

CLUSTER INVESTIGATION: A KEY CAPABILITY FOR STRATEGIC VACCINATION

A Memo on Implementation for State & Territorial Health Authorities

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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.

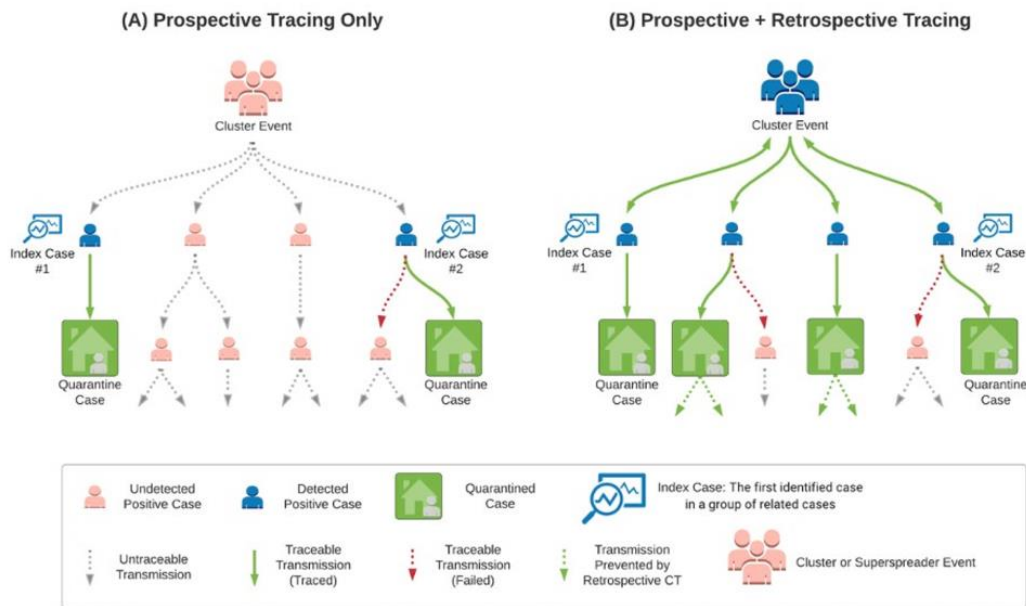


Figure 1. An illustration comparing prospective tracing only (A) against combined prospective and retrospective tracing (B). In both instances, Index Case #1 and Index Case #2 were infected at an (initially) undetected cluster event and detected through standard disease surveillance. The illustration demonstrates how the addition of retrospective tracing can break more transmission chains. In both instances some cases remain undetected due to limitations of contact tracing. This illustration was created by Adam Nagy and is a modification of a schematic found in Endo et al. "Implication of backward contact tracing in the presence of overdispersed transmission in COVID-19 outbreak." Wellcome Open Research, (2020), doi: 10.12688/wellcomeopenres.16344.1

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

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Further Reading and Resources

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