CLUSTER INVESTIGATION: A KEY CAPABILITY FOR STRATEGIC VACCINATION

A Memo on Implementation for State & Territorial Health Authorities

PARSA ERFANI • MARGARET BOURDEAUX MD MPH
Overview

Given current trends in transmission and vaccination in the United States, the COVID-19 outbreak in the U.S. is likely to substantially shift in the coming months from widespread transmission to sporadic outbreaks. This change demands a shift in our approach to mitigating COVID-19 spread. Specifically, this memo discusses how cluster investigations can serve as the backbone of COVID-19 mitigation and response going forward. Cluster investigations can be utilized to:

- Acquire actionable intelligence about the location and context of COVID-19 outbreaks so they can be modified
- Guide strategic approaches to testing and vaccination
- Connect infected individuals with life-saving therapeutics
- Provide social support to exposed individuals undergoing quarantine or isolation

In essence, cluster investigation programs can serve as a vehicle for a variety of effective COVID-response mitigation measures.

Part 1: What is cluster investigation?

Cluster Investigation—also called ‘Source Investigation’ or ‘Retrospective Contact Tracing’—seeks to determine the specific time and place an individual was infected in order to identify who was exposed in that setting. This is different from ‘Prospective Contact Tracing,’ which seeks to determine who an infectious individual may have exposed but provides an incomplete picture of all exposed individuals (Figure 1). COVID-19 is a clustering disease, meaning that a small proportion of cases perpetuate most of the transmission. This is because COVID-19 is often spread through aerosol transmission and people are highly infectious before they experience symptoms, unknowingly spreading the disease. Therefore, cluster investigation is an integral way to identify superspreading events and prevent mass transmission.

In a cluster investigation, a contact tracer will interview that confirmed case to figure out where and when the exposure occurred. If the event of exposure could potentially be a superspreading event, the contact tracer would aim to identify ‘casual contacts’ at the superspreading location (anyone in the confined indoor space where an individual was infected). Patron or staff lists at the identified location can help identify casual contacts at the establishment. Casual contacts at the outbreak would be notified of the exposure and connected directly to several services such as testing and vaccination. They can be connected to medical care and social support if they are infected.
Part 2: How can cluster investigations support COVID mitigation?

Cluster investigation will allow authorities to proactively identify outbreak sources or hidden cases and respond in a targeted manner to break the chain of spread. This approach allows authorities to detect unvaccinated, high-risk pockets, communicate with those individuals, and help them get vaccinated. Identifying the source of spread will empower authorities to provide:

1. **Location Assessment:** Location-based tracing allows for location-based prevention. When an outbreak is identified at a specific location, the proprietor (i.e. business owner, faith leader) may be motivated to establish screening guidelines and promote vaccination among their constituents. The location itself needs to be evaluated for safety. In particular, indoor air quality should be assessed to meet the recommended standard of 4-6 air exchanges per hour.

2. **Strategic vaccination:** Cluster investigation provides a unique window of opportunity to reach unvaccinated populations. Previously, contact tracing efforts ended with a request for exposed individuals to test for COVID-19, quarantine, or isolate. Now individuals can be
offered protection through vaccination. This personalized invitation to vaccination following exposure or known spread may be especially effective in increasing vaccine uptake among individuals who previously been hesitant to receive the vaccine. Immediate referral to walk-in or mobile vaccination sites (such as through CVS, Walmart, or local departments of health) can facilitate vaccination.

3. Targeted antibody therapy: Some exposed individuals who are identified through cluster investigation may be already infected and symptomatic and may benefit from antibody therapy. Antibody infusions are currently approved for treatment of early COVID and will soon be available as injections that are easier to administer. Cluster investigation can help identify high-risk individuals who may be strong candidates for life-saving antibody therapy.

4. Targeted support for isolation or quarantine: People identified as a close contact or cases in a cluster investigation may need social support to quarantine or isolate from others until they are no longer infectious. Contact tracers can ensure that people are connected to such services.

Part 3: How do I design cluster investigation in my state?

Recommendations for Implementation:

1. Staff can be dual trained in retrospective and prospective contact tracing, reducing the need for additional staff recruitment.

   Contact tracers who are already performing prospective contact tracing can be rapidly trained in retrospective tracing. Through interviews with infected individuals they are already contacting, they can identify locations and times where a superspreading event may have occurred. They can then reach out to the proprietors of these locations and attain patron and staff lists to determine who else may have been infected. This effort needs to be overseen by only a small number of epidemiologists and supervisors who can make sure the cluster investigation process is complete and that all individuals who may be at risk are offered easy-to-access testing and vaccination.

2. Dedicate testing programs to cluster investigations.

   Contact tracers can link exposed individuals identified during a cluster investigation to accessible testing. Authorities can consider providing several testing options, such as distribution of home-based testing kits, deployment of mobile testing units to the community of the identified cluster, or referral to testing centers. Of note, referring people to testing centers that offer testing for SARS-CoV2 variants will help to quickly detect variants of concern if they arise in the community. Authorities should also consider offering
vaccination to individuals at their time of testing. Many individuals who are being tested are at high-risk for COVID-19 and may be unvaccinated.

3. Link cluster investigations to COVID mitigation programs including vaccination, therapeutics, and social support services.

As described in Part 2, cluster investigation can serve as a vehicle for a variety of effective mitigation strategies—including vaccination, therapy, and social support for quarantine or isolation. Contact tracers should know when and how to connect exposed individuals to these services.

4. A small, specialized team of epidemiologists and experienced contact tracers can guide “validators” at locations of spread to respond appropriately.

Depending on the specific location of spread, a small, specialized team can provide the “validator” or leader of the establishment (i.e. business owner, faith leader) with site-tailored screening and prevention strategies. The team can also empower the validator with communication strategies to boost vaccine confidence among unvaccinated constituents. Given that the validator likely has an existing relationship with members, their engagement and buy-in can be key strategy to effectively promote vaccination among this unvaccinated population.

5. Data collected from retrospective contact tracing should be easy-to-use and shared across jurisdictions.

Data collected through retrospective contact tracing should be stored in an easy-to-use data platform that is searchable and analyzable. These data should be shared across jurisdictions as COVID-19 will commonly spread between different counties. When contact tracers have access to data from surrounding counties, they can more easily pursue prospective and retrospective contact tracing.

The Centers for Disease Control and Prevention provides in depth guidance on how to effectively and efficiently execute cluster investigation. Funding from The American Rescue Act of 2021 can be utilized to execute cluster investigation across states. Contact tracing and testing efforts can be supported by the 47.8 billion USD dedicated to COVID-19 testing (SEC. 2401). Vaccination can be supported by the 7.5 billion USD dedicated to vaccine activities at the CDC (SEC. 2301). The contact tracers needed to lead cluster investigations can be supported by 7.66 billion USD dedicated to the public health work force (SEC. 2501).

Acknowledgements

This memo is the work of the authors and was inspired and informed by a live event on May 4th co-hosted by the Program in Global Public Policy and Social Change at Harvard Medical School, and the National Governors Association. The event featured Dr. K.J. Seung, Assistant Professor at Harvard Medical School, and Dr. Shefali Oza, Partners In Health’s U.S. Public Health Accompaniment Unit. We thank Adam Nagy, Annmarie Sasdi, and Dr. KJ Seung for feedback and edits on this memo.
Further Reading and Resources


