquitously available across the world.

Mount Sinai's Kristine B. Rabii says that their "goal was to highlight the creativity of teams at the Mount Sinai Health System, and demonstrate that these tools can be utilized by any organization. We were able leverage the information collected to keep up with COVID-19, using platforms that are not proprietary or housed within electronic health records. The tools we had available at the outset of the pandemic didn't meet our needs, so our various teams collaborated to created new tools."

Dr. Waleed Javaid says that "this paper outlines Mount Sinai's leadership in rapidly developing cloud-based database that helped in limiting the spread of COVID among our staff and patients. We want to share our knowledge and methodology with everyone, so other health care institutions can implement similar sharable databases to keep our communities safe from dangerous pandemics."

Dr. Ismail Nabeel comments that the team has "iteratively and meticulously built an agile and responsive system which held its own as

the evolving variants of COVID-19 virus played havoc across the communities. Our efforts have led us to develop a dependable, customizable and evolving tool against COVID-19 that can be shared around the world to protect our very special [health](#) care heroes on the frontlines and beyond."

The research was published in *The Lancet Digital Health*.

More information: Kristine Bahareh Rabii et al, Development and implementation of centralised, cloud-based, employee health contact tracing database and predictive modelling framework in the COVID-19 pandemic, *The Lancet Digital Health* (2022). [DOI: 10.1016/S2589-7500\(22\)00171-6](#)

Provided by The Mount Sinai Hospital

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