

Centralized COVID-19 Contact Tracing in a Home-Rule State

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Abstract

Contact tracing is an evidence-based intervention to control many communicable diseases, including COVID-19. Before the COVID-19 pandemic, contact tracing in Michigan focused on HIV, sexually transmitted infections, and tuberculosis, and it was conducted by state and local health department staff. Within 2 weeks of the first reported COVID-19 cases in Michigan in March 2020, the existing public health workforce was overwhelmed by the need for contact tracing and daily symptom monitoring. This case study narrates the development of a staffing plan that included volunteers and contractual staff to conduct centralized contact tracing in a home-rule state (ie, a state in which local health departments have full authority and autonomy under public health code to conduct the functions necessary to prevent disease, including contact tracing). This case study details various training, workforce management, and technology tools that were used. During the study period (May 2020–June 2021), contact tracers called 432 218 contacts and 269 439 were successfully reached, 48 134 of whom reported developing symptoms. The most important lesson learned was the need for more automated processes to improve efficiency in processing volunteer applicants, training, and scheduling. Nonetheless, the centralized workforce was successful, was flexible, and met the changing demands in Michigan.

Keywords

COVID-19, contact tracing, capacity building, volunteers, response

Case investigation and contact tracing are core public health activities in preventing the transmission of infectious diseases, including COVID-19. Case investigators conduct outreach to people to confirm and answer questions about their diagnosis (case of disease). Contact tracers then conduct outreach to those identified as contacts to inform them of their exposure, answer questions, assess for any disease symptoms (including enrolling them in daily symptom monitoring), encourage testing, and provide support and resources for the contact to quarantine.

Typically, contact tracing is conducted by trained public health professionals from either the local or state public health agency. In Michigan, local health department (LHD) jurisdictions include a blend of single counties, multiple contiguous counties, and 1 city (Detroit). Michigan is a home-rule state, which means its 45 LHDs have full authority and autonomy¹ under the public health code to conduct the functions necessary to prevent disease, including contact tracing. In a 2019 study, 30 states had LHDs that were fully locally governed.² In Michigan, if an LHD is unable to execute those functions, the Michigan Department of Health and Human Services (MDHHS) can provide assistance. Before the COVID-19 pandemic, contact tracing for HIV, sexually transmitted infections, and tuberculosis was routinely conducted by contact tracers based in LHDs and at MDHHS.

Michigan reported its first 2 COVID-19 cases on March 10, 2020.³ As in other states, Michigan's public health workforce was quickly overwhelmed.^{4,5} MDHHS distributed state and federal funding to Michigan LHDs to hire additional staff. By May 1, 2020, >\$20 million had been distributed. These funds could be used for case investigation and contact tracing staff, technology, and other supports.

In addition, MDHHS developed a centralized workforce of full-time employees, contractual staff, and volunteers from Michigan whom LHDs could opt to request to assist with contact tracing and daily symptom monitoring.

Purpose

This case study describes the effort in Michigan to build a centralized workforce, which initially was volunteer based but eventually used a blended staffing model that included

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contractual staff, and how this workforce responded to fluctuating COVID-19 contact tracing needs.

Methods

Volunteer Staffing

On March 28, 2020, Michigan Governor Gretchen Whitmer issued a public call for people in Michigan to sign up to help in various capacities in the COVID-19 effort on a state web portal.⁶ During March 2020–May 2021, a total of 11 328 volunteers registered to be contact tracers. Of these, 7605 were students (primarily undergraduate and graduate students). Approximately one-quarter of the volunteers reported a public health ($n = 2653$) or clinical ($n = 2396$) background. More than 10% ($n = 1191$) self-reported proficiency in languages other than English. All potential volunteers had to be aged >18 years and undergo a public records search.

Initially, MDHHS chose volunteers who had a background in public health, nursing, community health work, or other health care; who had a telephone and computer; and who lived in Michigan. The next steps for these first statewide contact tracers were to take online trainings and sign a confidentiality agreement. During the next year, MDHHS used contact tracers from a pool of about 2000 volunteers who completed these steps. This volunteer and staffing program and subsequent analysis were not submitted for institutional review board review because they were part of COVID-19 operational response and public health surveillance.

Contractual Staffing

MDHHS also obtained contractual contact tracing staff through various avenues. To provide rapid staffing for the COVID-19 pandemic, the CDC Foundation recruited, hired, and trained contact tracers for multiple states. In Michigan, the CDC Foundation conducted specialized recruitment for Arabic- and Spanish-speaking contact tracers. MDHHS subsequently added contractual staff (both full-time and limited-term) to its centralized workforce. Training and performance requirements were similar for all staff types.

MDHHS also hired an organizational staffing agency to assist in the management of trainings, scheduling, and quality management. This agency provided on-call agents during all contact tracing shifts to answer questions. Active contact tracing took place 7 days a week, including many holidays.

Training

All volunteers, full-time employees, and contractual staff received contact tracing training per Centers for Disease Control and Prevention (CDC) recommendations. Initially, this training was an MDHHS-developed self-paced learning module. Eventually, everyone took the 7-hour “COVID-19 Contact Tracing” online course created by Johns Hopkins

University,⁷ followed by a 4-hour live training delivered by MDHHS staff. This training involved topics such as security and compliance, motivational interviewing and cultural competency, software training, and the fundamentals of SARS-CoV-2 transmission and science.

Tools

Workforce management. Staffing volumes fluctuated in response to COVID-19 case counts during May 2020–June 2021. As contact tracing demands decreased, MDHHS reduced the number of volunteers and contractual staff needed to meet the daily workload.

MDHHS used several online information- and workforce-management tools to make centralized contact tracing possible. A virtual sign-up page (www.michigan.gov/fightCOVID19) and corresponding volunteer management web portal created in Salesforce (CRM) collected important information about qualifications and tracked individuals through the volunteer vetting process (ie, background checks, trainings, and confidentiality agreements). The volunteer management software Galaxy Digital (Galaxy Digital) was used as the main tool for communicating with volunteers (eg, scheduling shifts, sharing training materials).

Contact tracing technology. Contact tracing for early COVID-19 cases in Michigan occurred in an existing disease outbreak management system built for symptom monitoring among people returning to Michigan from Ebola-impacted countries. This system initially did not integrate with Michigan’s electronic communicable disease surveillance system. In April 2020, the MDHHS team decided to build a new platform that could handle high volumes of contacts while incorporating efficiencies to lighten workforce demand. This system, Traceforce, was deployed on May 7, 2020, the same day that volunteer contact tracers began work. Traceforce is a Salesforce-based platform customized for Michigan.

LHDs had the option to manage any contacts (eg, high-priority contacts) within their own jurisdictions rather than refer them to Michigan’s centralized contact tracing staff. Traceforce was thus configured with various staff roles: LHD tracers made calls to contacts in their local health jurisdiction, and centralized contact tracers could make calls to contacts on behalf of any LHDs that chose the centralized option. Within Traceforce each day, contacts in Michigan’s communicable disease surveillance system (where LHDs recorded case investigation and contact elicitation data) were automatically referred and assigned to contact tracers through a process that queued some contacts for early outreach attempts and, depending on total volume each day, requeued others for later.

Software allowed staff to call contacts directly from their computers without the need to purchase state telephones or use personal telephones. All initial outreach was made via telephone, to establish a connection and explain the purpose

of contact tracing. The system was also designed to send automated text messages to contacts who opted into daily text symptom monitoring for their 14-day monitoring period. Each encounter was recorded in the system. If the contact consented, subsequent monitoring encounters could be created via telephone or mobile text monitoring. Contacts were asked during each encounter whether they needed food, medication, or other needs to safely quarantine at home and were referred to 2-1-1 (a call center that links Michigan residents to safety-net services they may be eligible to receive, such as food, health insurance, and transportation) if needs were identified.

The supervisor user role in Traceforce allowed managers to generate reports of contact tracer activity, including summaries of contact tracing timeliness and completeness. An integrated chat feature allowed contact tracers to reach supervisors with questions at any time during their shift. While few individual LHD customizations were built into the system, consensus building was conducted via weekly user meetings, and the LHD tracer role allowed LHDs to change the cadence of tracing or script to meet their own protocols.

Quality Management

MDHHS had a quality management plan to assess contact tracer performance over time. The process of evaluation included the number of completed initial encounters per contact tracer per day, completeness and accuracy of encounters, and whether tracers chose the correct outcome for each assessment or situation. Supervisors led staff meetings and provided one-on-one coaching and call-shadowing sessions to reinforce best practices and provide real-time guidance.

Data Analysis

We used Microsoft Excel to track the number of LHDs that used Traceforce and record the dates that they began to use it, beginning in May 2020, when the platform was deployed. We categorized the number of encounter attempts among 18 possible dispositions as those that (1) resulted in ≥ 1 successful encounter (ie, a contact tracer talked to the correct contact who consented to participate in the call), (2) resulted in no answer or a left message, and (3) had another result (eg, reached a person who lived out of state). We counted the number of contacts and how many contacts were reached within 24 hours of being referred to Traceforce. For contacts who had ≥ 1 successful encounter, we categorized outcomes as the following: the number of contacts who were tested for COVID-19, the number of contacts who developed symptoms of COVID-19, the number of contacts who had a positive test result for COVID-19, and the number of contacts who developed symptoms and had a positive test result. For contacts who enrolled in daily symptom monitoring, we counted the number of text

messages sent and number of telephone calls made. We used Galaxy Digital and Microsoft Excel to track the number of staff members, by employment type (volunteer vs contractor) over time (May 2020–June 2021); calculate increases and decreases in staffing levels; and examine the trends in staffing against the number of COVID-19 case numbers and the total number of contacts. We exported data from the Traceforce system and assessed case outcomes using SAS version 9.4 (SAS Institute Inc). Database changes did not allow us to quantify some data on contacts before June 2020.

Outcomes

Traceforce initially launched with 5 LHDs. By early August 2020, 36 of 45 LHDs were using Traceforce; by the end of October 2020, all but 2 LHDs were using Traceforce, with nearly all LHDs relying on centralized staffing support through MDHHS to conduct contact tracing. While volunteers eventually represented a small proportion of Michigan's total contact tracing workforce, their high proportion during the early months allowed us to focus on training and hiring long-term contractual staff.

During June 2020–June 2021, a total of 432 218 contacts were referred and assigned to contact tracers through Traceforce. Of 3 035 673 encounter attempts, 1 338 585 (44%) were successful. In 1 486 171 (49%) encounter attempts, there was no answer or a message was left. The remaining 210 858 (7%) encounter attempts had various other dispositions that resulted in the contact not participating in contact tracing, such as reaching people who lived out of state, had already received a positive test result (ie, classified as cases), were fully vaccinated, were duplicate referrals (ie, already contacted), did not confirm identity, or refused monitoring. A total of 269 439 (62%) contacts had ≥ 1 successful encounter with contact tracers. Of these 269 439 contacts, 108 837 (40%) were tested, 48 134 (18%) developed symptoms of COVID-19, 20 367 (8%) received a positive test result, and 5194 (2%) developed symptoms and received a positive test result for COVID-19 (Figure 1).

Once contacts were successfully reached, many enrolled in daily symptom monitoring via text messaging for the duration of their monitoring period, while others chose to conduct daily symptom monitoring via telephone. Of the >3 million total encounters, 932 667 (30%) were conducted by text message.

Between 50% and 60% of encounters were conducted within 24 hours of referral. Except for the September–November 2020 peak in cases, the state's centralized COVID-19 contact tracing workforce was generally able to keep pace with demand. The largest number of contacts eligible for daily symptom monitoring peaked at 28 967 on November 12, 2020 (Figure 2). Outside holidays, outreach was attempted on $\geq 99\%$ of all newly referred contacts during November 2020–June 2021. The greatest number of new

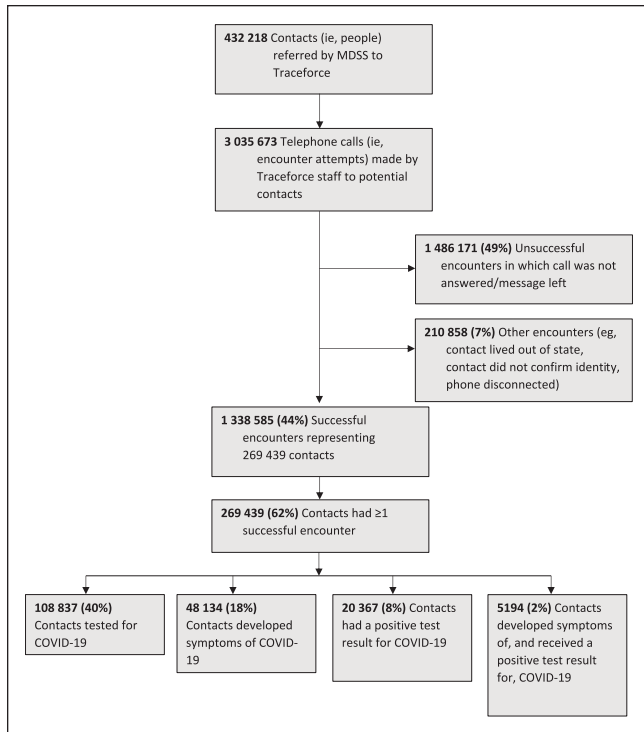


Figure 1. COVID-19 contacts referred for centralized contact tracing, Michigan, May 2020–June 2021. Abbreviation: MDSS, Michigan Disease Surveillance System.

contacts referred through Traceforce in a single day was 4495 on November 10, 2020.

Lessons Learned

Little published research is available to evaluate COVID-19 contact tracing strategies, especially related to home-rule states, or different types of staffing and technology models.^{8,9} This case study contributes to the literature on contact tracing strategies, especially involving a volunteer workforce during an unprecedented public health emergency. Despite the success of the contact tracing effort, there are many lessons learned that could have optimized these processes and outcomes. For one, more processes could have been automated to improve efficiency in processing volunteer applicants and in documenting initial training. In addition, to manage public goodwill, MDHHS could have done more to communicate with the volunteers whose services were not used.

Furthermore, MDHHS had a centralized volunteer management portal that was used for scheduling and communication but was not available initially to manage volunteer sign-ups, background checks, and training. Having such a system available at the deployment of the volunteer effort would have improved efficiency. Finally, despite training a tremendous number of staff, the rapid increase in contacts in fall 2020 did not allow all contacts to be monitored daily. Initially, MDHHS

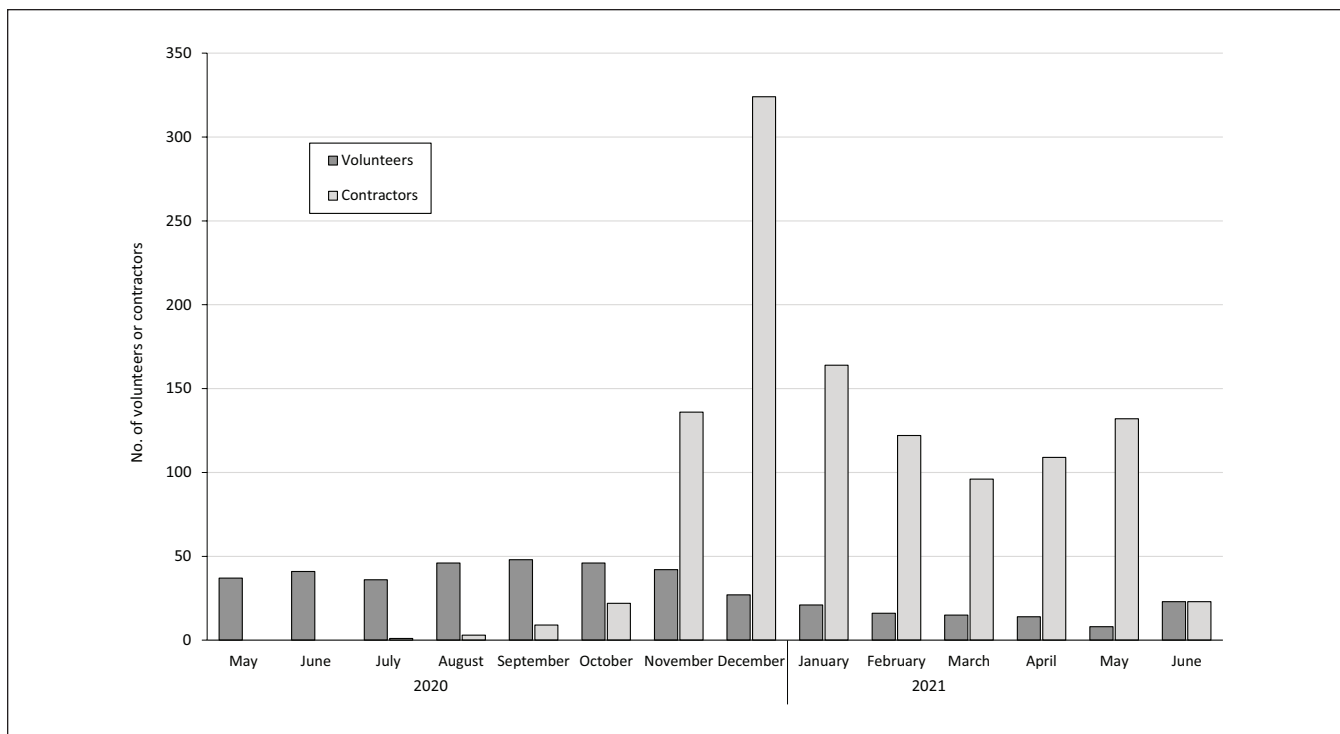


Figure 2. Number of COVID-19 contact tracing staff, by month and employment type, Michigan, May 2020–June 2021. Data sources: Galaxy Digital, Michigan Department of Health and Human Services Situation Reports.

did not have formalized trigger points to adjust staffing according to the number of contacts needing to be monitored per day. Lessons learned during that fall 2020 surge allowed us to modify staffing needs during subsequent surges.

Centralization of contact tracing in Michigan (both staffing and technology) was successful. MDHHS was able to efficiently build a common contact tracing technology and was able to use established staffing contracts to increase or decrease staffing in response to fluctuations in COVID-19 incidence. Some LHD positions take additional time to establish or may have rigid skill set requirements. Our flexibility allowed us to train staff with diverse backgrounds, including those from outside the health care and public health sectors. MDHHS was able to quickly recruit and train a workforce, including staff with specialized language skills, that had the flexibility to assist any of the 43 LHDs that elected to refer contacts to the centralized workforce.

Although Michigan's home-rule dynamic led to this model, it is not the only state with autonomous local public health jurisdictions, nor is it the only state that had to quickly assemble a contact tracing workforce robust enough to respond to the changing pandemic scenario.^{10,11} We hope this case study is a useful example for other public health departments facing public health resource constraints now and in the future.

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