



PANDEMIC RESILIENCE: GETTING IT DONE

A TTSI Technical Advice

Handbook

V 2.0

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A TTSI Technical Handbook for States and Municipalities

By the Massachusetts Testing, Tracing, and Supported Isolation (MA TTSI) collaborative

Mission Statement:

To enable a safe and progressive pathway to a pandemic-resilient, free society

By providing an end-to-end framework with scaled up testing, enabling rapid contact-tracing, and instituting supported isolation

Using the collective capabilities, assets, workforce, and innovative spirit of the regional ecosystem

While continuing to monitor and respond to the needs of our communities which may be impacted by the COVID-19 pandemic in different ways.

Members of this collaborative include:

- Policy
 - Harvard Edmond J. Safra Center for Ethics
 - Harvard Global Health Institute
- Contact Tracing
 - Partners In Health
- Medical Device Manufacturing and Supply Chain
 - Massachusetts Manufacturing Emergency Response Team (M-ERT)
- Diagnostic Testing Development and Capacity Planning
 - Massachusetts Life Sciences Center
 - Ginkgo Bioworks
- Health System Care and Resource Deployment
 - Beth Israel Lahey
 - Partners HealthCare

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This handbook defines TTSI programs and reviews how to:

1. Set targets for testing and contact tracing and make sure people have the right metrics for measuring progress on all of these (P. 6);
2. Inventory sample collection modalities; assess capacity; and fill gaps in sample collection capacity and collection kit supply (P. 17);
3. Inventory testing capacity in state and develop a supply chain support strategy and gap filling strategy for test capacity (P. 23);
4. Connect test data to contact tracing programs; and monitor progress in disease mitigation and suppression for decision-making and public communication (P. 29);
5. Set up and run contact tracing programs that successfully connect contacts to tests (P. 33);
6. Build a program of supported isolation (P. 40);
7. Inventory and assess test funding mechanisms and fill funding gaps (P. 42);
8. Run public communications programs so that the public understands the importance of participation and how broad confidence and safety are secured this way (P. 44).

It also provides three appendices:

- (1) Documentation of a contact tracing program in Madison, WI (P. 48)
- (2) An inventory of contact tracing resources (P. 52)
- (3) A CDC checklist for Contact Tracing Programs (P. 66)
- (4) In a separate document, a framework for supported isolation.

Because COVID response is fast changing with significant learning from week to week, we released a 1.0 version on July 3rd a living document in pdf form. This is the 2.0 release. A full COVID response also includes other non-pharmaceutical interventions from masking to social distancing rules to infection control to de-densification policies to air filtration techniques. This handbook covers only the TTSI element of infection control. TTSI on its own does not suffice but it does provide a critical backbone for COVID response.

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INTRODUCTION:

What is a TTSI program? A TTSI program uses diagnostic testing (T), contact tracing (T), and supported isolation (SI), to **mitigate** or **suppress** highly infectious and dangerous diseases where the diseases have both a long incubation period and a relatively short disease course. A TTSI program requires building a strong interface among health care systems, public health systems, and other civil society organizations, from businesses to non-profits to schools and colleges likely to participate in testing and tracing.

TTSI programs can be used to **mitigate** the disease. This means that the programs are used to help reduce case incidence of the disease alongside other non-pharmaceutical interventions such as stay-at-home orders. Mitigation does NOT bring case incidence to zero, but only slows disease spread. Mitigation **flattens the curve**. In the long term, it is more costly in time, testing resources and economic losses than suppression. Moreover, pursuing mitigation will make it hard to open schools, churches, and other congregate contexts without experiencing outbreaks within those organizations.

TTSI programs can also be used to **suppress** the disease. This means the programs are used at a sufficiently large scale to suppress the disease and drive case incidence to zero or near zero, providing a foundation on which to restore a vibrant economy. Suppression **breaks the chain** of disease transmission.

TTSI programs have historically been used for diseases like tuberculosis and measles. Testing and contact tracing themselves have also historically been used for syphilis and HIV AIDS. The longer disease course of these latter diseases has meant that isolation has not been a part of the testing and tracing response to those diseases.

In TTSI programs, isolation is “supported” with pay, on an analogy to jury pay and/or income replacement for low wage workers; with residential facilities where necessary; and with access to healthcare, food provision, etc. The reasons for these supports is that these isolation programs are voluntary, not enforced by misdemeanor or criminal penalties. They are incentivized rather than enforced. The reason for this design is to ensure that our disease fighting tools are compatible with maintenance of a free society. We should all expect to contribute to and participate in isolation programs as part of the set of rights and responsibilities that define our roles as members of a free society.

Importantly, the design of TTSI programs reflects specific features of COVID as a disease. With COVID, infected individuals shed virus for roughly two weeks to one month. Moreover, roughly 50% of COVID transmission occurs when individuals are asymptomatic or pre-symptomatic. In other words, many people unwittingly pass COVID on. This is what makes the disease so highly infectious and dangerous.

A TTSI program is **NOT** a universal testing program. It is **NOT** a random testing program.

TTSI is instead the strategic and targeted use of viral testing and contact tracing resources where they will make the greatest marginal contribution to disease suppression and drive case incidence of the disease back as close to zero as possible. It can be supplemented by additional forms of surveillance testing, including antibody testing, to assist in the smart targeting of viral testing resources.

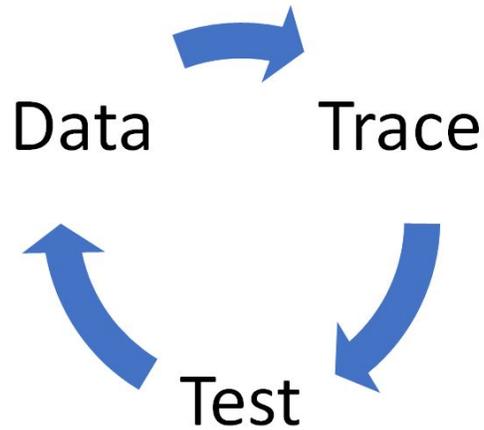
TTSI programs pursue **data-driven targeted testing of hotspots**, such as eldercare facilities, nursing homes, and correctional facilities. In the context of suppressing an outbreak, it will make sense to test the whole staff and resident population of such facilities.

TTSI programs also pursue **contact tracing-based testing**. Symptomatic people or people who believe they have been exposed to the disease present at clinics or testing sites for a diagnostic test, or they are found in hotspot testing programs. A positive test result activates a contact tracing team that identifies those who may have been exposed to the virus by the covid-positive individual. Those exposed contacts have a test appointment scheduled for them, regardless of whether they are symptomatic or asymptomatic. Again, **participation is voluntary** but public messaging needs to drive home the importance of contributing to the fight against COVID through acceptance of getting a test if one has been identified as a contact of an infectious person. As with the originally presenting symptomatic individual, for any contacts who test positive, their positive test result triggers a further round of contact tracing and testing. If the individual testing positive requires healthcare treatment, they are connected to health resources. If they are asymptomatic or only mildly symptomatic, they are connected to the resources necessary for supported isolation.

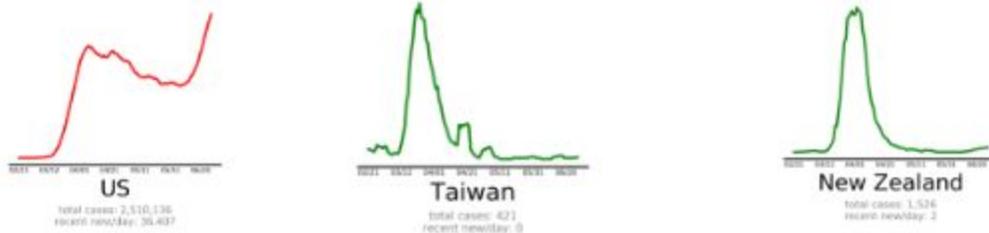
In addition to **viral testing of chains of contacts** that start from patients who present with symptoms or individuals who have experienced exposure, a TTSI program may be supplemented by **a limited degree of routine testing in critical contexts**, where there are highly vulnerable populations or employment contexts with national security implications. Examples of the former would be eldercare facilities, health care sites, correctional facilities, and employment contexts with assembly-line style work environments such as meat-packing plants. It may be reasonable to include other congregate settings such as schools, colleges and universities, and dense offices in such “critical context routine testing” programs.

Routine testing is a highly inefficient form of testing so it should be reserved for contexts of this kind. The goal of a TTSI program is to drive disease case incidence low enough that the general public can feel a strong sense of confidence and safety in resuming ordinary workplace activities.

This visualization captures the TTSI process:



Governors and state public health officials need to clearly determine whether they are pursuing a path of mitigation or suppression and need to communicate their choice of pathway to the public. The contrast between a suppression strategy (as used in Taiwan and New Zealand) and the current mitigation strategy of the U.S. is visible in these graphs:



SOURCE: <https://www.endcoronavirus.org/>

Additionally, given the prolonged risk of exposure and comparatively slow rate of case reduction, a mitigation strategy drastically increases the need and demand for personal protective equipment (PPE) both in and outside of healthcare facilities.

SECTION ONE: SETTING TTSI TARGETS

Step 1: Understand your baseline: Determine whether your jurisdictions are green (near zero case incidence), yellow (low case incidence/potential community spread), orange (moderate case incidence/ dangerous community spread) or red (high case incidence/ unchecked community spread). This information should be routinely communicated to the public.

Case incidence can be best measured and communicated with three measures: **new confirmed case trend, case trend as an estimate from the new deaths trend, and new COVID hospitalizations, in each case with a seven day rolling average.** All three should be used, and they should be used and communicated to the public together.

Metric 1: New confirmed case trend: New daily cases per 100k pop (seven day rolling average); + trend direction and rate

*Metric 2: Case trend as an estimate from new deaths trend: New daily deaths per 100k pop * 100 (assuming 1% IFR) (seven day rolling average); + trend direction and rate*

Metric 3: New daily hospitalizations per 100k pop (seven day rolling average); + trend direction and rate

Because case incidence numbers are affected by testing levels and deaths are a lagging indicator, it is important to track and compare both numbers and the information about cases that each provides. Whichever of metric 1 or metric 2 results in a higher estimate for the number of new cases per 100,000 people, should be used to determine the incidence level on the green, yellow, orange, red scale.

The daily case incidence number will determine whether a jurisdiction is green, yellow, orange, or red with the following cut-offs:

Covid Level	Case Incidence
Red	<i>>25 daily new cases per 100,000 people</i>
Orange	<i>10<25 daily new cases per 100,000 people</i>
Yellow	<i>1<10 daily new cases per 100,000 people</i>
Green	<i><1 daily new case per 100,000 people</i>

The incidence numbers can be used both at county or MSA level, or other local health district jurisdiction level, and at the state level. Policy decisions about which strategies of disease

response are best for a jurisdiction should be made by looking at both the local level and the state picture and considering the dynamic relationship between them.

These COVID levels provide a map that helps decision-makers and community members know where they are. The green level aligns with the CDC's low incidence plateau threshold. The levels do not in themselves provide information about how to respond, given where a community is. The levels do, however, communicate the intensity of effort needed for control of COVID at varying levels of community spread. In addition to paying attention to the levels, decision-makers should pay close attention to direction of trend and rate of change. While jurisdictions may plateau in yellow, in the orange level spread tends to have more velocity.

Step 2: Make a strategic choice: Mitigation or Suppression

The goal of a TTSI program used for purposes of suppression is to get to green (<1 new daily case/100,000) and stay green.

To achieve this epidemiologically defined goal, the relevant jurisdiction will need capabilities for (1) testing, tracing, and supporting isolation; (2) protecting the vulnerable; (3) treating the ill; and (4) activating other forms of non-pharmaceutical intervention (NPI) for disease control from masking and 6-ft social distancing rules to infection control and de-densification protocols.

While the green, yellow orange, red color levels help us keep our eye on the target of where we want to be with regard to epidemiologically defined goals, these four categories of capability are best measured via key performance indicators that support evaluation of how well the jurisdiction is doing in deploying all available tools for controlling the disease.

At the green level, jurisdictions are **on track for containment so long as they maintain maintenance levels of viral testing (i.e.. this is not a reference to antibody testing) and contact tracing, sufficient to control spikes and outbreaks**. Viral testing should be used both for symptomatic and asymptomatic individuals, with the latter need for testing flowing from exposure, role in a congregate setting or other critical context (e.g. elective surgery), or requirements of disease surveillance programs. It is not enough to get to green; one also has to plan to stay green.

At the red level, jurisdictions have reached a tipping point for uncontrolled spread and will require the use of stay-at-home orders and/or advisories to mitigate the disease.

At yellow levels, there may be some initial community spread. At orange levels, community spread has accelerated and is at dangerous levels. At both yellow and orange levels, jurisdictions can make strategic choices about which package of non-pharmaceutical interventions to use to suppress the disease. One jurisdiction may choose stay-at-home orders;

another may choose more intensive use of viral testing and tracing programs. All jurisdictions will want some combination of social distancing strategies and infection control.

In order to understand optionality at yellow and orange levels, decision-makers should review the different “phasing plans” that policy-makers have developed as guidance. They should be equipped to evaluate whether the “phasing plans” will help them meet their goals, having clearly in mind whether their goals are mitigation or suppression.

Covid Level	Case Incidence	Intensity of Control Effort Needed
Red	<i>>25 daily new cases per 100,000 people</i>	<i>Stay-at-home orders necessary</i>
Orange	<i>10<25 daily new cases per 100,000 people</i>	<i>Strategic choices must be made about which package of non-pharmaceutical interventions to use for control. Stay-at-home orders are advised, unless viral testing and contact tracing capacity are implementable at levels meeting surge indicator standards (see KPIs below).</i>
Yellow	<i>1<10 daily new cases per 100,000 people</i>	<i>Strategic choices must be made about which package of non-pharmaceutical interventions to use for control.</i>
Green	<i><1 daily new case per 100,000 people</i>	<i>On track for containment, conditional on continuing use of viral testing and contact tracing for surveillance and to contain spikes and outbreaks.</i>

Mitigation = some reduction in the rate of R (the reproduction rate of the virus) through diagnostic testing and contact tracing. Mitigation flattens the curve.

Suppression= an effort to get to zero or near zero case incidence. Suppression breaks the chain.

Both mitigation and suppression require a suite of activities ranging from stay-at-home advisories to 6-foot social distancing to mask wearing to TTSI implementation. TTSI is a tool that can be deployed at either mitigation or suppression levels. However, **we strongly recommend jurisdictions that have the capacity to deliver suppression-level surge resources for TTSI to pursue a suppression strategy as they will be on the most efficient path toward a restored economy without future lockdowns.**

Step 3: Understand Your Tools and the Definition of Success

TTSI tools consist of four categories:

- **viral tests (to find active infections) (see section 2-3)**
- **contact tracing programs (sections 4-5)**
- **supported isolation programs (section 6)**
- **funding and public communications resources (sections 7-8)**

These tools will be needed at both maintenance levels and surge levels.

Maintenance levels of TTSI resources are used in jurisdictions that are green to contain spikes and outbreaks. For jurisdictions at the green level, the goal is to have adequate TTSI resources to stop community spread. It continues to be important to measure communities along all capability measures: TTSI capability, other NPI capability, protection capability, treatment capability, and surveillance capability.

Surge levels of TTSI resources are needed once there is community spread. Jurisdictions at the yellow level have spikes that may also indicate community spread. Jurisdictions at Orange and Red levels are contexts with dangerous community spread. These jurisdictions at orange or red need “surge” levels of TTSI resources to drive the disease back close to near zero case incidence. Once a community has progressed along the path to zero and returned to green level status, the levels of testing capacity and contact tracing it needed should dramatically decline. Jurisdictions at the red level also need stay-at-home orders.

A **mitigation surge** targets broad and accessible testing, a test positivity rate of 10%, and for 60% of positives not coming from critical context testing to have come from contact tracing.

A **suppression surge** targets broad and accessible testing, a test positivity rate of <3%, and for 80% of positives not coming from critical context testing to have come from contact tracing.

Successful suppression efforts can work relatively fast to restore jurisdictions to near-zero case incidence in a matter of 1-2 months. In other words, a **surge** of testing and tracing resources is a **temporary** need; only **maintenance** levels are permanent until vaccines become widely available, presuming effective and durable immunity.

Key Performance Indicators for Contact Tracing are as follows:

	Maintenance/ Green Level	Suppression/ Orange, or Red Levels	Yellow, Mitigation/ Orange, Red Levels	Yellow, Mitigation/ Orange, Red Levels
Contact Tracing				
Performance				
Percent of Positives from Tracing vs. Symptomatics	>80%	>80%	>50%	
Percent of Index Cases Who Give Contacts	>75%	>75%	>75%	
Percent of Identified Contacts Traced	>90%	>90%	>80%	
Trace Time	24 hours	24 hours	24 hours	
Percent of Identified Contacts Traced	>90%	>90%	>80%	
Percentage of Contacts with Symptoms at Time of Trace	close to zero	close to zero	close to zero	
% traced contacts in quarantine, isolation, or active monitoring	90%	90%	90%	
% traced contacts receiving supports	varies with context; locales should set targets	varies with context; locales should set targets	varies with context; locales should set targets	
% traced contacts assigned to quarantine, isolation, or active monitoring who are fully compliant with program	90%	90%	90%	
% of traced contacts	90%	90%	0%	

tested			
Time from Contact from Contact Tracing Program to Test of Contact	24 hours	24 hours	24 hours

Key Performance Indicators for Viral Testing are as follows:

	Maintenance/ Green Level	Suppression/ Yellow, Orange, or Red	Mitigation/ Yellow, Orange, Red
Viral Testing			
Capacity			
Access	Anyone should be able to access a test regardless of symptoms, without requirement for a doctor's order and without requirement for government issued ID.	Anyone should be able to access a test regardless of symptoms, without requirement for a doctor's order and without requirement for government issued ID.	Anyone should be able to access a test regardless of symptoms, without requirement for a doctor's order and without requirement for government issued ID.
Supply	Sufficient to test for therapeutic purposes; hot spot testing purposes; contact tracing purposes for several links of the chain following from an index case to further positives to their contacts, and so on; surveillance purposes; and critical context purposes.	Sufficient to test for therapeutic purposes, hot spot testing purposes, contact tracing purposes for several links of the chain, surveillance purposes, and critical context purposes.	Sufficient to test for therapeutic purposes, hot spot testing purposes, surveillance purposes, and critical context purposes.
Performance			
Time from Symptom Onset to Test Positivity	24 hours	24 hours	24 hours
Turnaround Time	24 hours	24 hours	24 hours
Positive Test Ratio	<1%	<3%	Less than 10%

Step 4: Set Your TTSI Program Priorities

Any TTSI program is ultimately built up from a lot of on the ground program decisions. The following priorities for a TTSI program lead to the most efficient progress on the path to zero:

- 1) **Priority 1:** Test hotspots, using mobile-labs, walk-in, and drive thru clinics as well as testing of all staff and residents in congregate living facilities with outbreaks;
- 2) **Priority 2:** Encourage all symptomatics (regardless of severity of symptoms) to be tested (or to self-quarantine) and all those who have reason to think they have been exposed to the disease to come in for a test.
- 3) **Priority 3:** Trace the contacts of all covid-positive individuals throughout the population.
- 4) **Priority 4:** Layer in additional surveillance testing in “critical contexts”: congregate settings where de-densification is not possible or where there are high vulnerability populations and national security settings.

For a TTSI program to succeed, the first three priorities must be broadly advertised and effectively communicated to the public along with information about where to get a test. In addition, funding and payment processes must be streamlined. Health insurance does not cover this non-therapeutic, surveillance testing. Public coverage is necessary, and payment processes should be simple and streamlined.

The first three priorities, taken together, create a double-pronged program of hotspot testing and tracing and state-wide testing and tracing. This double-pronged program depends on actors in the healthcare system and the public health system and in civil society organizations from businesses, to churches and schools, and non-profits. Building an interface that can link them all to a shared TTSI infrastructure is critical.

If supported with a sufficient supply of testing capacity and contact tracers, as well as with ongoing use of other NPIs such as masking and 6-foot social distancing rules, this program should suppress the disease and drive case incidence close to zero, facilitating an open economy that can stay open and minimizing the need for private businesses to build and maintain testing programs. Once case incidence reaches green zone levels, contact tracing and testing capacity levels will fall back to maintenance levels.

N.B.: In contexts that have pursued mitigation rather than suppression and continue to be at yellow or orange levels of covid case incidence, it will be hard to open schools, churches, and other congregate contexts without experiencing outbreaks within those organizations. It might be tempting to envision routine testing in these contexts facilitated by a private market in viral tests. **However, resources should not be diverted to this purpose prior to the completion of the public mission to achieve suppression in the community more broadly.**

Once a jurisdiction has returned to green, it may make sense for schools, churches, and other congregate contexts to equip themselves with testing resources to provide early warning of outbreaks in their community. In contexts where people are currently employing routine testing, the frequency for individual testing ranges from daily to every fourth day to once a week. Once a jurisdiction has reached the green level, however, case incidence should be sufficiently low that organizations of this kind could rely on weekly pooled testing to catch outbreaks. (In pooled testing, samples are batched and tested together. If the batch delivers a positive result, the samples are then unbatched and run separately. In low incidence contexts, this is a more efficient approach to viral testing.)

Step 5: Anticipate Your Resource Needs

Some rough rules of thumb can be offered for determining resources needs for contact tracing personnel and viral testing supply.

Contact Tracing	Maintenance Capacity for Green Level	Suppression Capacity for Levels Yellow, Orange, or Red	Mitigation Capacity for Levels Yellow, Orange, or Red
Capacity			
Number of Tracers	30 tracers per 100k population (or 1 per 4000 in sparsely populated areas)	Planning: 30 tracers per 100k (or 1 per 4000 in sparsely populated areas) Activation: Whichever is higher, 30 per 100k or 5 tracers per every confirmed new daily case	30 tracers per 100k population

Viral Testing Capacity				
Covid Level		Maintenance	Suppression	Mitigation
Green	Conditional on ongoing infection controls and de-densification protocols	10 daily tests/100,000 people (Maintenance Level)	n/a	n/a
Yellow, Orange, Red	If high compliance with masking, 6ft social distancing rules, and mass gatherings bans and/or stay at home orders		600 tests per new daily death (7 day rolling average)	200 tests per new daily death (7 day rolling average)
	If no stay at home orders and only moderate compliance with masking,		1200 tests per new daily death (7 day rolling average)	300 tests per new daily death (7 day

	6ft social distancing rules, and mass gathering bans			rolling average)
	If no stay at home orders and only minimal compliance with masking, 6ft social distancing rules, and mass gathering bans		2500 tests per new daily death (7 day rolling average)	500 tests per new daily death (7 day rolling average)

N.B.1: The surge level of contact tracers needed is very substantial. Most jurisdictions will find it valuable to educate the public on how to do DIY contact tracing. This will provide an important expansion to the corps of contact tracing personnel. The volume of resources needed in red jurisdictions explains why the strategy often falls back to mitigation, yet it's important to remember that suppression can be pursued in orange and yellow zones even if mitigation has been chosen for red zones.

N.B.2: There is a trade-off between volume of tests and time for a mitigation and a suppression strategy. A mitigation strategy may use fewer tests on a daily basis but it will require more testing in aggregate. A suppression strategy involves a bigger investment of workforce and testing supply up front but a lower aggregate investment in disease control. Mitigation is penny-wise but pound foolish.

Using the rules of thumb above for a suppression strategy coupled with moderate compliance with other NPIs results in the following anticipated testing supply need for Massachusetts as of June 28, 2020.

State of Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	2,288	343	ongoing
AND				
Mitigation (Current WH numbers)	10%	42,882	2,068	From May 15- indefinite
OR				
Suppression	3%	171,529	37,841	July 1 - July 31
Barnstable, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	71	11	ongoing
AND				

Suppression	3%	2,379	537	July 1 - July 31
Berkshire, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	42	6	ongoing
AND				
Suppression	3%	943	217	July 1 - July 31
Bristol, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	188	28	ongoing
AND				
Suppression	3%	13,044	2,882	July 1 - July 31
Essex, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	263	39	ongoing
AND				
Suppression	3%	25,598	5,624	July 1 - July 31
Franklin, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	23	4	ongoing
AND				
Suppression	3%	535	123	July 1 - July 31
Hampden, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	155	23	ongoing
AND				
Suppression	3%	10,406	2,301	July 1 - July 31
Hampshire, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	54	8	ongoing
AND				

Suppression	3%	1,449	330	July 1 - July 31
Middlesex, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	537	81	ongoing
AND				
Suppression	3%	37,731	8,333	July 1 - July 31
Norfolk, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	236	35	ongoing
AND				
Suppression	3%	14,054	3,114	July 1 - July 31
Plymouth, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	174	26	ongoing
AND				
Suppression	3%	13,716	3,023	July 1 - July 31
Suffolk, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	268	40	ongoing
AND				
Suppression	3%	32,160	7,046	July 1 - July 31
Worcester, Massachusetts				
	Positivity Rate	Tests Per Day	Tracers Needed	Timetable
Maintenance	3%	277	42	ongoing
AND				
Suppression	3%	19,514	4,310	July 1 - July 31

SECTION TWO: INVENTORYING SAMPLE COLLECTION MODALITIES

To run a successful TTSI program, it is important to ensure that there are enough sample collection sites to meet the state’s targets and that all of the sample collection sites are integrated with public health data systems so that key performance indicators for sample collection can be tracked.

Samples are collected in (1) traditional healthcare settings, (2) new public testing clinics, (3) at-home (still to come); and (4) in congregate living settings and businesses, schools, office, and other potential locations of routine collection.

Some sample collection modalities involve **sending samples to a lab for analysis**. Some involve **point-of-care processing of results**. It is important to track the volume of both kinds of tests in each jurisdiction.

Sample collection sites that send samples to a central lab for analysis introduce a challenge of the speed at which results are returned as well as questions about whether the samples are fully accessioned at the point-of-collection or in the lab. The former methodology increases lab capacity.

Point-of-care collection sites introduce a challenge for the integration of results data with your public health data systems.

Charts such as the following can assist the effort to synthesize your data:

Sample Collection Modalities for Centralized Processing					
Modality	Currently in use in state?	Number of sites	Average daily # of samples collected	Accession methodology- individual or batched	Maximum daily # of samples that could be collected
Traditional Health Care Setting					
Primary care physicians					
Clinics- Urgent Care/ CVS/ Walmart/ Rite-Aid					
Community Health Centers, including Federally Certified Health Centers					
Public Testing Sites					

Drive-thrus					
Walk-ups					
Mobile Sites					
Mobile Pop-up Sites					
At-Home Tests					
Home Collection- Mail-in Results					
Routine Testing Sites					
Businesses					
Elder Care Facilities					
Correctional Facilities					
Schools					

Sample Collection Modalities for Point of Care Processing					
Modality	Currently in use in state?	Number of sites	Average daily # of samples collected	Data integrated with Public Health Systems?	Maximum daily # of samples that could be collected
Traditional Health Care Setting					
Primary care physicians					
Clinics- Urgent Care/ CVS/ Walmart/ Rite-Aid					
Community Health Centers, including Federally Certified Health Centers					
Public Testing Sites					
Drive-thrus					
Walk-ups					
Mobile Sites					
Mobile Pop-up Sites					

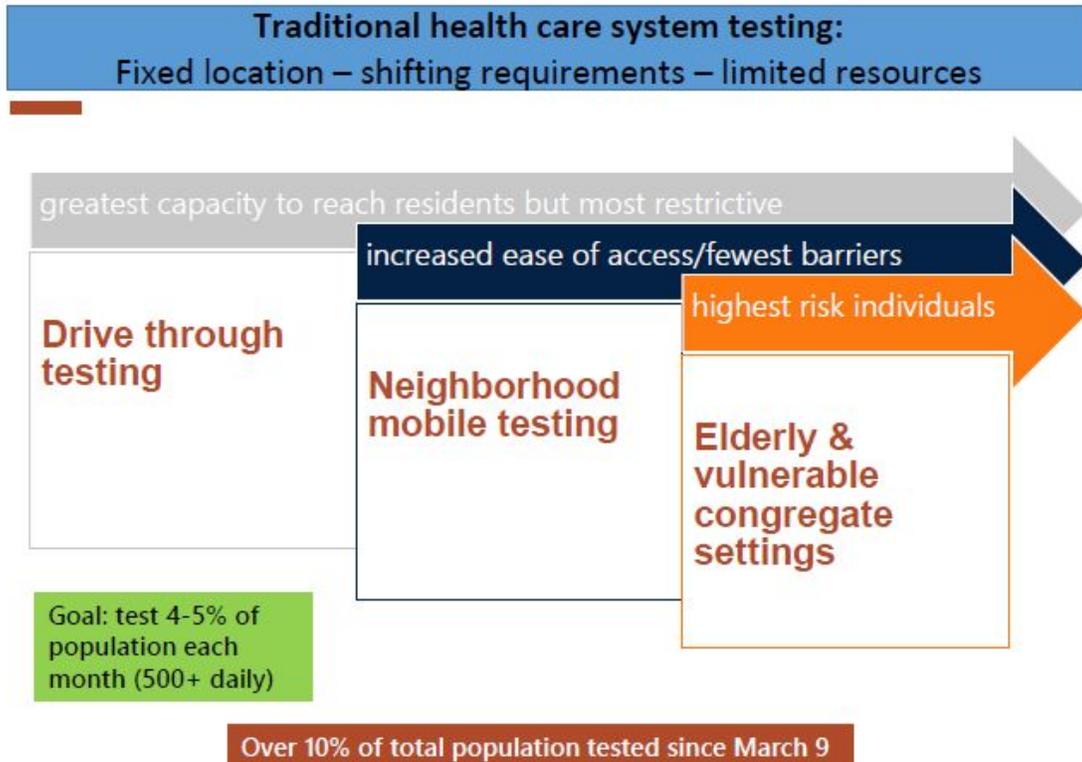
At-Home Tests					
Home Collections	N				
Routine Testing Sites					
Businesses					
Elder Care Facilities					
Correctional Facilities					
Schools					

Case Study: New Orleans Testing Strategy

New Orleans was one of the first municipalities to develop a city-wide testing strategy in mid-March following confirmation from the Health Department of communal spread. The city’s Phase One strategy featured a traditional testing model of a fixed location with drive through testing staffed by national Health and Human Services (HHS), Federal Emergency Management Agency (FEMA), state and local personnel. New Orleans soon recognized limitations of the Phase One model in reaching residents who could not access the fixed location, who lacked a Louisiana ID or symptom criteria, or who were anxious about visiting the site.

The city quickly moved to implement Phase Two of its testing strategy by deploying mobile testing units to neighborhoods staffed by locals. These units move to areas where the virus is spreading fastest or where barriers to testing are greatest. The mobile units allow for drive through and walk-up testing, providing multiple ways for residents to access tests. Phase Two removed Phase One ID/insurance and symptom requirements to test. Local health personnel provide on-site needs assessment and resources from the mobile units. Trained local personnel provide callbacks on test results and are having more success getting through to residents and directing them to local resources than the national callback center of Phase One. This mobile approach has seen New Orleans testing site demographics generally reflect the city’s demographics. It has also allowed local officials to constantly reassess areas to identify emerging high-risk groups and testing gaps.

Overall Testing Strategy

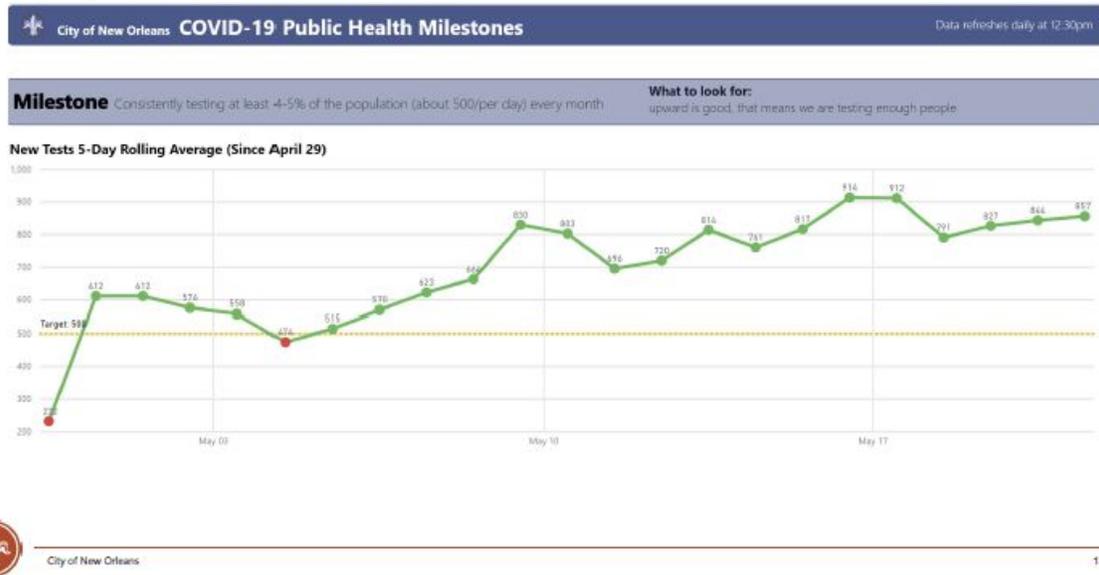


New Orleans' Phase Three strategy will incorporate "hyper mobile" pop-up testing at locations with the highest risk of outbreak or the highest risk individuals, including nursing homes and senior apartment buildings, homeless shelters, low-income developments, and other congregate settings. The hyper-mobile pop-up model allows for nimble and flexible test site set-up. The hiring of New Orleanians to staff these units provides cultural competence to the testing environment that helps build trust with those being tested.

Public transparency has been critical to the success of New Orleans testing strategy. The New Orleans Health Department created a testing dashboard accessible to the public through the existing municipal government communications channel used by residents to get information on emergencies and natural disasters (<https://ready.nola.gov/home/>).

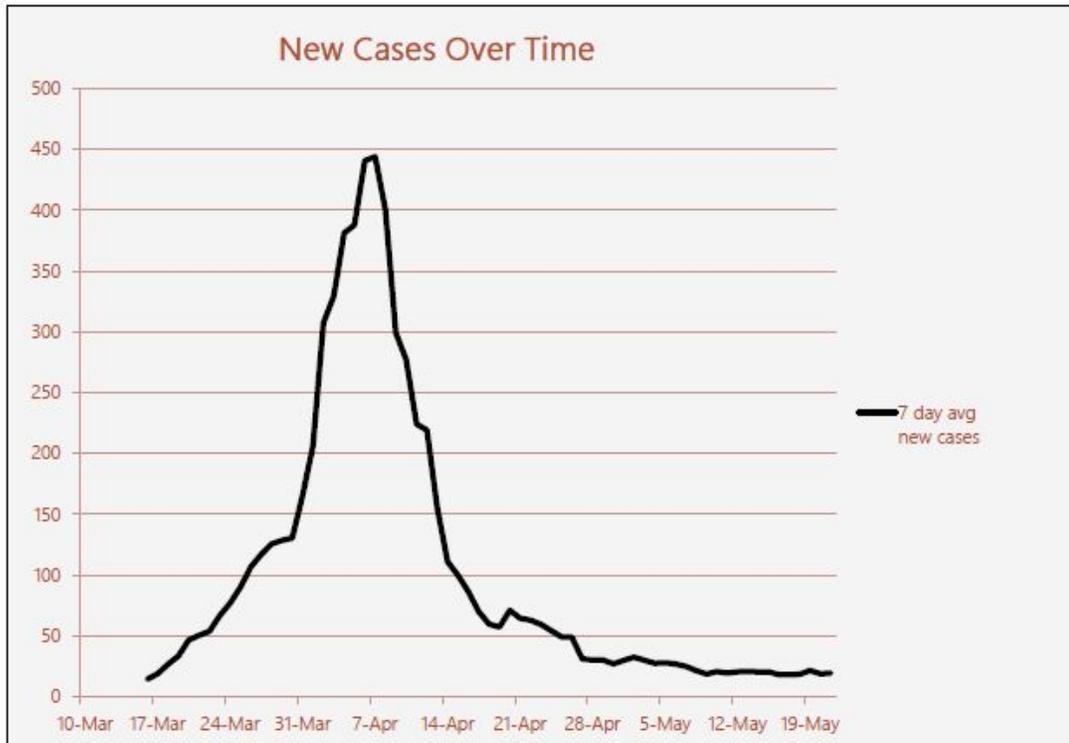
New Orleans Milestones: Public Transparency

[Public-facing dashboard at NOLA Ready](#)



The effectiveness of the city's rapid testing and tracing strategy is visible through the sharp peak in cases in late March/early April followed by a rapid decline in new cases. With the mobile testing strategy, health department officials can quickly mobilize testing resources to suppress new outbreaks (20 April in below chart).

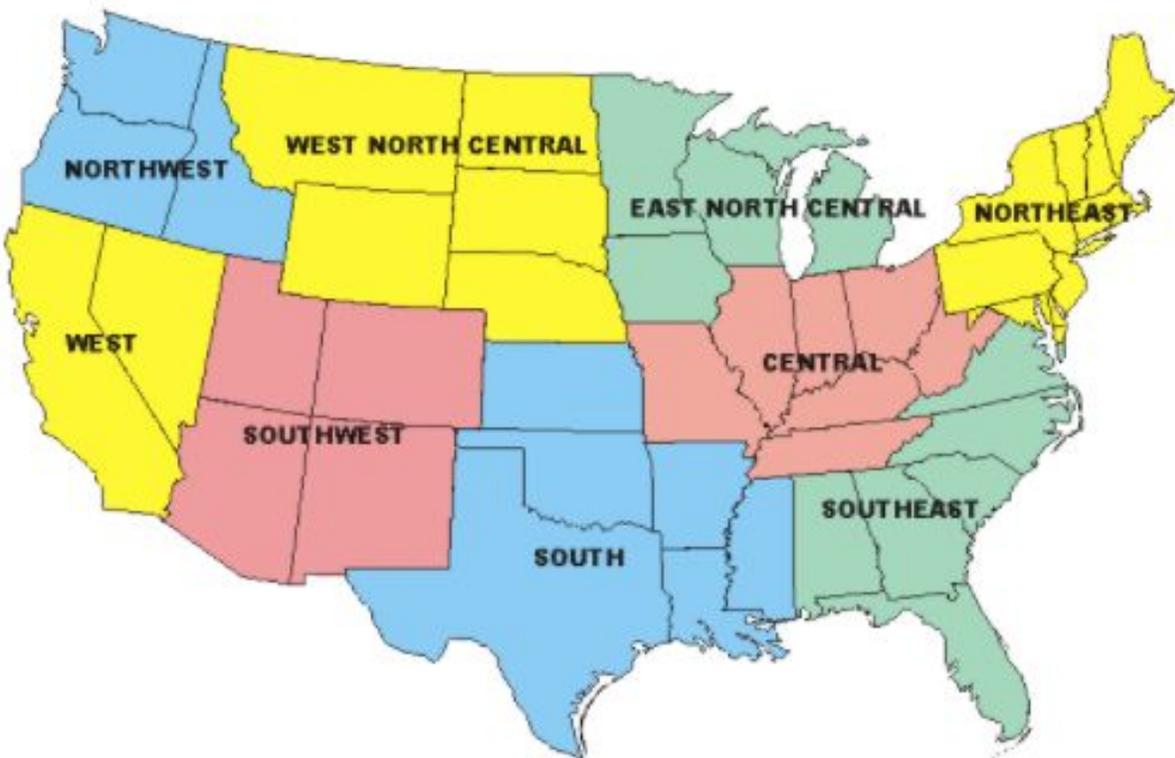
New Orleans: COVID Day 75



SECTION THREE: INVENTORYING OF TEST PROCESSING CAPACITY

The hardest element of establishing a TTSI program may be aligning testing capacity with sample collection volume. It is not reasonable to expect jurisdictions to conduct this inventory below the level of the state. The state should take on responsibility for securing sufficient lab capacity for all jurisdictions within it. **Ideally, the state would do this work as a participant in an interstate compact formalized by Congress and funded for procurement of testing capacity.**

To achieve this, the state needs to inventory testing capacity available to it and to identify gaps. Importantly, this inventory process should take into account labs available regionally and not just within the state itself. While the need for 24hr turn around on test results puts a geographic limit on how far away a lab can be from a sample collection site, some regional collaboration should be possible, particularly for high density population areas within one of the regions below.



Low population density locations should expect to make much greater use of point-of-care machines.

States want to have visibility into capacity at the regional level flowing from all of the following testing modalities; they should not rest content with understanding only the capacity in their own state. The chart below provides an assessment of national capacity.

SARS-CoV-2 Testing Methods						
Component Detected	Viral RNA				Viral Protein	
Method	RT-qPCR	iNAAT	NGS	CRISPR	ELISA	LFA
Clinical Accuracy	High	High	High	Medium	Unknown	Medium
Scalable to Meet US Needs?	Maybe	Maybe	Yes	Unknown	Unknown	Yes
Current US Tests/Day	~200,000	~5,000	0	0	0	Thousands
Projected Aug. 2020 Tests/Day	Hundreds of Thousands	Hundreds of Thousands	Millions	Unknown	Unknown	Hundreds of Thousands
Use Case	High-volume Centralized or Point-of-Care	High-volume Centralized or Point-of-Care	High-volume Centralized	Point-of-Use	High-volume Centralized	Point-of-Use
Turnaround Time	24-48 Hours (Centralized)	24-48 Hours (Centralized)	24-48 Hours	Minutes	24-48 Hours	Minutes
	Minutes (PoC)	Minutes (PoC)				
Sample Type	Nasal Swab or Saliva	Nasal Swab	Nasal Swab or Saliva	Nasal Swab	Unknown	Nasal Swab
Quantifies Viral Load	Yes	No	Yes	No	Yes	No
Key Scale-Up Barrier	Reagent/Kit Availability	Reagent/Kit Availability	Logistics	Novel Technology	Assay Development	Assay Development
Regulatory Status	EUA	EUA	EUA pending	EUA	Unknown	EUA
Supply Chain Risk	Medium	High	Low	Medium	Medium	Low
Representative Companies	<ul style="list-style-type: none"> • LabCorp • Quest • Roche • Thermo Fisher 	<ul style="list-style-type: none"> • Abbott • Hologic • Atlia Bio 	<ul style="list-style-type: none"> • Broad Inst. • Illumina • Hudson Alpha • Ginkgo 	<ul style="list-style-type: none"> • Mammoth • Sherlock • Broad Inst. 	<ul style="list-style-type: none"> • LabCorp • Quest • Abbott • Roche 	<ul style="list-style-type: none"> • Quidel • ChemBio • Cellex • OraSure

Source, Ginkgo Bioworks.

See also: <https://interventions.centerofci.org/pub/covid-testing-assessment/release/14>

In this analysis, key performance factors such as clinical accuracy and turnaround time are evaluated as well as key deployment factors such as current and future tests per day projections and supply chain risks. The availability of new or improved testing modalities will continue to be dependent on FDA authorization through their emergency guidance policies. Also, as has been experienced with PPE, the supply chain for key components (e.g. test swabs, reagents, etc) will continue to limit sample collection and processing capacity.

In order to evaluate the potential impact of these test modalities and evaluate which option(s) are most likely to scale in order to prioritize resources and time, a qualitative-to-quantitative trade-off analysis can be performed. Note that the 2 time horizons chosen for the evaluation are Q3 2020 and Q4 2020 which yield different outcomes based on the selected evaluation factors. For this

analysis, clinical accuracy, turnaround time, and number of tests per day were evaluated; assigning a value to each factor on a 0 to 5 scale.

Note that supply chain risk was not included as we anticipate supply chain disruption in some form for each test modality. As such, supply chain risk can be mitigated by pursuing more than 1 test modality.

Test Modality			Accuracy (High = 5 Low = 1)	Turnaround Time (Minutes = 5, >48hrs = 1)	Q3 2020	Q4 2020
					Tests/Day (1M+ = 5, <5K = 1)	Tests/Day (1M+ = 5, <5K = 1)
Viral RNA	RT-qPCR	Centralized	5	2	2	3
	RT-qPCR	PoC	5	4	1	2
	iNAAT	Centralized	5	2	1	2
	iNAAT	PoC	5	4	0.5	2
	NGS	Centralized	5	2	0	4.5
	CRISPR	PoC	3	5	0	1
Viral Protein	ELISA	Centralized	1	2	0	1
	LFA	PoC	1	4	0.5	2

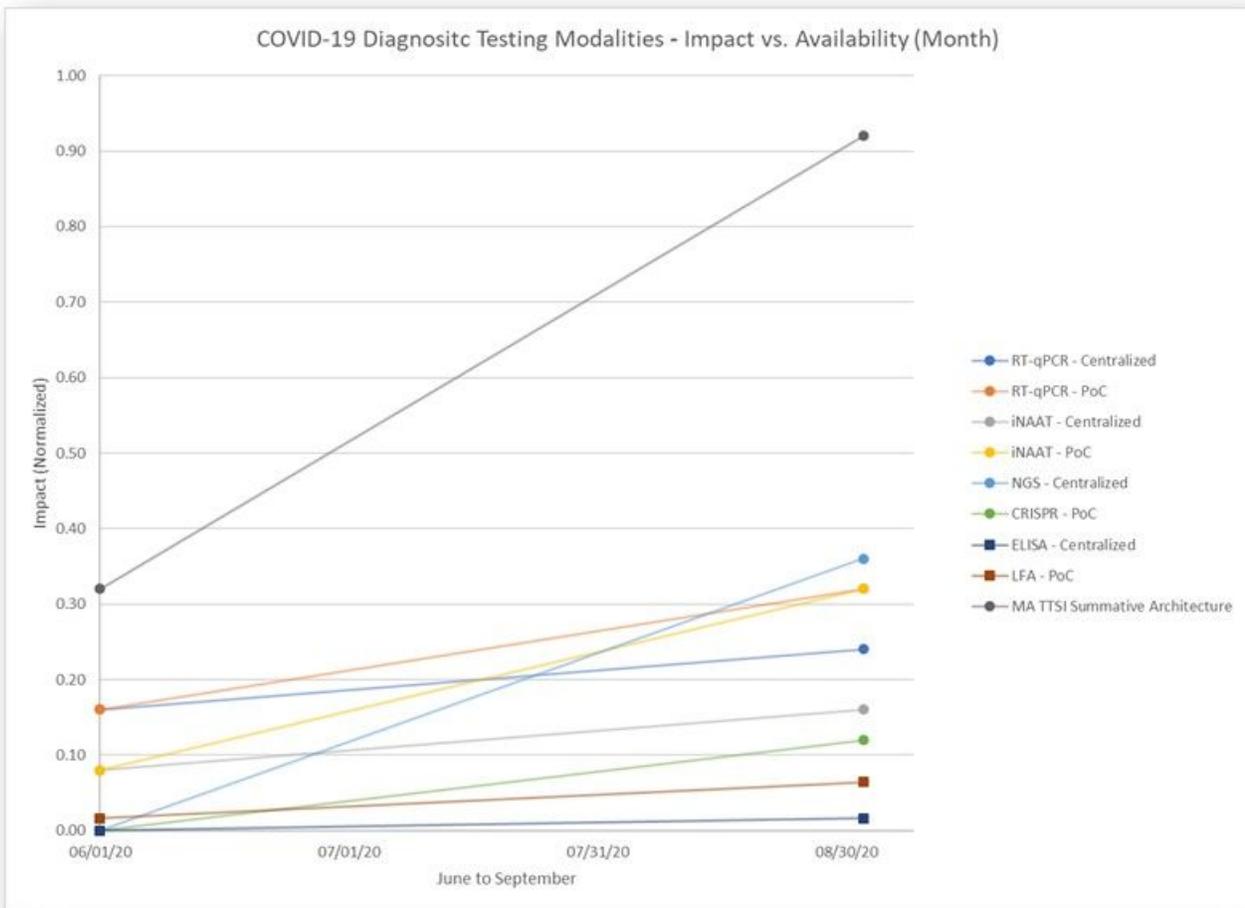
A utility function that combines multiple factors into 1 variable was created to assess the primary trade-offs we are considering when investing time and resources into scaling testing.

$$\text{Impact} = (\text{Clinical Accuracy}) \times (\text{Turnaround Time}) \times (\text{Tests/Day})$$

The derived Impact value can be normalized by dividing by the highest possible product in order to provide a 0 to 1 range for comparison. The Impact value was derived for all test modalities for both Q3 2020 and Q4 2020.

Test Modalities		Q3 2020		Q4 2020	
		Month Value	Impact (Normalized) = Accuracy x Turnaround Time x Tests/Day	Month Value	Impact (Normalized) = Accuracy x Turnaround Time x Tests/Day
Viral RNA	RT-qPCR - Centralized	06/01/20	0.16	09/01/20	0.24
	RT-qPCR - PoC	06/01/20	0.16	09/01/20	0.32
	INAAT - Centralized	06/01/20	0.08	09/01/20	0.16
	INAAT - PoC	06/01/20	0.08	09/01/20	0.32
	NGS - Centralized	06/01/20	0.00	09/01/20	0.36
	CRISPR - PoC	06/01/20	0.00	09/01/20	0.12
Viral Protein	ELISA - Centralized	06/01/20	0.00	09/01/20	0.02
	LFA - PoC	06/01/20	0.02	09/01/20	0.06
MA TTSI Summative Architecture		06/01/20	0.32	09/01/20	0.92

By plotting the Impact values against the initial dates of Q3 2020 and Q4 2020, an estimated rate of scaling of each test modalities' Impact can be compared visually.

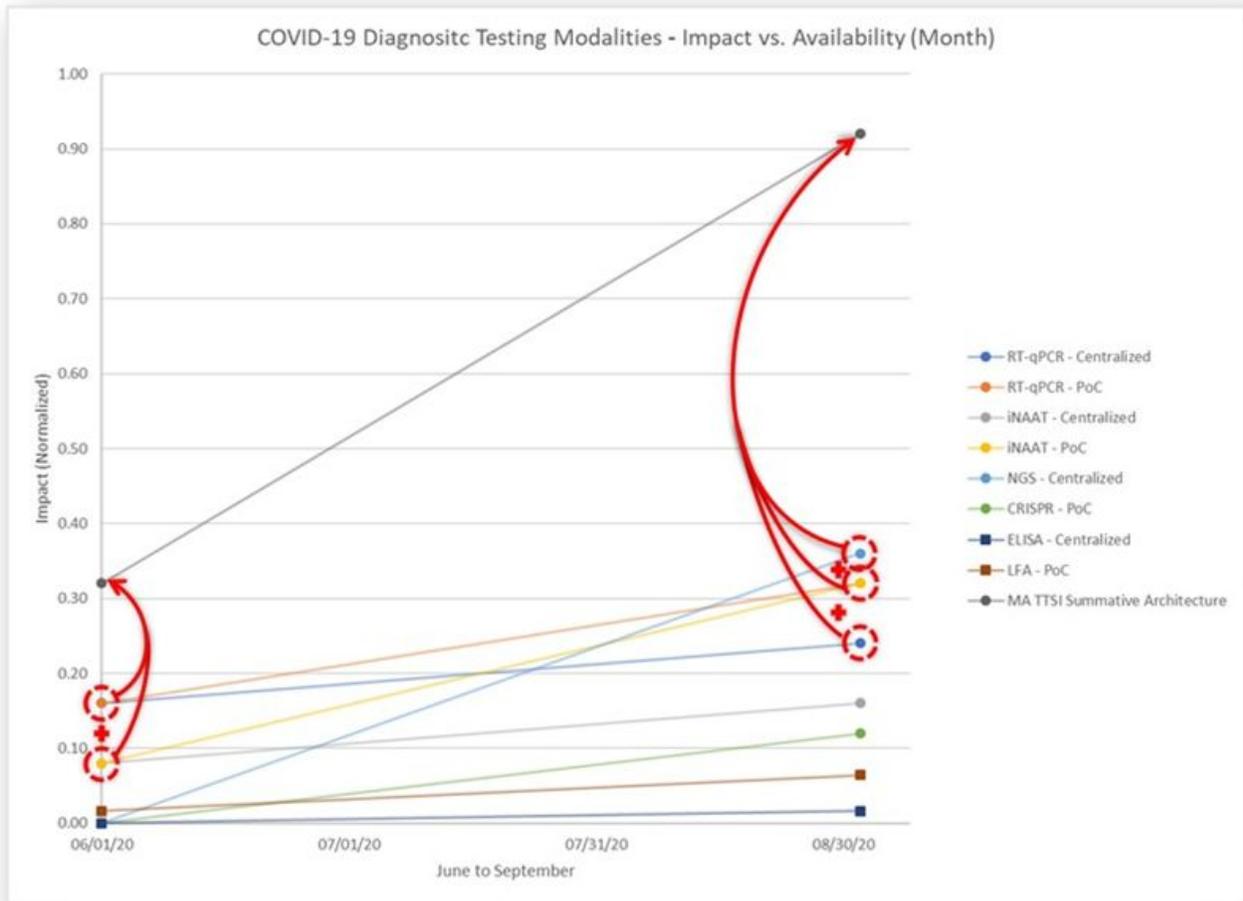


As mentioned for supply chain risk, there are additional uncertainties for each of these factors. Additionally, this is a semi-quantitative analysis that injects its own level of uncertainty.

As such, mitigations to these risks also provide an opportunity to improve in the independent Impact of each test modality. Instead of pursuing an either-or strategy of solely using 1 test modality, a great Impact can be achieved through the summative Impact of combining multiple testing modalities into 1 strategy.

The MA TTSI Summative Architecture strategy aims to pursue multiple testing modalities in parallel to maximize Impact and reduce the risks of supply chain disruption or scaling delays. For example, Hologic, Roche, Abbott, and Thermofisher all provide viral RNA testing platforms; however, each platform also requires proprietary or platform-specific consumables such as reagents or deep well plates. Qualifying alternative suppliers of these consumable materials, while necessary, may also take time if they require FDA Emergency Use Authorization amendments. Distributing the supply chain risk across these different platforms through the capacity of clinical laboratories, research laboratories, and healthcare providers is an important strategy.

For Q3 2020, the combination of both RT-qPCR Centralized and RT-qPCR Point of Care testing modalities, is how great impact can be achieved. Similarly, for Q4 2020, the projected availability of high-volume NGS Centralized testing further increases the strategy's impact by taking advantage of scaled capacity of the RT-qPCR tests. Additionally, the combination of centralized and point of care options allows for targeted deployment of test resources to areas experiencing high rates of transmission.

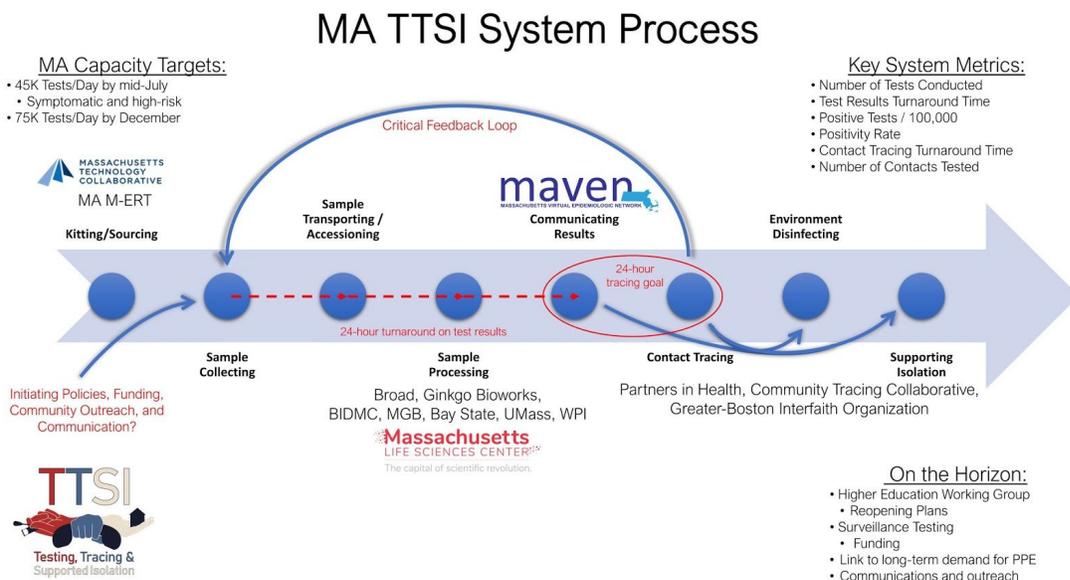


Inventoried test processing capacity also requires inventoried the supply chain and logistics that are supporting testing more generally. Establishing a high-volume test processing capacity in a centralized location is only valuable if the need for testing can be matched with the capacity. This is done through sample transporting from likely distributed collection sites and accessioning at the sample collection site to take advantage of high-throughput automation. How this fits into the end-to-end testing, contact tracing, and supported isolation system will be discussed in the next section.

SECTION FOUR: THE TTSI SYSTEM AS A WHOLE, DATA MANAGEMENT, AND REPORTING

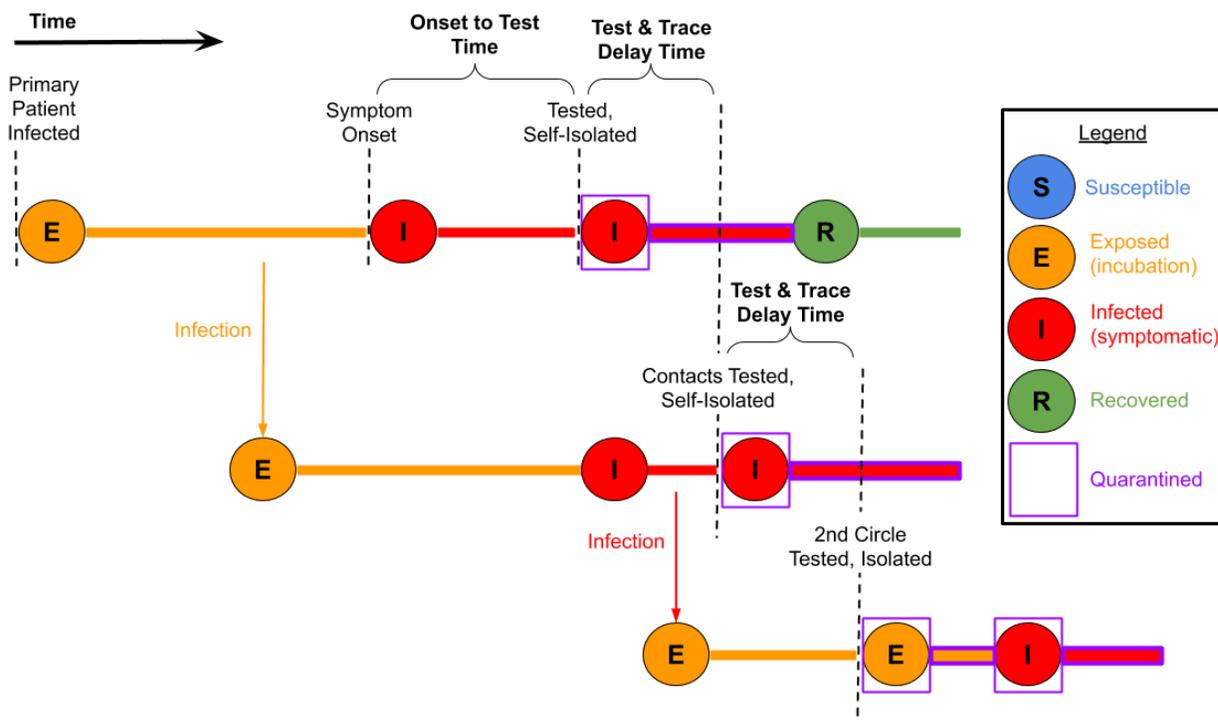
A TTSI system depends on a cycle of Test-Data-Trace-Test. Patient test results must flow both into state public health databases for general disease monitoring and into local jurisdiction contact tracing databases to trigger contact tracing work.

Here is an example from Massachusetts of a complete TTSI Systems map:



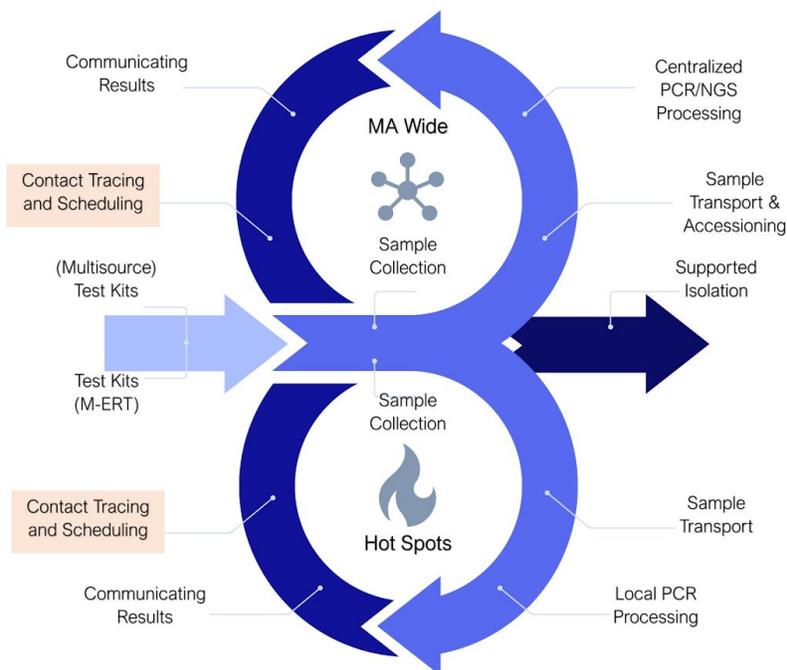
The implementation program consists of both a hotspot program and a state-wide tracing and testing program that provide feedback loops between testing, tracing, and testing of new contacts. The contact tracing organization and/or system can be the same for both the hotspot and state-wide programs.

In addition, surge capacity can flow either through centralized, regional lab processing or through point-of-care or more local lab processing. Either way, data flows and speed are fundamental to success. It is necessary to establish a data management system and infrastructure that enables a state-wide aggregated view while also providing localized information collection through contact tracing. Arranging testing for those that have been in contact with someone who has tested positive completes a feedback loop that drives suppression. The more rapidly this testing-tracing-testing cycle can be completed (e.g. 24 - 48 hours), the lower the likelihood of additional transmission through contacts.



Breaking the Chain: The Temporal Dynamics of Testing and Contact Tracing

The diagram below illustrates a state-wide testing, tracing, and supported isolation process utilizing a large centralized PCR and/or NGS capacity for test processing in combination with a localized hot spot testing strategy with more deployable and mobile resources.



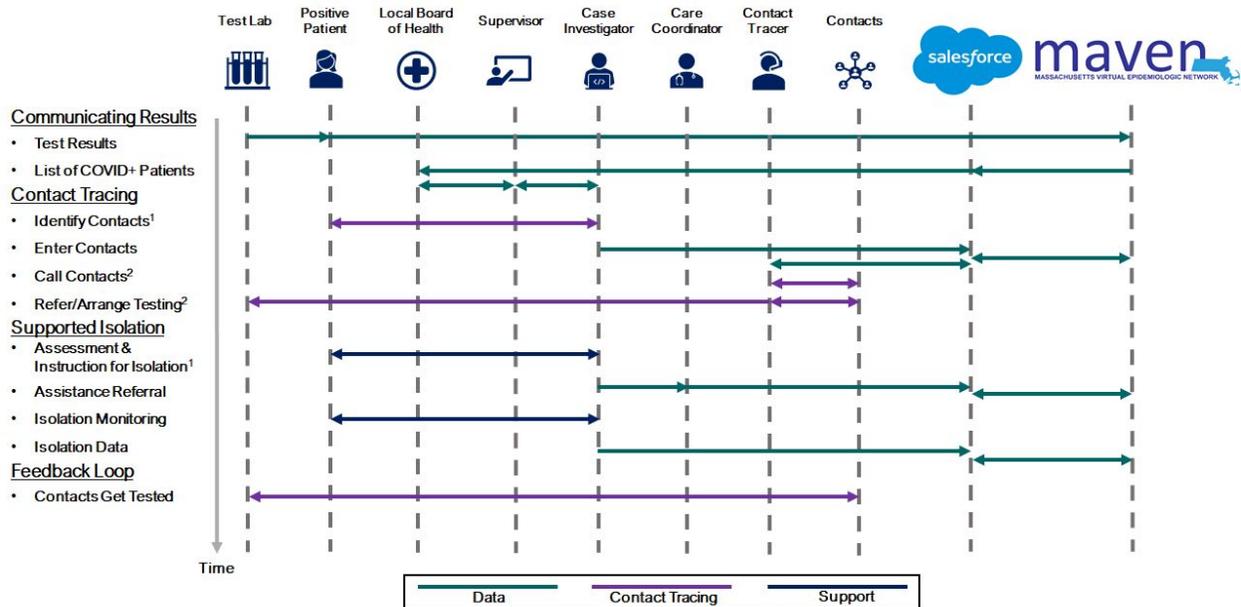
The key metrics for assessing the operations of a TTSI system were presented above in Section 2.

Due to both the distributed impact of COVID-19 regionally, as well as social isolation requirements, access to data to facilitate testing and tracing activities are vital. Stakeholders that need access to COVID-19 testing data include state emergency management agencies, state departments of public health, local boards of health, community health centers, labs processing tests, and the contact tracing workforce. The Massachusetts Community Tracing Collaborative (MA CTC) (<https://www.mass.gov/info-details/learn-about-the-community-tracing-collaborative>), which includes the Massachusetts Virtual Epidemiologic Network (MAVEN) that was established prior to COVID-19 for case investigation and surveillance purposes for infectious diseases, is an example of how this can be implemented.

Central to this, is the person that has tested positive for COVID-19 and their relationships with local boards of health and the contact tracing work force which includes case investigators, contact tracers, and care resource coordinators whose roles will be described in more detail in Section 5. To facilitate the relationship management, the MA CTC has integrated their MAVEN system with Salesforce, which is utilized for customer resource management (CRM) to track communications through phone calls and emails.

The integration of testing, tracing, and supporting data enables visibility into the resource needs (e.g. workforce, test kits, etc) and provides opportunities for further analysis to identify delays in the end-to-end system that can be further improved. An example of this is the amount of time it takes to provide information about COVID positive patients to the contact tracing team.

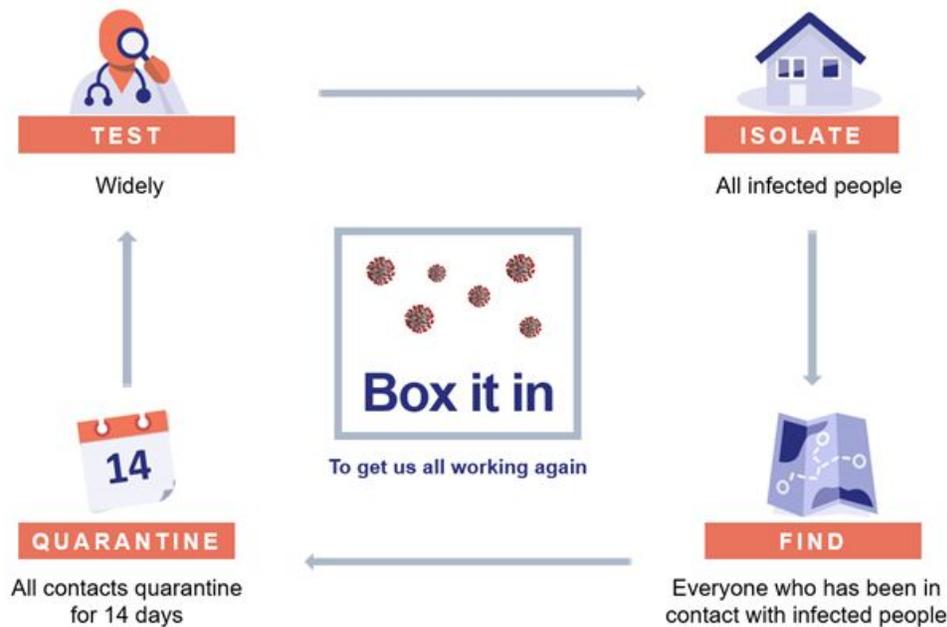
The diagram below illustrates the data management and communication architecture deployed in Massachusetts through the MA CTC.



Note that the steps designated with match superscripts happen in combination during a single call/contact. Additional support steps and data collection for quarantine of persons who came into contact with someone who tested can be added as well.

SECTION FIVE: IMPLEMENTING CONTACT TRACING PROGRAMS

Contact tracing is a key component of any successful suppression effort to “box in” COVID-19 (see figure below and the “Four Steps” from [Resolve to Save Lives](#) Contact Tracing Playbook). In contact tracing, local and state health departments quickly identify people infected with COVID-19 using widely implemented testing programs; instruct infected people to isolate; find and notify their contacts; and support these contacts so they can quarantine for 14 days.



Contact tracing for COVID-19 includes four key steps:

1. **Identify and notify cases** of their confirmed or probable COVID-19 status. Provide instructions on isolation and treatment.
2. **Interview cases** and help them identify the people they were in contact with during their infectious period.
3. **Locate and notify contacts** of their potential exposure, interview them to see if they have symptoms, offer testing if they do (and if they don't), and arrange for care if they are ill. Provide instructions on quarantine.
4. **Monitor contacts** and report daily on each person's symptoms and temperature for 14 days after the person's last contact with the patient while they were infectious.

This process continues until the end of any possible transmission chain has been reached.

Contact tracing programs may be run directly by departments of health, through contracts to outside vendors (like Partners In Health in Massachusetts), through community organizations recruited by public health departments (as in the NYC Knows program for HIV-AIDS), and

through the development of staff capacity through private and service year organizations. This work must be supported by public education on contact tracing and the public’s role. See for example Massachusetts’ Community Tracing Collaborative: <https://www.mass.gov/info-details/learn-about-the-community-tracing-collaborative>.

Because digital tracing apps are still 1-2 months away from viability, we do not review them in this handbook but instead focus on the urgent needs and resources for manual contact tracing.

Successfully breaking the chain of COVID-19 transmission and reopening state economies will require governors and senior health officials to develop a data-driven approach to contact tracing that builds on existing public health capabilities, gets the buy-in of the public as key players in the effort, coordinates stakeholders and resources, and effectively engages public and private partners to scale the workforce necessary to support these efforts in the near and long-term. Regardless of a state’s public health authority structure, it is essential that local public health tie in to a state’s contact tracing strategy.

Contact Tracing workforce development

State and local health departments will need to work together to assess and coordinate workforce capacities and determine additional staffing and infrastructure needed to contact all positive cases within 24 hours, quickly follow-up with their contacts who may have been exposed, and monitor and provide referrals to services for individuals in isolation and quarantine.

The following are steps for developing and supporting a contact tracing workforce (see National Governors Association [Contact Tracing Workforce](#) primer):

1. Build on existing state and local public health contact tracing workforce and capacity
2. Determine additional contact tracing workforce needs
3. Develop a recruiting and hiring strategy
4. Train the contact tracing workforce

The CDC’s [Interim Guidance on Developing a COVID-19 Case Investigation and Contact Tracing Plan](#) outlines the full public health workforce of epidemiologists, clinical staff, and data managers needed to support the full contact tracing effort. Core contact tracing staff that states will need to recruit and scale include the following (from [Resolve to Save Lives COVID-19 Contact Tracing Playbook](#)):

Role	Responsibilities	Potential Workforce
------	------------------	---------------------

Case Investigator	Interviewing cases, identifying contacts, providing instructions for isolation and referral to social or medical support*	Public health students and graduates, social workers, community health workers (CHWs), navigators/promotores
Contact Tracer	Notifying contacts of potential exposure, providing instructions on quarantine, referral to services,* follow up and symptom monitoring	CHWs, navigators/promotores, college students, volunteers, librarians and other service-oriented professionals
Contact Tracing Team Leads	Supervise teams of case investigators and contact tracers	Disease Investigation Specialists, Supervisor Public Health Nurses

* *Some states have identified separate cases manager or resource coordinator roles to support these responsibilities, particularly for complex cases*

The estimated number of case investigators, contact tracers, disease investigation specialists, and other personnel needed to conduct robust contact tracing will vary by or within states and should be closely aligned with both disease transmission models and testing strategies. Please refer to the chart in section 2 on tracing personnel needed according to case incidence levels (green, yellow, orange, and red).

States should start by partnering with local community health systems and Federally Qualified Health Centers. For example, contact tracing strategies should incorporate a community’s pre-existing local community health workers and prioritize training additional workers where possible. Community health workers have local and cultural competencies that support effective tracing, outreach, and provision of counseling on social and medical support services in the community. They are also well positioned to conduct sensitive COVID-19 conversations with the local population and to reach minority or at-risk communities.

Even with the deployment of local community health workers as contact tracers, surge capacity will be needed to cover outbreaks that exceed local capacity. Additional contact tracers could come from a variety of sources. Many states are working with nonprofits active in medically-underserved communities to improve contact tracing reach to those in need. Others are contracting with private organizations or local universities to deploy volunteers, including those with backgrounds in public health, social work, and medicine. The City of Baltimore working with The Rockefeller Foundation launched a program to expand workforce capacity through equitable recruitment of representative members of Baltimore’s community. The 276 contact tracers or care coordinators and 33 administrative, management and employment

development staff will expand outreach capacity by over 31,200 individuals over one year while providing jobs and public health career pathways for Baltimore residents.

State service commissions and service year programs, including Americorps, as well as the National Guard, the Medical Reserve Corps and other service organizations already engaged in a state's emergency response efforts can provide additional workforce leverage. These programs can work with local and national partners to train and redeploy active service year corps members to support contact tracing efforts, and create new service year positions to recruit and train local residents to meet this need. In Colorado, [more than 800 service year corps members](#) will be mobilized through the creation of new positions and redeployment of existing members.

For contact tracing to be effective, care coordination and social support referrals must be built into program design and workforce planning to ensure all are able to safely isolate and quarantine as needed, as demonstrated in the [Partners In Health](#) contact tracing graphic below. Please refer to Section Six: Providing Supported Isolation.

Linking cases and contacts to resources



An inventory of contact tracing practices, strategies, and resources spanning government, public health, foundation, association, and private groups follows the case study.

Case Study: Massachusetts Community Testing Collaborative

In March, local health departments in Massachusetts wrote to the state identifying a need for assistance with Covid-19 contact tracing. On April 3, 2020, the State of Massachusetts launched the Community Tracing Collaborative (CTC) in partnership with Boston-based global

public health group Partners In Health. The CTC is the central hub for all contact tracing efforts in Massachusetts, and is the first large-scale coronavirus contact tracing program in the US.

Key CTC actions to date include:

- Partnered with the Commonwealth Connector Authority (CCA) to stand up a virtual call center and create a communications strategy. CCA is typically responsible for outreach and communications surrounding health insurance enrollment.
- Deferred to local health boards to lead complex casework and casework in vulnerable populations. CTC provides workforce (via Partners In Health) and data support (via the state Department of Public Health) as well as guidance on policies and protocols.
- Mobilized academic institutions (e.g. public health programs) to train students to provide immediate contact tracing support while CTC recruited a more permanent workforce.
- Used existing, centralized database repository for all information surrounding testing, contact tracing, and case management. Both the CTC and local health departments can access information.
- Hired 1,500 case investigators and contact tracers and 150 care resource coordinators. CTC emphasized hiring from diverse populations and ensuring local representation in the workforce.
- Developed a training program for workers including role play, scenario-based learning, and self-paced online modules. Hired full time staff to manage the training program.
- Experimented with new avenues to increase phone response including texting, leaving messages, creating an inbound call line, and working with telecom companies to create a single caller ID.

Lessons Learned

- **Local Context is Key:** In Massachusetts, 10% of people who require isolation need additional supports to do so successfully (in NYC that number is 30%). Hiring local contact tracers and care coordinators is important for both cultural competency and identification/provision of social supports. Locals have knowledge of existing community supports for food, medication, and medical services. Local health boards are well suited to monitor transmission in the highest risk populations.
- **Localities Need Access to Shared Data Systems:** State-level actors can empower local officials through a shared data system. Massachusetts' system is "designed for all stakeholders"

so actors across jurisdictions can both provide inputs to the system and obtain and analyze outputs that help inform decisions on-the-ground.

- **Don't Cut Corners on Training:** Training needs to be a robust, continuous process and requires both technical and interpersonal components. Contact tracers receive 15+ hours of training during both on-boarding and at regular intervals.
- **Keep Metrics Focused:** Metrics tracking should center on comprehensiveness (“Are we reaching everyone we need to?”) and timeliness (“How long does it take to reach someone?”). These serve as important indicators of potential vulnerabilities community spread and inform adjustments to tracing protocols.

Massachusetts’ unified approach to contact tracing has enabled the state to build a robust contact tracing system, enabled by shared data, personnel support, and local knowledge. The CTC serves as a central hub for sharing data from across the state, training the tracing workforce at scale, and developing protocols and communications that support the epidemiological expertise existing within local health boards and their communities.

Additional Contract Tracing Resources

CDC Contact Tracing Explanation and Resources:
<https://www.cdc.gov/coronavirus/2019-ncov/php/open-america/contact-tracing/index.html>

CDC Interim Guidance on Developing a Covid-19 Case Investigation and Contact Tracing Plan:
<https://www.cdc.gov/coronavirus/2019-ncov/downloads/case-investigation-contact-tracing.pdf>

CDC Checklist for Developing a Covid-19 Case Investigation and Contact Tracing Plan:
<https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/health-department-checklist-final.pdf>

CDC Case Investigation Workflow:
<https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/COVID-19-Case-Investigation-workflow.pdf>

CDC Contact Tracing Workflow:
<https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/COVID-19ContactTracingFlowChart.pdf>

Association of State and Territorial Health Officials: Making Contact: A Training for COVID-19 Contact Tracers Introductory Online Course: <https://learn.astho.org/p/ContactTracer>

National Association of County & City Health Officials: Building COVID-19 Contact Tracing Capacity in Health Departments to Support Reopening American Society Safely: <https://www.naccho.org/uploads/full-width-images/Contact-Tracing-Statement-4-16-2020.pdf>

National Governors Association Building a Covid-19 Contact Tracing Workforce: <https://www.nga.org/memos/contact-tracing-covid-19/>

Partners In Health Part 1: Testing, Contact Tracing, and Community Management of Covid-19: https://www.pih.org/sites/default/files/PIH_Guide_COVID_Part_I_Testing_Tracing_Community_Management_4_21.pdf

The Rockefeller Foundation National Covid-19 Testing Action Plan: <https://www.rockefellerfoundation.org/national-covid-19-testing-action-plan/>

Resolve to Save Lives Covid-19 Contact Tracing Playbook: <https://contacttracingplaybook.resolvetosavelives.org/>

Inventory of Contact Tracing Practices and Resources

An inventory that spans contact tracing practices and resources from the Centers for Disease Control and Prevention (CDC), Partners In Health (PIH), Johns Hopkins University Center for Health Security (JHU), Deloitte, Resolve to Save Lives/Vital Strategies, The Rockefeller Foundation, and the National Governors Association is available in the appendix and via this link:

https://docs.google.com/spreadsheets/d/1nvkzEeQ_ebQxlv0BiTXe-JwzJQOTWtx4SRkzdKmnjKQ/edit#gid=1230785837

SECTION SIX: PROVIDING SUPPORTED ISOLATION

Every TTSI effort must involve the creation of a robust supported isolation network. Most people facing COVID-19 infection or exposure are able to self-isolate in their own home, but some cannot do so safely or do not have a home. Those with mild to moderate symptoms—who may be travelers, essential workers, people who live with immunocompromised individuals, people in group living settings, or without shelter—can all benefit from supported isolation.

For any effort to be successful, each isolation site must offer more than just shelter. Quality of life, including mental well-being and physical safety, must be accounted for in order to appropriately incentivize and reassure those isolating. To that end, effective supported isolation sites will include no-cost access to:

- Three meals per day that satisfy any dietary restrictions, allergies, and cultural needs.
- Hygiene products and cleaning services, such as laundry services, janitorial services, and deep-cleaning room turnover teams.
- Building security measures and staff.
- Behavioral health care, including regular check-ins; incorporation of essential mental health care may involve the hiring of additional staff, as well as offering training for those unfamiliar with working with unique adult populations. It may also be valuable to weave in [telehealth](#) services, which are expanding as reimbursement improves and behavioral health needs rise.
- Substance use disorder care, which can range from retaining the support of an on-call pharmacist to starting people on methadone, if necessary.
- Thoughtful prioritization of quality-of-life resources, including robust internet access, to make the lengthy stay more tolerable and allow people to complete the recommended length of their stay.

When establishing sites and resources for supported isolation, care must also be taken to ensure that people will be able to use and access them. It is essential for the locations of the sites to be spread throughout the area served to ensure equitable access. These sites should also be connected to the population by a variety of transportation options. Connection to both transit and the sites themselves will be best managed through referrals from a centralized intake service managed by the local government or public health service.

Staying in an isolation center must also be fiscally possible; wage replacements and small cash incentives are both useful in making isolation a viable option. Workers can also be protected with expanded paid and unpaid sick leave; [New York & New Jersey](#) adopted legislation to this effect in March, and [federal action](#) expanding family and medical leave soon followed.

A small sample of locations offering supported isolation facilities that can serve as models:

- [California](#) is offering emergency housing for sick and medically vulnerable individuals experiencing homelessness, as well as providing support to isolated individuals through [volunteer efforts](#).

- [Chicago, IL](#) is offering access to Covid-19 Isolation Facilities for unsheltered individuals and anyone experiencing symptoms.
- [King County, WA](#), which faced waves of COVID-19 infection before much of the U.S., built a robust network of isolation, quarantine, and recovery spaces in response.
- [Massachusetts](#) set up COVID-19 isolation facilities for homeless individuals in hotels across the state.

For additional information, see “[USofCare Playbook: Isolation and Quarantine Solutions to Serve At-Risk Populations during COVID-19.](#)”

SECTION SEVEN: FUNDING TTSI

Currently, there are several proposals for funding state TTSI programs (eg, [Rockefeller, Edmond J. Safra Center for Ethics](#)) including block grants to states for implementation of contact tracing, collaborative networks of states, and formal interstate compacts funded by Congress for test procurement. The goal of these proposals is to increase testing capacity and foster TTSI initiatives, recognizing that these are public goods that will continue to be critically important for months to come. AEI's "[Roadmap to Reopening](#)," for example, proposes linking supplemental funding to healthcare providers to increased surge capacity and stronger partnerships with public health authorities in order to contain ongoing and future outbreaks.

Testing the Insured

The Families First Coronavirus Response Act ([FFCRA](#)) mandates that testing and related services be entirely covered by all government and private insurance plans. The [CARES Act](#) expanded the range of tests and services that insurers must cover at no cost to subscribers, including reimbursing out-of-network providers. CMS [increased](#) its reimbursement for COVID tests from \$51 to \$100 to support testing capacity.

Testing the Uninsured

The FFCRA allocated \$1 billion to the National Disaster Medical System to reimburse medical providers for testing uninsured patients, permitting providers to bill the government directly for such services. States and local governments can seek reimbursement for eligible expenses associated with coronavirus testing through FEMA's Public Assistance program.

A big challenge for TTSI programs is that while healthcare payment and financial structures, particularly with the adjustments described above can address the needs for therapeutic testing, they do not address surveillance testing.

We are still in need of stable funding structure and payment processes for testing that flows from hotspot programs, state-wide contact tracing programs, and surveillance testing in congregate settings. We recommend that for surveillance testing, states shall grant funds in the form of vouchers to be delivered by contact tracing programs and routine testing programs to those needing tests. Vouchers shall be priced at cost + 5-8%. They should be funded by a federal appropriation.

Contact Tracing

Local and state public health agency funds, including federal emergency response funding/CDC PHEP grants. New funding will be essential to recruiting these individuals at scale. ASTHO has requested an appropriation of \$3.6 billion for a 12-month effort. Entry-level personnel could be identified from government employees in other agencies, particularly where

these employees have experience working in communities, and where previous workstreams have been limited by the pandemic - including librarians, teachers and other school personnel.

CDC has designated \$50 million in a cooperative agreement for an organization to support COVID-19 workforce development. It is unclear if that funding is being used to support this recruitment. To achieve the scale needed to restart and reopen most local and state jurisdictions, more funding will be needed to support these professional positions in addition to this initial federal investment. [Source: [ASTHO Guide](#)]

Supported Isolation

Effective Supported Isolation will require provision of care packages of food, medical supplies, and PPE, assistance with internet access and other services, and/or financial support or paid leave. The FFCRA [requires](#) certain employers to provide up to two weeks of paid leave for when an employee is unable to work due to quarantine pursuant to public health orders. State authorities could work with hotels, restaurants and other food services, local internet service providers, and local businesses to provide these services.

Senator King (I-ME) is [advocating](#) appropriations in support of this element as follows:

- *Voluntary self-isolation facilities* (\$4.5 billion): Some people will not be able to self-isolate in their homes because of the number of people living there or the physical structure of their dwelling. We can use idle hotels and other hospitality infrastructure to deliver this essential public service.
- *Voluntary self-isolation income support* (\$30 billion): We must disincentivize infected individuals from engaging with their communities during the period of isolation. For many people, the need to earn money outweighs taking steps to protect their own health and the health of their communities. We must provide income support during the period of self-isolation to ensure maximum effectiveness.

SECTION EIGHT: PUBLIC COMMUNICATIONS IN SUPPORT OF TTSI

The success of a voluntary TTSI program depends on the public’s understanding of their role in the mitigation and suppression of the disease. Coordinated communication efforts are essential for people to understand why they may be called by a contract tracer, when and where to get tested, who will pay for the test, and how those who test positive allow their community to stay open by entering supported isolation.

TTSI communication campaigns need to come from both state agencies and local health departments. States should develop and share with communities communication materials to support TTSI efforts, such as brochures, posters, op-eds, blogs, public service announcements and success stories, and work with media and community engagement specialists to ensure public understanding, appreciation and buy-in for contract tracing as a critical measure for stopping the spread of the disease. See below for a detailed communication strategy.

The Path to Zero Is the Path of Hope

It’s in your power to reduce the death and harm in your community.

What's Our Case Incidence Level/Trend?	What's the #1 most important individual action?	What's our collective policy goal with regard to the virus?	What's our collective goal with regard to the health care system?
Red	Stay at home	Flatten the Curve	Get PPE to the Frontlines Get Ventilators Keep the Healthcare System from Getting Overwhelmed
Orange/Yellow	Stay 6 ft apart Wear a Mask Wash your hands Take the Call	Break the Chain	Enlist communities to support contact tracing Train communities to do contact tracing Enroll contact tracers Support Isolation

	Know Your Status Get a Test Warn Friends and Neighbors about Exposure		Activate all our labs
Green	Know Your Status Take the Call Get a Test Warn Friends and Neighbors about Exposure	Contain the Spike Block a Second Wave	Keep the contact tracing going Build community health

Components of a TTSI Communication and Community Engagement Strategy:

1. **Provide** your contact tracing corps and skilled contact tracers with training and materials that ensure people who engage with contact tracers feel supported and protected and receive empathetic, culturally appropriate engagement in an accessible language.
2. **Determine** messages and channels for relaying messages to different audiences.

a) cases, contacts, high risk settings and health care providers.

- Support cases and contacts while in isolation and quarantine to ensure they have the information needed to stay safe and adhere to public health recommendations.
 - Share new information on the COVID-19 situation in the area.
 - Reiterate and update on health and safety recommendations.
 - Link to information sources, including official websites, press briefings and hotline.
 - Consider using email or text messages for sharing messages (or digital apps as relevant).
 - Provide fact sheets, FAQs and other educational resources

- Target messages to specific audiences, including COVID-19 cases and contacts, high-risk communities such as long-term care facilities and group homes, and health care providers and hospitals.
- Make materials available in multiple languages according to local needs.
- Send notifications to health care providers when there are changes to procedures or policies relating to provision of health care, laboratory testing, treatments, or vaccines.

b) the general public

- Communicate widely via public information campaigns, using mass media, web sites and digital media to explain contact tracing and its impact.
 - Engage journalists and consider journalist briefing calls to ensure journalists understand the program and are reporting factual and timely information.
 - Use mass media and digital communication campaigns to build awareness of how contact tracing is helping us all get to a better tomorrow.
 - Use official health department social media handles to amplify messaging.
 - Develop communications campaigns that explain the contact tracing and testing process and how personal information is protected.
 - Develop a “Take the call” campaign that shows the importance of answering calls and engaging honestly with contact tracing staff in the era of spam calls.
3. **Engage** community leaders by identifying people that communities trust, such as faith and ethnic group leaders, business leaders, leaders within vulnerable populations, teachers, public officials and others. Build relationships with them, and enlist them as validators of your contact tracing messages. You can engage community leaders by:
 - Establishing a mechanism for feedback to refine messaging and tactics
 - Sharing communication plans and approaches
 - Sharing official fact sheets and other communication tools
 - Encouraging them to participate in press briefings
 - Encouraging and supporting them to share official public health notifications, recommendations and other messages with their communities. Community leaders can use existing communication channels (such as social media and email newsletters) and establish new channels
 4. **Understand** risk communication principles and apply them.
 - Express empathy often. COVID-19 is scary, and spokespeople should acknowledge that. People may find it invasive to consider sharing information about who they’ve been in contact with. Be sure to empathize with the public about the downsides of contact tracing, while reminding people of the benefits to their family, neighbors, friends and communities.
 - Communication that expresses empathy, is credible, provides anticipatory guidance, promotes action, and shows respect will help build trust.
 5. **Respect** confidentiality. Communication on every level needs to address and allay public concerns about privacy and confidentiality.

6. **Establish** a centralized mechanism to manage communication.
 - Depending on the size of the community and communication needs, a small team may be needed to support the various activities and coordinate with external stakeholders (e.g., community leaders, media outlets).
 - The centralized mechanism should be linked with health department staff responsible for monitoring and analyzing the epidemic science and situation. This will ensure communications are accurate and up-to-date.
7. **Evaluate** and improve communication effort. Assess what's working and what's not working to improve communication messages and strategies.

Comments, suggestions, corrections should be directed to:

globalhealth@harvard.edu with subject line TTSI Handbook.

APPENDIX

Example of guidance and process for following up with contacts during the tracing process provided by Public Health Department for Madison & Dane County, Wisconsin.

2019 Novel Coronavirus Follow-Up for

Contacts to COVID-19

Updated 6/17/2020 @ 3:25 pm

Onboarding Guide for Case Follow up and Contact Tracing

1. Contacts will be assigned by headadmin and will be assigned via email. These emails will likely have no content in the body of the email, just a WEDSS ID number for you to look up, and Contact or COVID or Coronavirus as well as possibly the client initials.
2. Review record, looking at monitoring tab to see risk level and exposure date assigned by the PHN working with source patient. Also, check the investigation tab for any notes that may be entered that are applicable to the contact exposure. The contact should be linked to the case (located in the investigation tab), you can also look up the case record to gain more clarity on the exposure (Note: can only view case record if a Dane Co case)
3. Notify contacts that they may have been exposed to someone with 2019-nCoV.
 - Reference this phone script which may be helpful as you make calls
4. If no risk level was determined prior to interview review the following in order to determine during your interview:
 - v level of exposure to the person diagnosed with 2019-nCoV using [CDC's guidelines](#). (Scroll down to the 1st table for applicable info!) algorithm also helpful
 - v [Recommendations for People in US Communities Exposed to a person with known or suspected COVID, other than HCW or Essential Workers](#)
 - v [Healthcare personnel with potential exposure in a health care setting](#)
5. Medium and high risk contacts should use the Wisconsin monitoring form to record their symptoms – PHMDC will NOT be checking in daily for temperatures and symptoms
 - [Instructions for Individuals with Medium-Risk Exposure, P-02598A](#) available in multiple languages

- [Instructions for Individuals with High-Risk Exposure, P-02598](#) available in multiple languages

6. If contacts develop fever and/or respiratory symptoms, they should call their health care provider and report their symptoms, exposure to a positive COVID-19 case and ask to be tested for COVID-19. Ensure individual has a plan for seeking health care. If seeking emergency care and/or transportation client should inform providers that they have been exposed to COVID-19 and wear a mask during transport if they have one available.

7. If contact is asymptomatic, recommend testing no earlier than day 12 of quarantine, with the understanding that 14-day quarantine period must be completed even if test is negative.

8. For symptomatic contacts of confirmed cases, they should be considered a “probable”. To track these, they need to be converted to a DI. Once they are converted to a DI, it will appear in your case load as “new”, you will do any future documentation in the new DI and then close it as final.

9. Contacts who work in a health care organization will be managed by the health care organization’s infection prevention staff to ensure health care providers and patients are identified and notified of their exposure. [Per CDC guidance health care worker guidance](#), health care facilities could consider allowing asymptomatic HCP’s who have had an exposure to work with restrictions (mask and active symptom monitoring by a designated person at the facility). Definition of a Health Care Worker (HCW): Anyone who works at a healthcare facility, including environmental services, lab techs, receptionists, etc.

10. Per CDC guidance dated April 8, 2020, Essential workers who have been exposed to COVID may work during their monitoring period, with restrictions. <https://www.cdc.gov/coronavirus/2019-ncov/community/critical-workers/implementing-safety-practices.html> However, Wisconsin and PHMDC are NOT following CDC’s guidance. In order to best protect the community, all contacts should quarantine and not go to work. The only exception is health care workers.

11. Provide your contact information to the client in case they have questions. PHMDC staff do not need to contact client for regular symptom monitoring.

12. Send client HIPPA, (see link at bottom of document for HIPPA folder with languages other than English) appropriate fact sheets via email, and appropriate notification letter (sending COVID letter guidance)via secure email. Instruct client to check junk email folder if they don’t find it in their inbox.

- [Instructions for Individuals with Low-Risk Exposure, P-02598B](#) available in multiple languages
- [Instructions for Individuals with Medium-Risk Exposure, P-02598A](#) available in multiple languages

- [Instructions for Individuals with High-Risk Exposure, P-02598](#) available in multiple languages
 - High risk household contact instructions
 - PHMDC Symptom Tracker
13. If an interpreter is needed, here is the information to use Pacific Interpreters:
- Dial: 1-XXX-XXX-XXXX
 - Access Code: XXXX
 - Indicate Language
 - Phone Number
 - Program Name (COVID-19)
14. Assure isolation/quarantine based on risk level – convey importance of social distancing and isolation, what it means for the population and family and friends around them
- If hospitalization is not necessary, client may isolate at home. See [CDC guidance](#) for client and others in the household.
 - Explain what isolation recommendations will be if the client is tested and has a negative or positive test result (if a negative test, still must remain isolated for 14 days due to contact status
 - If a letter is needed for employment, use template letter here. Give to contact, who can provide employer with letter. Upload a copy of this letter into the contact's filing cabinet in WEDSS
15. Client should monitor their symptoms daily using the appropriate PHMDC Symptom Tracker. We will NOT be checking in with them daily for their temperatures and symptoms – only an initial phone call.
16. Confirm individual has a plan for seeking care if symptoms worsen. Client should call their health care provider before seeking care. If seeking emergency care and/or transportation client should inform providers that they are under evaluation for Novel Coronavirus.
17. Recommend testing no earlier than day 12 of the quarantine period. **Assure clients that if they do test positive, PHMDC will work with them to notify their contacts and assure proper follow up, they should NOT be doing this without our guidance.**
18. Provide education regarding [infection control](#) at home. General cleaning guidance fact sheet here

19. Enter info into WEDSS based on this guidance. Be sure to document ALL attempts to contact in WEDSS.

20. Once initial contact has been made and education on isolation provided, case can be closed.

- There is no need to keep the record open for the duration of the 14-day monitoring period. If the contact ends up calling back with questions/concerns, etc. the record can be re-opened so documentation can occur.
- If contact is experiencing symptoms, they must be converted to a DI.

21. Other Information

- Unable to contact- attempt contact 3 separate times, with at least 2 different types of contact (i.e. phone call, email, texting is least preferred method- reference text protocol for script) in the same business day (if referral comes in after 2pm, you may attempt 1 or more contacts the next morning)
- If you are not scheduled to work the next day and you have not heard back from contact, please email headadmin (headadmin@cityofmadison.com) and ask for it to be reassigned to a contact tracer for the next day.
- If, after the above attempts to contact do not work, a notification letter (Using COVID letter guidance) needs to be mailed to the contact at the address listed in WEDSS.
 - § Be sure notification letter has your contact information in it so client can get in touch with you
 - § Follow letter delivery instructions, attaching letter for client to email
- Document *all* attempts (unsuccessful and successful) to contact in WEDSS.
- Once a referral is received, you must make an attempt to contact as soon as possible. If this can't be done, email headadmin asking to have it reassigned. If you have tried to contact during your scheduled shift, and are not working the next day, email headadmin to have it reassigned to someone on the next day. No referrals will be assigned after 3:30pm
- Minors -If the contact is a child under the age of 18 years old, tell the child you need to get in contact with a parent and get parent contact information.
- Negative Test Results: If a contact is tested and the results are negative, a separate DI will be created in WEDSS for this. No charting is needed in the DI. Just know that there will be two records, a CI (which you will have done your charting in) and a DI.

APPENDIX

Contact Tracing Inventory of Best Practices and Resources

Contact Tracing Inventory of Practices and Resources		
Recruiting personnel	Hiring	
	CDC	Workforce estimation calculator: https://www.cdc.gov/coronavirus/2019-ncov/bhp/contact-tracing/COVIDTracer.html
	Partners In Health	Full-time paid contact tracing staff is the most effective and efficient approach to building surge capacity. Emphasis on hiring from diverse populations and ensuring local representation in the workforce. Hiring local contact tracers and care coordinators is important for both cultural competency and identification/provision of social supports. Locals have knowledge of existing community supports for food, medication, and medical services
	JHU	Johns Hopkins COVID-19 Contact Tracing Course on Coursera: https://www.coursera.org/learn/covid-19-contact-tracing?edocomorp=covid-19-contact-tracing
	Deloitte	Hiring public health students via internships, volunteer and practicum offers opportunities to create additional avenues for skilled personnel, while providing workforce development opportunities
	Resolve/Vital Strategies	A checklist for establishing a scaled-up public health workforce for COVID-19 contact tracing: https://contacttracingplaybook.resolvevosavelives.org/checklists/workforce Contact tracing staffing calculator: https://preventepidemics.org/covid19/resources/contact-tracing-staffing-calculator/ See 4.b "Sample job descriptions": https://contacttracingplaybook.resolvevosavelives.org/checklists/workforce Sample contact tracing staff supervision tool: https://vital.ent.box.com/s/k6x5l7jb4hazw/h61x3ch4uu0erzygkzb
	Rockefeller	In order to build trust, public health authorities should consider employing (either as hires or volunteers) contact tracers who come directly from the regional areas they will work with, and have strong cultural awareness, linguistic abilities, and community connections.
	NGA	Governors, state health officials, and state workforce boards can align efforts by retraining and reemploying dislocated workers as contact tracers, potentially providing on-ramps to career pathways in public health. State and local workforce development boards (WDBs) can assist health departments in recruiting, identifying, and training new contact tracing hires. WDBs can match eligible job seekers with contact tracing job opportunities and connect them with required training. Numerous states have opted to expand hiring under public-private partnerships with entities with demonstrated competencies and experience in workforce hiring, recruitment, and workforce management.
	Redeployment of public employees	
	CDC	
Partners in Health		
JHU		
Deloitte		
Resolve/Vital Strategies	Public health professionals working in other areas of the health department or in other private or organizations or public agencies may be available to support. See 2.b "Existing public health staff that can fill contact tracing roles": https://contacttracingplaybook.resolvevosavelives.org/checklists/workforce	

Contact Tracing Documentation Activity

	Rockefeller	Public health professionals who are temporarily deployed for contact tracing serve an important bridging role as states and cities ramp up contact tracing. They often have the necessary expertise. However, as they are often temporary workers, this recruitment strategy is not sustainable and they might lack the requisite local knowledge and interpersonal connections.
	NGA	Several states, such as Alabama, have reassigned staff from within its health department to increase contact tracing capacity. While volunteers and reassigned state employees play an important surge role, such time-limited deployments may pose challenges for management and accountability. States will need to balance volunteers and temporary surge workforce with efforts to build and sustain a paid, skilled contact tracing workforce moving forward.
Service personnel	CDC	ncov/downloads/php/national-service-resources-support.pdf Other service organizations, such as the Medical Reserve Corps, the US Digital Response, and more are making their volunteers available to assist with COVID-19 efforts: https://www.cdc.gov/coronavirus/2019-ncov/php/open-america/staffing-guidance.html
	Partners in Health	
	JHU	Mobilize medical students for COVID-19 response, including contact tracing: https://jamanetwork.com/journals/jama/fullarticle/2764427
	Deloitte	Consider college students taking a gap year. Note that these are surge resources and not long term full time employees.
	Resolve/Vital Strategies	National guard or other volunteers may be willing to support contact tracing
	Rockefeller	Deploying the national guard and volunteers is a cost-effective way to stand up a contact tracing workforce but they often lack the local connections and necessary time allotment for contact tracing efforts. Also consider Service Year, PeaceCorps and other AmeriCorps personnel who can be deployed quickly.
	NGA	The Ohio Department of Health is augmented tracing capacity of its 113 local health jurisdictions by connecting local health departments with volunteers, supporting onboarding and training, and developing a statewide pool that can surge to cover outbreaks that may exceed local capacity. More than 40,000 National Guard members have been deployed for COVID-19 relief work across the country, with states such as Iowa, North Dakota, Rhode Island, Washington and West Virginia activating the National Guard to conduct contact tracing.
Recruitment of community organizations	CDC	Some communities identify volunteers and/or philanthropic organizations willing to assist the COVID-19 response. Matching their knowledge, skills, and abilities with key roles in case investigation and contact tracing and providing relevant training can expand the workforce.
	Partners in Health	Engage and reinforce existing community health workforce members and cadres—including Community Health Workers. Engage FQHCs as key implementation and staffing partners where possible
	JHU	Johns Hopkins COVID-19 Contact Tracing Course on Coursera: https://www.coursera.org/learn/covid-19-contact-tracing?edocomorp=covid-19-contact-tracing
	Deloitte	Mobilized academic institutions (e.g. public health programs) to train students to provide immediate contact tracing support while a more permanent workforce is recruited

	<p>Resolve/Vital Strategies</p> <p>Partnering with a private organization, such as a local university or non-profit organization, to manage hiring and/or workforce operations may be quicker and easier than doing this through health department mechanisms.</p> <p>Consider communities and populations disproportionately impacted by COVID-19 and hiring from within these communities. Consult with community-based organizations and community leaders who have earned local community trust.</p>
	<p>Rockefeller</p> <p>Engaging a trustworthy local community group, well-networked non-profit and/or rigorous research academic institute to train and hire contact tracers, including to provide support services for self-isolation and administrative management, can ease the workload of overwhelmed public health departments.</p> <p>Hiring as locally as possible is the cornerstone of effective contact tracing.</p>
	<p>NGA</p> <p>Several states including Arizona have partnered with universities or medical schools to deploy volunteers with backgrounds in public health, social work, and medicine.</p> <p>Many states are partnering with local community health systems, Federally Qualified Health Centers, and non-profits serving medically-underserved communities to help build in-roads to hard-to-reach communities that would otherwise not be possible if relying on technology and remote workers alone.</p>
<p>Organizational staffing</p>	<p>CDC</p> <p>Consideration should be given to the alignment of staff assignments and supervision with workflow. Those activities requiring knowledge of and access to public health surveillance systems (e.g., surveillance triage, case investigation) may be better integrated into the health department's workflow. Some jurisdictions have found it useful to mobilize a cadre of state case investigators to bolster local efforts in the event of clusters or outbreaks.</p>
	<p>Partners in Health</p> <p>Depending on local laws and governance structures (in home-rules states vs. states with more centralized control over public health), options for how to ramp up surge staffing vary. States and localities need to determine what kind of staffing strategy (centralized versus decentralized). Some states and cities have opted to hire a centralized surge workforce to be deployed upon request to local departments, or are operating virtual call centers with full statewide coverage; other jurisdictions are providing grant funding to local health departments to hire and manage surge staff locally; others are contracting local CBOs to accompany local health department staff with surge support</p>
	<p>JHU</p> <p>Deloitte</p>
	<p>Resolve/Vital Strategies</p> <p>If working with a network of volunteers, ascertain their commitment to ensure a reliable workforce; if reliable, consider leveraging their existing infrastructure for personnel onboarding and management. Consider how to handle staffing when contact tracing needs change, for example using hourly wages and reserving the right to reduce or scale hours as needed.</p>
	<p>Rockefeller</p> <p>Consider the administrative burden for public health departments when recruiting, training and deploying contact tracers.</p>
	<p>NGA</p> <p>Several states employed surveys of local health departments to determine current workforce capacity and engaged local health departments and other key stakeholders in planning and ongoing coordination through entities like the Massachusetts and North Carolina Community Tracing Collaboratives. If the number of reported daily cases outpaces the ability to conduct case interviews within 24 hours, states may need to consider strategies for hiring additional staff, shifting the composition of the contact tracing workforce, providing temporary surge resources, or considering other force-multiplying technology investments to automate or augment manual contact tracing.</p>

Contact Tracing Documentation Activity

Training personnel		
Coursera / Massive Open Online Courses	CDC	Contact tracing trainings for contact tracers, case investigators, and supervisors: https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing/index.html A-Z list of training resources for contact tracing: https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/contact-tracing-training-plan.pdf CDC Covid-19 training resources also available on the TRAIN Learning Network here .
Partners in Health	JHU	JHU Covid-19 Contact Tracing: https://www.coursera.org/learn/covid-19-contact-tracing?edocomorp=covid-19-contact-tracing
Deloitte	Resolve/Vital Strategies	ASTHO has training materials that most State and Local Health Departments use. Making Contact: A Training for Covid-19 Contact Tracers: https://learn.astho.org/p/ContactTracer
Rockefeller	Rockefeller	Public Health Foundation's TRAIN Learning Network Catalog of Covid-19 Contact Tracing Courses
NGA	Rockefeller	References ASTHO, CDC, and JHU contact tracing courses (above).
CDC	CDC	
Partners in Health	Partners in Health	
JHU	JHU	JHU is providing training for contact tracers through its Coursera course.
Deloitte	Deloitte	Working with Schools of public health to develop field epidemiology trainings for contact tracing.
Resolve/Vital Strategies	Resolve/Vital Strategies	
Rockefeller	Rockefeller	In addition to other public health schools mentioned above, Yale University is also offering a course used for CT contact tracers.
NGA	NGA	Hawaii has partnered with the University of Hawaii to increase training programs for community health workers, as well as providing training for an additional 300 contact tracers.
CDC	CDC	Contact tracing explanation and resources: https://www.cdc.gov/coronavirus/2019-ncov/php/open-america/contact-tracing/index.html Contact tracing and case investigation "how-to" overview: https://www.cdc.gov/coronavirus/2019-ncov/php/principles-contact-tracing.html
Partners in Health	Partners in Health	Cross-train staff in case investigation and contact tracing to maximize workforce flexibility Developed a training program for workers including role play, scenario-based learning, and selfpaced online modules. Hired full time staff to manage the training program. Training needs to be a robust, continuous process and requires both technical and interpersonal components. Massachusetts contact tracers receive 15+ hours of training during both on-boarding and at regular intervals.
JHU	JHU	
Deloitte	Deloitte	
Resolve/Vital Strategies	Resolve/Vital Strategies	
Other offerings		

Contact Tracing Documentation Activity

	Rockefeller	Consider capacity building for community groups on public communications and behavior change around contact tracing.	
	NGA		
Cultural competency	CDC	To help build trust, jurisdictions should try to employ public health staff who are of the same racial and ethnic background as the affected community and can communicate in their preferred language. When that is not possible, it is important to provide interpreters for individuals who have limited English proficiency and consider translating the data collection instruments.	
	Partners in Health		
	JHU	https://johnshopkinsph.libsyn.com/health-equity-in-covid-19-breaking-down-longstanding-barriers-to-save-lives	
	Deloitte	Collaborate with racial/cultural equity centers (i.e. Center Urban and Racial Equity) to help develop materials that are thoughtful, guided information on cultural competency, social justice and health equity. Trainings: https://www.train.org/main/course/1078759/ ; trainings on implicit bias and systemic racism: https://www.mittrainingcenter.org/courses/lbpha1219	
	Resolve/Vital Strategies		
	Rockefeller	Cultural competency is key to reaching some of the most affected and vulnerable communities. Training and hiring practices for contact tracers must emphasize cultural sensitivities, and be facilitated by community groups, trusted leaders and faith organizations.	
	NGA	States are partnering with local universities, community colleges, Area Health Education Centers (AHECs), and nonprofit organizations to support tailored training for contact tracers. California Governor Gavin Newsom's California Connected is a collaboration between the California Department of Health, local health departments, the University of California San Francisco and University of California Los Angeles to support training for a culturally competent and skilled workforce.	
Process Management & Support Tools			
	Call centers		
	CDC	The first connection can be made through different channels such as phone, text, email or (if necessary) in-person in the primary language of the individual. This process can be manual, automated, or semi-automated based on jurisdictional capacity. Protocol should clearly outline the primary and secondary means of reaching a client and address confidentiality at the start of communication.	
	Partners in Health	In Massachusetts, partnered with the Commonwealth Connector Authority (CCA) to stand up a virtual call center and create a communications strategy. CCA is typically responsible for outreach and communications surrounding health insurance enrollment. Robust call center operations integrated with an underlying best-practice CRM (customer relationship management) tools. The platform of the state system of record of cases and the call center platform must be integrated or interfaced Experimented with new avenues to increase phone response including texting, leaving messages, creating an inbound call line, and working with telecom companies to create a single caller ID.	
	JHU		
Deloitte	Think of 'call centers' more like 'contact centers'; While initial outreach may be by phone, follow-up and ongoing contact can be done by text, email or other automated options, based on user preference.		

Contact Tracing Documentation Activity

	Resolve/Vital Strategies	Identify which communication with contacts can be passive only (e.g. by web, email, text, or app interface), or, if resources allow, by phone. Determine protocols for cases and contacts who do not respond to texts or phone calls (by risk level). Determine protocol for in-person visits and incorporate PPE considerations for in-person communications.
	Rockefeller	
	NGA	
In person contact	CDC	Talking with the patient: a case investigator's guide to Covid-19: https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing/case-investigator-guide.html Notification of Exposure: a Contact Tracer's Guide to Covid-19: https://www.cdc.gov/coronavirus/2019-ncov/php/notification-of-exposure.html . Clients in special populations and/or congregate settings (nursing homes, correctional facilities, shelters) require additional considerations and should be triaged and assigned to a special infection control team, if available.
	Partners in Health	Human connection is essential in this process—not everyone is reachable via technology, especially the most vulnerable. Phone calls and follow up are laborintensive, but critical to a robust equitable approach
	JHU	
	Deloitte	
Scripts	Resolve/Vital Strategies	See Draft Contact Tracing Protocols for Mass Gatherings under "Implementation": https://contacttracingplaybook.resolve.to.saves.lives.org/checklists/protocols#3-cases-for-interview-and-contact-elicitation
	Rockefeller	Human contact and ability to administer "psychological first aid" where needed make for successful contact tracing efforts.
	NGA	Community Health Workers, or frontline public health workers with deep community expertise that serve as a link between communities and health and social services, may be well-positioned to serve in contact tracing or care coordination roles.
	CDC	Key information to collect during a case interview and sample questions: https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing/keyinfo.html Sample public messaging scripts for phone and social media on contact tracing "Answer the call to slow the spread": https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing-comms.html
Partners in Health	Partners in Health	The public health workforce conducting contact tracing and case investigation need to rely on clear and precise forms and scripts to guide activities and communication with cases and contacts. See Massachusetts Community Tracing Collaborative sample contact tracing scripts: https://www.mass.gov/doc/contact-tracing-scripts/download
	JHU	
	Deloitte	Develop scripts that have interviewing techniques embedded to support the interviewer. Collaborate with public health experts to review and edit scripts to assure that interviews include rapport building and interviewing techniques.
Resolve/Vital Strategies	Resolve/Vital Strategies	Covid-19 case interview draft contact elicitation form: https://vital.ent.box.com/s/7frd3rgu6fi2qzcae1qfc32xe5xh41q

Contact Tracing Documentation Activity

	Rockefeller	Interview scripts should allow for follow-up on support services during the self-isolation period.
	NGA	
Other	CDC	<p>Preliminary criteria for evaluating digital contact tracing tools: https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/prelim-eval-criteria-digital-contact-tracing.pdf</p> <p>COVIDTracer tool allows local and PH officials to assess up to three different contact tracing strategies, including estimating plan's potential effectiveness, the average number of contacts per case, and the time needed for case interviews and contact follow-up activities: https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing/COVIDTracer.html</p> <p>Contact tracing has a regional focus. The goal is for communities that share public health nurses and are in the catchment areas of hospitals and community hospitals will be working with the same contact tracing staff.</p> <p>Using data to evaluate effectiveness and guide quality improvement is necessary from the onset of the program. Carefully designed data dashboards, with data minimally disaggregated by race, ethnicity, gender, age, and location provide real-time insight into how the disease is spreading, and where to direct resources.</p> <p>A National Plan to Enable Case Finding and Contact Tracing in the US: https://www.centerforhealthsecurity.org/our-work/pubs_archive/pubs_pdfs/2020/200410-national-plan-to-contact-tracing.pdf</p> <p>Review of mobile application technology to enhance contact tracing capacity: https://www.centerforhealthsecurity.org/resources/COVID-19/COVID-19-fact-sheets/200408-contact-tracing-factsheet.pdf</p> <p>Potential for using AI to support contact tracing and to analyze data.</p> <p>Contact tracing protocols and forms: https://contacttracingplaybook.resolvetosavelives.org/checklists/protocols</p> <p>Contact tracing steps for Covid-19: https://vital.ent.box.com/s/4v68nmog4fv2kntbagxsv96vjww2logk</p> <p>A checklist for using technology solutions to increase efficiency and efficacy of contact tracing efforts: https://contacttracingplaybook.resolvetosavelives.org/checklists/technology</p> <p>Monitoring of contact tracing programs is crucial to allow public healthcare experts to gain real-time knowledge and tweak their efforts. States need to track and share their common metrics to determine what success looks like.</p> <p>As state authorities develop contact tracing strategies, an essential step is coordinating with local health departments to determine baseline capacity, technological support needs, opportunities to minimize duplication of efforts and existing organizational structures. States may also consider local community needs, demographics, culture and language, as well as epidemiological trends to inform implementation strategies.</p>
	Partners in Health	
	JHU	
	Deloitte	
	Resolve/Vital Strategies	
	Rockefeller	
	NGA	
Integration with Public Health System		
Relation to testing (make appts, do testing)	CDC	<p>will be responsible for case prioritization. Think through how non-laboratory-confirmed cases will be reported by providers and managed by the health department for onward tracing. This may require a modification of provider reporting requirements.</p> <p>CDC Covid-19 case investigation hierarchy to prioritize contact tracing cases (page 14): https://www.cdc.gov/coronavirus/2019-ncov/downloads/case-investigation-contact-tracing.pdf</p>

Contact Tracing Documentation Activity

Partners in Health	Quickly train all health care workers in standard Infection Protection and Control (IPC) measures for COVID-19 and provide general education to patients at health facilities.
JHU	
Deloitte	
Resolve/Vital Strategies	See contact tracing protocols for mass gatherings under Implementation Tools: https://contacttracingplaybook.resolve-saves-lives.org/checklists/protocols#3-cases-for-interview-and-contact-elicitation
Rockefeller	Contact tracing must be a part of a multi-pronged strategy that includes testing, social distancing and isolating/quarantine.
NGA	
CDC	Self-isolation guidance should be reviewed with the client and instructional materials provided (https://www.cdc.gov/coronavirus/2019-ncov/downloads/10Things.pdf) Checklist for contact tracer use to determine client ability to safely self-isolate or self-quarantine, and assess support needs: https://www.cdc.gov/coronavirus/2019-ncov/downloads/php/self-quarantine_form.pdf Emphasis should be placed on helping clients identify any need for social support during self-isolation and connecting them to resources. Local partnerships can help support clients and contacts in need of housing and other support services during self-isolation and self-quarantine
Partners in Health	Contact tracing, linked to resources, is the way to make the response more equitable. For contact tracing to bend the curve, it must be linked to provision of resources---food, housing, support--for those who cannot quarantine.
JHU	
Deloitte	Collaborate with PH officials and staff to develop protocols that can support contact tracing personnel in relation to quarantine/isolation; offer trainings with updated legal responses for staff: https://www.train.org/cdctrain/course/1090658/
Resolve/Vital Strategies	Identify landscape of agencies or local organizations that already work in the community providing similar services and explore contracting with them to facilitate social support for contacts in quarantine/isolation. This may include health care providers or social services providers, religious groups, food banks, etc. See template scope of work for social support and wrap-around services: https://vital.ent.box.com/s/fo5lbaogpkcs41pzjlsiztmdqjz3sx A checklist for setting up policies and facilities for out-of-home isolation and quarantine: https://contacttracingplaybook.resolve-saves-lives.org/checklists/isolation
Rockefeller	Train contact tracers to look for common themes in interviews and escalate them to relevant entities which provide social services to increase response rates and improve trust.
NGA	
CDC	
Relation to active	

Contact Tracing Documentation Activity

<p>monitoring</p>	<p>Partners in Health JHU Deloitte Resolve/Vital Strategies Rockefeller NGA</p>	<p>Which staff in the jurisdiction will conduct medical monitoring? Will certain cases be delegated to a staff-member with clinical expertise (e.g., complex or high-risk cases)? Determine whether laboratory and provider reporting requirements should be altered to alert local and state health departments of critical data elements to aid in prioritization. If a jurisdiction's resources do not allow for active daily monitoring, clients will be asked to self-monitor and communicate remotely (email, video, phone, text, monitoring apps) to notify public health authorities of their health status and symptoms. For those self-monitoring and sharing reports remotely, reports must be received by the agreed upon time each day, and protocol must address follow-up actions for clients who do not report out.</p>
<p>Relation to compliance of contacts with public health department orders</p>	<p>Partners in Health JHU Deloitte Resolve/Vital Strategies Rockefeller NGA</p>	<p>Care managers or care resource coordinators will need strong local connections with community-based organizations to connect at-risk populations in need of self-isolation or quarantine services to existing resources. Determine under what circumstances will isolation be mandatory (under public health orders) as opposed to voluntary and make this distinction clear to the client. If a client refuses to comply with voluntary isolation instructions, state and local jurisdictions have the authority to mandate isolation. Need to determine what steps will be taken for contacts under self-monitoring who do not report as required. How intensive will the outreach be (e.g., same-day home visit)?</p>
<p>Interactions between contact tracing teams and local and state public health departments</p>	<p>Partners in Health JHU Deloitte Resolve/Vital Strategies Rockefeller NGA CDC</p>	<p>Collaborate with public health officials and staff to develop protocols that can support contact tracing personnel on compliance matters. States and cities may have different approaches. Confirm which authority has jurisdiction to issue an order depending on where the case or contact is found, resides, or need to be isolated/quarantined. Where isolation or quarantine guidelines can be mandated by law, establish protocols with processes and consequences if someone refuses to comply. See section 2 Legal authority over isolation and quarantine: https://contacttracingplaybook.resolvetosavelives.org/checklists/protocols See Self Isolation & Self Quarantine Enforcement and Compliance: Principles and Considerations for US Contact Tracing Programs: https://vital.ent.box.com/s/osc6r3jaz9414btwmuvh1z3o0gxefsn</p> <p>Determine what type of collaborative agreements can be set in place for data sharing between contact tracing teams and local and state public health departments. How will privacy and confidentiality be maintained? How will case investigators document and transfer the list of contacts to the contract tracer? Work out how to transfer contact information from one jurisdiction to another to ensure notification of exposure for contacts outside of your jurisdiction.</p>

Contact Tracing Documentation Activity

<p>Interactions between contact tracing teams and other service providers relevant to supported isolation</p>	<p>Partners in Health</p>	<p>Coordinate contact tracing with other state COVID-19 Command Center activities (e.g. testing, supports). Create capabilities that are additive to and coordinated with local public health jurisdictions. Build into program design ways to support local health departments to sustain expanded contact tracing and emergency epidemic response capacity over the medium to long-term In Massachusetts, there is a balancing of caseload between local public health boards and state-wide tracers. Local public health boards turn to the surge contact tracers provided by the Community Testing Collaborative (CTC) when needed. The CTC defers to the local health boards to lead complex casework and casework in high risk populations (congregate settings, disease clusters, health care workers, complex cases).</p>
	<p>JHU</p>	
	<p>Deloitte</p>	<p>Develop a roles and responsibilities guidelines/protocol that outlines PH staff roles and contact tracing teams roles; offer training for contact tracing teams to learn from PH local and state staff.</p>
	<p>Resolve/Vital Strategies</p>	<p>Establish governance structure and relevant government agencies' and organizations' roles in contact tracing. See section 1 Governance: https://contacttracingplaybook.resolvetosavelives.org/checklists/protocols.</p> <p>Determine protocol for locating and notifying contacts outside of the jurisdiction in cooperation with the jurisdiction where the contact resides.</p>
	<p>Rockefeller</p>	<p>Health departments need to be appropriately staffed and empowered while managing increased workloads across jurisdictions. Centralized decision-making for public health departments leads to better coordination for testing and contact tracing implementation.</p>
	<p>NGA</p>	<p>Regardless of a state's public health authority structure, coordination and buy-in of local public health with a state's contact tracing strategy will be essential. State health agencies will need to play a vital role in assessing state-wide needs, developing a shared strategy and vision, supporting coordination and linkages across systems, centralizing and leveraging technology to enable sharing of information, and implementing as well as deploying and surging resources as necessary.</p>
	<p>CDC</p>	
	<p>Partners in Health</p>	<p>For contact tracing to be effective, care coordination and social support referrals must be built into program design and workforce planning to ensure all are able to safely isolate/quarantine as needed</p>
	<p>JHU</p>	
	<p>Deloitte</p>	<p>Use protocols to define interactions, roles and responsibilities for services providers that support isolation capabilities.</p>
<p>Resolve/Vital Strategies</p>	<p>A checklist for establishing wrap-around policies and social support services: https://contacttracingplaybook.resolvetosavelives.org/checklists/supports</p> <p>A checklist for setting up telemedicine for contacts and cases including policies, service provision, and linkages to support and care resources: https://contacttracingplaybook.resolvetosavelives.org/checklists/consult</p>	
<p>Rockefeller</p>	<p>Contact tracing teams should have access to resources and trainings to follow up on emerging needs to provide wrap-around services.</p>	

Contact Tracing Documentation Activity

	NGA	When developing protocols, states may consider developing a social support services package and begin identifying community-based organizations that can provide such services at no cost to the state or individual. Delaware is partnering with Healthy Communities Delaware to provide necessary support services, such as grocery delivery or alternative housing, to enable individuals in at-risk communities to safely self-isolate.
Ethics Safety of contact tracing personnel	CDC	Guidance on risk assessment of health workers and others with potential exposure to Covid-19: https://www.cdc.gov/coronavirus/2019-ncov/hcp/guidance-risk-assessment-hcp.html Every effort should be made to interview the client by telephone or video conference instead of in-person. For in-person interviews, recommended infection prevention and control practices at a home or non-home residential setting can be found on CDC's Evaluating PUIs Residential page: https://www.cdc.gov/coronavirus/2019-ncov/php/guidance-evaluating-pui.html .
	Partners in Health	What mental health services/tools will be provided to contact tracing staff? How will mental health be prioritized for staff members?
	JHU	
	Deloitte	Offer robust trainings around scenarios of safety concerns for contact tracing personnel.
	Resolve/Vital Strategies	
	Rockefeller	Launch large-scale PSA campaigns to demystify contact tracing and to promote success stories.
	NGA	
	CDC	Minimum professional standards should include providing employees with appropriate information and/or training regarding confidential guidelines and legal regulations. All public health staff involved in case investigation and contact tracing activities with access to such information should sign a confidentiality statement acknowledging the legal requirements not to disclose COVID-19 information. Efforts to locate and communicate with clients and close contacts must be carried out in a manner that preserves the confidentiality and privacy of all involved. This includes never revealing the name of the client to a close contact unless permission has been given (preferably in writing), and not giving confidential information to third parties (e.g., roommates, neighbors, family members). Legal and ethical concerns for privacy and confidentiality extend beyond COVID-19. All personal information regarding any COVID-19 clients and contacts should be afforded the same protections. Core training recommendations for protecting health information: https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing/list-requirements-for-protecting-health-info.html
	Partners in Health	A checklist for building privacy and data security into contact tracing programs: https://contacttracingplaybook.resolvetosavelives.org/checklists/privacy-and-data-sharing
	JHU	
Deloitte	Offer trainings for HIPAA compliance and ongoing knowledge assessments for all contact tracing personnel.	
Resolve/Vital Strategies	Identify and document protocols for maintaining confidentiality during contact tracing, e.g., any requirements for storage of notes and data, and special considerations when conducting contact tracing from home. Follow HIPAA regulations. A checklist for building privacy and data security into contact tracing programs: https://contacttracingplaybook.resolvetosavelives.org/checklists/privacy-and-data-sharing	

Contact Tracing Documentation Activity

	Rockefeller	Everyone involved in contact tracing must be given clear information about what information will be collected, how it will be kept secure, how it will be used, and what resources will be provided to anyone ordered to self-quarantine.
	NGA	
	CDC	Determine what type of collaborative agreements can be set in place for data sharing between contact tracing teams and local and state public health departments. How will privacy and confidentiality be maintained? Ideally laboratory, provider, and contact case reports should be transmitted to the local health authority electronically and then seamlessly imported into the system in an automated fashion. The data system should facilitate many-to-many relationship mapping between identified cases and contacts in order to support data analysis and source-spread mapping of COVID-19 transmission. The data system should be user-friendly, flexible and accessible by mobile device, as well as a laptop or desktop computer. A cloud-based system will allow the greatest flexibility and ensure routine data storage, protection and updating, but unique jurisdictional laws and regulations may necessitate on-premises data storage.
	Partners in Health	Using data to evaluate effectiveness and guide quality improvement is necessary from the onset of the program. Carefully designed data dashboards, with data minimally disaggregated by race, ethnicity, gender, age, and location provide real-time insight into how the disease is spreading, and where to direct resources. System Integration capability important to create/maintain seamless back-end connectivity to state system of record, operating partners, and digital automation tools. In Massachusetts, the Community Tracing Collaborative (CTC) used existing, centralized database repository for all information surrounding testing, contact tracing, and case management. Both the CTC and local health departments can access information
	JHU	
	Deloitte	
	Resolve/Vital Strategies	Describe the data flow from case reporting by creating a data map. Ensure case management system can accept all relevant laboratory results and case identifying information. See checklist for case reporting: https://contacttracingplaybook.resolve.to.saves.lives.org/checklists/reporting .
	Rockefeller	All digital contact tracing must protect confidentiality and privacy rights in order to maximize trust and minimize stigma and misinformation, especially of vulnerable populations.
	NGA	
	CDC	Set targets for select process and outcome metrics (especially for timeliness of patient and contact notification and self-isolation/self-quarantine) to guide adjustments to policies and protocols.
	Partners in Health	Contact tracers provide practical self-help and effective referrals to health care. (Not clinical advice, telemedicine, HIPAAcentric EMR/EHR.) Hiring local contact tracers and care coordinators is important for both cultural competency and identification/provision of social supports. Prioritize hiring from hardest-hit and most vulnerable communities; ensure recruiting and workforce partner have clear accountability for equity and diversity in hiring. Metrics tracking should center on comprehensiveness (“Are we reaching everyone we need to?”) and timeliness (“How long does it take to reach someone?”). These serve as important indicators of potential vulnerabilities community spread and inform adjustments to tracing protocols.
	Other ethics issues	

Contact Tracing Documentation Activity

JHU	Digital Contact Tracing for Pandemic Response: Ethics and Governance Guidance: https://muse.jhu.edu/book/75831	
Deloitte	Consider issues related to minority health and disparities.	
Resolve/Vital Strategies	A checklist for establishing routine monitoring and assessment metrics of contact tracing programs: https://contacttracingplaybook.resolvetosavelives.org/checklists/metrics Covid-19 contract tracing metrics: https://vital.ent.box.com/s/29g4oj8rsb7qt843ffw08tb4p3znuuj	
Rockefeller	Privacy and protection of medical records and data are essential for vulnerable populations whose legal status or other identity markers can put them at an increased risk.	
NGA	The CDC and other experts recommend case investigators and contact tracers demonstrate cultural competency and linkages to their local communities. To hire its contact tracing workforce, Oregon focused on recruiting individuals with cultural and linguistic competence for the populations they serve, and will deploy teams of public health workers to deploy within communities.	

Health Department Checklist: Developing a Case Investigation & Contact Tracing Plan for Coronavirus Disease 2019 (COVID-19)

Case investigation and contact tracing are well-honed skills that adapt easily to new public health demands and are effective tools to slow the spread of COVID-19 in a community. Thoughtful planning can help ensure that these activities facilitate compassionate care for the people affected by COVID-19 and also prevent community transmission of the virus.

This checklist is a supplement to CDC's [Health Departments: Interim Guidance on Developing a COVID-19 Case Investigation & Contact Tracing Plan](#) and is a tool that can assist health departments in developing a comprehensive plan. This tool does not describe mandatory requirements or standards; rather, it highlights important areas for consideration.

For additional information, users can access the corresponding section of the guidance document listed in each header (i.e., *Guidance Section #*).

COVID-19 case investigation and contact tracing activities will vary based on the level of community transmission, characteristics of the community and their populations, and the local capacity to implement both case investigation and contact tracing.

Scaling Up Staffing Roles Involved in Case Investigation & Contact Tracing ([Guidance Section II](#))

Staffing Plan	Completed	In Progress	Not Started
Estimate # of case investigators/contact tracers needed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recruit and hire surge workforce	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Include consideration for culturally and linguistically diverse populations that the jurisdiction serves	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop organizational structure (identification of staff who will perform key roles identified in CDC guidance)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training	Completed	In Progress	Not Started
Develop training plan for current and new case investigators and contact tracers, including supervisors/leads	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Include knowledge-based and skills-based training as well as opportunities for continuous and peer-to-peer learning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determine how training will be delivered	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determine how training will be tracked to ensure all staff are trained	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Case Investigation & Contact Tracing Activities (Guidance Section IV & Guidance Section V)

Case Investigation & Contact Tracing Strategy	Completed	In Progress	Not Started
Define close contact and contact elicitation window	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop criteria for discontinuation of self-isolation and self-quarantine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop testing strategy for:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Suspected and probable cases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Asymptomatic and symptomatic contacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Outbreaks in congregate settings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Possibly for community at-large	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop case investigation strategy to prioritize cases if unable to investigate all confirmed and probable cases (triaging protocol likely needed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop close contact monitoring strategy to prioritize close contacts to monitor and/or modify intensity of monitoring depending on public health resources available	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Program Workflow	Completed	In Progress	Not Started
Describe how cases are identified in your jurisdiction's data management system (case report CMR, lab test, other)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Describe how case interview assignments are made	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diagram and/or describe in detail the program workflow with surge staff and their supervision incorporated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Procurement	Completed	In Progress	Not Started
Procure any needed supplies, including PPE, COVID-19 kits for patients and contacts, materials/equipment for case investigation and contact tracing staff (e.g., laptops, tablets, cell phones)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Laboratory Services	Completed	In Progress	Not Started
Establish linkage to testing sites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop understanding of statewide laboratory capacity and laboratory turnaround time for results reporting	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identify SARS-CoV-2 tests in use by laboratories serving the jurisdiction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Protocols	Completed	In Progress	Not Started
Develop protocol for triaging cases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Obtaining necessary information to inform triaging	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Determining case assignment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop case investigation protocol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Can include interview guides, call scripts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Case Investigation & Contact Tracing Activities (Guidance Section IV & Guidance Section V) *continued*

Protocols	Completed	In Progress	Not Started
- Protocol covers:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Confidential notification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Risk assessment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Self-isolation instructions including any daily monitoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Linkage to self-isolation support services and medical services (if needed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Linkage to testing (if needed and available)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Close contact elicitation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Discontinuation of self-isolation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Specimen collection for testing (if applicable to role), proper PPE use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Case investigation when patients are unable to participate (including minors); proxy interviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Use of data collection forms and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Establish timelines for 1st contact interviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop goals for timeliness of interviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop contact tracing protocol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Can include interview guides, call scripts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Protocol covers:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Confidential notification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Risk assessment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Self-quarantine instructions including daily monitoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Linkage to self-quarantine support services and medical services (if needed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Linkage to testing (if available)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Discontinuation of self-quarantine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Contact tracing activities when contacts are minors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Specimen collection for testing (if applicable to role), proper PPE use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Use of data collection forms and tools	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Establish timelines for 1st contact interviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop goals for timeliness of interviews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Case Investigation & Contact Tracing Activities (Guidance Section IV & Guidance Section V) *continued*

Protocols	Completed	In Progress	Not Started
Develop protocol for assessing need and eligibility of patients and contacts for support services, triaging requests, and providing linkage to needed services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop protocol for medical monitoring of patients with COVID-19 who are at higher risk for severe disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop protocol for using interpretation services if case investigator/contact tracer is not fluent in primary language of patient with COVID-19 or close contact	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop protocol for providing case investigation and contact tracing services to people who are deaf or who have hearing loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop protocol for serving public health orders for isolation and quarantine, if applicable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Outbreaks (Guidance Section VI)

Complex Investigations	Completed	In Progress	Not Started
Develop guidance for handling complex investigations (e.g., outbreaks in congregate living or workplace settings)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Formation of interdisciplinary team(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Triage protocol for handing over investigations to team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Plan for surge staffing if needed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Special Considerations (Guidance Section VII)

Protocols	Completed	In Progress	Not Started
Develop protocol for managing case investigations when a patient is unable to participate (e.g., cognitively impaired, deceased, intubated, unconscious, a minor)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop protocol for interjurisdictional case investigation and contact tracing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop protocol for case investigation and contact tracing for flights (or other mode of public transportation) arriving in the US or between US states, or cruise ships arriving at US ports of entry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Building Community Support (Guidance Section VIII)

Communications and Community Engagement Strategy	Completed	In Progress	Not Started
Develop a communications and community engagement strategy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Engage local community leaders, public officials, and influencers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop clear, empowering messages that create awareness of case investigation and contact tracing activities and encourage acceptance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Also share messages that dispel misinformation and direct public to reliable sources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Use all available communication channels to reinforce messages	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Communications and Community Engagement Strategy	Completed	In Progress	Not Started
- Ensure messages and materials are culturally sensitive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Tailor messages to reach specific audiences, including vulnerable populations in the community	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop or adapt existing health education materials to share with patients and close contacts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Translate into primary languages of affected community members (also consider translating data collection instruments)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Include materials for low literacy levels and that are graphics-based (more images than text)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Identify communication avenues (social media, newspapers, TV news stories, billboards, TV ads)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Data Management (Guidance Section IX)

Data Management Infrastructure	Completed	In Progress	Not Started
Develop and implement data management infrastructure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Laboratory, provider, and contact case reports should be transmitted electronically and seamlessly imported into the system in an automated fashion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop modules for:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Case investigations of confirmed and probable cases,	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Patient risk assessment (including contact elicitation),	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Contact investigation (including risk assessment)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Should be editable without the need for vendors/contractors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
› Should be able to link multiple individuals within the system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Establish user roles in data management system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop routine canned reports for feedback to staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop routine canned reports to review program successes and identify areas for improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Develop interview forms for patients and close contacts that incorporate critical data elements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Collaborate with healthcare providers for data sharing (e.g., access to electronic health records)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Ensure that local data security and confidentiality standards are being met	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Evaluating Success (Guidance Section X)

Evaluation and Quality Improvement	Completed	In Progress	Not Started
Develop plan for evaluation and quality improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Consider setting targets for select metrics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Select process and outcome metrics to routinely review	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Use reports to identify areas for training and help leadership identify any necessary program adjustments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Identify staff member who will run reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Identify staff who will receive reports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Determine frequency reports will be run	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop protocol for supervisory review and feedback on case and contact investigations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Confidentiality and Consent (Guidance Section XI)

Security and Confidentiality	Completed	In Progress	Not Started
Develop plan addressing security and confidentiality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Assess standards currently in place to protect patient information and determine if modifications are needed for COVID-19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Develop Protocols for:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Security of confidential case investigation and contact tracing information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Maintaining confidentiality, including legal requirements for public health personnel	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Support Services to Consider (Guidance Section XII)

Support Services	Completed	In Progress	Not Started
Develop plan for providing support services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Assess services available for patients, contacts, and their families	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Fill critical gaps in wraparound services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Establish eligibility criteria	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Provide alternate housing to support the isolation of patients and quarantine of close contacts who are unable to do so safely at their home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Provide telemedicine safety net pool of providers for on-call clinical consult with patients and contacts who do not have a primary healthcare provider	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Partner with local community groups and organizations that can help support specific populations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
- Establish processes for connecting patients and contacts to support services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>