Peer Assessment of Public Health Emergency Response Toolkit
DRAFT 10/28/13

Rachael Piltch-Loeb, Christopher Nelson, John Kraemer, Elena Savoia, and Michael Stoto

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Overview

Major public health emergencies are relatively rare, and when they do occur, they differ in important ways. The peer assessment approach described in this toolkit provides an opportunity for health departments to collaborate in their efforts to learn from such incidents. The goals are to improve future responses for the public health agencies that responded to the incident, as well as to identify best practices for other health departments responding to similar incidents in the future.

The primary players involved in a peer assessment are the *requestor*, the public health practitioner or group of practitioners representing the jurisdictions that responded to the incident, and the *assessment team* or assessors, the peer public health practitioners who have been called upon to review the response to the incident. The peer assessment process begins with a review of preliminary reports and other documents about the incident, and may include interviews with some of the key players, to identify the critical issues. The assessment team then visits the requesting jurisdiction, and conducts a "facilitated lookback" meeting or uses some other approach to further discuss the issues with representatives of the organizations that were involved in the response. Together the requestors and the assessors conduct a root cause analysis to identify factors that contributed to positive and negative aspects of the response, and that should be addressed to improve future responses.

This toolkit begins with a brief introduction to the peer assessment process and a glossary of terms used. Next detailed information is provided for both requestors and assessment teams about the peer assessment process and root cause analysis, illustrated with an example based on the 2012 West Nile Virus Outbreak in the Dallas-Fort Worth Metroplex in Texas. In addition, two separate and parallel sections provide detailed Job Action Sheets for both requestors and assessment teams. The final section summarizes the research background supporting the peer assessment process.

To illustrate the peer assessment approach in more detail, two complete case studies are included as appendices, the Texas West Nile virus example and a Salmonella outbreak in Alamosa, Colorado. A final appendix presents a template that can be adapted to employ the peer assessment process used in these jurisdictions in other settings.

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[1] LAMPS (Linking Assessment and Measurement to Performance in PHEP Systems) is the CDC-funded Preparedness and Emergency Response Research Center (PERRC) based at Harvard School of Public Health. The authors would like to thank the contributions of Jesse Bump and Elizabeth Lee. This paper has benefited from the contributions and comments on previous versions from many colleagues at Harvard and RAND, researchers associated with other PERRCs, and others. This white paper was developed with funding support awarded to the Harvard School of Public Health under cooperative agreements with the US Centers for Disease Control and Prevention (CDC) grant number 5P01TP000307-01.

This toolkit is based on a review of the scientific literature on peer assessment and root cause analysis in public health, healthcare, and other fields (as summarized in Part III) as well as the experience of the authors and an *ad hoc* practitioners advisory panel. It has been field tested in two locations and a draft of this toolkit has been reviewed by the practitioners' advisory panel and other experts. This approach, however, is still a work in progress and some aspects of the process we describe here are based on the best judgment of the authors and advisors rather than firm scientific evidence. In the spirit of continuous learning that this toolkit represents, we invite users to inform us of their experience in using this approach and suggest improvements that might be appropriate in particular contexts. Please post your comments to the project website https://blogs.commons.georgetown.edu/lamps/

Finally, since it is intended for users at the state and local lever, this toolkit does not address implementation of this approach on a national scale. Costs, training of assessors, relationship to existing reporting requirements and other implementation issues are addressed in our other work available at URL.

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I. Introduction

Peer Assessment Rationale

Major public health emergencies are relatively rare, and when they do occur, they differ in important ways. While we can be grateful that the harm that emergencies cause is uncommon, their infrequency has caused difficulties in learning from real-world incidents impeding systems improvement efforts in public health emergency preparedness (PHEP). The peer assessment approach described in this toolkit provides an opportunity for health departments to collaborate in their efforts to learn from such incidents. The goals are to improve future responses for the public health agencies that responded to the incident, as well as to identify best practices for other health departments responding to similar incidents in the future.

After an agency or group of agencies respond to an incident that stresses the abilities of the public health system to respond, the public health practitioner or group of practitioners representing the jurisdictions that responded to the incident can initiate a peer assessment process as a "requestor." This not only provides direct benefits to the requestor, which will have the assistance of a "peer assessment team" in the after action review process, but also fosters communication and collaboration across jurisdictions, allowing requestors to engage with each other and with their assessment team. There may be indirect benefits to the assessment team as well, given the opportunity to learn from the public health response of the requesting jurisdiction.

The incident report resulting from the peer assessment process can also serve as a supplement to a standard after action report (AAR). In addition, the report can be shared with others through a critical incident registry (CIR) for public health emergency preparedness (Piltch-Loeb, 2013). A PHEP CIR is intended to provide a database of incident reports, allowing for both sharing with others in similar contexts and facilitating cross-case analysis.

This peer assessment process was field tested in two jurisdictions that have experienced a public health emergency: a Salmonella incident in Alamosa County, Colorado, and a major West Nile virus outbreak in the Dallas-Fort Worth Metroplex in Texas. A site visit was conducted for each incident, during which a peer assessment team (a group of public health practitioners from other jurisdictions) led practitioners from the responding jurisdiction through a document review and "facilitated look-back" process (Aledort, 2006) to perform a root cause analysis. These analyses are documented in detail. The West Nile Virus example can be found in the example boxes throughout this toolkit and both cases can be found in full in the appendices.

Peer assessment for public health emergency incidents enables practitioners to learn from experience which moves public health emergency preparedness into the culture of quality improvement (QI) recommended by the National Health Security Strategy (NHSS) and enhances the health security of our nation (DHHS, 2009). Continuous QI is also fundamental to the Public Health Accreditation Board's national accreditation process. Through the peer assessment process, public health practitioners assist their peers in assessing the successes and failures involved in responding to a public health emergency and work with them to find solutions. Research has shown that standard quality improvement methods such as "learning collaboratives" may not be appropriate in the context of PHEP. This is due to the lack of evidence based and agreed upon performance measures, and the difficulty of carrying out rapid plan-do-study-act (PDSA) cycles and measuring processes and results after rare events (Stoto, 2013a). The peer assessment process is designed to highlight the root causes of these successes and failures, and lead to thoughtful lessons learned and improvement strategies that can be institutionalized. For further information on the research support for this approach, see Part III of this report.

Intended Users of this Toolkit
The primary players involved in a peer assessment are the *requestor*, the public health practitioner or group of practitioners representing the jurisdictions that responded to the incident, and the *assessment team* or assessors, the peer public health practitioners who have been called upon to review the response to the incident. An ideal peer assessment team will consist of a meeting facilitator, a note taker, and perhaps a third individual to help with the root cause analysis. In this toolkit there are separate guides for requestors and assessors.

This toolkit begins with a brief introduction to the peer assessment process and a glossary of terms used. This is followed by detailed information for both requestors and assessment teams about the peer assessment process and root cause analysis, illustrated with an example based on the Dallas-Fort Worth Metroplex West Nile Virus outbreak. Following this, two separate and parallel sections provide detailed Job Action Sheets for both requestors and assessment teams. The final section summarizes the research background supporting the peer assessment process.

To illustrate the peer assessment approach in more detail, two complete incident reports are included as appendices, one is the example used throughout the toolkit, the Texas West Nile virus experience, and the other is the Salmonella outbreak in Alamosa, Colorado. A final appendix presents templates that can be adapted to employ the peer assessment jurisdiction in other settings.

The document has been developed by a research team based at Georgetown University, with funding support awarded to the Harvard School of Public Health Preparedness and Emergency Response Research Center under a cooperative agreement with the Centers for Disease Control and Prevention (CDC) grant number 5P01TP000307-04.

GLOSSARY OF TERMS

Adaptation: A change made during the response to an incident that specifically limited the response challenge in that situation

Assessment team (also see facilitator): Peer public health practitioner conducting the review of the response to an incident at the request of the responding jurisdiction

Critical Incident Registry (CIR): A catalogue of reports on a jurisdiction's response to an incident. The registry is in development in conjunction with the other methods discussed in this document, especially peer assessment.

Contributing Factor: Underlying factors (modifiable & un-modifiable) that lead to the immediate cause

Facilitated Lookback: A method to bring individuals together to discuss a particular incident that follows a "systems improvement" spirit to get at causes that contributed to the incident (Aledort, 2006)

Immediate Cause: Initially explicit reason(s) for response challenges that affected meeting the response objective

Lesson for Systems Improvement: Identification of why something went wrong and the way in which prevent similar response challenges in future events

Lookback Facilitator: Peer public health practitioner conducting the review of the response to an incident at the request of an involved jurisdiction. (Facilitator specifically refers to this person's role being to lead the facilitated lookback in-person meeting)

Objective: The goal of the response

Peer Assessment Model: The engagement of public health practitioners in analyzing the response of a public health system response to a particular incident.

Public Health Emergency Preparedness (PHEP): The capability of the public health and health care systems, communities, and individuals, to prevent, protect against, quickly respond to, and recover from health emergencies, particularly those whose scale, timing, or unpredictability threatens to overwhelm routine capabilities. Preparedness involves a coordinated and continuous process of planning and implementation that relies on measuring performance and taking corrective action (Nelson, 2007).

Requestor: Member of the jurisdiction which has asked for a peer assessment of their response to an incident

Root Cause Analysis: A qualitative, retrospective, quality improvement tool used to analyze adverse incidents and sentinel events (e.g., a preventable error leading to death, serious physical or psychological injury, or risk of such injury) at the lowest system level (Wu, 2008)

Response Challenge: Item that limited the ability to respond to an element of the public health emergency incident

Story Arc: The overarching series of events that led to challenges in meeting an objective, including the various factors that enabled or barred the objective being met.

II. The peer assessment process

What is peer assessment?

Peer assessment is a process designed to analyze a public health system's response to an emergency, identify root causes of successes and failures, and highlight lessons that can be institutionalized by the responding public health system and others to improve future responses. After an agency or group of agencies respond to an incident that stresses the abilities of the public health system, the jurisdictions that responded to the incident initiates a peer assessment as a "requestor." This not only provides direct benefits to the requestor, which will have the assistance of a "peer assessment team" in the after action review process, but also fosters communication and collaboration across jurisdictions, allowing requestors to engage with their assessment team. There may be indirect benefits to the assessment team as well, given the opportunity to learn from the public health response of the requesting jurisdiction.

Peer assessment is not a substitute for a "hot wash" immediately after an incident, rather it serves a different purpose. The primary goal of a hot wash or immediate review is to identify issues that require attention and record the facts about what happened before memories fade. Rather than asking "what" and "how many" questions, a peer assessment process is intended to help jurisdictions understand "how" and "why" problems occurred as a step towards identifying and addressing contributing factors that are likely to be a problem is future incidents. (Although some hot washes identify "strengths and weaknesses" or "things that went well/not so well," it is usually not possible to systematically address "why" questions in the immediately aftermath of the incident). The report resulting from the peer assessment process can stand alone as an incident report, serving as or complementary to a standard AAR. In addition, the incident report can be shared with others through a critical incident registry (CIR) for public health emergency preparedness (Piltch-Loeb, 2013). A PHEP CIR is intended to provide a database of incident reports, allowing for both sharing with others in similar contexts and facilitating cross-case analysis.

Assessment teams should be composed of public health practitioners from jurisdictions that are similar in terms of size, population served, and public health systems in place (as described in detailed below). Peer assessment teams will ideally include three members: one to facilitate discussions, another to take notes, and a third person to focus on the root cause analysis process.

Initiating a Peer Assessment

How is a peer assessment initiated?

Typically, a peer assessment should be initiated within six months after the response to an incident has concluded; however, in some long-duration incidents it may be possible and desirable to begin assessment planning and data collection sooner.

The assessors may be identified by the requestors in the responding jurisdiction by selecting practitioners from contacts in other jurisdictions or states. In some cases, state health departments or national professional organizations may help to identify appropriate peer assessors. A site visit for peer assessment teams should occur at an agreed upon time within approximately 60 days of the request for peer review.

EXAMPLE: Texas West Nile Virus outbreak

In Texas, the state health department contacted a practitioner in the Houston area to assist in reviewing the response to the West Nile Virus outbreak in the Dallas-Fort Worth Metroplex. State health officials were able to use their relationships to identify a practitioner who knew about the incident but was not directly involved in the response.

Once the peer assessment team has been identified, what will the process entail?

The major components of the peer assessment process are as follows and more detail in the form of job action sheets is included below.

- The responding jurisdiction prepares an initial report for the peer assessors to review
    - Supplemental documentation is also shared to provide the peer assessment team with as much background information as possible
- A site visit is scheduled for the peer assessment team to conduct in-person meetings with requestors
- Prior to the site visit will be a conference call to identify the critical issues in the incident
- The assessment team will prepare slides to facilitate the discussions during the site visit
- An on-site meeting will be conducted to analyze the response to the incident through a root cause analysis process
    - The site visit may include one-on-one interviews and a facilitated look-back meeting
- After the site visit the assessment team will follow up with the requestors as needed
- The peer assessment team will draft an incident report for the review of the requestors and final recommendations

MASTER ACTIVITIES LIST

Timeframe	**Peer requestor**	**Peer assessment team**
As soon as possible following an incident	Prepare an initial report	
Within six months of the incident	Request an assessment	
Approximately 1 month out	Schedule site visits Choose a data gathering approach (interviews,	Schedule site visits

	facilitated lookback, etc.) Invite meeting participants	
Approximately 2 weeks out	One-on-one discussion with assessment teams Document review	One-on-one discussion with requestors Document review
Approximately 1 week out	Establish the attendance list Send a reminder email Confirm meeting logistics	
Day of meeting: 1 hour before meeting	Meeting set-up	Meeting set-up
During meeting	Participate	Facilitate discussion
Day of meeting: 1 hour after meeting	Discuss feedback with assessment team	Discuss feedback with requestor
Within 1 month after visit		Write analysis report Make recommendations
Within 2 months after visit	Discuss findings with assessment team	Discuss findings with requestors *and modify if needed*
Open-ended	Follow-up	Follow-up

Preparing for a Peer Assessment

What Documents Should Be Reviewed?

The review will usually include the following:

- Relevant incident action plans (to help assessment teams understand response activities and identify opportunities for improvement).
- Documentation of established partnerships activated during the incident (to provide context for assessment teams).
- Data on relevant health and significant non-health outcomes, response activities, etc.
- Media reports
- Time line of major events
- Preliminary After Action Reports (AAR) and related documentation
- Other relevant documents at the discretion of the requesting jurisdiction

What information should be shared?

The initial report filed by the jurisdiction should be the starting point for the site visit. Peer assessment teams, should begin by reviewing the completeness and face validity of this description and whether the view of what happened changed since the report was written. Providing documents to the peer assessment team early in the process may reduce the need for additional data requests.

Though peer assessment teams will have already been given access to relevant plans, reviewing how this incident/event evolved compared to planning assumptions will be important to isolate the unique features of the incident. Peer assessment teams should plan to review the history of the department in responding to similar types of incidents or

incidents of a different nature but with similar capabilities being stressed, through a review of relevant documents. If an AAR has been drafted by the requesting jurisdiction, this AAR should serve as a point of reference.

EXAMPLE: Texas West Nile Virus outbreak

An AAR that had been drafted for the state health department served as the foundation for the issues to be discussed at the meeting and an informative document to review the incident and key personnel who responded to the incident.

How will site visits be scheduled?

The requesting jurisdiction and peer assessment team will identify a date that works for both of their schedules. Site visits will ideally be at least one full day so as to meet with as many involved personnel as possible, either individually or in a group, and to involve dialogue between assessment teams and the requesting jurisdiction.

What logistical arrangements will be necessary?

A site visit from a peer assessment team will require an in-person meeting between the requestors and those involved in the response and the assessors. The requestors will be responsible for identifying a venue for this meeting that can accommodate the meeting attendees and providing lunch if appropriate. The size of the venue will vary on the meeting participants. For more information on the ideal venue for the meeting and meeting set-up, please see the sections below.

Conducting for a Peer Assessment

How will the peer assessment team collect information?

The peer assessment team will collect the majority of the data for their assessment through in-person interviews and a facilitated lookback process. The peer assessment team will first contact the staff member who requested the assessment to interview that individual and get in touch with others involved. The following approaches can be used in tandem, or as the peer assessment team finds appropriate. In our experience, we have found it helpful to include the facilitated lookback approach described below.

- *Interviews.* One-on-one or small group interviews would usually be the first step in the site visit process, or they could be conducted by phone beforehand. Interviews will usually be the primary way for peers to find out details about the incident. Interviews should be conducted with key personnel, beginning with the person in charge of leading the response. Interviews should be conducted with others involved in the response as indicated by the jurisdiction. Interviewees should be chosen to ensure that all relevant perspectives are covered. Interviews consist of a structured conversation between peer assessment teams and local practitioners. If

time is limited, an informal meeting with leaders of the response can replace individual one-on-one interviews in conjunction with a facilitated lookback.

EXAMPLE: Texas West Nile Virus outbreak

The peer assessor met with the state health officials who had requested the assessment via teleconference two weeks prior to the site visit. The teleconference consisted of a planning discussion and a brief AAR review to establish the key issues to discuss with meeting participants. The teleconference also provided an opportunity for the state officials to share with the peer assessor any on-going challenges that were currently going on in the area.

- *Facilitated Lookback.* A facilitated lookback is an established method for examining public health systems' emergency response capabilities and for conducting a candid systems-level analysis. A facilitated lookback brings together as many parties as possible involved in the response and may be more effective if time or resources are limited for a site visit. The individuals participating in the lookback process will have had different responsibilities in the response, and bring their personal perspectives to the table. Individuals can be from outside of the public health department and will ideally include local health department representatives, state health department representatives, medical personnel, emergency managers, etc. Through the use of a neutral facilitator, i.e. the peer assessment team, decision-making can be probed through in detail in discussions with public health leaders and key staff as well as a variety of community stakeholders who were involved with the response. For more detail on the facilitated lookback methodology, see Aledort (2006).

How Will a Facilitated Lookback be Scheduled, if One Is To Be Conducted?

If a facilitated lookback is planned, the peer assessment team in conjunction with leaders of the requesting jurisdiction should send an email invitation to personnel to be included in the meeting (described above). The invitation should include: the purpose of the meeting, the time and location of the meeting, the "systems improvement" spirit of the meeting, and the "no-fault zone" attitude that will encourage open discussion. A follow up email should be sent prior to the meeting to remind participants.

- All of the individuals and organizations that played key roles in the response should be included or represented, as well as participants with varying perspectives. Suggested meeting participants include:
    - Leaders of the emergency response from responding jurisdictions
    - Emergency responders
    - Representatives from the local jurisdictions outside of explicitly public health activities (environmental, public works, etc.), depending on the type of incident
    - State health workers involved in the response
    - Volunteer coordinators
    - Hospital and other healthcare delivery system representatives

- Coalition leaders
- Government workers involved in emergency declaration activities

EXAMPLE: Texas West Nile Virus outbreak

The facilitated lookback was the foundation of the site visit in Texas. During the facilitated lookback there was representation from three different counties who had been involved in the WNV response as well as state regional office representatives.

EXAMPLE: Texas West Nile Virus outbreak

A sample invitation used in TX is below:

On April 19th from 9:30 to 2 PM at the North Central Texas Trauma RAC offices, 600 Six Flags Drive, Arlington, Texas, we will be conducting a review of the public health response to West Nile Virus in 2012. The goal of this meeting will be to discuss the factors that contributed to the response challenges in dealing with West Nile Virus, and what were learned in this context. Because you were an integral part of the response and mitigation efforts, I hope you will consider attending this meeting to share your perspective. You may also want to invite key members of your organization that were directly involved in the response efforts for mosquito surveillance and control. Because the response to West Nile Virus involved many state and local organizations, the success of the meeting hinges on your participation.

This review is being organized in conjunction with the peer assessment learning program. The goal of the program and review are to improve the process for after-action learning from critical incidents. This program recently began with the support of public health researchers and the CDC.

Please let XXX, know if you are able to attend by contacting her via email (XXX). If you have any additional questions please feel free to contact [ONE OF THE UNDERSIGNED].

Thanks very much and we hope to see you there,

Director, Response and Recovery Unit and
Director, Community Preparedness Section
Department of State Health Services

What on-site peer assessment activities will occur?

How should the meeting space be prepared on the day of the meeting?

The location of the meeting will be determined by the requesting jurisdiction based on access to a meeting space; however, the meeting space should include PowerPoint display, boards or writing pads that can be written on during the discussion, and a roundtable set up that can accommodate 20-25 people (will vary based on meeting attendance).

- Chairs in the room should be organized so participants can face each other, and the facilitator will ideally be the only individual who stands during the discussion.
- Tent cards should be on-site for participants. Tent cards should then be displayed at each individual's seat.

How will the peer assessment meeting be facilitated?

The peer assessment team will facilitate the meeting. The requestors will participate in this meeting with their colleagues and peers from other responding jurisdictions. The requestors should plan to share their thoughts on the response. A preview of the meeting's structure is listed below and can be found in more detail in the sample slide deck in Appendix 3:

- *Agenda*
- *Objectives for meeting*
- *Core questions to be discussed today*
- *Ground rules for discussion*
- *Introduction of participants*
- *Overview of root cause analysis, to explore issues for discussion*
- *Root cause analysis diagram explanation (see section below for further details)*
    - *Explain this is a process to get at root causes so as to limit the same issues occurring in the future and better learn*
    - *An explanation of the root cause analysis process demonstrated through an example from the Texas West Nile Virus outbreak.*
- *Root cause analysis diagram example from peer assessment team's experience*
- *Root cause analysis methods in PHEP explanation*
- *Review of timeline of events:*
    - *Probe which events were triggers for action*
- *Figures or visuals representing event*
- *Discussion of first issue (capability or identified topic):*
    - *Consider the following:*
        - *Who was involved*
        - *Why was this an issue*
        - *What factors contributed to this being an issue*
        - *What factors were in the department's control, what factors were unmodifiable but played a role*
    - *During the discussion, the individual tasked with observing root causes should attempt to fill in the RCA diagram*
        - *RCA diagram should then be displayed on the screen for feedback*
- *Discussion of second issue (repeat for as many issues as time for)*
- *Lessons Learned from discussions*
- *Action plan for the jurisdiction*
- *Feedback for peer assessment team*
- *Contact information of the assessment team to provide any additional comments*

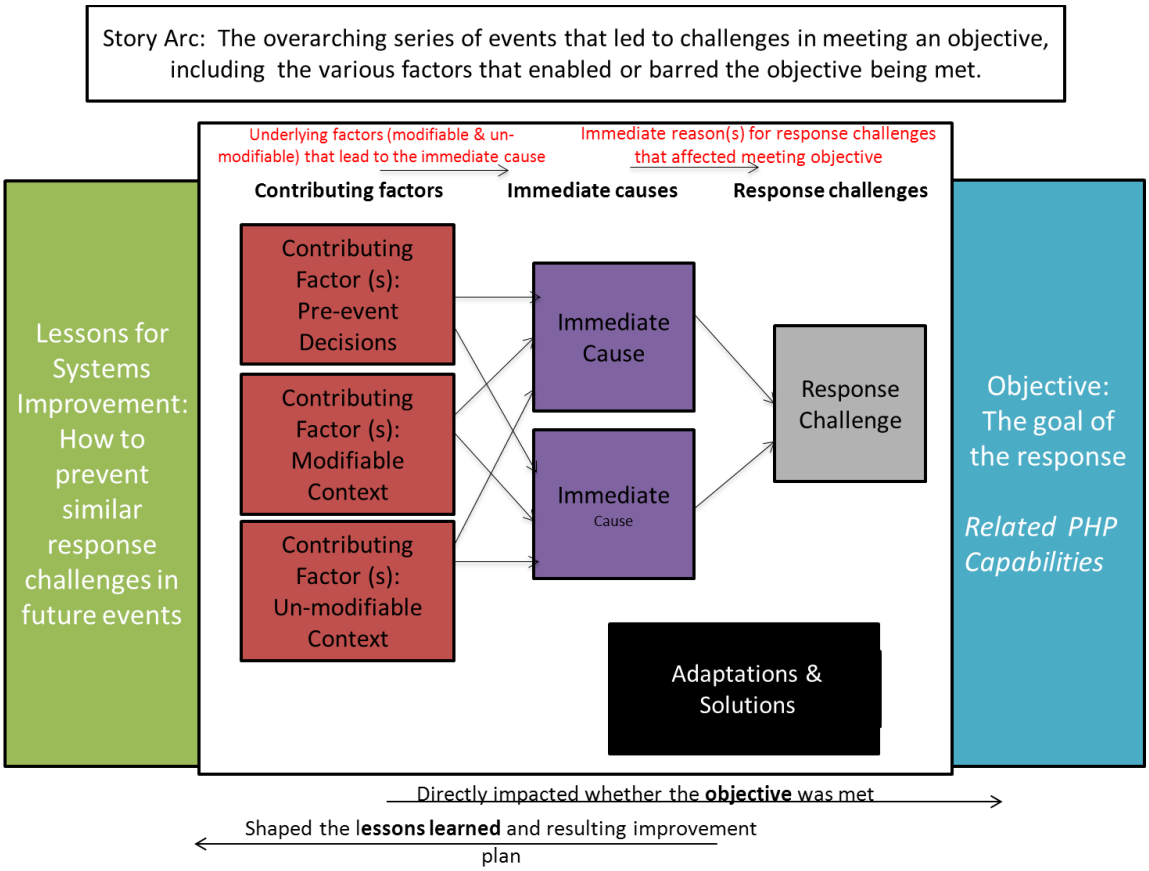
If possible, after the meeting the peer assessment team(s) should meet with the leaders who requested the assessment to ask for any additional comments and how they believe the meeting went.

EXAMPLE: Texas West Nile Virus outbreak

Post-meeting, the peer assessor and state health officials met for approximately one hour to discuss how the meeting went and what could have gone better. The discussion included how the state health officials could update their AAR based on what they heard during the meeting.

How Should the Discussion Progress during the Site Visit?

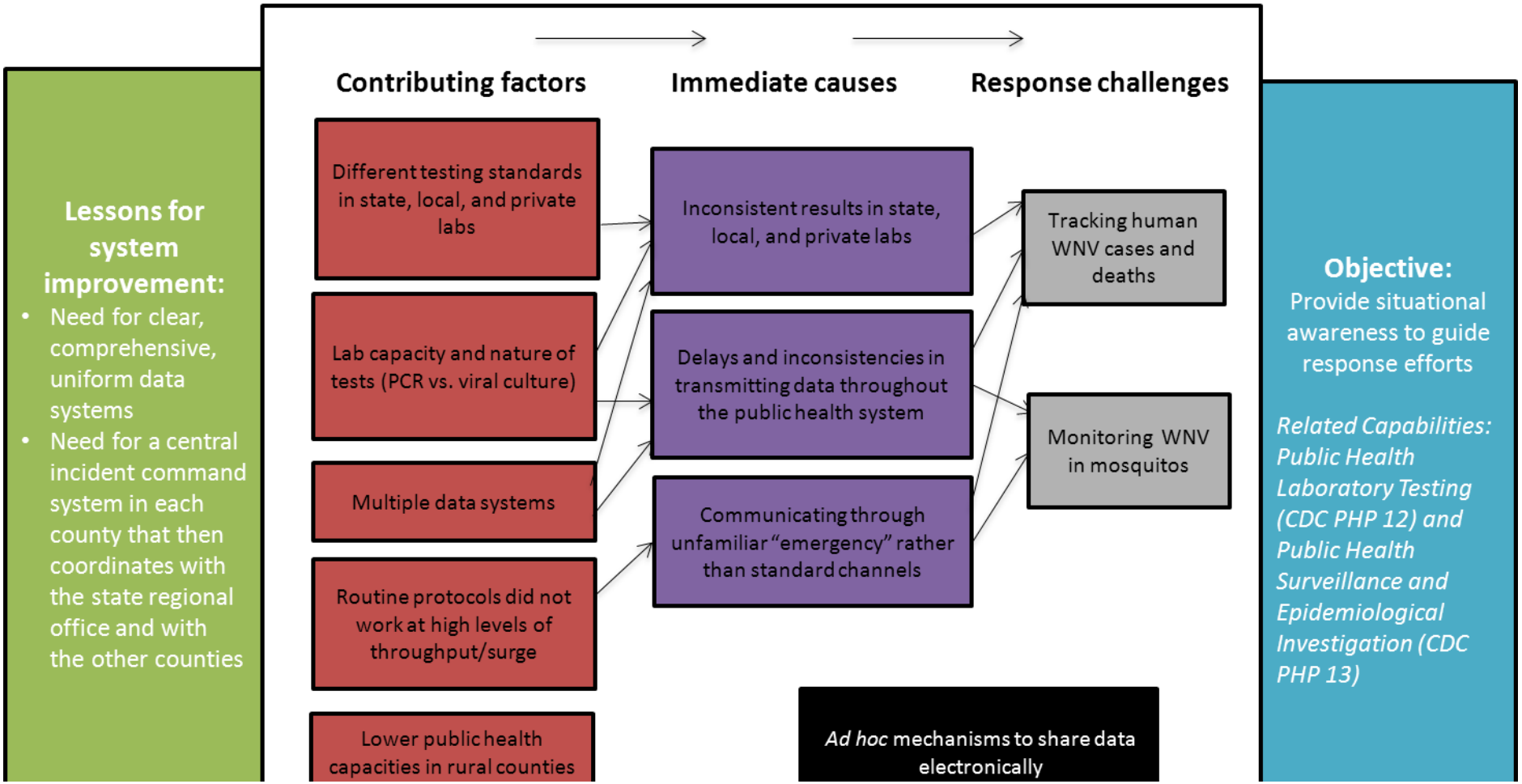
Having practitioners engaged in the public health response participating in an in-person meeting, provides an opportunity to discuss root causes of specific response challenges experienced during the incident. This format is different than a typical "hot wash" and is intended to get at the root causes of such challenges rather than initial impressions. Thus the peer assessment team should lead the group in the root cause analysis process:



The facilitator will lead the discussion. This discussion should be documented by the note-taker and serve as the basis for the report to be developed by the peer assessment team(s) following the meeting. The requestors should participate in the process below by contributing their knowledge and expertise.

Below is a full example of this process from the Texas West Nile Virus incident.. Throughout the step-by-step root cause analysis process described below, relevant portions are highlighted to demonstrate how this occurred during this test case

Story Arc: Counties in Texas send lab samples to the central state labs in Austin or use their own local labs, depending on the size of the county. Dallas County used their own labs, while Denton and Tarrant County sent mosquito samples to the state. Samples and results overwhelmed labs and were collected in different formats, resulting in data sets that could not be easily compared or understood and limiting the ability to interpret or use surveillance data.



Step 1: Define the story arc

The peer assessment team, after reviewing the context and incident description, should identify and outline the story arc – the set of major issues and events that sets the stage for each response challenge that was discussed at the meeting. The story arc can be response objective specific (see Step 2.). Story arcs typically include a few pieces of contextual information relevant to explaining why the objective has come about. The story arc should mention events that affected the outcome of the response. These events are a series of "pivotal" nodes (events, decisions, or points in time) that could have gone differently leading to a different outcome.

EXAMPLE, Step 1. Story Arc: Texas West Nile Virus outbreak

Story Arc: Counties in Texas send lab samples to the central state labs in Austin or use their own local labs, depending on the size of the county. Dallas County used their own labs, while Denton and Tarrant County sent mosquito samples to the state. Samples and results overwhelmed labs and were collected in different formats, resulting in data sets that could not be easily compared or understood and limiting the ability to interpret or use surveillance data.

Step 2: Identify candidate challenges

In accident or clinical incident investigations, identifying adverse events often focuses on fairly obvious, discrete occurrences – the patient dies or is physically injured, the airplane engine falls off, etc. Public health emergencies will usually involve a host of individual "response challenges," some obvious, others not-so-obvious. These response challenges will have been discussed during the meeting, but may be further explored upon reflection. The assessment team must first consider what the participants' perceptions of what were the most important response challenges were – i.e. the ones that had an impact on the outcome, or at least had the potential to impact the outcome, but also subject them to critical assessment.

To frame the response challenges, it is important to consider what the response needs were. In defining the response need, the public health system's goal and objectives should be documented. What did the public health system hope to achieve in responding to this event (outbreak, weather incident, etc.)? Other probing questions could include:

EXAMPLE, Step 2a. Objective: Texas West Nile Virus outbreak

Objective:
Provide situational awareness to guide response efforts

Related Capabilities: Public Health Laboratory Testing (CDC PHP 12) and Public Health Surveillance and Epidemiological Investigation (CDC PHP 13)

- To which PHEP capabilities did these goals relate to?
- At what point in time were goals set?
- What were seen as the priority public health functions in responding to the incident?

Step 3: Select a subset of response challenges for in-depth analysis

Based on the initial analysis, the assessment team may need to select a short list of response challenges for further analysis. After the perceived goals are identified, try to identify what prevented goal from being (easily) met. Ask the question: Working backwards, what led the jurisdiction toward the resulting outcome? Selection may be guided by the following criteria:

- Importance to the response under analysis
- Likely importance to future responses
- Relevance to key stakeholders
- Potential for improvement

EXAMPLE, Step 3. Response Challenges for in-depth analysis: Texas West Nile Virus outbreak

The three pivotal response challenges identified early in the discussion were:
1. Surveillance data
2. Mitigation through aerial spraying
3. Communication through atypical channels and with the public

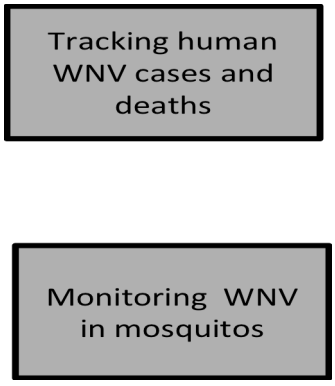
The root cause analysis process was repeated for each of these general response challenges that taxed the jurisdiction's ability to respond. The example in these boxes is taken from the root cause analysis process of Challenge 1.

Step 4: Assess response challenges

Below are some of the ways assessment teams may assess response challenges:

- *Compare perceived challenges with the broader set of response activities*. Consulting incident action plans, timelines, and other sources, the assessment team may ask whether perceived challenges may have been caused by deficiencies in response activities *not* identified by informants at the time of the emergency. It may be useful to consult jurisdiction's response plans, the specific response functions listed for relevant capabilities in the CDC's *PHEP Capabilities* guidance, the *Target Capabilities List*, or others. Where possible, actions taken during the response

EXAMPLE, Step 4. Assess Response Challenges: WNV, TX



can be compared with thresholds/standards (e.g., time for activating the EOC). While it is unlikely that there will be a single, definitive list of tasks that should have been executed, this process will at least provide a counterweight to informant perceptions.

- *Look for convergence/divergence in stakeholder viewpoints*. Generally, if representatives from responding agencies from most/all parts of the system share a common perception of a response challenge, it should give us more confidence in its veracity. However, it is important to note divergences in perceived challenges and seek to assess whether those are systematically related to rank, place in the organization, training background, etc.
  - On which response challenges was there broad agreement among meeting participants?
  - On which response challenges was there disagreement among meeting participants? Were disagreements related to position within the organization, professional background, or other observable factors?
- *Examine what-if analysis.* In some cases it may be possible to observe what would have happened under another response (e.g., PODs that operate using slightly different procedures), but these opportunities are rare. However, it is often possible to use documents and informant discussions to explore "what-if" scenarios as a way to assessing the extent to which a perceived challenge actually affected outcomes.
- *Consider adaptations and solutions.* To meet a response challenge, there are often ad hoc changes to procedures or new ways of a jurisdiction responding that happen during an incident. These on-the-spot changes in procedures may enable the jurisdiction to better respond to the incident and therefore mitigate the response challenge that is occurring. These adaptations, or changes made during the response to an incident that specifically limited the response challenge in that situation, or solutions, a way of solving the ongoing problem should be documented for the reference of the meeting participants so as to be considered for a lesson learned or incorporation into future planning efforts. To identify if an adaptation or solution was utilized for this response challenge, consider:
  - Was the response challenge limited by an action the jurisdiction or another organization took? If so, what was this action?
  - Despite the challenge, was the jurisdiction successful in meeting its objective? What activities enabled the jurisdiction to do so?
  - What would have helped the jurisdiction to better meet the response challenge?

EXAMPLE, Step 4. Adaptations and Solutions : Texas West Nile Virus outbreak

Ad hoc mechanisms to share data electronically

- Were any steps taken towards this while the incident was occurring? If so, what were those steps?
- Did a new group take on responsibilities not typical? Who took action towards an adaptation or solution?

Step 5: Identify factors that contributed to the response

5a. Immediate Causes: For each response challenge, use the data collected to solidify the immediate causes. These were the first explanations for why a response challenge occurred. Below is a list of probing questions that may lead to finding an immediate cause:

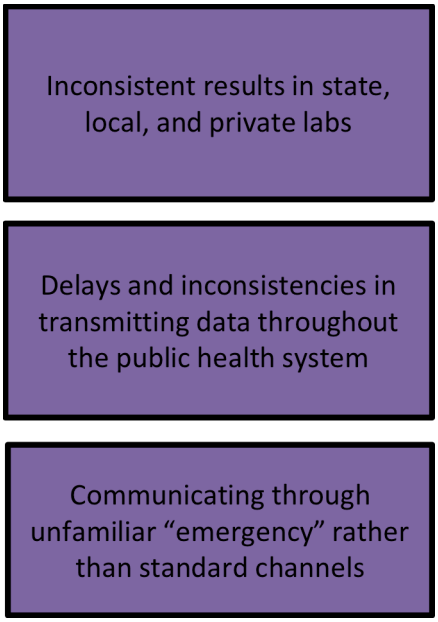
- What decision-making and organizational factors influenced the response actions undertaken to address specific response challenges?
- What human factors (staff actions, training and expertise) influenced the response actions undertaken to address specific response challenges?
- What population factors (demographics, hazards vulnerability, etc.) influenced the response actions undertaken to address specific response challenges?

Step 5b: Examine the contributing factors

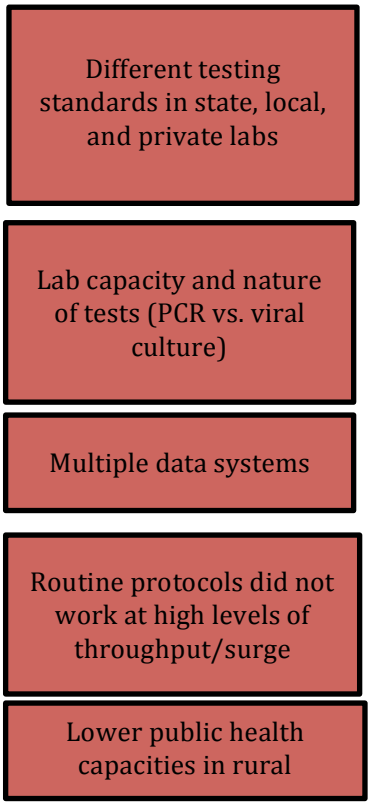
Most likely, for each immediate cause there were multiple reasons that cause occurred.

- *Types of factors*. These factors may have been modifiable, un-modifiable, or pre-determined. Modifiable factors can be changed by the responding jurisdiction, un-modifiable causes are out of the control of the jurisdictions, and pre-determined factors were part of an existing plan or structure but technically in the control of the jurisdiction. The same factor can influence more than one immediate cause. The factors described in the report should draw on those discussed during the meeting, and go one step further, so as to define the relationship of these

EXAMPLE, Step 5a. Immediate Causes: Texas West Nile Virus outbreak



EXAMPLE, Step 5b. Contributing Factors: Texas West Nile Virus outbreak



factors to the immediate causes.

- *DOTMLPF.* To identify what triggered the jurisdiction's decision-making, consider the Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities (DOTMLPF) framework developed in the military:
    - Doctrine: Plans, policies, protocols & procedures developed and implemented before an event that determine responses during the event; includes "cultural" differences, informal norms/expectations
    - Organization: how we organize to respond to an emergency, e.g. federal/state/local roles, regional response organizations
    - Training: how we prepare to respond; basic training to advanced individual training, various types of unit training, joint exercises, etc.
    - Materiel: all the "stuff" necessary to for an effective response
    - Leadership and education: how we prepare leaders at various levels and in different organizations to lead the response; professional development
    - Personnel: availability of qualified people for emergency response operations
    - Facilities: real property
- Notes
    - While it may not surface every issue, the process of deep analysis described here is likely to identify more issues than a more superficial analysis. For instance, issues that appear at first to be personal conflicts between different people who were involved with the response often reflect deeper systems issues that are easier and more useful to talk about
    - Sometimes the points that come out in such an analysis may be so sensitive that they cannot be in a public report, but at least there is some learning for the requesting jurisdiction. In other cases it might be possible to describe the issue in sufficiently general terms that it can be included in a public report.

Step 6: Document lessons for systems improvement
Lessons learned are conclusions that emerge from the root cause analyses to be considered when making future plans or responding to a similar incident in the future. Lessons learned may address organizational issues or process issues, but should consider the contributing factors and what can be done to mitigate such response challenges in the future. The facilitator should probe the group for lessons learned that come to mind immediately after the discussion; however, additional lessons learned may be identified through brainstorming after the completion of the site visit. Lessons learned may also be revised as other response challenges are discussed. The finalized lessons learned will be included in the final analysis report (see below).

EXAMPLE, Step 6. Lessons for Systems Improvement: Texas West Nile Virus outbreak

Lessons for system improvement:

- Need for clear, comprehensive, uniform data systems
- Need for a central incident command system in each county that then coordinates with the state regional office and with the other counties

What Kind of Follow-up Can Be Expected after the Site Visit?

After the site visit, the assessment team will summarize what was said at the meeting in an analysis report to be shared with the requestors and other meeting participants. The report is designed to share findings with those involved, get requestors' input, and respond to any concerns that may be raised by the assessors. The report contains information gathered through the facilitated lookback and/or interviews. The assessment teams will then prepare a final report.

This section provides information for reviewing the material collected at a site visit, completing an incident report for a CIR entry, and communicating with the peer assessment teams following the site visit process.

How should an incident report be organized?

Whether the incident report is solely for the requesting jurisdiction or to be submitted to the PHEP CIR, the report should include four components: a brief summary of the incident including the PHEP capabilities tested during the incident; a background section that includes previous history of the health department in responding to similar types of incidents; a description of the incident that includes involved parties; and an internal assessment of the response to the incident. Sample incident reports can be found in Appendices 1 and 2. The initial report will be designed to inform an appropriate peer assessment team of the type of incident that occurred, department's staff, and others involved.

What Will the Analysis Report Include?

- *Abstract.* A short summary of the CIR entry, including a brief description of the incident, capabilities analyzed, and key findings. If the CIR entry intentionally leaves out important capabilities (i.e., to limit the scope of the write-up) this should be explicitly noted.
- *Context:* Based on what the peer assessment team read prior to the site visit, and what was learned during the site visit, the report should start with a description of the jurisdiction. This context should include any information needed to understanding the analysis and findings, and may include the jurisdictional environment the health department operates in (home-rule, by state, etc.), the number of jurisdictions involved, information about the location of the health department, population served, and leadership of other agencies that were involved (i.e. public works, emergency responders, agriculture, etc.), plans and planning processes, etc.
- *Incident Description:* This should be a straight fact pattern of what happened during the incident that was discussed during the site visit. The peer assessment team will use their discretion when deciding what information to include.
- *Analysis*: the analysis section employs root-cause or similar analysis to understand whether and why particular PHEP capabilities were successfully employed in response to the incident (Piltch-Loeb, 2013). This approach is discussed in Appendix 3 (template) and in the analysis section above. For many of the issues discussed during the site visit, there will be similar root causes. The below process is another description of the root cause analysis process, to complement what is discussed in person with the jurisdiction and serves as another point of reference (in addition to the slides in the appendix):

What if any recommendations will come from the report?
Based on the identified root causes, peer assessment teams should make recommendations for changing protocols and processes for the future. These recommendations should be in line with what was discussed at the on-site meeting, and can also include the peer assessment teams own expertise. These recommendations should be documented to be discussed with the requesting jurisdiction. Recommendations should be actionable items. In making these recommendations, consider these elements:

- What lessons learned/recommendations can be generalized using the story arc?
- What actions might prevent similar weaknesses or build on strengths in future responses?
    - Consider the actions the department could have taken to create different outcomes
    - Consider the alternative actions the department could have taken
- What changes could be implemented prior to future events to change the outcomes later on?
    - Unlike typical AAR/IPs, peer assessment reports do not need to include every corrective action identified. Rather, since the purpose is to identify issues and potential solutions that might be relevant in other situations,

solutions that seem innovative and potentially generalizable to similar jurisdictions should be included.

- Should the response goals be different?
- In different circumstances, would this response have been appropriate?
- What do the lessons learned tell us about the underlying capacity of the system to respond when the above mentioned capabilities are stressed?

What Sort of Follow-up Discussion Should Occur to Ensure Accuracy?
The requestor will receive the peer assessment team's report, which will include a description of the incident and the root cause analysis report. The requestor should review this report and identify any issues that do not appear to accurately reflect what was discussed or any recommendations that do not seem appropriate for the jurisdiction. A follow up meeting via conference call will be scheduled to discuss these concerns and the process for implementing any recommendations.

A formal process may be needed for the requesting organization to "approve" the peer assessment team's report and ok it for distribution to registry or outside partners. This should be an agreed upon deliverable at the initial request and agreement to conduct a peer assessment.

EXAMPLE: Texas West Nile Virus outbreak

The peer assessors shared their root cause analysis diagrams and corresponding summary with the requesting practitioners. The requestors then commented on the diagrams and made a few substantive suggestions based on their perception of the meeting. The assessors considered these changes and after discussing them via teleconference with the requestors made the appropriate adjustments to reconcile the report.

Will There Be Additional Follow-up?
Additional follow up may be requested by the jurisdiction, CIR administrators, or peer assessment teams at the parties' discretion.

IIa. REQUESTOR JOB ACTION SHEET

Preparing for a peer assessment

As soon as possible following an incident:

- *Preparing an initial report*. The report should describe the incident you would like assistance reviewing, including the type of incident, capabilities assessed, and challenges involved. In some cases, a draft AAR that can serve this purpose may already have been completed.
  - The report should roughly follow the CIR entry outline: a brief summary of the incident including PHEP capabilities tested in the incident; a background section that includes the responding department's experience with this type of incident; a description of the incident that includes involved parties; and an internal assessment of the response to the incident.

Within six months of the incident:

- *Requesting an assessment*. You should contact a select group of peers that you think would be appropriate peer assessment team members. Three peer assessment team members will be your target number for the assessment. (If a CIR exists and has administrative staff, you should work with these administrators to identify appropriate peers and initiate discussions).
  - Consider individuals who are from similar jurisdictions or have experienced similar incidents themselves

Approximately 1 Month before the site visit:

- *Scheduling site visits.* You and the assessment teams will coordinate a site visit time. Site visits will ideally be at least one full day and include the three person peer assessment team.
  - To find a time that works for all parties:
    - You will provide potential dates for site visits and communicate with peer assessment teams via email or phone
      - The date that works for all involved will be selected and you will notify the requestors that this date works
    - Once a date is selected you will identify a location for the meeting to take place
      - Should an overnight visit be necessary, you will then work with requestors to find a hotel in close proximity to the meeting location
      - Note: CIR staff can assist in hotel reservations and transportation reservations when applicable

- *Establishing a meeting methodology.* To maximize the time and skill set of the assessment teams, you will most likely want to plan a facilitated lookback meeting. While the lookback is not required, it has been effectively used at both site visits. You should plan accordingly, and consider:
  - Inviting those who played key roles in the response, as well as participants with varying perspectives. Suggested meeting participants include:
    - Leaders of the emergency response from responding jurisdictions
    - Emergency responders
    - Representatives from the local jurisdictions outside of explicitly public health activities (environmental, public works, etc.), depending on the type of incident
    - State health workers involved in the response
    - Volunteer coordinators
    - Hospital representatives
    - Home health representatives
    - Coalition leaders
    - Government workers involved in emergency declaration activities (if applicable)

- Creating an invitation that includes: the purpose of the meeting, the time and location of the meeting, the "spirit of systems improvement" being explored in the meeting, and the no-fault zone that will exist during the meeting. A sample invitation is in the toolkit

Approximately 2 weeks before the site visit:

- *Document review.* Prior to the site visit, you will send the assessment teams additional information about your jurisdiction and incident
  - Additional documents that may be relevant to send include:
    - Relevant plans (to help assessment teams understand response activities and identify opportunities for improvement).
      - Items to consider include incident logs, timelines, etc.
    - Documentation of established partnerships activated during the incident (to provide additional context)
    - Data on relevant health and significant non-health outcomes, response activities, etc.
    - Media reports
    - Time line of major events
    - Current after action reports (should any exist)
    - Other relevant documents at the discretion of the requesting jurisdiction
- *One-on-One Discussion with Assessment teams.* Prior to the site visit, you will discuss your understanding of the incident with the assessment teams. This discussion will serve to establish:
  - The most effective on-site meeting format
    - Confirm if you are comfortable with the facilitated lookback process (see toolkit)
    - Do you believe one on one interviews are necessary as well?
    - Will there be time for pre- and post- debriefs with the assessment teams?
  - Key points for discussion during the site visit
    - You should share your thoughts on the incident
    - You should update the assessment teams as to what the parties who are attending the meeting are aware of
    - You should establish what capabilities were stressed during the incident
  - What information the meeting participants are aware of
    - Has the draft AAR been shared with these parties?
    - Is there any sensitive information not to be discussed?

Approximately 1 week before the site visit:

- *Establish attendees.* Create a rough attendance list for the meeting including the names of participants and their roles. Send an email reminder to all who were initially invited. Some reminders to consider:
  - Are all key parties represented based on your document review?
  - How will you identify participants at the meeting?
    - Create tent name cards for all those expected to attend and bring these to the meeting along with blank tent cards for any last minute attendees

- *Establish meeting schedule.* Create a rough agenda for the peer assessment teams visit including the time frame for the facilitated lookback and the time frame to have individual discussions if you and the assessment teams have deemed that necessary. Ordering lunch from a local caterer to be delivered to the meeting site or building in a block of time for participants to get their own lunch will help the meeting schedule run smoothly.

Peer Assessment activities on-site

Approximately 1 hour before the meeting begins:

- *Day-of meeting preparation.* The meeting space should include PowerPoint display, boards that can be written on during the discussion, and a roundtable set up. You will ideally set-up the room in the following way:
  - Chairs in the room should be organized so participants can face each other
  - Tent cards should be on-site for participants who attend to write their name and role on and should then be displayed at each individual's seat.
    - You should have a tent card as well

Meeting begins:

- *Meeting Duration.* During the meeting you are expected to participate in the same fashion as other participants. Consider the assessment teams questions thoughtfully and engage as you see fit. Your toolkit provides information on the slides that are to be used during the meeting.

Meeting Ends after approximately 5 hours:

- *Post Meeting On-site follow up*. If possible, after the meeting you should meet with the assessment team to share your perspective and clarify anything that may not have been clear during the meeting. It is at your discretion what to discuss at this point

Site Visit Follow Up

Within approximately 2 months after sight visit:

- *Discussing findings.* You will be sent an analysis report with root cause analysis diagrams and recommendations that has been compiled by the peer assessment teams to review
  - You should review this report for inaccuracies, items that you do not agree with, and for how realistic the recommendations are
  - Consider how this report reconciles with the AAR your jurisdiction has drafted, sharing the report with those who attended the meeting, and if you should revise your AAR
  - After reviewing the report, schedule a conference call with the assessment teams to discuss anything that you do not agree with the assessment teams on
    - Attempts should then be made to reconcile this disagreement
    - The report should not be filed until the requestors and assessment teams have agreed on the course of the discussion and appropriate recommendations

- *Filing the report.* After you and the assessment teams have agreed on the report, root cause analysis diagrams, and recommendations, the assessment teams will submit these documents to the CIR system.

- *Follow up.* Additional follow up may be requested by the jurisdiction, CIR administrators, or yourself at the parties' discretion.

IIb. ASSESSMENT TEAM JOB ACTION SHEET

Preparing for a peer assessment

Approximately 1 Month before the site visit:

- *Scheduling site visits.* If CIR staff availability is limited, you and the requestors will coordinate a site visit time. Site visits will ideally be at least one full day and include a three person peer assessment team.
  - To find a time that works for all parties:
    - You will be provided three potential dates for site visits and will then select a date that works for you. You will notify the requestors that this date works
    - Once a date is selected you will wait to be notified of the meeting location by the requestors
      - Should an overnight visit be necessary, you will then work with requestors to find a hotel in close proximity to the meeting location
      - Note: CIR staff can assist in hotel reservations and transportation reservations when applicable

Approximately 1- 2 weeks before the site visit:

- *Document review.* Prior to the site visit, you will review the preface to the peer assessment toolkit, the background document on a CIR entry, and document any additional questions relevant to this event.
  - Additional documents that may be relevant to review include:
    - Relevant plans (to help assessment teams understand response activities and identify opportunities for improvement).
      - Items to consider include incident logs, timelines, etc.
    - Documentation of established partnerships activated during the incident (to provide additional context)
    - Data on relevant health and significant non-health outcomes, response activities, etc.
    - Media reports
    - Time line of major events
    - Current after action reports (should any exist)
    - Other relevant documents at the discretion of the requesting jurisdiction
- *One-on-One Discussion with Requestors.* Prior to the site visit, you will discuss your understanding of the incident with the requestors of the review. This discussion will serve to establish:
  - The most effective on-site meeting format
    - Are you comfortable with the facilitated lookback process (see toolkit)?
    - Do you plan to conduct one on one interview as well?
    - Will there be time for pre- and post- debriefs with the requestors?
  - Key points for discussion during your site visit
    - Do you know what capabilities were stressed during the incident?
  - A rough attendance list for the in-person meeting
    - The requestors will have invited relevant parties
    - You should consider, are all key parties represented based on your document review?
  - What information the meeting participants are aware of
    - Has the draft AAR been shared with these parties?
    - Is there any sensitive information not to be discussed?

Peer Assessment activities on-site

Approximately 1 hour before the meeting begins:

- *Day-of meeting preparation.* The meeting space should include PowerPoint display, boards that can be written on during the discussion, and a roundtable set up. You will ideally assist requestors in the following room set-up:
  - Chairs in the room should be organized so participants can face each other
  - The three assessment teams should determine their roles for the meeting
    - One of you will be the note taker
    - One of you will be the discussion facilitator
    - One of you will be focusing on the root cause analysis process and probing the group on this process
    - If three assessment teams are on-site, you may determine among yourselves who will fill each role
  - Tent cards should be on-site for participants who attend to write their name and role on. Tent cards should then be displayed at each individuals' seat. You should have a tent card as well.

Meeting begins:

- *Meeting Facilitation.* The following process has been used successfully to facilitate the in-person lookback. A slide deck has been annotated for you and can be found in Appendix 3 (*link to template*). A sample completed slide deck can be found through Appendix 1, the WNV case study. It follows the below outline with rough time estimates:
  - Agenda
  - Objectives for meeting
  - Core questions to be discussed today
  - Ground rules for discussion
  - Introduction of participants

    (The above portion should take approximately 30-45 minutes)
  - Overview of root cause analysis, to explore issues for discussion
  - Root cause analysis diagram explanation (see section below for further details)
  - Root cause analysis diagram example from your experience
  - DOTMLPF in PHEP explanation
    - Explain this is another way to examine RCAs

    (The above portion should take approximately 30 minutes)
  - Review of timeline of events:
    - Probe which events were triggers for action
  - Figures or visuals representing event

    (The above portion should take approximately 15 minutes)
  - Discussion of first issue (capability or identified topic):
    - To initiate the conversation, you should consider probing the participants with following:
      - Who was involved
      - Why was this an issue
      - What factors contributed to this being an issue
      - What factors were in the departments control, what factors were unmodifiable but played a role
    - As the assessment team in the facilitator role you should then move on to the RCA process that has been introduced:
      - Define the story arc
      - Consider the organizational goal or objective and relevant PHEP capability

        - Identify the responders' response challenge to focus on
        - Discuss immediate causes of that challenge
        - Discuss contributing factors to those immediate causes
    - During the discussion, if you are tasked with observing root causes you should attempt to fill in the RCA diagram based on the discussion
        - You should then display the RCA diagram you have attempted to get feedback before moving on to the next issue

  (The above should take approximately 45 minutes to 1 hour)
- Discussion of second issue (repeat for as many issues as time for)
  (The above should take approximately 45 minutes to 1 hour)
  (Consider a lunch break here for approximately 30 minutes)
- Lessons Learned from discussions
- Action plan for the jurisdiction
- Feedback for you
- Your contact information to provide any additional comments
  (The above should take approximately 30-45 minutes)

Meeting Ends after approximately 5 hours

- *Post Meeting On-site follow up*. If possible, after the meeting you should meet with the leaders who requested the assessment to ask for any additional notes and how they believe the meeting went. It is at your discretion how to handle this conversation and the notetaker should share with the requestors anything that was unclear during the discussion

Site Visit Follow Up

Within approximately 1 month after sight visit:

- *Analysis Report.* You will draft and share an analysis report with the requesting jurisdiction. The report contains information gathered through the facilitated lookback and/or interviews. Please consider the following when drafting your report:
    - *Context:* Based on what you read prior to the site visit, and what you learned during the site visit, the report should start with a description of the jurisdiction.
    - This context should include the jurisdictional environment the health department operates in (home-rule, by state, etc.), the number of jurisdictions involved, information about the location of the health department, population served, and leadership of other agencies that were involved (i.e. public works, emergency responders, agriculture, etc.).
    - *Incident Description:* This should be a straight fact pattern of what happened during the incident that was discussed during the site visit.
    - *Re-iterating identified root causes:* You should follow the root cause analysis diagram and counter-factual approach in identifying the root causes in this incident.
        - This approach is discussed in Appendix 3 (slides) and in the analysis section above.
        - For many of the issues discussed during the site visit, you will notice there are similar root causes.
        - Include the actual root cause analysis diagrams in your report as an appendix
    - *Making recommendations.* Based on the identified root cause, you should make recommendations for changing protocols and processes for the future at the end of your report. These recommendations should be in line with what was discussed at the on-site meeting, and can also draw on your own. In making these recommendations, consider these elements:
        - What lessons learned/recommendations can be generalized using the story arc?

- What actions might prevent similar weaknesses or build on strengths in future responses?
  - Consider the actions the department could have taken to create different outcomes
  - Consider the alternative actions the department could have taken
- What changes could be implemented prior to future events to change the outcomes later on?
- Should the goals be different?
- In different circumstances, would this response have been appropriate?
- What do the lessons learned tell us about the underlying capacity of the system to respond when the above mentioned capabilities are stressed?

Within approximately 2 months after sight visit:

- *Discussing findings .* You should send your findings, which include a description of the incident and the root cause report to the requesting jurisdiction. You should then schedule a conference call with the requesting jurisdiction to discuss the report and anything that the requestors do not agree with you on. After this call:
  - Attempts should then be made to reconcile this disagreement
    - The report should not be filed until the requestors and assessment teams have agreed on the course of the discussion and appropriate recommendations

- *Follow up.* Additional follow up may be requested by the jurisdiction, CIR administrators, or yourself at the parties' discretion.

III. The Evidence Base for Peer Assessment in Public Health Emergency Preparedness

Background

The Institute of Medicine has defined the public health system as the "complex network of individuals and organizations that have the potential to play critical roles in creating the conditions for health" (IOM 2003). For public health emergency preparedness (PHEP) system, these organizations include not only federal, state and local health departments, but also hospitals and healthcare providers, fire departments, schools, the media, and many other public and private organizations (IOM 2008). In the last decade, organizations involved in public health emergency preparedness have worked hard to innovate and improve their processes, but most have not often systematically analyzed why innovations work (or do not work) or have a framework for disseminating lessons learned from their experience. As a result, "lessons learned" from public health emergencies often remain unlearned—or at least untranslated—to new emergencies and new organizations. The consequences may be avoidable morbidity and deaths or, at best, inefficient use of resources in a time when public health budgets are small and often shrinking.

To address these problems, and ultimately improve the public health system's ability to respond effectively to emergencies, the federal government's National Health Security Strategy (NHSS) calls on the nation's public health system—defined broadly as per the IOM—to adapt systematic quality improvement (QI) methods and a culture of QI to learn from experience in order to enhance the health security of our nation (DHHS 2009). As in healthcare more broadly and other industries, effective quality improvement in the PHEP system requires use of rigorous analytical methods that allow the system's performance to be assessed and compared over time and between jurisdictions. However, standard quality improvement methods such as learning collaboratives that are widely used in healthcare settings may not be appropriate in the context of public health emergency preparedness due to the lack of established evidence-based and agreed upon outcome and performance measures, the difficulty of carrying out rapid plan-do-study-act (PDSA) cycles and measuring associated outcomes (Stoto, 2013a).

Part of the problem is that public health emergencies are relatively rare and generally not repeated in the same manner and context. While routine hospital services can be studied and improved with statistical process and outcome measures, system improvement for rare events requires the in-depth study of individual cases (Berwick, 2003). When the focus is on improvement rather than accountability, and on complex PHEP systems rather than their components or individuals, qualitative assessment of the system capabilities of PHEP systems can be more useful than quantitative metrics (Stoto, 2013a). Qualitative methods can help probe *how* and *why* things happen by helping illuminate how causal mechanisms are triggered in varying contexts.

Effective PHEP system improvement, similarly, requires systematic methods for learning from individual organizations' experience in unusual situations. The challenges of learning from experience is not to determine what should have been done, but rather to identify and address underlying factors that could limit the system's ability to respond effectively to future events, which are likely to be different. For instance, while the specific challenges experienced during the 2009 H1N1 influenza pandemic were new, the response required combinations of some of the basic capabilities that had been tested in prior emergencies, such as the need to maintain communications with the public or provide epidemiologic situational awareness.

The limitations of current approaches also reflect the intrinsic difficulty of learning from unique event. One problem, for instance, is the lack of "counterfactuals," knowledge of what would have happened under another response. Analyses of public health emergency responses, moreover, must take into account additional challenges such as the common need for a multi-jurisdictional, multi-sectoral response, involving the entire emergency preparedness system, making it is difficult to know what the best approach would have been (Stoto,2012). Here too, qualitative methods can be a useful complement to quantitative approaches, whose strength lies in identifying patterns of variation in, and covariation among, variables.

Although qualitative methods are often criticized as insufficiently rigorous and transparent, there is a well-established body of social science methods that can help to ensure rigor in qualitative research. Gilson and colleagues (2011) summarize a series of concrete processes for ensuring rigor in case study and qualitative data collection and analysis (see Box 1). Because the focus is on public health systems rather than individuals, Yin's (2009) classic book on case study methods, now in its 5th edition, is also relevant. March and colleagues (1991) and Weick and Sutcliffe (2001) offer more specific suggestions for studying unique incidents. Stoto, Nelson, and Klaiman (2013) discuss the application of these methods to PHEP. They stress a family of "theory oriented" evaluation methods that use program theory to guide questions and data gathering, and which insist on explicating the theories or models that underlie programs, elaborating causal chains and mechanisms, and conceptualizing the social processes implicated in the program' outcomes (Dixon-Woods, 2011). One well-known member of this family is known "realist evaluation." Developed by Pawson and Tilley (1997), this perspective places the focus of research and evaluation less on relationships among variables than among exploration of the causal mechanisms that generate outcomes. The perspective also recognizes that mechanisms that can be "fired" successfully in one context may not work well in other contexts.

Box 1. Processes for ensuring rigor in case study and qualitative data collection and analysis (adapted from Gilson, 2011)

- *Prolonged engagement with the subject of inquiry*. Although ethnographers may spend years in the field, HPSR tends to draw on lengthy and perhaps repeated interviews with respondents, and/or days and weeks of engagement within a case study site
- *Use of theory*. To guide sample selection, data collection and analysis, and to draw into interpretive analysis
- *Case selection*. Purposive selection to allow prior theory and initial assumptions to be tested or to examine ''average'' or unusual experience
- *Sampling*. Of people, places, times, etc., initially, to include as many as possible of the factors that might influence the behavior of those people central to the topic of focus (subsequently extend in the light of early findings) Gather views from wide range of perspectives and respondents rather than letting one viewpoint dominate
- *Multiple methods*. For each case study site: Two sets of formal interviews with all sampled staff, Researcher observation & informal discussion, Interviews with patients, Interviews with facility supervisors and area managers
- *Triangulation*. Looking for patterns of convergence and divergence by comparing results across multiple sources of evidence (e.g., across interviewees, and between interview and other data), between researchers, across methodological approaches, with theory
- *Negative case analysis*. Looking for evidence that contradicts your explanations and theory, and refining them in response to this evidence
- *Peer debriefing and support*. Review of findings and reports by other researchers
- *Respondent validation*. Review of findings and reports by respondents
- *Clear report of methods of data collection and analysis* (audit trail). Keeping a full record of activities that can be opened to others and presenting a full account of how methods evolved to the research audience

In support of the peer assessment approach presented in this toolkit, this section presents four specific approaches that draw on this social science/evaluation theory literature: case study research, peer assessment, root cause analysis, and facilitated lookbacks. The following section discusses how analyses based on these approaches can be shared and further studied in a Critical Incident Registry.

Case study research

Stoto and colleagues (2005) used a qualitative case study approach of the public health responses to West Nile virus, SARS, monkeypox, and Hepatitis A to measure PHEP goals and objectives, as well as the capabilities and capacity-building activities intended to assure those goals and objectives. They conducted site visits in six states, and at least two local areas within those states, that illustrated the range of the public health response. Site visits were conducted by two- or three-member teams of RAND scientists using a detailed discussion guide as described below. These teams collected information through in-person interviews with senior officials of the selected health departments and others in the communities nominated by the health departments. These interviews were conducted individually or in groups, depending on the preferences of the state and local officials. Telephone interviews were scheduled with key informants who were not available during the visit. Before, during, and after the site visits, team members gathered information regarding the nature and extent of the public health departments' emergency response activities for as many of the outbreaks as were relevant, including information on the departments' interactions with HHS and other federal agencies and other public or private entities. The teams also gathered materials prepared by the health departments during the outbreaks (for both internal and external use), analyses extracted from relevant reports and publications, and other materials.

Peer assessment

Ensuring objective, systematic, and reliable analyses of critical incidents can be challenging if health officials are evaluating their own response (Piltch-Loeb, 2013). As an alternative, evaluation by peers in similar jurisdictions offers the potential for objective analyses by professionals familiar with public health preparedness as well as the particularities of the system's being assessed and, at the same time, can be an effective way to share best practices to support and amplify technical assistance provided by CDC.

Our research has indicated that such peer assessments can be both reliable and objective. In one example, the Health Officers Association of California (HOAC, 2007) conducted in-depth emergency preparedness assessments in 51 of the state's 61 LHDs. LHDs included in this report were assessed between November 8, 2005 and October 26, 2006. The primary purpose of the project was to assess public health emergency preparedness in each LHD relative to specific federal and state funding guidance and identify areas needing improvement. A structured assessment instrument, keyed to the CDC and HRSA 2005-06 Guidance, was used to examine the extent of LHD capacity and progress in preparedness. The instrument included performance indicators and a 4-point scoring rubric (from minimally to well-prepared) for quantifying the results. Teams of three to four consultants from a small corps of expert public health professionals recruited for this project made 2-day site visits to the LHDs that volunteered to participate in the assessment. The assessment methods included utilizing the assessment tool to guide interviews with multiple levels of LHD staff, reviewing local preparedness-related documents, and directly observing. An LHD-specific written report of findings and recommendations was prepared and sent to each participating LHD within 6-8 weeks of the site visit.

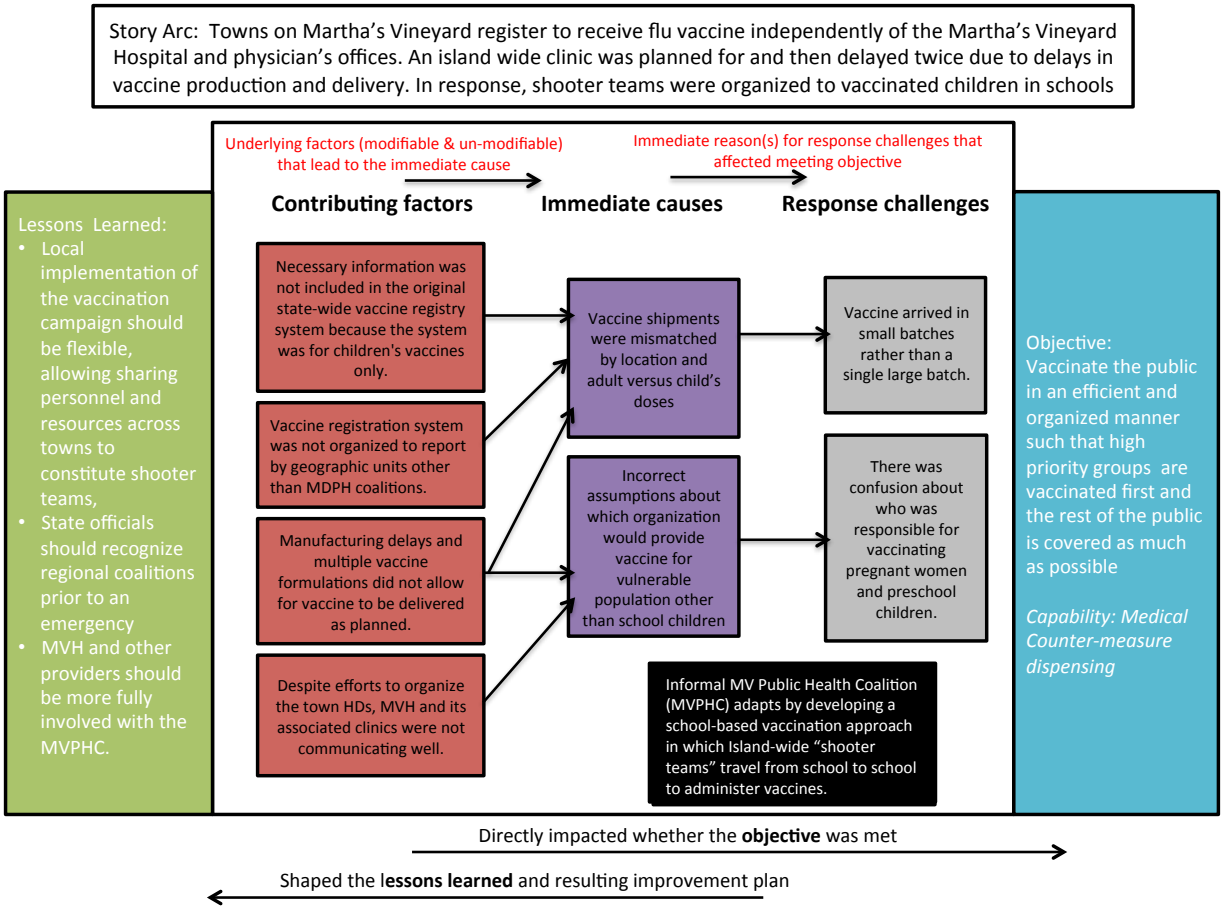
Root Cause Analysis

Root cause analysis can be used to support many of the new approaches already discussed. Many strategies have been described for deep, probing analyses about what caused a negative outcome or engendered a positive one. Root cause analysis (RCA) is familiar to many in the healthcare sector because both the Joint Commission and Department of Veterans Affairs require RCAs for certain clinical events (Wu, 2008). The general goal of RCAs is to move from superficial, proximate causes to system-level root causes by repeatedly asking why each identified cause occurred (Crouteau, 2010). In principle, RCAs should facilitate significantly better learning from a single incident, but they sometimes fail to do so. In particular, researchers have identified

discrepancies in analysis, dependent on experience and organizational expectations; limited rigor; and practical barriers, such as scarcity of time and resources (Wu, 2008). There is often a tendency to simplify explanations about critical incidents, either by discounting information that does not conform to pre-existing beliefs or by failing to examine a problem from multiple perspectives (Weick, 2001) and to blame failures on situational factors instead of identifying opportunities for systems improvement (Edmondson, 2010). While these are not inevitable problems, they do highlight the need for tools and processes intended to help root causes to be responsive to common challenges faced when conducting RCAs, and highlight the persistent issues that arise from a lack of training in retrospective analysis.

To illustrate the approach to root cause analysis described in this toolkit, consider the case study that our group prepared on the public health system response to the 2009 H1N1 pandemic on Martha's Vineyard, an island of 16,000 residents in Massachusetts (Higdon, 2013). The public health emergency response objective was to vaccinate the public in an efficient and organized manner such that high priority groups are vaccinated first and the rest of the public is covered as much as possible, an example of *CDC PHP Capability: Medical Counter-measure dispensing.* As is discussed in more detail in Higdon and Stoto (2013), the six town health departments registered as a single entity to receive vaccine supplies from the state, but separately from the island's only hospital, one pediatrician, and the Wampanoag Indian tribe. An informal Martha's Vineyard public health coalition (MVPHC), representing the towns and the tribe but not the hospital or other providers, planned a single island-wide vaccine clinic. But when vaccine deliveries were delayed and came in small units, the coalition switched to a school-based vaccination strategy in which "shooter-teams" drawing on all of the towns vaccinated the children in each school depending on the number and type of vaccine that arrived. The hospital was not aware of the change in plans and made inconsistent assumptions about which organization would provide vaccine for vulnerable population other than school children, which caused confusion. A root-cause analysis, summarized in Figure X, suggested the following lessons from this experience.

- Local implementation of the vaccination campaign should be flexible, allowing sharing personnel and resources across towns to constitute shooter teams,
- State officials should recognize regional coalitions prior to an emergency
- Hospital and other providers should be more fully involved with the MVPHC.



Facilitated Lookbacks

A facilitated lookback is an established method for examining public health systems' emergency response capabilities and for conducting a candid systems-level analysis. Through the use of a neutral facilitator and a no-fault approach, dimensions of decisions are probed and nuances in past decision-making explored in detail through discussions with public health leaders and key staff, as well as a variety of community stakeholders involved with the response. A brief chronology of the events that occurred is reviewed during this session. The facilitator guides the discussion and asks probing questions surrounding key issues about what happened at various points in the chronology that was presented, key decisions that were made by various stakeholders, and how decisions were perceived and acted upon by others, and lessons-learned are elicited (Aledort, 2006).

By way of illustration, we describe a facilitated lookback meeting that was conducted in Boston in May, 2010, one of three such meetings conducted to provide information for the Massachusetts Department of Public Health 2009 H1N1 AAR/IP. The objectives were (1) to conduct systems-level analysis of state/local/private sector responses to 2009-2010 H1N1 pandemic; (2) to identify lessons applicable to both pandemic and public health preparedness generally, and (3) to identify opportunities and goals for improvement. The ground rules stressed the importance of a "systems improvement spirit," specifically:

- There is no perfect response to pandemic
- Participants will have different perspectives
- Open and honest dialogue and feedback
- Ask questions and challenge one another

- No one singled out, blamed, or penalized
- Action plan based on what is learned is needed.

Following a review of the timeline of the response and some statistical data, participants addressed five sets of issues: vaccine priorities and distribution; vaccine administration and clinic management; staffing and surge issues; communication with the public; and communication within the public health system. For each of these topics, the following core questions framed the discussion:

- Brief overview of your "normal" activities, roles and responsibilities
- What went well? Why?
- What could have gone better? What could have been done differently? What were the underlying problems?
- What systems changes are needed to improve future performance?

Together with information from a series of individual and group interviews, as well as the Martha's Vineyard case above (Higdon and Stoto, 2013), information from the facilitated lookbacks led to the identification of both successes and problems in the Massachusetts response efforts. Most of the challenges came from the inability of health officials to track and forecast vaccine distribution effectively. Large healthcare delivery organizations made use of electronic medical records to automatically schedule vaccination appointments and notify patients. Community health centers with less advanced technology took advantage of their relationship with their clients to overcome reluctance to accept the vaccine. Despite a fractured public health "system" on Martha's Vineyard, local health and school officials worked together to share resources such as vaccination teams that would go from one school to another as vaccine became available. The analysis also illustrates the challenges of managing the distribution of vaccine when the timing and amount of vaccine to be delivered was uncertain and identifies a number of lessons about community resilience. In particular, it shows the need to balance precise policies with flexible implementation as well as the importance of local involvement in decision-making and increasing the transparency of communications. The case illustrates the importance of building community capacity strong community-wide partnerships to address persistent public health problems. More generally, the case illustrates both the value of previous investments in building the public health's system's social capital as well as the need for more.

A Critical Incident Registry for PHEP

Other fields have found ways to learn from rare events, and they may provide a model for the public health emergency preparedness system. Aviation is probably the most prominent example. In the mid-1970s, almost 1,000 people died a year from air crashes around the world. Today, that number has been cut in half even though the number of flights has dramatically increased (Boeing 2012). Air safety has improved in large part because of the use of critical incident registries (CIRs), which are used to identify and systematically analyze rare events—and responses to them—to drive learning and systems improvement. Through use of such registries, the airline industry has become adept at drawing system-wide lessons from single incidents, and piecing together system improvements from seemingly innocuous occurrences observed across multiple accidents or close calls (Wald 2007).

Because of their success in aviation safety, critical incident registries have also been adopted in other industries, including other sectors of transportation, healthcare, and workplace safety. They are currently used by public and private sector organizations including the Federal Aviation Administration, National Transportation Safety Board, National Aeronautics and Space Administration, the Food and Drug Administration, and the Federal Bureau of Investigation. In health care the Joint Commission, the Veterans Health Administration and the New York Chapter of the American College of Physicians maintain registries. Though these registries take different forms, depending on the practical context, all

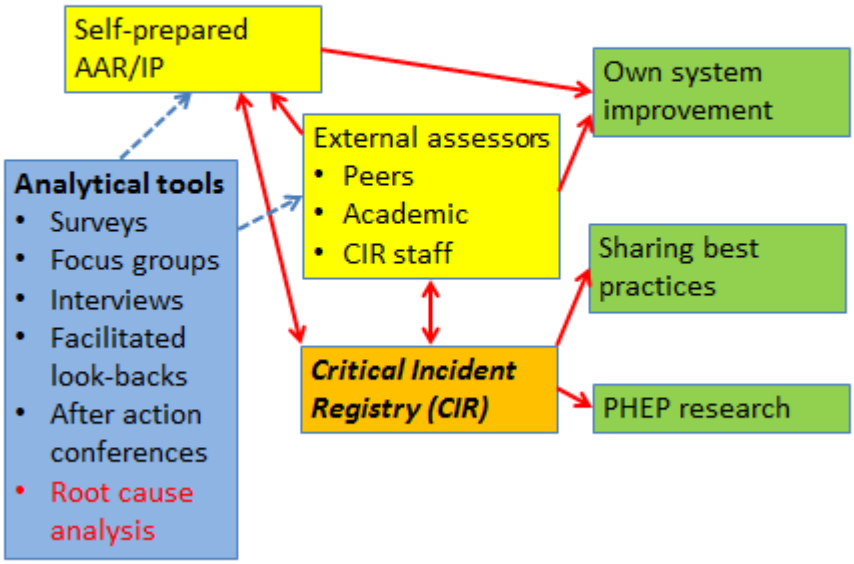
are designed to facilitate learning from relatively infrequent events. The major applications of CIRs in different sectors include: (1) understanding contexts and mechanisms that drive successful and unsuccessful practices within system; (2) identifying and sharing best practices; (3) driving individual and organizational improvement; and (4) describing the frequency and nature of incidents. An important part of the success of critical incident registries is their use of root cause analysis, which moves from superficial, proximate causes to system-level root causes by repeatedly asking why each identified cause occurred (Croteau 2010).

The success of critical incident registries in other fields suggests that a properly designed PHEP CIR could support broader analysis of critical public health incidents, facilitate deeper analysis of particular incidents and stronger improvement plans, and help to support a culture of systems improvement. In particular, by encouraging root cause analyses and sharing the results of those analyses with others through a database, a PHEP CIR could be a valuable approach for systems improvement. It may also facilitate better investment of scarce resources in approaches most likely to be effective.

However, while systems for sharing lessons from emergency responses currently exist, none have all of the characteristics of successful CIRs. For instance, in order to share lessons learned about public health preparedness, the National Association of County and City Health Officials maintains a collection of local health departments' reports of "successful practices" from the H1N1 pandemic and other events. This collection is designed for quick suggestions and hypothesis generation about best practices, but root cause analysis and in-depth evaluations are neither required nor typically included. The DHS LLIS system includes relatively few public health incidents and, as illustrated with the problems observed by Savoia and colleagues (2012) in their analysis does not encourage deep analysis. Indeed, as was seen in the 2009 H1N1 AAR/IPs discussed above, root causes are often not explored in PHEP. Thus, there remains a need for an approach that, in addition to capturing events and responses in a more usable way, also provides an analytical method for extracting lessons from reports about how the PHEP system responded to specific incidents.

Critical incident registries consist of a database of reports about the response to individual incidents that are submitted by the public health agencies responding to the emergency. As illustrated in Figure 1, peer assessments are one way that incident reports might be generated.

Figure 1. How a CIR could enhance learning from experience in PHEP



To be effective, registries require standard protocols for analysis of critical events and probing analysis that can enable the translation of lessons to identify patterns of successes and failures are needed. In order to provide enough information for a credible analysis, experience in other fields and discussions with public health practitioners suggest that standard CIR reports should consist of four parts: a brief summary, a background/context section, a description of the incident, and an analysis of the PHEP system's role in the incident. The abstract-length summary is condensed overview of the incident, what PHEP capabilities were tested, significant contextual factors, and the key findings derived from analyzing the incident. It would be searchable by researchers and practitioners seeking to identify trends across similar incidents or lessons that might be applicable to a current or anticipated incident, as is common in the three aviation databases. The background would provide the contextual information (such as the type and size of the health department, community resources and characteristics, nature of the pathogen) needed to analyze the system's performance. The incident description provides a concise explanation of the incident, including a timeline of how the incident unfolded and relevant changes throughout the incident, and sufficiently detailed on both the incident's key events and health system context in order to critically analyze the PHEP system's response. Finally, the analysis section employs root-cause analysis to provide a deep analysis of whether and why particular PHEP capabilities were successfully employed in response to the incident (Piltch-Loeb, 2013). Unlike typical AAR/IPs, CIR reports do not need to include every corrective action identified. Rather, since the purpose is to identify issues and potential solutions that might be relevant in other situations, solutions that seem innovative and potentially generalizable to similar jurisdictions should be included.

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Appendix 1. TEXAS WEST NILE VIRUS CASE STUDY

Requestor: Texas State Department of State Health Services (on behalf of local health departments in the Dallas-Fort Worth Metroplex)
Assessor: Harris County Public Health & Environmental Services

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Abstract

In the summer of 2012, the Dallas-Fort Worth Metroplex experienced a severe West Nile Virus (WNV) outbreak in which more than 1,868 confirmed cases of West Nile disease and 89 WNV-related deaths were reported.

The incident stressed a number of *public health preparedness capabilities* including

- Public Health Laboratory Testing (CDC PHP capability 12) and Public Health Surveillance and Epidemiological Investigation (CDC PHP capability 13), limiting the state and local public health system's to provide situational awareness to guide response efforts;
- Vector control (CDC PHP capability 11: Non-Pharmaceutical Interventions), including aerial spraying and other mosquito control activities;
- Emergency Public Information and Warning (CDC PHP capability 4) to communicate ways that residents could use to protect themselves; and
- Emergency Operations Coordination (CDC PHP capability 3) and Information Sharing (CDC PHP capability 6) to coordinate efforts between and among state and county public health and other public and private organizations.

Lessons for system improvement from an analysis of this incident include the need for:

- clear, comprehensive, mosquito-centric, uniform data systems;
- a central incident command system in each county that then coordinates with the state regional office and with the other counties;
- pre-determined science-based triggers for mitigation efforts as well as mutual assistance plans with spraying companies and among counties; and
- a means to share information with other jurisdictions locally, with the state, and nationally.

Context

Although West Nile Virus cases were reported throughout Texas in 2012, the outbreak was especially severe in the three counties in the Dallas-Fort Worth Metroplex (Dallas, Tarrant, and Denton), which together are referred to as the "Metroplex." West Nile virus and other mosquito-borne diseases are rare in the Metroplex. It was the first time in over forty years that some mitigation activities, such as aerial spraying, had been considered or used as a vector control activity to prevent disease.

Dallas County, the largest of the three has a population of approximately 2.4 million, Tarrant County, which includes Ft. Worth, has approximately 1.8 million people, and Denton County has approximately 600,000 people and is more rural than the others. Each county includes dozens of cities. Texas counties are governed by an elected council and judge (county executive officer).

Dallas County has its own department of health, which has independent relationships with laboratories, and outside contractors. Tarrant and Denton counties each

has its own public health department, but relies on the state for lab support and other resources. Texas is a home-rule state in which the Texas Department of State Health Services (DSHS) supports local jurisdictions in their public health decisions. There are hundreds of jurisdictions within the state of Texas, each with their own decision making structure and public health department or service. Many counties do not have public health departments, and DSHS has regional offices (including one for the Metroplex) to support these jurisdictions.

Incident Description

The 2012 West Nile Virus season in Texas was the most severe on record. A total of 1,834 human cases were confirmed throughout the state between June and December 17, 2012, including 836 neuroinvasive cases and 86 deaths. Many factors influenced the severity of this outbreak, including the prolonged drought, high temperatures, active mosquito population, and other environmental issues. In addition, many of the human cases occurred in areas of the state where the number of WNV cases is typically low, particularly the Dallas-Fort Worth Metroplex which saw more than 1,868 confirmed cases of West Nile neuroinvasive disease and 89 WNV-related deaths were reported.

During the spring and early summer of 2012, the Dallas, Tarrant, and Denton county health departments and DSHS performed routine surveillance and epidemiologic activities related to WNV. DSHS executive staff were first notified of an increased number of cases of human WNV infection in July. As a result, conversations and planning activities were initiated among DSHS Health Service Region (HSR) leadership, local health department leadership, emergency management agencies, and local elected officials. Once WNV was suspected, surveillance data poured in to the state from counties throughout Texas, in a variety of formats. In some locations such as Dallas County, local lab capacity supported rapid polymerase chain reaction (PCR) testing, but other locations did not have this capacity and relieved heavily on state labs. The DSHS lab routinely performs culture based testing of mosquito samples as part of the CDC Arbovirus Mosquito Surveillance Network. The state lab did begin PCR testing of mosquito pools once the outbreak was identified. DSHS activated the State Medical Operations Center (SMOC) and its public health emergency preparedness functions on August 9, 2012, the same day Dallas County Judge Clay Jenkins declared a public health emergency. This signaled that the outbreak had reached a critical milestone and that normal control and abatement measures at the local level might not be adequate to prevent an increasing incidence of disease or avert increasing numbers of death related to the neuroinvasive form of the disease. To support the response to this outbreak, DSHS staff in Austin and the health service regions began a multi-faceted approach to support local health departments and elected officials to prevent, mitigate, and respond to the outbreak. DSHS liaisons were activated to coordinate the response between counties, and DSHS Rapid Assessment Team (RAT) was deployed to the Metroplex on August 14 to help coordinate and integrate response activities in the region.

Despite substantial push back from citizens in parts of the community, two counties chose to conduct aerial spraying. It began first in Dallas County on August 16, with the DSHS having contracted with Clarke Aviation, a global environmental products and services company. Denton County declared a disaster declaration on August 22, but weather delayed spraying until August 31. The SMOC was de-activated on September 11.

Timeline

July 2012

- *DSHS leadership notified of increased testing of mosquitos and the increase in mosquitos testing positive for WNV*
- *DSHS leadership initiates planning activities with health service regions, local health departments, emergency management official, and elected officials in the impacted areas of the state*

August 9, 2012

- *DSHS activates the State Medical Operations Center*
- *Dallas County Judge, Clay Jenkins, declares a public health emergency in Dallas County*

August 14, 2012

- *A DSHS Rapid Assessment Team (RAT) deploys to the Metroplex for two weeks to serve in a liaison role*
- *In this liaison role, DSHS is able to help coordinate and integrate response activities in Dallas and Denton counties*

August 16, 2012

- *Aerial spraying begins in Dallas County*

August 22, 2012

- *Denton County Judge, Mary Horn, declares a disaster declaration in Denton County and requests aerial spraying*

August 31, 2012

- *Aerial spraying beings in Denton County*

September 11, 2012

- *DSHS State Medical Operations Center is deactivated*

Analysis

On May 13, 2013 a facilitated lookback meeting was conducted in Arlington, Texas to review the public health system response to the incident. DSHS and each of the three county health departments were represented, along with Dallas county judge Clay Jenkins. The meeting was facilitated by a peer assessor from Harris County, Texas, with the assistance of research staff from Georgetown University. Following a review of the epidemiological facts and timeline, three issues were discussed in detail: surveillance, mitigation efforts (including aerial spraying), and communicating with the public.

Surveillance

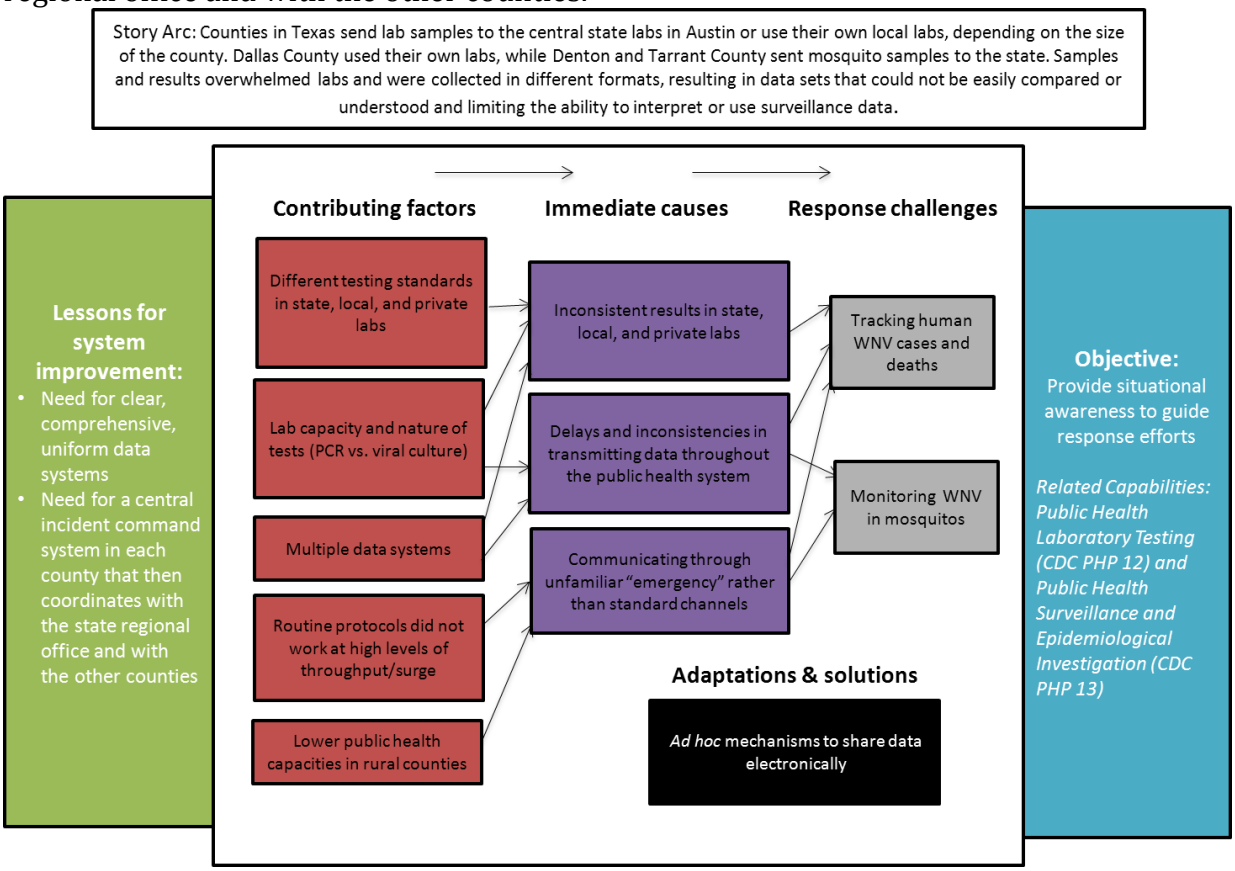
In order to track the spread of West Nile virus through the community, and to provide situational awareness to guide response efforts (*objectives*), state and local health departments utilized reports of human WNV cases and the results of mosquito testing. The *response challenges* in this incident were in obtaining consistent and reliable data to track human WNV cases and deaths and in monitoring WNV in mosquito pools to guide local control efforts.

There were a number of *immediate causes* for the problems encountered. First, laboratory testing in Texas is done in a combination of state, county, and private laboratories, depending on the size of the county, each operated under a different time frame. Dallas County was able to test all of their own samples, Tarrant County had a lab with limited processing capacity so some of their samples were sent to the state, and

Denton County did not have their own capacity. There were also differences between procedures used for diagnostic testing of mosquito pools; some labs used polymerase chain reaction (PCR) while others used a different method to culture the virus. Differences among laboratories in testing procedures and standards led to delays n the results. Communicating results from all of these laboratories to the appropriate local health department took time, and communication through unfamiliar emergency channels complicated the process. To address these problems, *ad hoc* mechanisms were developed during the outbreak to share surveillance data among the local health departments and DSHS – once any jurisdiction received a report it was blast e-mailed to all of the others (*adaptations and solutions*), but only late in the incident.

A variety of *factors contributed* to this situation. Some are in the nature of surveillance and laboratory testing, and are unchangeable at least in the near term: different testing standards in state, local, and private labs; differences in laboratory capacity (and generally lower public health capacities in rural counties) and the nature of tests (PCR vs. viral culture); and routine protocols did not work at high levels of throughput/surge. The existence of multiple data systems, on the other hand, might be changed to prepare for future events, or expected and compensated for.

Taking this into account, the analysis of public health surveillance and laboratory capacities suggested two *lessons for improving public health system* in preparation for future events: the need for (1) clear, comprehensive, uniform data systems and (2) a central incident command system in each county that then coordinates with the state regional office and with the other counties.



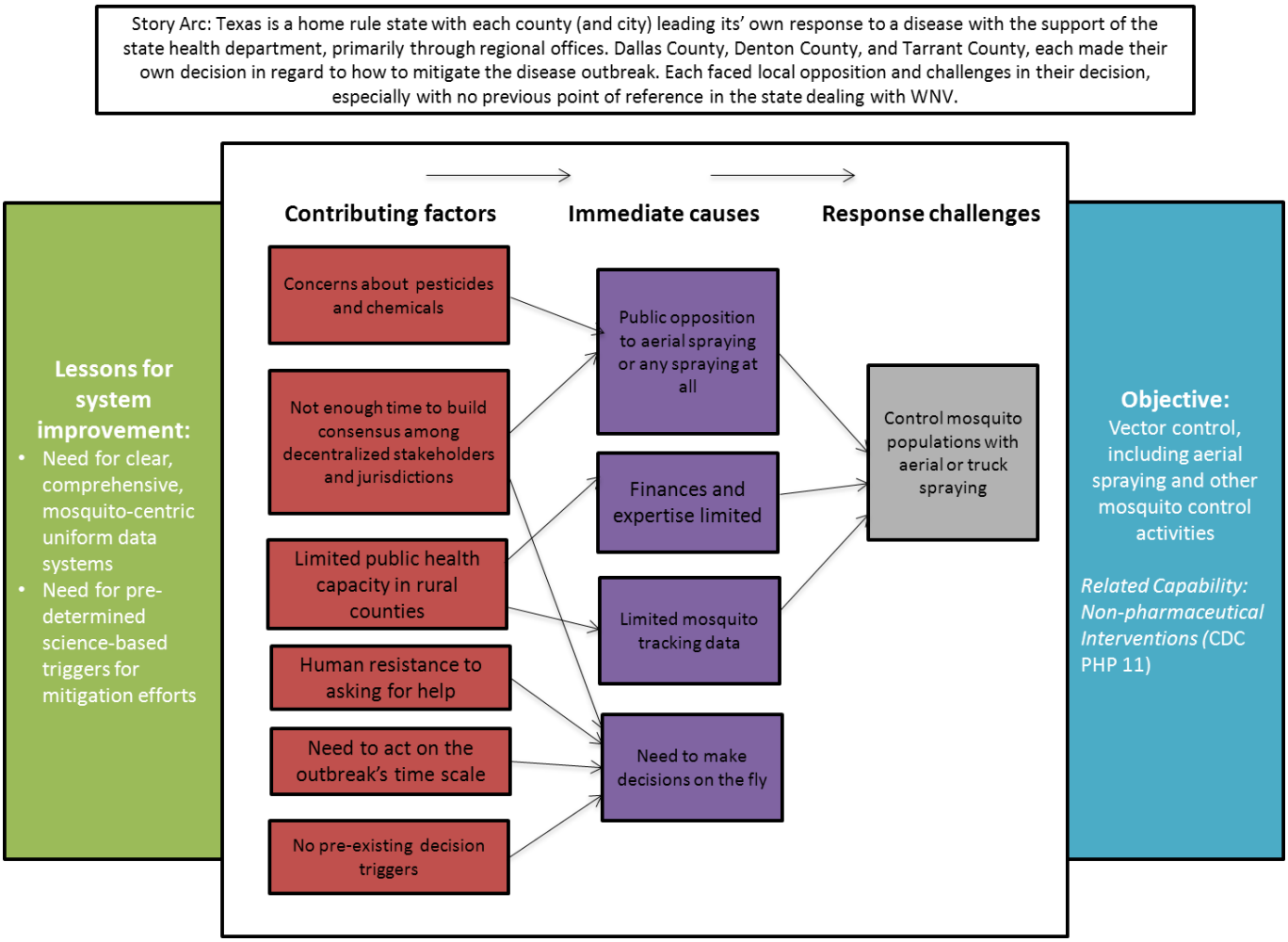
Mitigation

Once the scale of the WNV outbreak was known, officials had to make decisions about how to control the mosquito population (*objective*). In particular, the *response challenge* was whether to utilize aerial spraying, which had not been done historically in the Dallas-Fort Worth Metroplex, or to use truck spraying. This decision had to be made separately in each county and in consideration of the independence of each county and the cities in each county.

Four *immediate causes* influenced this public health system's response. First, there was public opposition to all forms of spraying and especially to aerial spraying. Second, there were questions about the financial implications of spraying and only limited expertize about how this should be done. Third, there was only limited mosquito tracking data to guide decisions on where and when to spray. Finally, the pressing time frame required decisions to be made "on the fly."

A variety of *factors contributed* to this situation. Some are unchangeable at least in the near term: public concerns about pesticides and chemicals in general, limited public health capacities in more rural counties such as Denton and Tarrant, and natural human resistance to asking for help from an organization outside of a person's normal realm. In addition, although there was a need to act quickly because of the time scale of the outbreak, there were no pre-existing decision making triggers (i.e. if there are a certain number of identified cases then aerial spraying should take place, etc.). As a result, there was not enough time to build consensus among decentralized community members, organizational stakeholders such as businesses or the hospital, and the various counties.

Taking this into account, the analysis of mitigation efforts suggested two *lessons for improving public health system* in preparation for future events: the need for (1) clear, comprehensive, uniform data systems that include mosquito data and (2) science-based triggers for spraying, as well as mutual assistance plans with spraying companies and among jurisdictions for times when spraying is necessary.



Communicating with the public

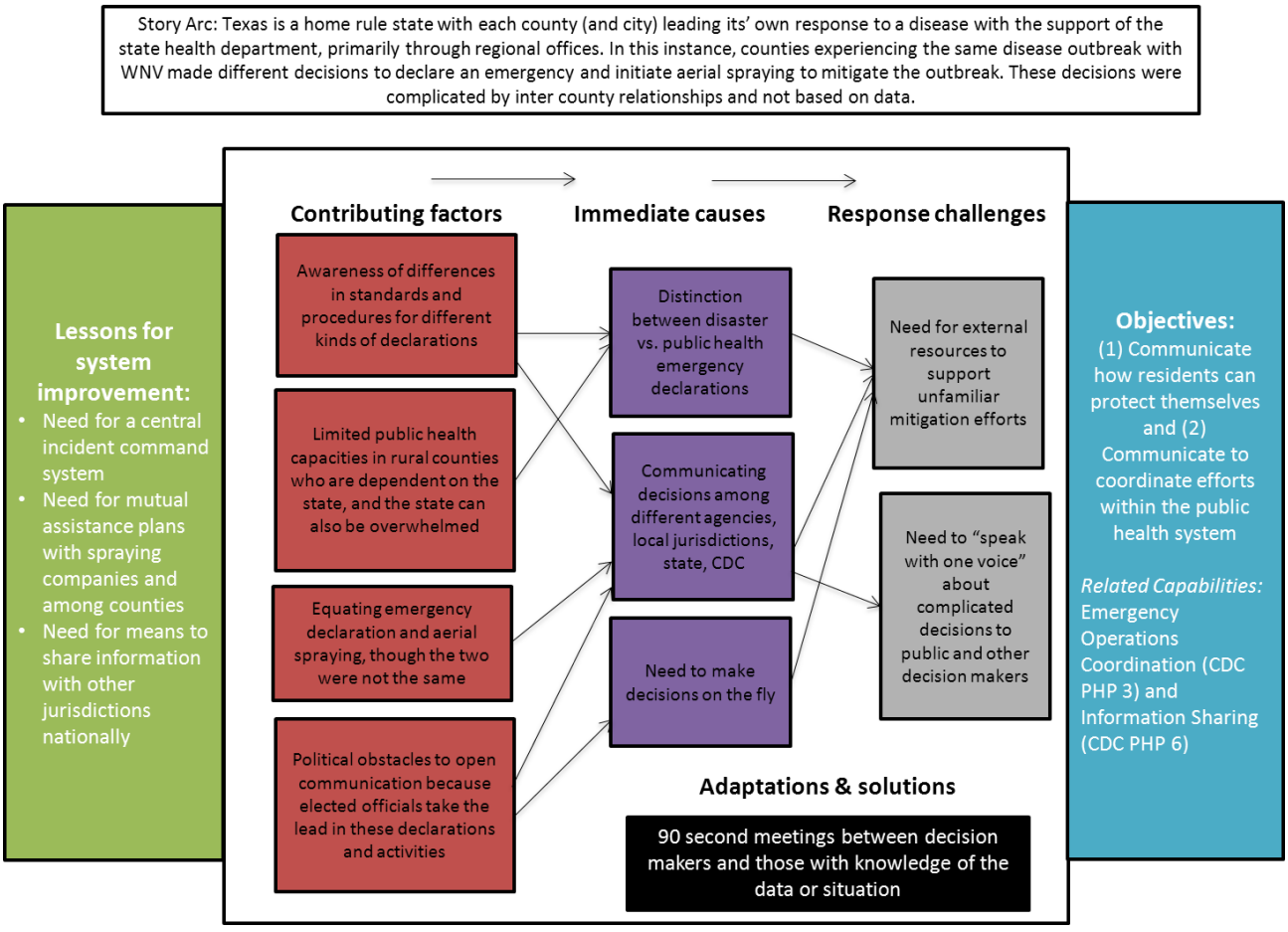
The final set of *objectives* were to communicate with residents about how they could protect themselves from West Nile virus and to communicate within the public health system to coordinate efforts between and among state and county public health and other public and private organizations. These objectives set up two *response challenges.* First, health officials needed external support for unfamiliar mitigation efforts, which required a unity of purpose. Second, although complicated decisions were being made independently in three counties (e.g. Dallas County decided to engage in aerial spraying significantly before the other two counties), there was a need to speak to the public with one unified voice.

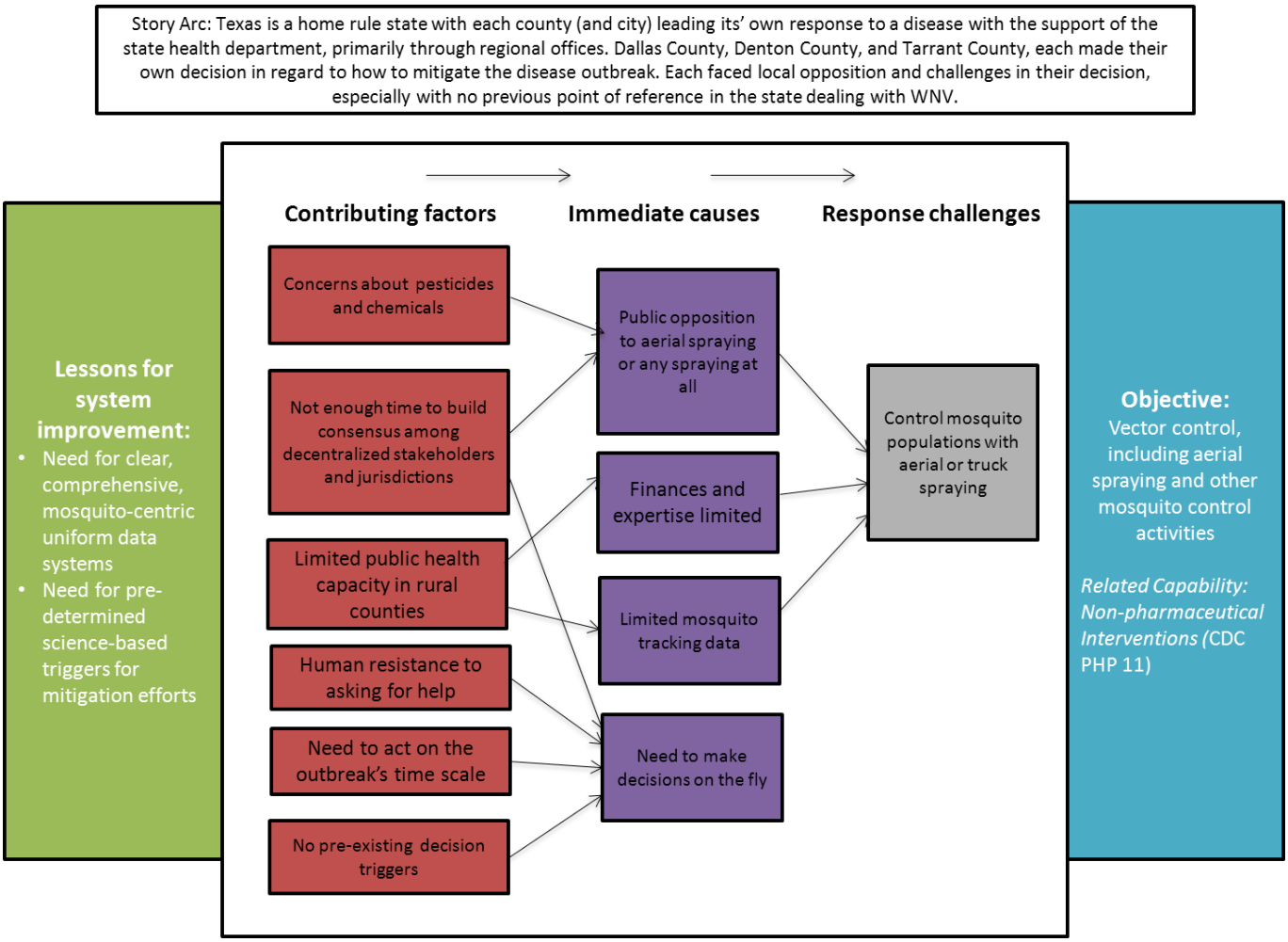
Three *immediate causes* contributed to these response challenges. First, there was confusion about the distinction between a disaster declaration and a declaration of a public health emergency. Second, each of the jurisdictions was communicating separately with the state health department and CDC officials. Finally, as noted above, was the need to make disease mitigation decisions on the fly. To address these issues, elected officials and public health personnel began holding very brief meetings between decision makers and

those with information on data or processes. These meetings (*adaptations and solutions*) occurred both within and between counties and helped to spread information among key personnel as rapidly as possible.

A variety of *factors contributed* to this situation. One factor was unchangeable at the local level at least in the near term: the limited public health capacities in rural counties that are dependent on the state health department, which can also be overwhelmed. Two other factors reflected a lack of awareness, of the difference in standards and procedures for different kinds of declarations, and that an emergency declaration and a decision to use aerial spraying were not equivalent. The final factor was political obstacles to open communication about the emergency declaration and aerial spray decision because elected officials take the lead in making these official decisions.

Taking this into account, the analysis of mitigation efforts suggested three *lessons for improving public health system* in preparation for future events: the need for (1) a central incident command system in each county that then coordinates with the state regional office and (2) mutual assistance plans with spraying companies and among jurisdictions for times when spraying is necessary. This analysis also identified the need for (3) a means to share information with other jurisdictions locally, with the state, and nationally.





Communicating with the public

The final set of *objectives* were to communicate with residents about how they could protect themselves from West Nile virus and to communicate within the public health system to coordinate efforts between and among state and county public health and other public and private organizations. These objectives set up two *response challenges.* First, health officials needed external support for unfamiliar mitigation efforts, which required a unity of purpose. Second, although complicated decisions were being made independently in three counties (e.g. Dallas County decided to engage in aerial spraying significantly before the other two counties), there was a need to speak to the public with one unified voice.

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