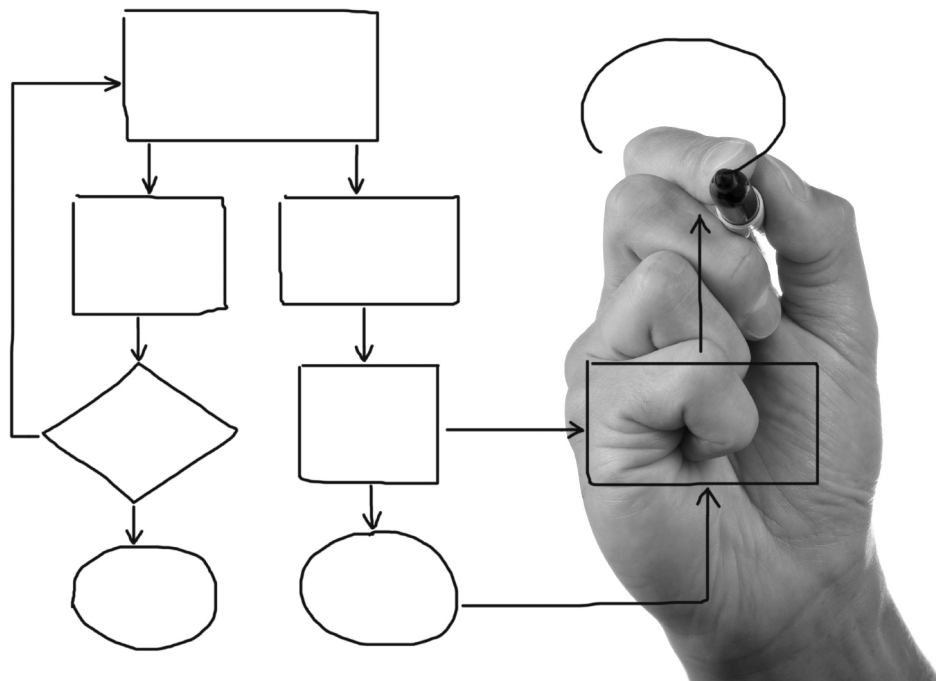


Continuity of Operations Plan (COOP) Tabletop Exercises for Public Health Laboratories

Summary Report and Recommendations from Two Exercises



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TABLE OF CONTENTS

- About This Report 3
- Executive Summary 3
- Tabletop Exercise 3
- APHL Regional Consortia 4
- Next Steps 4
 - APHL 4
 - Public Health Laboratories 4
- Acronym Glossary 5
- Introduction 6
- Tabletop Exercise Overview 6
- Findings 7
- Exercise Categories 10
 - Pre-event planning 10
 - Activation 10
 - Mission Essential Functions 10
 - Alternative Arrangements 11
 - Communications and Information Services (IS) 12
 - Reconstitution 13
- Post-Exercise Survey 13
- Conclusions 13
- Recommendations 13
 - APHL 13
 - Public Health Laboratories 13
- Conducting a Virtual Tabletop Exercise 14
- References 15
- Appendix: Tabletop Exercise Presentation Template 16
- Acknowledgements 27

ABOUT THIS REPORT

In 2021, the Association of Public Health Laboratories (APHL) collaborated with the RAND Corporation to develop and conduct tabletop exercises with public health laboratories to build upon prior work completed in 2011 and 2019. The goal of this work was to assess the laboratories' Continuity of Operations Plans (COOPs) in response to disaster scenarios. This evaluation report describes data gathered during the tabletop exercises, such as the strengths and weaknesses of continuity of operations planning and provides recommendations to improve this planning. The target audience of this work are public health laboratories, especially those that participated in the exercises, and the Centers for Disease Control and Prevention (CDC).

EXECUTIVE SUMMARY

To ensure continuation of essential activities and minimize interruption of operations, public health laboratories are required to have in place an effective Continuity of Operations Plan (COOP) to address emergency situations.¹ The emergency preparedness national standards state that laboratory COOPs should include:

- Procedures for regular maintenance of redundant testing supplies
- Processes to designate alternate testing facilities for short-term duration in case of localized infrastructure failure
- Agreements with other agencies to take over critical testing, as appropriate
- Procedures to address personnel shortages
- Procedures to address equipment failures
- Procedures to address operational loss of laboratory facilities

Public health laboratories are in various stages of development of their COOPs, and the extent to which they have tested their COOPs vary. Testing is critical for confirming the accuracy and appropriateness of continuity of operations planning and uncovering gaps or incorrect assumptions during an exercise allows the opportunity for correction before an event occurs. The Association of Public Health Laboratories (APHL) contracted with the RAND Corporation to build upon its past work for APHL in 2011² and 2019³ to update previously developed tabletop exercises and conduct an exercise with eight public health laboratories during the current 2021 collaboration.

Tabletop Exercise

The [tabletop exercises](#) provided an opportunity to identify strengths and areas for improvement in COOP development and implementation for each laboratory that participated. The eight laboratories had varying experience with developing and testing their COOP. The same scenario was conducted with each laboratory, yielding insights into how different laboratories approach each area of the COOP. Unlike previous exercises in which each laboratory separately walked through a given scenario, this exercise examined the role of a consortium of laboratories. Two exercises were conducted with four laboratories from the same regional consortia to create cross-laboratory discussion. APHL's regional consortia, discussed in more detail below, allows for laboratories to share testing services and resources with other participating consortia laboratories.

During the exercise, laboratory directors were asked to act as observers to give their laboratory staff an opportunity to use the COOP for the given scenario. Some laboratories had clear delegation of authority in the absence of the director, while for others it was not always defined and should be clarified. Directors should ensure that their deputies and other relevant staff members have access to information and resources needed to sustain operations in the event that they are unavailable.

Activation of the COOP varied per laboratory; some laboratories activated the COOP early on in the scenario, while others waited until much later in the exercise to do so for reasons unique to their laboratory. Laboratories indicated a willingness to activate the COOP partially if only some core activities are impacted. The laboratories also had differing means of prioritizing mission essential functions (MEFs), or functions that need to be continuously, or nearly continuously, operated after disruption of normal operations.

The majority of the eight laboratories had identified alternative facilities that would be able to take over some of their sample testing in the event that the laboratory had to cease testing. In many instances, these plans were not formalized

with signed Memorandum of Understanding (MOU) or Memorandum of Agreement (MOA) or other legal agreement.

Laboratories can use multiple modes of communication, including automated systems for notifying personnel of emergencies, but the amount of redundancy varied. In particular, those laboratories using automated systems were not all clear on how often the system was updated, and many laboratories struggled to identify alternative communication methods that did not rely on mobile phones. Additionally, some laboratories using mobile phones also did not know if their call lists were up to date.

APHL Regional Consortia

APHL has regional consortia that can be utilized both during and outside of an emergency so that participating laboratories can share guidance and resources with each other through informal agreements.⁴ For this reason, the eight participating laboratories were divided into two groups by regional consortia. The exercise provided an opportunity to discuss and utilize these agreements. As per the participants, opportunities provided by these agreements include:

- Resource and test-sharing services
- Financial support for APHL/CDC-funded activities
- Workforce development and training programs
- Collaboration on regionally relevant topics

Next Steps

Our work indicates that public health laboratories are generally aware of the need for continuity of operations planning, but not all laboratories have dedicated the time and resources to develop comprehensive COOPs and test them. This leads to the following recommendations for APHL and public health laboratories.

APHL

Provide laboratories with examples of successful/exemplary sections of COOPs. Specifically, APHL can share redacted COOP sections in areas that many laboratories have less well-developed COOPs, such as MEF, reconstitution and alternative arrangements.

Collect and share successful laboratory MOUs. Because executing a MOU is a significant hurdle for many laboratories and typically outside their expertise, providing examples of recent successful MOU documents as a template would be beneficial.

Develop a way to share COOP information across laboratories. In addition to the example text, APHL should consider ways of sharing information on testing and exercising COOP as well as available resources. This could be through APHL-sponsored webinars, dedicated sessions at the APHL annual meeting, dedicated web pages, etc.

Public Health Laboratories

Finalize all COOPs and ensure that updated COOPs are stored in accessible locations both on- and off-line. Ensuring that COOPs are comprehensive and that the knowledge staff have about COOP operations are written into the COOP is an important next step for many of the laboratories. Having the COOP available if electronic systems are unavailable is important.

Identify opportunities to engage jurisdictional level emergency operations center (EOC) leadership. Laboratories should clarify what their current role is, if any, with respect to their state or health department EOC and ensure they have communications with, or active representation on, the EOC.

Review and update emergency planning for information technology (IT) and facilities departments. Laboratories need to consider the impact of emergencies on IT systems, including backup servers if all on-site systems are disrupted, and the impact on facilities.

Hold periodic (annual or biennial) tabletop exercises. Such exercises will refresh staff knowledge of the COOP and could also help with planning should the director not be available in the case of an actual incident. Key roles to participate in an exercise include the assistant laboratory director/deputy director, the emergency response manager, division

manager(s), facilities staff and IT staff.

Conduct regular notification drills. This will ensure that contact information is kept up to date and may help in determining additional communication modes.

ACRONYM GLOSSARY

APHL	Association of Public Health Laboratories
BT	Biological Terrorism (Threat)
CDC	Centers for Disease Control and Prevention
COOP	Continuity of Operations Plan
CLIA	Clinical Laboratory Improvement Amendments
CT	Chemical Terrorism (Threat)
EMAC	Emergency Management Assistance Compact
EOC	Emergency Operations Center
GETS	Government Emergency Telecommunications Service
IS	Information Systems
IT	Information Technology
MEF	Mission Essential Function
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
PHL	Public Health Laboratory

INTRODUCTION

When an event disrupts normal operations (e.g., natural disaster, equipment malfunctions, staffing shortages), public health laboratories must be able to continue their core population-based activities, as well as respond quickly and effectively to the situation. Regardless of whether the situation is natural or human-made, many public health laboratory functions are essential to the response. For example, newborn screening is vital to ensuring the health of infants at all times. During flooding disasters, water testing becomes especially important to ensure water is free of contaminants and safe to drink. In a terrorism incident, testing is necessary for identifying and verifying the presence of bioterrorism or chemical terrorism agents and toxins to protect the public's health and safety. During a pandemic influenza incident, laboratories may be called to perform specific influenza testing and may have to function with fewer personnel if some of the laboratory staff are ill. Recent incidents such as Hurricanes Irma and Maria in 2017, which damaged and destroyed laboratories in Puerto Rico and the US Virgin Islands, demonstrate the importance of continuity of operations planning for public health laboratories.⁵

In order to respond to hazards and threats, public health laboratories should have in place a continuity of operations plan (COOP).⁶ The laboratory COOP is a comprehensive, pre-event plan that describes the procedures, policies and arrangements necessary for a laboratory to respond quickly and effectively to a wide variety of possible disruptions or threats.

Public health laboratories are in various stages of development of their COOPs and differ in the extent to which they have tested them. This testing is critical for confirming the accuracy and appropriateness of their continuity of operations planning and for uncovering gaps or incorrect assumptions, allowing a laboratory to update their plan before an event occurs. The Association of Public Health Laboratories (APHL) contracted with the RAND Corporation—referred to as RAND in this report—in 2021 to build upon RAND's past work for APHL in 2011² and 2019³ to update the previously developed tabletop exercise and run the exercise with eight laboratories. While RAND's previous work ran the exercise with one laboratory at a time, this work involved engaging two consortia and running two tabletop exercises with four laboratories in each exercise. The exercises were virtual and used Microsoft Teams, which allowed for both all-group and individual laboratory discussions using Microsoft Teams breakout rooms. The joint-laboratory exercise also allowed for discussion between laboratories to create cross-laboratory learning opportunities.

TABLETOP EXERCISE OVERVIEW

As discussed in the introduction, RAND and APHL led two virtual tabletop exercises in May 2021 with eight US public health laboratories selected from two regional laboratory consortia (one consortium includes 10 laboratories and one includes 12). Four laboratories were selected for each TTX by APHL staff in consultation with RAND with an attempt to include different size laboratories and both local and state laboratories. The laboratories were divided by region and participated with other laboratories from their region, with four laboratories per exercise. The results of these two exercises are not necessarily generalizable to all public health laboratories. The entire exercise was conducted using Microsoft Teams, with individuals participating either from their homes or offices, or, in some cases, groups from a laboratory participating together from a conference room. The two tabletop exercises provided the opportunity to identify strengths and gaps in COOP development and implementation. Past scenarios, including questions and probes, developed by RAND were updated to hold a discussion-based exercise that provided public health laboratories the opportunity to walk-through and evaluate their current COOPs in response to a major disruption, in this case a severe snowstorm. The goal of the tabletop exercises was to assess the how laboratories respond to a disaster by implementing their COOPs. Most of the laboratories' written COOPs were briefly reviewed but our assessments were based solely on discussions during the exercise. Therefore, the data presented here reflects the information described during the exercises, which may or may not be present in each laboratory's actual written COOP.

The exercise, which can be found in Appendix A, consists of a set of customizable PowerPoint slides. The exercise we

used is focused on a blizzard scenario, but the general structure can be amended to accommodate another disaster scenario that would be more appropriate for different locations (e.g., hurricane, earthquake, terrorism event, etc). This structure includes a set of introductory slides, followed by situation reports and discussion slides. The introductory slides give an overview of the exercise structure, guidelines, and outline the exercise schedule. The exercise objectives as listed are:

- In response to a disruptive incident, assess the laboratory's ability to:
 - Activate the COOP
 - Notify key personnel
 - Identify and implement essential laboratory activities after the disruption
 - Identify alternative laboratories and process for relocation
 - Reconstitute normal operations
- Evaluate the adequacy of the COOP, identify gaps in the COOP, and suggest improvements in the COOP

The exercise then moves into the first situation report describing a winter storm warning.

Throughout the exercise, the storm steadily worsens, and each situation report is followed by a set of discussion questions. The discussion questions are general and can apply to several scenarios. There are probes provided to gather increasingly detailed information from exercise participants. The other purpose of the general questions is to provide the exercise participants an opportunity to discuss each disaster response scenario without leading them to next steps or conclusions. For example, one of the goals of the discussion period (Appendix A, Slide 12) is to generate discussion about notification of employees when a storm is steadily worsening. However, the questions asked are generic, "What actions need to be taken? What decisions do you need to make?" without written questions on notification systems or operations. The facilitator allows the discussion to generate from the generic questions about next steps, and then uses the probes in the notes section, if needed, to direct the discussion to communication and notification strategy and plans.

To run the tabletop exercise successfully, it is important that specific laboratory personnel attend the exercise to avoid gaps in knowledge and expertise that are needed during a given scenario. The laboratory director and/or deputy director should attend the exercise, as well as an emergency response manager or other person who knows the COOP and emergency response systems well. It is important that there be a representative from facilities so that concrete knowledge on building access, generators and similar information can be used during the exercise. It is also necessary for an information technology (IT) representative to be present to speak to connectivity, including reporting, server location and other important technological information when systems are compromised due to inclement weather or other types of disasters. Leads or managers within various divisions, such as newborn screening, biological terrorism (BT), chemical terrorism (CT), microbiology or other key divisions within the laboratory, should be present, particularly if one division is the focus of the exercise. For example, this exercise focused on newborn screening, so it was essential that newborn screening personnel were in attendance.

FINDINGS

As previously described, the exercises had two breakout sessions in which each laboratory entered its own breakout room (within MS Teams) and went through the exercise facilitated by one RAND and one APHL staff member. After each of the breakout room sessions, the entire group came together, allowing the four laboratories to share their responses and procedures with each other and ask questions. The laboratories expressed varying levels of COOP preparedness in the areas of activating the COOP, notifying key personnel, identification and implementation of essential laboratory activities, identification of alternate laboratories and process for relocation, and reconstitution to normal operations. Some laboratories seemed to be similarly prepared across all areas while other laboratories presented varying levels of preparedness.

Table 1.1 outlines the elements of the response that we assessed with the exercises. For each element, each author independently placed laboratories into one of three stages (early, intermediate or advanced) based on our subjective assessment of their actions in the exercises. We then compared our placement and discussed areas we were not in

agreement on and came to consensus on where to place each laboratory. Our assessment is based on the exercise and discussion and does not necessarily confirm that all of the information discussed in the exercise is part of the written COOPs. “Early Stage” is used when a laboratory has either no COOP or a COOP that is being drafted and the discussion identified substantial missing elements; “Intermediate” is used when a category has an operational COOP with sections that may need to be revised or may not have enough detail; and “Advanced” is used when a category has operational, detailed COOP that has already been tested in real-world or simulated scenarios and revised accordingly. Table 1.2 presents how we assessed each laboratory for each exercise category as early stage, intermediate or advanced.

The exercise categories in Tables 1.1 and 1.2. were created by RAND as a means to break down laboratory disaster response into steps that can be evaluated separately. This allows for more specific feedback to APHL and laboratories that can aid in the improvement of COOPs, such as feedback that multiple laboratories have strong facilities response but need to improve IS/IT response in an emergency. The categories also mirror the topics that RAND guided laboratories through during the exercise, which included pre-event planning, COOP activation, facilities response, mission essential functions, alternate arrangements, communications, IS/IT response and reconstitution to normal operations. They also encompass many sections of the COOPs RAND reviewed.

As shown in Table 1.2, the laboratories ranged in how complete their COOPs were. Reconstitution is marked as “Not Assessed” for the laboratories that did not have time to discuss it. The following sections discuss more detail from the exercises for each of the COOP categories.

Table 1.1 TTX Elements and Examples

Category	Early Stage	Intermediate Stage	Advanced Stage
Pre-Event Planning	Laboratory has a draft COOP or is in the process of drafting COOP	Laboratory has a fully written and adopted COOP	Laboratory has a fully written and adopted COOP that has been tested before or implemented in real world event(s)
COOP Activation and Accessibility	Activation thresholds of COOP not addressed, access to the COOP may be difficult to impossible in an emergency (such as only being available online)	Clear thresholds for COOP Activation are identified, COOP is accessible in an emergency in both online and hard copies	COOP has clear thresholds for activation and has been tested before in real world (events), COOP is accessible in an emergency
Facilities	Facilities staff, equipment and planning not addressed and/or not identified in COOP	Facility staff are engaged with COOP planning, laboratory’s COOP includes facility details	Facility staff are engaged with COOP planning, laboratory’s COOP includes facility details, laboratory has generator/back-up that is tested regularly
Mission Essential Functions	MEF are not identified in COOP	MEF are clear and identified	MEF are clear, identified and ranked
Alternative Arrangements	No MOU/MOA identified	One or multiple potential MOU/ MOA identified, or informal arrangements identified	One or multiple MOU/ MOA identified with formal arrangements in place
Communications	COOP includes a communication plan for staff, although staff list may not be included in plan; laboratory primarily uses cell phone notification for emergencies (no automated system)	COOP communication plan includes current staff lists (or location of staff list); automated communications systems for staff notifications in place	COOP communication plan includes current staff lists; automated communications systems for staff notifications in place; COOP accounts for communication with alternate laboratories, couriers and EOC, back-up (e.g., radio) comms are identified
IS/IT	IT systems not addressed in COOP; back-up servers are either onsite or non-existent;	IT systems including server locations and back-up systems addressed in COOP	IT systems, including server locations and back-up systems, addressed in COOP; interoperability with other laboratories IT system in place; back-up servers are off-site

Category	Early Stage	Intermediate Stage	Advanced Stage
Reconstitution	Lack of plans in place for reconstitution activities	Plans in place to make repairs to laboratory (if need be) and recertify laboratory equipment	Plans in place to make repairs to laboratory (if need be) and recertify laboratory equipment; laboratory has experience in making laboratory repairs and recertifying equipment

Table 1.2. TTX Exercise Assessment Chart

Laboratory	Pre-Event Planning	COOP Activation & Accessibility	Facilities	Mission Essential Functions	Alternative Arrangements	Communications	IS/IT	Reconstitution
Lab 1	[Teal]		[Grey]	[Teal]		[Grey]	[Light Blue]	Not Assessed
Lab 2	[Grey]							Not Assessed
Lab 3	[Light Blue]	[Teal]		[Light Blue]				[Grey]
Lab 4	[Teal]			[Light Blue]	[Teal]	[Grey]	[Teal]	Not Assessed
Lab 5	[Grey]				[Teal]	[Grey]		
Lab 6	[Teal]		[Grey]	[Teal]	[Light Blue]		[Grey]	
Lab 7	[Teal]	[Grey]				[Teal]	[Grey]	
Lab 8	[Grey]			[Teal]	[Grey]	[Teal]	[Light Blue]	[Grey]
Laboratories 1-4 are in one consortium. Laboratories 5-8 are in the other consortium.								

Key

- Early Stage or not fully addressed in exercise
- Intermediate Stage
- Advanced Stage

Exercise Categories

Pre-event planning

While the laboratory directors were present during the exercise, the exercise scenario had them out on vacation and they were therefore primarily observers and not active participants. Because of this, the deputy director or laboratory manager took over and was the primary lead for this exercise, although all the staff present participated to some extent. Some of the laboratories had full COOPs to use during this exercise, multiple laboratories were in the process of revising their COOPs at the time of this exercise, and some laboratories' COOPs were incomplete. COOP documentation is one recommended area of improvement for the laboratories that do not have a COOP that is up to date. Additionally, multiple laboratories stated that they only had access to their COOP online and did not have a physical copy stored in the laboratory or elsewhere. This presented a challenge when power outages occurred during the exercise, and an additional area of improvement would be for all laboratories to ensure that they have a hard copy of their most recent COOP version available and an electronic copy available on back up or offsite servers. Another area of improvement is to ensure that all pertinent information is written into the COOP. In some cases, individuals have a deep level of knowledge of the laboratory and emergency operations, but if those individuals are not available during an emergency, that knowledge is not necessarily widely available if it is not part of the written COOP.

Activation

The stage at which the laboratories decided to activate their COOP during the exercise varied across laboratories. Some laboratories activated the COOP after the initial storm warning (Appendix A, Slide 7, Situation Report #1), while others avoided activating their COOP until later in the exercise. At least one laboratory waited to activate the COOP because activation would automatically trigger certain actions, such as samples being diverted to another state or private laboratory. There was also a range in knowledge expressed about when to activate the COOP; for some laboratories the triggers for COOP activation were unknown, while others were quite clear at what point the COOP should be activated. Some laboratories started with partial activation of their COOP before moving to full activation.

It was clear that activating the COOP is an organic process that is dependent on assessment of each scenario and the impact it will have on laboratory operations, but a potential improvement would be for all laboratories to have written information about what should trigger COOP activation, whether partial or full, or what variables should be considered when making the decision to activate the COOP. In addition, the ability to activate parts of the COOP without triggering actions like sending samples to another laboratory would be preferable. Laboratories may otherwise wait to activate the COOP to avoid this trigger but therefore also delay other important procedures laid out in their COOP.

Mission Essential Functions

During the exercise, some laboratories indicated that they have only one priority test, such as newborn screening, while others stated that they have multiple priority tests. The MEF identified by laboratories during the exercise included newborn screening, rabies testing, Biowatch, and BT and CT agents among others. There was some indication that MEFs can be flexible or change depending on certain factors; one laboratory prioritized rabies during the exercise but also indicated that rabies is significantly less of a priority in the winter than in the summer, when more testing is needed. According to participants from multiple laboratories, newborn screening is a priority test that cannot be delayed significantly. However, some laboratories indicated that they outsource their newborn screening, so it is not a critical test for their COOP. One laboratory stated that they use a ranking system and have set up all functions as priority 1–4,

with 1 being the highest priority during an emergency. Participants from another laboratory identified one priority test but expressed that the laboratory needs to develop a list of essential/high priority tests beyond it. Other laboratories indicated that they have multiple priority tests but need to improve prioritization among them.

It was noted that having fewer staff onsite due to inclement weather or any other reason would necessitate a decision on specimen prioritization. Multiple laboratories indicated that if inclement weather is predicted, staff stay late the day/night before to process and complete as many tests as possible so that there are no tests left to finish when the weather hits. Additionally, participants from multiple laboratories stated that once they activate their COOPs, the laboratories notify all hospitals to start sending specimens directly to other laboratories—in some cases, other public health laboratories; in other cases, private laboratories—for processing.

Alternative Arrangements

In the event of a large-scale disruption to laboratory activities, for instance if the laboratory building undergoes significant physical damage, laboratory functions will need to be moved to an alternative location once the immediate emergency situation has been cleared (e.g. streets passable, etc). This can be done by sending specimens, with or without sending personnel, to another laboratory with the capabilities to complete the testing (such as a public health, academic or private sector laboratory) or standing up a new laboratory. Alternative arrangements voiced during the exercise included private laboratories and other state or local laboratories within but also outside of the region. However, most of these did not appear to be written down and some seemed to be based on existing relationships of current laboratory staff, which could present a challenge in the event of staff turnover. The vast majority of laboratories have handshake agreements with other laboratories, and while some also have Memorandums of Understanding (MOUs) with companies such as PerkinElmer, others relied on the handshake agreements alone and did not have formal agreements such as MOUs or Memorandums of Agreement (MOAs). Some of these handshake agreements appeared very strong during the exercise, while other laboratories indicated that they needed to revisit the relationships that had “gone stale.” Laboratory staff reported that they generally will always find a way to support another public health laboratory in a COOP situation and had examples within the past year of doing that. Some participants said that participating in this exercise reminded them to strengthen their agreements with other states.

As the winter storm became more severe during the exercise, multiple laboratories indicated that they would notify partners before activating the COOP or diverting tests to their partner laboratories. These communications would take place via phone and email, but there was strong indication presented during the exercise that partner laboratories, whether public or private, would have significant prior warning that samples may be diverted to them. For example, the laboratories that process tests for other state laboratories, such as newborn screening, had built into their COOP the need to notify these laboratories as soon as inclement weather was forecasted. This was a strength in that partner laboratories seem to regularly receive prior warning and therefore have the opportunity to prepare in the event that sample relocation or diversion is necessary.

Participants discussed both legal and financial barriers to entering into MOUs or MOAs. More than one laboratory indicated that it had pursued MOUs but was not successful when the MOUs were held up by legal review, and the legal challenges of working across states were also mentioned by multiple laboratories. One challenge that arose from even informal handshake agreements was contractual issues for a laboratory that processes newborn screening samples for other states. This laboratory indicated that they would need to revisit their contractual language with these states, as it currently does not allow for the moving of samples to another state without permission, which could delay the process significantly in an emergency. It was also stated multiple times that state licensure requirements and Clinical Laboratory Improvement Amendments (CLIA) considerations and limitations bar staff from moving off-site to other laboratories, and that in some cases the need to also move equipment would make it a cumbersome process. Therefore, the laboratories focused on moving or diverting samples, not staff, to other laboratories. The exception mentioned was an agreement at least one laboratory has with PerkinElmer, which does allow for transfer of personnel to assist with the testing.

Financial constraints were also repeated across laboratories as barriers to formal agreements, such as MOUs, with other public health laboratories. An example of these barriers is the funding and staff time needed to update and process MOUs annually that, because they are dependent on an emergency, may not be used every year. Financial procedures

for test-sharing via handshake agreements varied; one laboratory had experience reimbursing states for testing, another laboratory reported shipping reagents to the laboratory performing the tests to help defray the costs, while another indicated that it had not reimbursed a state for testing that had been diverted to that state in an emergency. One exercise participant expressed confidence in the public health laboratory network despite lack of formal MOUs/MOAs, saying that “no public health laboratory would leave another hanging.” At the same time, at least one laboratory had an agreement to pay PerkinElmer per specimen tested as needed.

The declaration of a State of Emergency by a state governor can help aid laboratories in entering formal agreements and/or transferring specimens to other laboratories. During the exercise, multiple laboratories noted that it is easier to sign MOUs and emergency contracts after a governor’s declaration of emergency. Laboratories also indicated that they can send all specimens to other states under the Emergency Management Assistance Compact (EMAC) once the governor declares an emergency. EMAC is a national mutual aid system for all types of hazards that allows states to share resources with one another.⁷ This allows for samples to be moved across state lines to alternate laboratories during disasters under specific EMAC processes that address liability, workers’ compensation, reimbursement and licensure in advance. All 50 states, the District of Columbia, Puerto Rico, Guam, the US Virgin Islands and the Northern Mariana have joined EMAC.

Another source of information and support for some laboratories during an emergency was their city, county and/or state Emergency Operations Center (EOC). The Centers for Disease Control and Prevention (CDC) writes that EOCs bring together “highly trained experts and state-of-the-art technology to coordinate resources, information and crisis and emergency risk communication to strengthen our nation’s ability to detect and respond to public health threats.⁸” During the exercise, participating laboratories expressed a range of knowledge of and integration with their EOC(s). One laboratory did not know what an EOC was, while multiple other laboratories stated that EOC communication was built into their COOPs. These laboratories identified that their state EOC would likely be activated after Situation Report #3 (Appendix A, Slide 12) when the severe storm hits, travel is difficult and power outages occur. At least one laboratory expected that it would receive information from their state EOC at this point, including laboratory-specific details if needed. Participants from that laboratory also discussed that laboratory managers receive updated EOC contact details monthly, so managers are able to reach out to their EOC for information in an emergency.

Communications and Information Services (IS)

The majority of the laboratories rely on cell phone communications and call-down lists to notify laboratory personnel in the event of an emergency. However, multiple laboratories utilize alert systems that issue automatic alerts through emails, text messages and phone calls, often through a larger system like a university or hospital that the laboratory is part of. At least one laboratory indicated that an alert is issued on their website when no specimen pick-ups at clinical sites can be made due to inclement weather. During the exercise, most laboratories struggled to provide a communications strategy in the case of disruptions to cell phone and internet networks. The exceptions were a laboratory that had three 800MHz radios for leadership to communicate amongst themselves and another laboratory that also discussed the use of handheld radios. Handheld radios could be a possible solution for laboratories as there is a need for backup communication plans if cell phone lines are disrupted. Another laboratory discussed Government Emergency Telecommunications Service⁹ (GETS) cards as a possible solution, which give the user priority if cell phone lines are overwhelmed, but it was voiced that in some states these cards are only available to first responders and not public health laboratory staff.

Even in situations in which cell phone networks were not disrupted, some laboratories did not have up-to-date staff cell phone lists or call-down plans, did not know the process by which new employees get added to the list and previous employees removed, and/or did not know where the most recent cell phone list was located. While some laboratories did have up-to-date information, there is a need for this information to be accessible both online and offline in the event of a power outage. Additionally, some automated systems were operated by the health department and it was not clear if, and could be useful if, the systems could be modified specifically for laboratory staff needs.

One challenge that was cited across multiple laboratories was difficulty communicating with couriers in the event of inclement weather. In particular, the laboratories that utilize large couriers such as UPS indicated that it is extremely

difficult or impossible to speak with the couriers directly, which could pose a problem if samples need to be diverted once they are already en route. One laboratory tracks the courier website which shows the zip codes that the courier is or is not delivering to during inclement weather. However, the laboratory indicated that this information is often unreliable, and sometimes large sets of samples are delivered when the website indicated they would not be, which creates a significant challenge. Communication with couriers is something to be examined more fully across the laboratories, although the exercise provided an opportunity for laboratories to learn from each other. For example, some laboratories have backup emergency transport service if the regular couriers are not operating, and it was also discussed that public health laboratories around the country have used the National Guard or police vehicles to move specimens when necessary.

Another challenge that arose during the exercise for some laboratories was the existence of onsite servers without backup. This became an issue when systems were down during the exercise due to the blizzard. Other laboratories had off-site servers that were not compromised during the exercise. However, in some of these cases, there was a question about ability to access the server from offsite locations, which should be explored further. One recommended improvement would be for all laboratories to ensure they have either offsite servers and/or offsite backup servers that can be accessed from alternate locations.

Reconstitution

Reconstitution was the last discussion question before entering the last cross-laboratory discussion, and not every laboratory was able to discuss this due to time constraints in the exercise. However, most of the laboratories that were able to speak to reconstitution discussed similar procedures, such as the use of contractors for restoration/reconstruction of the laboratory and the need to recertify equipment to ensure that all laboratory equipment is operational. Also discussed was the need for communication with submitters and other testing laboratories to indicate that the laboratory will be resuming testing, to procure new reagents if reagents have expired and for staff to check that the Laboratory Information System (LIS) is operating and reporting results properly.

Post-Exercise Survey

After both exercises, participants were given a short online survey to provide their thoughts and feedback about the exercise. In total, 29 participants responded to the survey. The responses indicated that the majority of respondents found the exercise to be either very or extremely helpful. Over 70% of respondents indicated that they think the exercise should be run with laboratories at least once a year, with most other respondents indicating that the exercise should be run at least every 2–3 years. The majority of respondents also rated having an external facilitator run the exercise as extremely helpful.

CONCLUSIONS

Recommendations

Based on the tabletop exercises conducted, we consider state public health laboratories to be generally aware of the need for COOPs, but not all have invested the time and resources to develop comprehensive COOPs and test them. We recommend the following steps to APHL and public health laboratories.

APHL

Provide laboratories with examples of successful/exemplary sections of COOPs. Specifically, APHL can share redacted COOP sections in areas that many laboratories have less well-developed COOPs, such as MEF, reconstitution and alternative arrangements. Additionally, APHL can include options for when physical transportation becomes extremely difficult, such as the use of national guard and state police during emergencies.

Collect and share successful laboratory MOUs. Because executing MOUs is a significant hurdle for many laboratories and is outside the expertise of most laboratory professionals, providing laboratory directors with successful MOUs to use as a template would be beneficial.

Develop a way to share COOP information across laboratories. In addition to the example text, APHL should consider ways of sharing information on testing and exercising COOP as well as available resources. This could be through APHL-sponsored webinars, dedicated sessions at the APHL annual meeting, dedicated web pages, etc.

Public Health Laboratories

Finalize all COOPs and ensure that COOPs are stored in accessible locations both on- and off-line. Ensuring that COOPs are comprehensive and that all staff knowledge about COOP operations are written into the COOP is an important next step for many of the laboratories. Additionally, as discussed during the exercise, it is important that COOPs are accessible even during a power outage and that employees know where physical copies are located.

Identify opportunities to engage jurisdictional level emergency operations center (EOC) leadership. Laboratories should clarify what their current role is, if any, with respect to their state or health department EOC and ensure they have communications with, or active representation on, the EOC.

Review and update emergency planning for IT and facilities. Reviewing IT plans and operations in the case of a power outage and severe weather would compel laboratories to plan for backup servers if all on-site systems are disrupted. Planning for facilities needs in the event of severe weather would necessitate knowledge and planning on generator fuel loads and runtime, building access and other important information.

Hold periodic (annual or biennial) tabletop exercises. Such exercises will refresh staff knowledge of the COOP and could also help with planning should the director not be available in the case of an actual incident. Key roles to participate in an exercise include the assistant laboratory director/deputy director, the emergency response manager, division manager(s), facilities staff and IT staff.

Conduct regular notification drills. Both announced and unannounced notification drills, conducted during business and non-business hours, would compel laboratories to maintain up-to-date staff contact information. Notification drills are also helpful for determining whether communication modes are sufficient and functioning as expected.

Conducting a Virtual Tabletop Exercise

Conducting a virtual tabletop exercise differs in several ways from conducting a tabletop exercise in person, and the methods vary depending on if the virtual exercise is done with one or multiple laboratories. These exercises were run using Microsoft Teams, but Zoom or another software with breakout rooms (for exercises with multiple laboratories) could be used as well. Running the exercise virtually with a single laboratory is somewhat simpler as it does not require the use of breakout rooms. In this case, the facilitators and laboratory participants all remain in the main meeting throughout the exercises. When running a virtual exercise with multiple laboratories, breakout rooms are needed to allow each laboratory to walk-through the exercise on its own, and then return to the main meeting room for group discussion.

At the time of these exercises (spring 2021), when using Microsoft Teams with multiple laboratories, breakout rooms needed to be set up before the event started. Prior to this exercise, one breakout room per laboratory was created and, once the meeting began, participants were assigned to their laboratory's breakout room. When using Zoom, it is possible to assign participants to breakout rooms before the meeting begins, but, at the time of these exercises, Microsoft Teams allowed for assignment to begin once participants had joined the meeting.



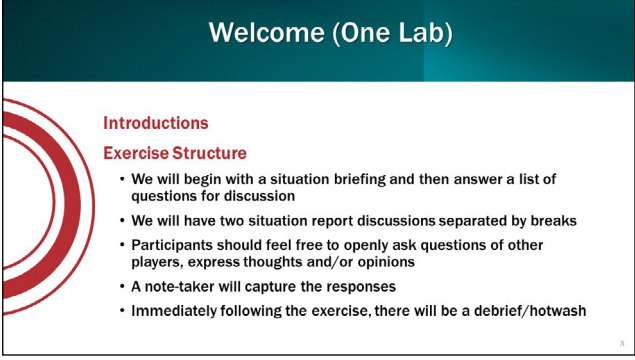
One representative from RAND and APHL was present in each breakout room to facilitate the exercise and answer questions. While it is possible for just one facilitator to be assigned per breakout room to guide participants through the exercise, two facilitators allow for one person to be the primary facilitator while the other is the primary notetaker who aids with facilitation as needed. Additional facilitators would not necessarily be needed in the case of a laboratory director leading his/her laboratory through the exercise as long as there was a notetaker present. If a group of public health laboratories ran the exercise together to allow for cross-laboratory discussion, each laboratory director could facilitate his/her laboratory through the exercise in their breakout room and have a note taker to capture key elements.

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APPENDIX: TABLETOP EXERCISE PRESENTATION TEMPLATE

The tabletop exercise presentation template is [available for download](#) on [aphl.org](#).

Slides	Notes to Facilitator
 <p>Continuity of Operations Plan (COOP) Tabletop Exercise</p> <p>Name of Lab(s) Date</p>	<p>Choose a visual that represents the type of scenario.</p>
 <p>APHL</p> <p>This presentation was developed by APHL in collaboration with the RAND Corporation to serve as a foundation for public health laboratories. The concepts and views detailed in this presentation are the those of the presenter, and don't necessarily represent the views of APHL.</p>	
 <p>Welcome (One Lab)</p> <p>Introductions</p> <p>Exercise Structure</p> <ul style="list-style-type: none">• We will begin with a situation briefing and then answer a list of questions for discussion• We will have two situation report discussions separated by breaks• Participants should feel free to openly ask questions of other players, express thoughts and/or opinions• A note-taker will capture the responses• Immediately following the exercise, there will be a debrief/hotwash	<p>Use this slide if one laboratory is participating.</p>

Slides

Notes to Facilitator

Welcome (Multiple Labs)

Introductions

Exercise Structure

- We will begin with a situation briefing and then each lab will enter its own breakout room to answer a list of questions for discussion
- We will have two breakout discussions within labs and two discussions with the whole group
- Participants should feel free to openly ask questions of other players, express thoughts and/or opinions
- A note-taker will capture the responses
- Immediately following the exercise, there will be a debrief/hotwash

4

Use this slide if multiple laboratories are participating.

Exercise Timing (One Lab)

9:00 am ET	Convene and introductions
9:15–10:45 am ET	First Session: Discussion of Situation Reports
10:45–11:00 am ET	BREAK (15 minutes)
11:00 am – 12:30 pm	Second Session: Discussion of continued Situation Reports
12:30–1:00 pm ET	Labs on break/Lunch
1:00–1:30 pm ET	Hotwash

5

During the final break, the facilitators will meet to discuss high-level feedback for laboratories.

Exercise Timing (Multiple Labs)

9:00 am ET	Convene and introductions
9:15–10:45 am ET	First Session: Discussion of Situation Reports <ul style="list-style-type: none">• 9:15–10:00 am ET: Lab specific break out rooms, discussion and continue reading situation reports (45 minutes)• 10:00–10:45 am ET: Large group (consortia) discussion (45 minutes)
10:45–11:00 am ET	BREAK (15 minutes)
11:00 am – 12:30 pm	Second Session: Discussion of continued Situation Reports <ul style="list-style-type: none">• 11:00–11:45 am ET: Lab specific break out rooms, situation updates (45 minutes)• 11:45–12:30 pm ET: Large group (consortia) discussion (45 minutes)
12:30–1:00 pm ET	Labs on break/Lunch
1:00–1:30 pm ET	Hotwash

6

Walk through the schedule and how it will work (breakout rooms, personnel will be moved automatically back to main room, etc.). During the final break, the facilitators will meet to discuss high-level feedback for laboratories.

Slides

Notes to Facilitator

Exercise Guidelines

- This is an open, low-stress, no-fault environment for discussion and problem solving
- Varying viewpoints and options are expected and encouraged
- Assume the scenario is plausible
- Assume you are under normal operations
- Respond based on your knowledge of current plans and capabilities (i.e., you may use only existing assets)
- Decisions are not precedent setting and may not reflect your organization's final position on a given issue; this is an opportunity to discuss and present multiple options and possible solutions

These can be modified as needed.

Objectives

- In response to a disruptive incident, understand the laboratory's ability to conduct
 - Activation of the COOP
 - Notification of key personnel
 - Identification and implementation of essential lab activities
 - Identification of alternative labs and process for relocation, and
 - Reconstitution to normal operations
- Evaluate the adequacy of the laboratory COOP, identify gaps, and suggest improvements

These can be modified as needed.

Situation Report #1: Winter Storm Warning

- In response to a disruptive incident, understand the laboratory's ability to conduct
 - Activation of the COOP
 - Notification of key personnel
 - Identification and implementation of essential lab activities
 - Identification of alternative labs and process for relocation, and
 - Reconstitution to normal operations
- Evaluate the adequacy of the laboratory COOP, identify gaps, and suggest improvements



These should be modified depending on the desired scenario (tornado, earthquake, etc).
For TTXs with multiple laboratories, the facilitator can present the first scenario while everyone is in one "room."

Slides

Notes to Facilitator

Lab Breakout Rooms [Multiple Labs Only]

- You will now be assigned to a breakout room with the other members of your lab to discuss this situation and response
- Each breakout room will have [#] facilitators
- The breakout room discussion will be [#] minutes

This slide is only needed if there are multiple laboratories participating.

Discussion

- What actions need to be taken based on Situation Report #1?
- What decisions do you need to make? Who makes these decisions?
- Given the forecast, how will the storm likely impact lab operations?

Estimated timing for the discussions is:

- For one laboratory: 25 minutes per situation report
- For multiple laboratories: 10–15 minutes per situation report

Facilitator questions/probes (use as necessary):

- What site security precautions do you take, if any? Who is responsible for this?
- Where can you find your laboratory COOP? Who has access to it?
- If/when staff are working from home, is the COOP available to them or just staff in the office?
- Do you activate the COOP? How much certainty is needed before you do something?

Situation Report #2: Winter Storm Warning turns into Blizzard Warning



- The average temperature in your city in January has been 10° F (-12° C). Your city has had continuous snow cover since December 2. So far this winter, 135.2 inches of snow has fallen. The current snow depth is 30 inches.
- On a Tuesday in late January, an Arctic front sweeps across the (region).
- Between 6:00 and 7:00 am on Wednesday morning, a wall of snow accompanies the cold front's passage through your city, along with a major temperature drop.
- By Noon, the National Weather Service upgrades the winter storm warning to a Blizzard warning.
- Power in the laboratory has been flickering on and off.

These should be modified depending on the desired scenario (tornado, earthquake, etc).

Slides

Notes to Facilitator

Discussion

- What actions need to be taken?
- Does this new information change any of your previous decisions?
- What decisions do you need to make? Who makes these decisions?

13

Facilitator questions/probes (use as necessary):

- How does this affect your network communications?
- How do you notify employees? What back-up communications systems do you have (e.g., if cell phones don't work)?
- Is contact information up to date? How do staff update their contact information? What process ensures that new staff are included in the call down list and staff who are no longer employees are removed?
- When was the last time you had to contact staff away from the office or conducted a call-down drill? How often is the "call down list" verified?
- What other agencies/organizations do you notify?

Situation Report #3: It Hits

- 24 hours later, early Thursday morning, the blizzard hits your city. Within hours, the temperature drops from 26 to 0° F (-3 to -18° C). Drifts of over 2-3 ft develop as strong winds blow the new snow and snow that had previously accumulated.
- The combination of snow fall and blowing snow causes extremely low visibility, making travel nearly impossible.
- Buildings throughout the area, including your lab, are experiencing power outages.
- Reports suggest that approximately one half to three quarters of lab personnel cannot report to work for at least 48 hours due to power outages at home, school closures, and impassable roads.



14

These should be modified depending on the desired scenario (tornado, earthquake, etc).

Discussion

- What actions need to be taken?
- Does this new information change any of your previous decisions?
- Does the reduced staffing impact your ability to conduct critical tests?

15

Facilitator questions/probes (use as necessary):

- What are the laboratory's critical functions/which laboratory activities and testing are essential and therefore must continue? How do you prioritize functions? Is this identified in your COOP or is it a decision you made on the fly? Which activities are nonessential and may be suspended or deferred?
- How does this situation impact your ability to receive samples?
- How do you secure select agents?
- If your COOP resources are online and the power goes out, do people still have access to that material?
- How would you know which laboratories in the consortia are hit? How would you communicate with other laboratories under these conditions?
- What EOC do you engage with? How do they communicate with you?
- Are there legal barriers?
- Has relocation to an alternate facility been tested?

Slides

Notes to Facilitator

Consortium Discussion [Multiple Labs Only]

- What was your strategy to notify employees?
- What essential and/or key lab activities and testing did you identify?
- When and/or how did you formally implement the COOP?
- What's the role of your lab with your EOC?

16

This slide is used for TTXs with multiple laboratories only.

- (Move from breakout rooms to main room and discuss)
- Each laboratory should debrief to the group and answer the above questions (~ 5 minutes each to report back, then discuss/Q&A, etc.).
- Breakout room leaders let laboratories lead the discussion, but be prepared to prompt if there is not enough discussion.

Facilitator questions/probes to get cross-laboratory discussion:

- What's the role of your laboratory with your health department-level Emergency Operations Center (EOC), statewide EOC, laboratory-specific EOC?
- How are you integrated at this level? Have you made progress integrating your laboratory into these larger EOCs

15 Minute Break

Be back at [XX time]

17

Edit depending on timing.

Situation Report #4: Heavy Snow and High Winds Continue

- It has been 12 hours since the blizzard began, and heavy snow and high winds continue.
- The conditions created are similar to that of the blizzard of 1978 and March 1993.
- Late Thursday night, an ice storm hits your lab.



These should be modified depending on the desired scenario (tornado, earthquake, etc).

For TTX with multiple laboratories: Present this slide all together, then move to breakout rooms for the second time.

Slides	Notes to Facilitator
<div data-bbox="191 323 821 680"> <p style="text-align: center;">Discussion</p> <ul style="list-style-type: none"> • What actions need to be taken based on Situation Report #4? • What decisions do you need to make? Who makes these decisions? </div>	<p>Facilitator questions/probes (use as necessary):</p> <ul style="list-style-type: none"> • Who inspects the building to report back on any potential damage? • Who is responsible for the ensuring the security of the building and how is that managed? • Who do they contact and how are employees notified? • How do you and other employees know if your laboratory has sustained damage or not? • Do you have select agents? What arrangements need to be made for them? <p>The goal is to get the laboratories to discuss how they know if there is damage to the laboratory before telling them that the laboratory is damaged (on the following slide).</p>
<div data-bbox="191 932 821 1289"> <p style="text-align: center;">Discussion: Alternative Facilities/Relocation</p> <ul style="list-style-type: none"> • What arrangements are in place for transferring testing responsibilities to other facilities? <ul style="list-style-type: none"> ○ Does the lab have an MOU or MOA with another lab to cover essential tests and activities? ○ What are the financial arrangements? • Do laboratory staff, equipment, and essential activities need to be relocated to another facility? <ul style="list-style-type: none"> ○ What are the logistical considerations? ○ Are there any legal barriers to relocating essential tests and activities to another lab? </div>	<p>These should be modified depending on the desired scenario (tornado, earthquake, etc).</p> <ul style="list-style-type: none"> • The roof sustains severe damage. You may need to modify based on the type of building that the laboratory is in. For example, instead of roof damage, consider broken windows, which allow snow inside the laboratory. • Electrical power is completely lost. Even backup generators are frozen and iced up. • All laboratory functions are rendered defunct.
<div data-bbox="191 1472 821 1829"> <p style="text-align: center;">Discussion</p> <ul style="list-style-type: none"> • What actions need to be taken based on Situation Report #5? • What decisions do you need to make? Who makes these decisions? </div>	<p>Let discussion naturally occur. If concluded, use specific questions/probes on the following slide as necessary.</p>

**Discussion:
Alternative Facilities/Relocation**

- **What arrangements are in place for transferring testing responsibilities to other facilities?**
 - Does the lab have an MOU or MOA with another lab to cover essential tests and activities?
 - What are the financial arrangements?
- **Do laboratory staff, equipment, and essential activities need to be relocated to another facility?**
 - What are the logistical considerations?
 - Are there any legal barriers to relocating essential tests and activities to another lab?

Facilitator questions/probes (use as necessary):

- How will the specimens/samples be transported to the other laboratories? Will they receive them directly?
- Does your laboratory have authority for another state's laboratory to perform tests for you?
- What about the CLIA certification of a laboratory? How do laboratory staff get certified if they go to another facility?
- How do you maintain chain of custody during a relocation of essential activities?
- Do you have electronic systems to share/receive results with other laboratories (state, local, private sector)?
 - Do the liability and other laws and policies of your state support having another state's laboratory perform tests for your laboratory?
 - ◆ Does your state's laws and policies authorize your laboratory to pay another state's PHL for tests they perform for you?
 - ◆ Do your state laws and policies authorize your laboratory to set fees and charges?
 - Are policies in place to ensure protection of privacy and confidentiality related to shared tests?
 - ◆ Does your laboratory have authority to exchange information related to tests and test results with another state's PHL?
 - What could you do to advance MOUs/legal agreements if/when they get stuck with your legal counsel or county lawyers?

**Situation Report # 6:
Widespread Damage**

The lab(s) that you had planned to transfer testing to when your lab was hit by the blizzard was/were also hit by the blizzard and is/are now unable to operate.

Slides

Notes to Facilitator

Discussion

- Do you have agreements in place for transferring testing responsibilities to an additional back-up lab or labs?
- What are the legal, logistical, and financial considerations?
- What other decisions do you need to make? Who makes these decisions?

24

Facilitator questions/probes (use as necessary):

- How will the specimens/samples be transported to the other laboratories? Will they receive them directly?
- What is the impact on roads, and how does that affect transportation options for samples?
- Are there specific public-private partnerships that can be utilized?

Situation Report #7: Restoration

- It is now early March, over one month since the blizzard.
- Power has been restored. The roof has been repaired, and the laboratory building deemed safe to reenter.



These should be modified depending on the desired scenario (tornado, earthquake, etc).

Discussion: Reconstitution

- When does reconstitution begin?
- What is involved with reconstitution?

25

Facilitator questions/probes (use as necessary):

- How do you recertify technicians and equipment?
- How quickly do you bring testing back into the laboratory?

Slides

Notes to Facilitator

Consortium Discussion [Multiple Labs Only]

- When you realized your lab couldn't perform newborn screening or other essential functions, who did you decide to send those responsibilities to?
- Do you have MOUs in place? What role does the consortia play in your COOP?
- What barriers did you discuss in terms of partner labs?
 - Legal
 - Logistical (including results reporting)
 - Personnel
 - Financial
- How did you contact other labs?
- What arrangements were made prior to the event? Have those arrangements ever been implemented or tested before?

27

This slide is used for TTXs with multiple laboratories only. Each laboratory answers the above questions, followed by Q&A and general discussion. As before, facilitators let laboratories lead, but be ready to prompt as necessary.

Facilitator questions/probes (use as necessary):

- What were the legal/financial considerations or obstructions?
 - How did you decide to move forward despite these challenges?

Final Discussion Questions

How might your lab engage private-sector or academic partnerships in one of these scenarios?

28

Facilitator questions/probes (use as necessary):

- Are there potential partnerships you could explore but haven't yet?
- Is there anyone who you could contact to have a conversation about the potential to form a private-sector or academic partnership?

Exercise Assessment

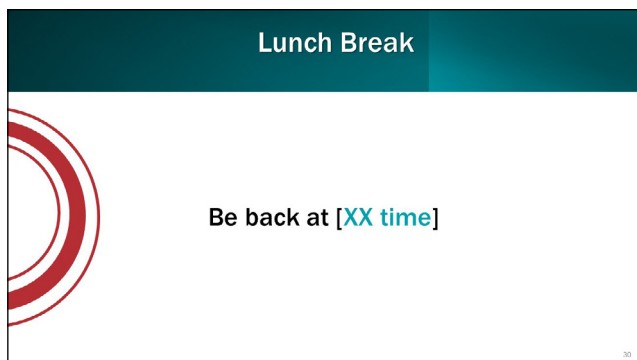
- Thank you for participating in this exercise. Please take a short survey to give your feedback: [\[Insert survey link if this is desired\]](#)
- The link will be posted in the chat.

29

Insert link here to easily copy/paste into chat: [\[link\]](#)

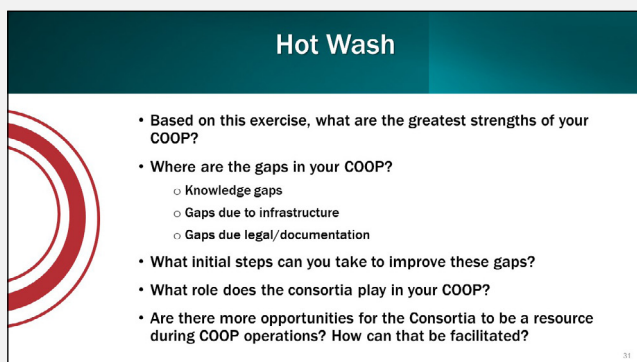
Slides

Notes to Facilitator



The slide features a dark teal header with the text "Lunch Break" in white. On the left side, there is a decorative graphic of three concentric red and white curved lines. The main content area is white and contains the text "Be back at [XX time]" in black, where "XX" is in a larger, bold font. A small number "30" is visible in the bottom right corner.

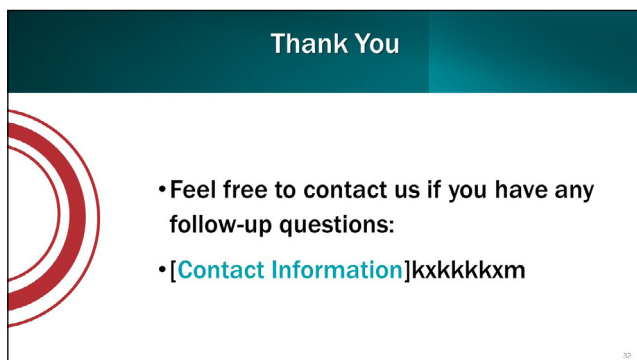
Edit depending on timing of break.



The slide features a dark teal header with the text "Hot Wash" in white. On the left side, there is a decorative graphic of three concentric red and white curved lines. The main content area is white and contains a bulleted list of questions. A small number "31" is visible in the bottom right corner.

- Based on this exercise, what are the greatest strengths of your COOP?
- Where are the gaps in your COOP?
 - Knowledge gaps
 - Gaps due to infrastructure
 - Gaps due legal/documentation
- What initial steps can you take to improve these gaps?
- What role does the consortia play in your COOP?
- Are there more opportunities for the Consortia to be a resource during COOP operations? How can that be facilitated?

Edit this slide during the exercise depending on what has already come up in the exercise.



The slide features a dark teal header with the text "Thank You" in white. On the left side, there is a decorative graphic of three concentric red and white curved lines. The main content area is white and contains two bullet points. A small number "32" is visible in the bottom right corner.

- Feel free to contact us if you have any follow-up questions:
- [Contact Information]kxkkkkxm

ACKNOWLEDGEMENTS

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RAND Social and Economic Well-Being is a division of the RAND Corporation that seeks to actively improve the health and social and economic well-being of populations and communities throughout the world. This research was conducted in the Community Health and Environmental Policy Program within RAND Social and Economic Well-Being. The program focuses on such topics as infrastructure, science and technology, community design, community health promotion, migration and population dynamics, transportation, energy, and climate and the environment, as well as other policy concerns that are influenced by the natural and built environment, technology and community organizations and institutions that affect well-being. For more information, email chep@rand.org.

Association of Public Health Laboratories

The Association of Public Health Laboratories (APHL) works to strengthen laboratory systems serving the public's health in the US and globally. APHL's member laboratories protect the public's health by monitoring and detecting infectious and foodborne diseases, environmental contaminants, terrorist agents, genetic disorders in newborns and other diverse health threats.

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8515 Georgia Avenue, Suite 700
Silver Spring, MD 20910

Phone: 240.485.2745

Fax: 240.485.2700

www.aphl.org