Laboratory Response Network for Chemical Threats (LRN-C)

Level 3 Resource Handbook

APRIL 2020

APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES®

HANDBOOK UPDATES:

March 2015

- CDC blood and urine shipping guidelines and the specimen collection document (Appendix F, G, H)

February 2018

- Updated information about the ERLN
- Added information about the WLA
- Updated LRN-C information from CDC website, including Appendix F, G, H
- Added an acronyms appendix (Appendix J)

October 2018

- Updated the CT Coordinator's Role in Training and Jurisdictional Planning
- Exercises and Evaluation
- Added Biomonitoring
- Updated Appendix E
- Added Appendix K

April 2020

- Added SAMS account information
- Updated Acknowledgments
- Updated all Appendices

Table of Contents

Acknowledgments

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Disclaimer

The information contained in this handbook reflects current observations of the chemical threat Level 3 programs of the laboratories included in this report. These agencies and contributing workgroup members were not asked to represent the views of other Level 3 programs in the nation and made no pretense of doing so. This handbook does not necessarily represent the official view of APHL or any of the laboratories included in this report. The URLs and links to reference materials or outside information contained in this handbook were verified to be accurate as of the publication date.

The original version was prepared November 2014. This updated version is located in the LRN-C Toolkit SharePoint site hosted by APHL. Updates to the LRN-C Level 3 Resource Handbook will be the responsibility of Josh Rowland (josh.rowland@aphl.org).

Introduction

The APHL Chemical Threat Collaborative Workgroup, in conjunction with state public health laboratories, has developed this *Laboratory Response Network for Chemical Threats (LRN-C), Level 3 Resource Handbook*. This guide may be used by LRN-C partners who provide Level 3 outreach and training to hospital personnel, laboratorians, first responders and personnel of other agencies that would respond to an accidental or intentional chemical release resulting in human exposure. This document can assist CT Coordinators, Level 3 coordinators, assistant CT laboratory coordinators and others who are tasked with ensuring the proper collection, packaging and shipping of clinical specimens and subsequent testing by LRN-C laboratories following a chemical exposure event.

This document does not establish a one-size-fits-all model; rather, it addresses important areas of preparedness and response that may be tailored to meet the needs of individual jurisdictions. CT Coordinators may use the information to build a robust preparedness program to identify and track the extent of exposure following a chemical release.

Background: Laboratory Response Network for Chemical Threats (LRN-C)

The US Centers for Disease Control and Prevention (CDC), the Federal Bureau of Investigation (FBI) and the Association of Public Health Laboratories (APHL) formed the Laboratory Response Network or LRN in 1999, to respond to acts of bioterrorism (BT). In 2003, federal funding became available to establish the Laboratory Response Network for Chemical Threats (LRN-C) to respond to chemical emergencies. Both the LRN-B and LRN-C provide collaborative and interconnected analytical testing abilities that enhance the national public health infrastructure and have become valuable resources for our national emergency preparedness capability.

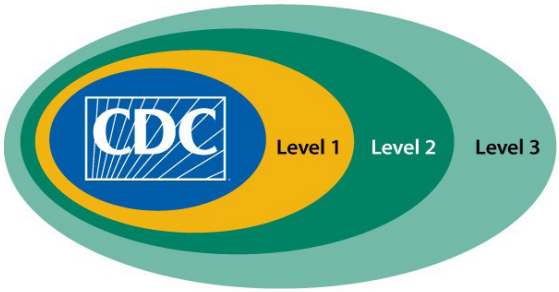


Figure 1. The LRN-C structure is a three-tiered system.

The LRN-C structure is a three-tiered system that provides testing of clinical specimens collected from individuals who may have been exposed to chemical warfare agents or toxic industrial compounds that are not routinely tested for by healthcare-based laboratories (Figure 1). Each LRN-C member laboratory has Level 3 capabilities, which include expertise in clinical specimen collection, storage, packaging and shipping. Level 2 laboratories perform chemical agent/metabolite testing that can be used to respond to potential chemical release events within their jurisdiction. There are ten Level 1 laboratories that can provide testing for an expanded number of chemical analytes. They also serve as surge capacity testing laboratories for the CDC.

CT Coordinators are important members of each LRN-C laboratory, providing the foundation of Level 3 activities by networking with hospitals and other clinical laboratories, first responders, emergency planners, and other response groups. These efforts are vital in promoting relationships with response agencies necessary to effectively provide surge capacity laboratory services for chemical exposure events and related public health emergencies. In addition to Level 3 activities, CT Coordinators may also be asked to help support Level 1 or 2 duties or testing capabilities.

Funding for the LRN-C Program

Funding for public health laboratory chemical threat programs comes primarily from the CDC's Public Health Emergency Preparedness (PHEP) cooperative agreement. This agreement specifies core public health emergency functions that the CDC considers important for all awardees to possess. Laboratory preparedness is one of these elements.

PHEP funding is distributed based on the specific needs of each state, territory or major metropolitan area, such as Los Angeles, Chicago, and New York City. Cooperative agreement funding is distributed over a five-year cycle and each awardee must explain how their jurisdiction intends to meet specified capabilities and functions described in the agreement. After funding has been approved, the awardees must provide regular progress reports to the CDC detailing their status in completing the goals that were stated in the cooperative agreement application and submitted work plan.

The PHEP cooperative agreement contains multiple capabilities that cover a variety of areas within a health department. Laboratory testing is one such capability and includes preparedness for response to public health emergencies that include

biological and chemical threats. Some jurisdictions work on these components together by partnering their LRN-B and LRN-C laboratories, while in others, the two operate independently. Other functions defined under laboratory testing, such as proficiency testing and method validation, are specific to each type of LRN laboratory.

There are several specific benchmark tasks designated by the CDC that every awardee must be able to demonstrate. These tasks are directly tied to funding, and if not performed appropriately, may adversely affect the entire state's PHEP funding. Historically, most of these benchmarks must be met by each public health laboratory. It is important to work with your local PHEP coordinator to understand these benchmarks and the expectations in the PHEP cooperative agreement to ensure your laboratory program is aligned with the expectations of the PHEP cooperative agreement coordinators.

In addition to the PHEP cooperative agreement, other grants and sources can be pursued to help further fund and expand the Level 3 program. Cooperative agreements for laboratory emergency preparedness activities may be available from local jurisdiction homeland security agencies, hospital organizations, and state and local governments. Biomonitoring, opioids, and other relative grant opportunities may also be available to help further expand the analytical testing functions of the laboratory.

Level 3 Outreach

Although the LRN-C has been in existence since 2003, increasing local and state medical community awareness of the network capabilities and their important role during a chemical emergency is a constant challenge that requires continuous effort, especially on the part of the LRN-C coordinators. By recognizing that each state has different characteristics such as geographical size, population density and diversity, industrial and transportation risks, and existing response capabilities, the requirements for terrorism preparedness and response efforts must inevitably be different.

Consequences of most natural disasters are tangible and are often measured in the cost of infrastructure destruction; however, the adverse effects of a chemical exposure event most likely will not be measured by infrastructure damage, but rather by the number of people impacted. A chemical exposure event's largest impact may be the worried well and economic issues; a large-scale event may easily overwhelm the fragile healthcare infrastructure in many areas.

Justifying investments in increased chemical exposure event training can be difficult for those not immediately involved in the efforts to mitigate the effects of an event. As a result, preparedness capabilities may be below expected levels due to limited response capability, an understaffed healthcare system, and limited knowledge of response plans. A renewed momentum in training and education about chemical threats and how to respond to them is encouraged for CT Coordinators in order to reduce the potential for unnecessary exposures and morbidity as well as reducing the numbers of the worried well and decreasing the economic impact.

State and local agencies take the lead in detecting and responding to chemical exposure events. These same agencies are the first to enact response measures to diminish the damage. It is important for all response agencies, including state and local public health to develop appropriate plans to respond to chemical exposure events. In addition to response plans, training and exercise programs strengthen and test interactions and capabilities necessary for response efforts.

Providing chemical exposure awareness educational training for all first responders and first receiver agencies is a crucial step toward building strong and responsive communities. A well- attended and effective training program will not only help communities recognize chemical exposure events, but can also minimize risks to responders, caregivers, and citizens, in addition to understanding the important role that the LRN-C laboratory will play in determining who was exposed and the severity of the exposure.

An incident involving chemical exposure will tax healthcare facilities, especially those that have staffing shortages. Understaffed hospitals may not be able to adequately care for a large influx of patients who may have been exposed to a chemical agent. To alleviate healthcare worker deficits, LRN-C chemical awareness and response training provided to healthcare workers may help them be more responsive during a chemical threat, resulting in a more effective means of care and mitigation. CT Coordinators are challenged to show agencies that by educating those that will respond during a chemical exposure event the whole community benefits and the healthcare infrastructure will be able to provide treatment for those who need it.

All CT Coordinators should be prepared to help in the following areas:

- **Planning**: The CT Coordinator can provide valuable information to local health departments, hospitals and first

responders on the existing LRN-C capabilities for providing clinical analysis of patient specimens. The coordinator can help these groups develop plans to incorporate the collection of patient specimens and the subsequent dissemination and interpretation of the results, if appropriate.

- **Training**: Medical personnel will be responsible for the recognition of symptoms related to a CT event, collecting specimens, and ensuring they are delivered to the nearest capable Level 1 or 2 laboratories for testing. The CT Coordinator should provide training on who to collect specimens from, the appropriate types of specimens to be collected, what kind of paperwork needs to be completed and how to get samples to the LRN-C laboratory.
- **Drills and Exercises**: After response plans are developed and individuals are trained, the next appropriate step is to exercise those plans to ensure that they will work as intended. A CT Coordinator may play a minor or a major role in exercise development and participation. Exercises can be designed to practice specific processes, such as the collection and shipping of samples, or they can be much larger events with multiple agencies, where the specimen collection portion is just a minor component.
- **Emergency Response**: The CT Coordinator may spend most of their time planning, training, and exercising, but they will also play an active role in a true response. The level of responsibility of the CT Coordinator will vary in each jurisdiction, but in almost all cases they will be the contact person for laboratory analysis of specimens collected from patients potentially exposed to chemical agents. In addition, the CT Coordinator may be responsible for accessioning samples delivered to the LRN-C laboratory, packaging and shipping specimens to another LRN-C laboratory or the CDC, reporting patient results back to the hospital and perhaps even performing analysis of the specimens themselves.

Recommended Skills and Abilities for Level 3 Activities

The CT Coordinator and others performing CT outreach should be knowledgeable in a wide variety of areas. They should be familiar with the signs and symptoms of chemical exposures, understand the science behind the analysis of clinical specimens for a variety of chemical analytes, and know the internal work processes of first responders, hospitals, emergency medical professionals and epidemiologists. The CT Coordinator should also learn the principles of incident command. Other essentials include effective public speaking, time management, communication and any technical skill crucial for networking with diverse professional agencies.

Developing and improving personal skills is very important to the success of the CT Coordinator. Experience has revealed that it is beneficial to follow a training plan for acquiring additional education to build LRN-C CT Coordinators knowledge, skills, and abilities. Appendix A provides a non-exhaustive list of courses and professional development courses that may be beneficial to the CT Coordinator. It is up to the discretion of each jurisdiction to determine which courses will be most applicable to suit their needs.

Other activities may include:

- Keeping a current list of all LRN-C CT Coordinators, assistant CT Coordinators, and Level 3 coordinators.
- Developing a system or join a mailing list that maintains the current contact list.
- Developing a close relationship with neighboring LRN-C Level 3 jurisdictions to participate in “round-robin” style drills, emergency inventory exchange or to recruit “talent” when responding to real events (see the APHL member laboratory list).
- Investigating the possibility of creating an official Memorandum of Understanding (MOU) with your public health department and adjacent jurisdictions participating in the LRN-C response.

Additional Laboratory Resources Available to the CT Coordinator

Depending on the event, there may be many samples requiring analysis that originate from a variety of matrices. The LRN-C laboratory’s focus is on clinical samples, but it is quite possible that food, environmental or a variety of other matrices will need to be tested. While this may not be the primary focus of the CT Coordinator, they could help coordinate the testing of these additional samples.

Since it is crucially important for laboratories to understand the roles of all partners involved in a suspicious incident event to ensure a timely and effective response, APHL has developed Guidelines And Algorithms for Responding to Incidents Involving

Suspicious Non-Clinical Samples. The primary intended purpose of the document is to provide guidance to state and local LRN laboratories working with multiple organizations and agencies, including first responders, involved with a response to a suspicious non-clinical sample incident (e.g., white powders). In addition to laboratory testing, the document also provides detailed information for threat assessments, field screening, chain of custody, shipping, and includes references within to further supplement other guidance documents currently available in the field. The practices outlined within the guidance document are not meant to be a standalone protocol, and it is still strongly recommended that LRN laboratorians continue to work closely with their first responder communities to provide additional guidance. The guidelines are meant to be a starting point for communication, planning, and response, and should be further adapted to state and local needs, protocols and systems.

Additionally, APHL hosts and manages the LRN-C Toolkit. The LRN-C Toolkit is a SharePoint site full of information for CT Coordinators and members of the LRN-C program. The site allows LRN-C members to post announcements and questions to other members and share documents such as training materials and promotional materials developed by states. Access to the site can be granted by contacting eh@aphl.org.

An important resource that the CT Coordinator should be aware of is the Integrated Consortium of Laboratory Networks (ICLN). The ICLN, established in 2005, is comprised of six different laboratory networks, each with a specific focus. This network provides a coordinated response to acts of terrorism or other major incidents requiring laboratory testing capabilities. In addition to the LRN, the ICLN comprises:

- The National Animal Health Laboratory Network (NAHLN) is coordinated through the US Department of Agriculture (USDA). The purpose of NAHLN is to provide the capabilities to detect and respond to animal health emergencies that involve bioterrorist events or newly emerging diseases.
- The National Plant Diagnostic Network (NPDN) was also established by USDA. The mission of NPDN is to detect and diagnose outbreaks of pests or pathogens with the potential to damage food, feed, fiber, fuel crops and forest trees.
- The Food Emergency Response Network (FERN) is co-managed by USDA and the Food and Drug Administration (FDA). FERN is responsible for detecting and identifying biological, chemical and radiological agents in food. The primary objective of FERN is to help detect and prevent attacks on food.
- The Environmental Response Laboratory Network (ERLN) and the Water Laboratory Alliance (WLA) are managed by the US Environmental Protection Agency (EPA). ERLN's focus is on responding to chemical, biological or radiological terrorist attacks or natural disasters that affect human health and the environment. The focus of WLA is on the analysis of water samples for chemical, biological or radio chemical contaminants.
- The Department of Defense Laboratory Network (DLN) is managed by several offices within the Office of the Secretary of Defense. DLN provides capabilities for early detection, confirmation, response and consequence management following acts of terrorism or warfare involving chemical, biological, radiological, nuclear (CBRN) agents, infectious agents and other hazards.

The CT Coordinator's Role in Training and Jurisdictional Planning

While each incident is unique, a well-organized comprehensive plan for communication and coordination is critical for an efficient response during a chemical exposure event.

The role of the CT Coordinator includes planning, partnerships, training and education, exercising response plans, and assistance during chemical response incidents. The CT Coordinator is encouraged to understand their role and the role of their laboratory during a Chemical Response event. Response plans, which may vary from state to state, may be found in a city, county or state chemical response, or emergency operations plan. When a Chemical Response Plan does not exist within their agency or jurisdiction, the CT Coordinator may consider working with other interested emergency response partners for plan development. The CT Coordinator should also determine if any MOUs or other agreements exits with other states or federal agencies and familiarize themselves with any existing agreements.

Partnering with central and peripheral agencies will help others understand the LRN-C laboratory's capabilities and assistance they can provide during a chemical response event. It is worthwhile for the CT Coordinator to maintain an easily accessible list of contact information for hospitals, healthcare facilities, public health departments, Poison Centers, National Guard Civil Support Team (CST), and any other peripheral emergency response agency in their state. If partner relationships are newly developing, you may consider arranging conference room time for a meet-and-greet and a presentation of the LRN-C laboratory's role in a

chemical incident. These meetings may also be an opportunity for the new coordinator to learn about the partnering agencies and their roles in the emergency response community.

Because federal, state (including public health and the LRN-C), and local jurisdiction disaster response plans follow the Incident Command System (ICS), it is important for the CT Coordinator to be familiar with ICS, a standardized, on-scene, all-hazards incident management approach allowing for the integration of facilities, equipment, personnel, procedures, and communications that operate within a common organizational structure. See Appendix A for ICS related training.

It is also within the role of the CT Coordinator to take part in real-life chemical exposure emergencies. A key mission of the LRN-C program is to identify and track the extent of exposure following a chemical release event. To do this, clinical specimens must be collected from individuals who have been exposed. Depending on the scale of the event this will likely not be an easy task. The LRN-C program depends on the cooperation of the medical and first responder communities for the collection of these specimens. The coordinator may act as a liaison between partners or as a lead over any collection, packaging, and shipping of samples.

Level 3 Training for LRN-C Partners

CT Coordinators should design their own educational training programs based on their jurisdictional needs. Before a training program is developed, consider presentation goals or objectives. Three to five goals should be adequate. Design the actual training presentation around achieving these goals. The PHEP Performance Measure Specifications and Implementation Guidance along with communication from the PHEP coordinator may be good resources for training objective development.

One of the main goals of training is to provide proper specimen collection, packaging and shipping procedures as outlined by the CDC. Please refer to Appendices E, F and G. It may also help to explain the role of the CDC, as well as the specific signs and symptoms that result from chemical exposure. Level 3 training also promotes awareness of LRN-C program capabilities and helps establish proper notification channels. Educational training is an important part of outreach.

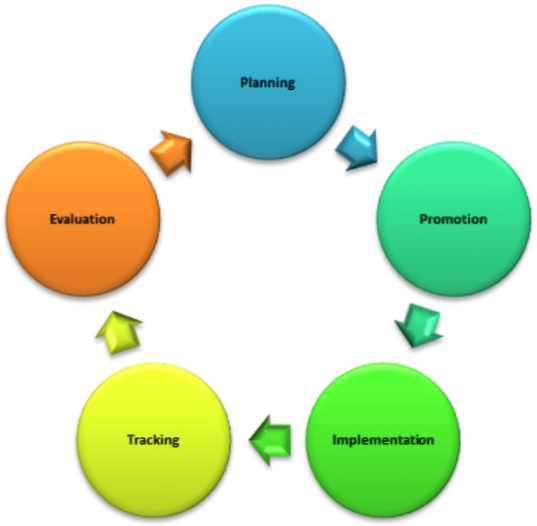


Figure 2. The training program should be a cyclic process.

It may be helpful to consider your training program as a cyclic process with basic components (Figure 2).

I. Planning

When developing a new multi-jurisdictional plan, the CT Coordinator is encouraged to start the process through focus group discussions with key partners. This will help the CT Coordinator understand the priorities and constraints of their partnerships and how their mission objectives overlap. Jurisdictional plans should be well-aligned and integrated with existing federal, state, and local emergency response protocols. The CT Coordinator should also be prepared to develop customized solutions to bridge gaps in response protocols. Examples include an early notification from first responders as soon as a toxic exposure incident occurs or identify clinicians who lead health departments in order to issue blanket lab orders for Mass Casualty Incidents (MCIs).

Design a training guide that outlines the purpose, participant objectives, target audience, and educational expertise.

The training program should be in a format easy to present, with information applicable to target audiences, such as emergency preparedness coordinators, hospital laboratory workers, phlebotomists, emergency room nurses and physicians, first responders, poison centers, and safety officers. Additionally, a training program database may prove beneficial to keep pertinent information about trained facilities, supplies, and associated costs of the training program.

Training program accreditation is an effective method to entice multidisciplinary participants. Consider who may be in the audience, e.g., physicians, nurses, pharmacists, EMTs, and hospital laboratorians. There are different types of educational credits available based on the target audience and professional career paths. If there are several types of educational credit offered, you may attract a larger and more diverse audience.

Other useful documents to develop are a training guide, a pre-test, a post-test, and a program and speaker evaluation forms. Program and speaker evaluations are a great way to garner feedback and suggestions to use to enhance or improve the training program. In addition, many accreditation agencies will require a post-test evaluation in order to measure learner retention before they will award contact hours.

Once the program training design has been completed, it is a good idea to have co-workers and colleagues, who represent members of the target audience, review the materials for clarity and understanding.

II. Promoting

Level 3 training events should be announced in advance to targeted audiences. These events also serve to promote awareness of your LRN-C program.

Partnering or coordinating with your bioterrorism (BT) coordinator may be advantageous when offering training. BT or CT training programs and may target the same audience when performing outreach activities. Other partners and training events in your state may also help when pursuing the same audience, such as healthcare coalitions (Appendix K), Hazmat training for healthcare providers, FBI Weapons of Mass Destruction (WMD) related training, joint criminal epidemiological investigations, CST with WMD response training.

Effective promoting should draw the intended audience in with an attention-grabbing title that will make them want to learn more. Some example promotion strategies and materials (Appendix B) include general correspondence, e-mails or letters, a website (Appendix J), and flyers or brochures (Appendix I) that provide the following information:

- Purpose of the training
- Learning objectives
- Intended target audience
- Length of program or training
- Presenter qualifications
- Accreditation agencies
- Contact hours for attendance

Some additional legal information may be required:

- Commercial interests
- Conflicts of interest
- Commercial support or bias

Create a Chemical Threat Response Kit to leave with the hospital after the training that may include (Appendix D):

- LRN-C facts
- Chemical threat or terrorism laboratory preparedness response guide
- Specimen packaging and shipping supplies and materials
- Resource guideline and references
- Public health lab or LRN-C lab information
- Symptoms of CT agent exposures

The target audience may be identified based on the PHEP cooperative agreement criteria and on your agency or jurisdictional specific policies and procedures. Most of the target audience will be from hospital laboratories and hazmat teams, but this could be expanded to include pharmacists, nurses, EMTs, emergency planners, etc.

Appendix J is a webpage template designed to help you organize information to place on or develop your website. Your webpage design and functionality will be a coordinated effort between you and your facility website administrator. Follow the suggested effective promotion tools when considering information to place on your website or webpage. Attention-grabbing titles with brief descriptions work best for website information. Effective websites and webpages usually follow the “less is

the best rule" in order to avoid overwhelming your viewers.

Where to Promote

Deciding where to promote the training program will vary based on the laboratory's location and agency needs. The training program may also be conducted in conjunction with LRN-B employees. Examples of promotion channels include conference calls, conferences and workshops for disaster preparedness, local or state hazmat meetings, website announcements for professional organizations, and emails from local partners who organize meetings.

How Often to Promote

When deciding on how often to promote the training program consider program influences such as budgetary needs for promotion materials, grant requirements, agency requirements, hospital staff turnover, and other considerations.

Training Program Literature

Training program literature is an effective way to promote a specimen collection, packaging and shipping training program. The literature can be in any medium, but it is probably best to have materials such as a flyer or a brochure that can easily be distributed to prospective laboratories.

The literature created should include the following:

- LRN facts
- Learning objectives for the training
- Length of program
- Accreditation and/or contact hours offered
- Presenter/trainer qualifications
- Laboratory personnel contact information (e.g., CT Coordinator, emergency on-call)
- Legal information (i.e., commercial interests, conflicts of interest, commercial support or bias, endorsement of off-label product use, etc.)

Consider adding a funding source acknowledgment or disclaimer. Examples:

- Funding for this seminar is provided by a grant from the US Department of Health and Human Services Office of the Assistant Secretary for Preparedness and Response
- Hospital Preparedness Program (HPP)
- Funding for this conference/material was made possible, in part by CDC
- The views expressed in written conference materials or publications and by speakers and moderators do not necessarily reflect the official policies of HHS, nor does the mention of trade names, commercial practices or organizations imply endorsement by the US Government
- This project is funded 100% by federal funds

III. Implementation

PowerPoint presentations and on-line training programs should be considered as an acceptable format. Presentation time should satisfy both the objectives and target audience availability. Also, consider that many first responders have multiple shifts that may request training. Accommodation for some agencies could result in training over several days. Establish a laboratory resource guide that would include program-specific information. The resource guide should have answers to the frequently asked questions, contact information, and reference websites.

Here are some recommendations for developing an effective presentation:

- If PowerPoint is used, spend no more than two minutes per slide, so for a half-hour, about 15 slides would be needed. Spend the least amount of time presenting to the audience as possible to maximize information disseminated. If the presentation is too long, participants may become overwhelmed or lose interest in the message.

- If slides are filled with text, the audience may focus on the slide text and not to the message. Try to use visual slides that reinforce key points by using graphs, photos, and other visual aids.
- Present as if talking to a relative; keep them interested.
- Use humor and questions, if appropriate.
- Practice the presentation, so that slides are not to read verbatim.
- Use inflection and vary the speed of speech.
- Keep reiterating the main messages so the participants walk away with a clear sense of the main idea of the presentation.
- Use case studies or actual events to explain talking points. This type of information can be customized for the audience by using names of local hospitals, locations, and locally known chemical hazards and events. For a healthcare audience, add symptoms and medical terminology. When presenting to a fire department (FD) environmental health & safety (EH&S) audience, the addition of field-testing information may draw interest. LRN-C stories make excellent case studies!
- Games and group discussions can transform the training from a slide presentation into an interactive session. Throw in a tabletop exercise. The audience can fill out a lab request form or do hands-on specimen collection shipment and packaging as part of the exercise.
- Have fun!

Training Kit for Hospital Laboratories

The hospital laboratory training kits should include all materials necessary to perform the training. Since each LRN-C laboratory conducts training in a different manner, materials needed may differ based upon training delivery methods. See Appendix C for a list of materials used by one LRN-C laboratory. It is recommended that each hospital is asked if they maintain a supply of the necessary specimen collection, packaging, and shipping materials required.

Continuing Education Units (CEUs) and Other Incentives

All participants should receive a certificate of completion for training, even if continuing education credits. Seek out training events organized by healthcare preparedness coordinators, PHEP coordinators, and first responders who can incorporate Level 3 training to get automatic CEUs appropriate for the audience. For example, a healthcare decontamination and hazmat class may want nursing CEUs, and a hazmat workshop for firefighters would want hazmat and EMS CEUs.

It is important to be familiar with all the requirements for issuing the CEU/CME with each accreditation type offered. The CEU/CME coordinator may issue training certificates and sign-in sheets just prior to the training session. The accreditation agency may provide verbiage to use for promotional purposes and other sponsorship requirements. Know the requirements each accrediting agency has for training record retention. Accreditation for the training program you develop takes time, so have a plan.

Tracking

Maintain a list of contacts for every hospital, agency, or other partner groups. Keep this list updated on an annual or semi-annual basis. The update can be done when contacting a group to offer a refresh of certification training. A training schedule could be used as an aid to create and maintain a facility contact and training schedule database. To schedule training, contact the hospital laboratory supervisor, emergency preparedness coordinators, safety officer, or other points of contact. Consider sending some promotion materials during any initial contact that explains the purpose of the training.

Exercises and Evaluation

Training Schedule

A training schedule should include and be coordinated with key partners, such as PHEP and other emergency preparedness coordinators and ideally included in a multi-year exercise plan schedule. This comprehensive approach is typically referred to and can be accomplished with a training and exercise planning workshop (TEPW). A TEPW approach can help align multiple requirements, assist with long term planning where exercises can build upon themselves, and assist with coordinated, multidisciplinary, intelligent exercise designs that may be able to serve multiple partners, requirements, and goals. Training may also be planned and scheduled on a smaller scale depending on the scope and purpose. To help with planning a coordinated training schedule, consider creating and maintaining a facility contact and training schedule database that can be shared with appropriate personnel. To schedule training, be sure to contact appropriate personnel ahead of time, such as a hospital laboratory or an emergency room supervisor, a state or local emergency preparedness coordinator, safety officers, or other relevant partners in your jurisdiction. Also consider sending some promotional or reference materials during any initial contact that may help explain the purpose of an LRN-C related training, such as LRN-C Specimen Packaging and Shipping Exercise (SPaSE) job aids, chemical exposure posters, state developed awareness materials, or other materials previously mentioned within this handbook.

Training and exercise planning should address key factors such as:

- Evaluation - policy, practice or capability
- Participant role or position - who needs to be evaluated
- Planners/Controllers - who can help
- Scenario - relevant and realistic

Planning meetings should cover:

- Concepts and objectives
  - Scope and purpose of the exercise
- Initial planning meeting
  - Input from planning team and task assignments
- Mid-term planning meeting
  - Scenario, documentation and timeline
- Final planning meeting
  - Review final plan and events

Training Content

LRN-C training material may have slight variability between states based on individual public health systems or identified key partners or established LRN-C systems. However, all LRN-C training material should contain information relative to chemical threats such as chemical threat awareness and preparedness measures, chemical threat exposure symptoms, and chemical threat response measures. LRN-C trainers should adapt topics into their training program tailored to jurisdictional needs and in coordination with key partners. LRN-C training material is briefly covered within this document, and available from resources such as the CDC, APHL, Poison Centers, and other state public health departments.

LRN-C trainers should be familiar with CDC and APHL resources available here:

- https://emergency.cdc.gov/lrn/chemical.asp
- https://www.cdc.gov/biomonitoring/chemical_threat_agents.html
- https://www.aphl.org/programs/environmental_health/Environmental-Emergency-Preparedness-Response/Pages/Laboratory-Response-Network-for-Chemical-Threats.aspx

LRN-C trainers should adapt their training content to best fit their audiences, whether presenting to hazmat groups, healthcare workers, law enforcement, or others. It is recommended that during training such as seminars and workshops to move from a lecture-based approach to more of an interactive and simulation-style training when possible. It has been shown that only 5% of

lecture material is typically retained, whereas 95% of material is retrained when the training is interactive or in a simulation. A good practice is to try to create a 'mini' exercise to use within training to have the interactive piece.

Exercise objectives should try to utilize the "SMART" concept:

- Simple: An easily understood statement
- Measurable: Can be gauged against a standard
- Achievable: Challenging, but not impossible
- Realistic: Plausible for your area and relevant to what you want to accomplish
- Task-oriented: Tied to a task and measure(s) you want to exercise

Examples of SMART objectives can include topics such as:

- Upon confirmation of a suspected chemical exposure case, the PIO develops and issues a Health Alert Network (HAN) message within 90 minutes.
- The hospital and public health laboratory will discuss issues in a tabletop exercise to identify gaps in procedures related to a response to a chemical exposure incident.
- By (time frame) (who) will (do what) by (how much/when – a measurable value).

Exercises and Evaluations

Participation in exercises can strengthen existing partnerships, create new partnerships, identify gaps or weaknesses in plans or procedures, improve response plans, and promote the importance of the LRN-C laboratory's role in a chemical response with its partners. Exercises should be thoughtfully designed during the initial planning phase with key partners and those who will be providing an oversight role. The initial planning phase devotes time to identifying key participants, exercise goals and objectives, and provides an opportunity to possibly align with another program's or partner's goals and objectives for a joint exercise. Some programs are required to conduct an official Homeland Security Exercise and Evaluation Program (HSEEP) compliant exercise per federal (PHEP), state, or other grant requirements, such as, the Centers for Medicare &Medicaid Services (CMS). When an official HSEEP compliant exercise is not required, it is still considered a best practice for exercises to follow the HSEEP guidelines or be "HSEEP compatible."

For specific information on conducting exercises, such as determining timelines, scheduling meetings, and obtaining necessary documents, please visit: https://training.fema.gov/programs/emischool/el361toolkit/conductingexercisesdrills.htm.

An excellent introduction to HSEEP compliant exercises is obtained through FEMA's Emergency Management Institute. These free, online, independent, self-paced study courses are highly recommended for those who intend to plan, conduct or participate in HSEEP exercises. Please refer to Appendix A course website information.

Prior to conducting an exercise, determine the extent of participation from the LRN-C laboratory and its partners in the exercise (e.g., if providing actual chemicals or other materials, level of participants previous training, if there will be any sample analysis, etc.). A good practice is to maintain an adequate supply of items that might be requested from participants for the exercise or have been used in previous exercises, such as urine cups, manifests, shipping boxes, etc. When larger exercises are not practical or feasible, consider conducting a smaller scale workshop or tabletop. Examples of exercise types with their complexity and capability levels are listed in Appendix D.

The DHS/FEMA HSEEP model (Figure 3) is the standardized foundation for emergency planning and exercise design that has been adopted throughout federal, state and local governments, and particularly those which receive funding through the PHEP Cooperative Agreement. HSEEP uses common methodology and terminology toward capability-based preparedness.

Figure 3. Homeland Security Exercise Evaluation Program planning cycle

The HSEEP Exercise Cycle provides a common approach to building and maintaining emergency response capabilities: Design and Development, Conduct, Evaluation, and Improvement Planning, are all represented in a cyclic approach, building on successive, continued efforts to improve planning and response actions, and builds upon complexity. The advantages of designing HSEEP-compatible exercises are that it will provide a logical process for training, exercising, and evaluating plans. It offers a starting point and provides a framework for exercises and provides templates for exercise documentation. Other states and programs may be able to build upon the exercises conducted which can help reduce planning and can help facilitate networking between states and partners.

The Exercise Cycle is part of an overall Planning Cycle, which includes Planning, Training and Equipping, Exercising, and Improvement. With each iteration of these cycles, capabilities are expected to be improved. The purposes of exercises are to evaluate player actions against current response plans and capabilities for a public health emergency and to evaluate the response actions for the purpose of improving future responses.

Questions to consider with an exercise evaluation can be topics such as:

- If "x" were to happen, what preparedness measures are in place?
- Is the inventory adequate for a response?
- How would the public health emergency response work for a chemical incident in the state or region?
- Do the hospitals know how to collect appropriate samples?
- Do the hospitals know how to package and send appropriate samples?
- How are results reported to public health partners?

The HSEEP model uses a building block approach to exercises, tiered from less to more complex (Figure 4). The yellow blocks represent exercises where response activities are theoretical, and the orange blocks represent real response movements. It is imperative that organizations do not jump directly to conducting a full-scale exercise without first holding seminars, workshops, tabletops, games and trainings.

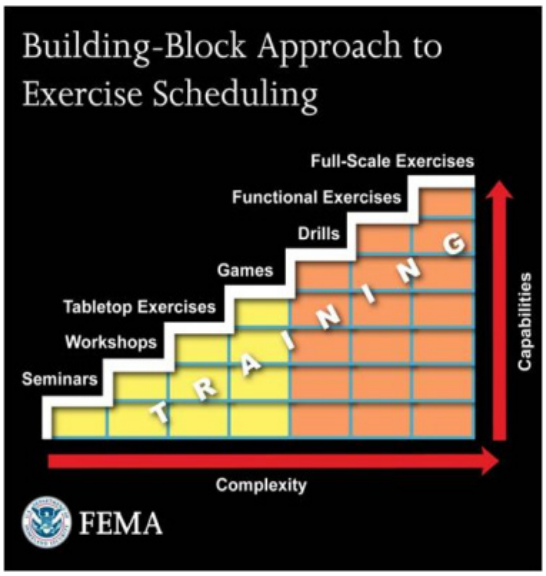


Figure 4. Building Block Approach to Exercise Scheduling

Principles are focused around first building a clear plan or protocol, identifying the abilities required to complete tasks associated with the operational plan or protocol, and then testing it with exercises. Ideally, objectives should be written with the final product in mind, so they can test current plans and procedures.

Another cornerstone of HSEEP is developing an After-Action Report (AAR) and Improvement Plan (IP) to document findings, identify specific positive changes and refinements that can be implemented to improve the plan, the abilities and trainings, the exercises, and therefore, the actual responses that the exercise simulated to enhance with evaluation.

For Level 3 activities, a protocol may consist specifically of the CDC LRN-C Specimen Collection Packaging and Shipping guidance, or it could be built into an All-Hazard Emergency Operations Plan for Public Health or clinical sentinel labs. Next, training would be conducted with the plan elements, followed by an exercise.

Some basic principles for planning and conducting successful exercises include:

- Develop clear emergency, incident, and integrated response plans that assign responsibilities during each stage of an event.
- Identify specific capabilities needed to complete tasks associated with the operational plan or protocol.
- Implement effective training programs that support the capabilities.
- Conduct exercises to meet specific PHEP requirements, or alternatively combine Level 3 activities in exercises planned for larger events.

- Start planning early, at least several weeks to a year before an exercise.
- Keep it simple, especially when beginning the development of exercises.
- Identify key people, positions, and partners (e.g., public health coalitions, local and state health departments, emergency managers, the National Guard, hospitals, SNS and MCM coordinators, HPP coordinators, fire departments, etc.) early and include them in planning, when possible.
- Identify measurable "SMART" objectives and write objectives with a final product in mind.
- Test elements directly from current plans and procedures, or that have been included in previous trainings to help reinforce the learning.

After Action

The following are recommended practices/actions to consider adopting for use after a training or exercise:

- Conduct a "hot wash" immediately after an exercise with participants in order to gather feedback and findings.
  - Collect information such as exercise evaluation guides, participant feedback forms, evaluator notes, etc.
- Send a copy of the AAR/IP to key participants in order to share findings from the exercise and to help with recommended and identified areas of improvement, as well as identified strengths.
- Send a participation certificate and a thank you note to the facilities and individuals that received training or participated in an exercise.
- Distribute contact hour certificates and provide accreditation agency reports of training activities.
- Update facility contact and training schedule database. Enter contact information, training dates and other pertinent information concerning your program.
- Solicit laboratories for future exercises emphasizing that participation is essential to preparedness.

NOTE: "After Action" denotes a very specific AAR/IP (After Action Report/Improvement Plan) which is a fundamental and specific part of the HSEEP process.

Specimen Packaging and Shipping Exercise (SPaSE)

Every year the PHEP LRN-C awardees are required to participate in a Specimen Packaging and Shipping Exercise (SPaSE). This exercise is designed to demonstrate the awardees' ability to properly transfer clinical specimens to the CDC. The exercise is graded based on the awardees' ability to package and ship the specimens following the CDC guidelines.

Two documents found on the secure LRN website will be helpful in training and preparing for the SPaSE. The first document, *Guidelines for SPaSE*, provides information on how to register for an exercise, the sample requirements, shipping details, and other exercise information. The second document, *Example SPaSE Evaluation Report*, is an example exercise report providing details on exercise evaluation. While these documents provide information about the exercise and evaluation, they do not provide details for all aspects of specimen collection, packaging, and shipping.

Information sheets on the public CDC LRN website provide flow charts of specimen (blood and urine) collection, packaging, and shipping; instructions for shipping specimens to the CDC; shipping manifests; and other helpful information. The following documents on the public CDC LRN website, as well as any others that might be recommended by the CDC or partner laboratories, are documents with which to be familiar.

If you are instructed to ship your specimen to the CDC laboratory, follow the directions in these flowcharts:

- Instructions for Shipping Blood Specimens to CDC after a Chemical Event
- Instructions for Shipping Urine Specimens to CDC after a Chemical Event

You can find the required paperwork for urine and blood specimens below. Remember, blood tubes and urine cups cannot be shipped together in the same package:

- Chemical Exposure Blood Specimen Collection and Shipping Manifest
- Chemical Exposure Urine Specimen Collection and Shipping Manifest

Biomonitoring

The field of biomonitoring serves to measure the extent of human exposure to an environmental contamination. Biomonitoring studies often deploy Clinical Laboratory Improvement Amendments (CLIA) validated methods, generating analytical laboratory data, to measure the uptake of environmental chemicals of concern in clinical specimens. The results of these studies serve to answer a variety of environmental health questions and, additionally, may be utilized for diagnostic purposes. State and local public health institutions will often capitalize on the reliability of the laboratory's data by initiating biomonitoring studies to aid epidemiological investigations, craft public health policy, and assess exposures in a population as well as subsequent remedial actions.[1]

Biomonitoring may be conducted for a few reasons, one of which is for emergency response. During a chemical event, such as the intentional release of arsenic into a local water supply, level 1 and level 2 laboratories within the LRN-C may be called upon to initiate a study that surveils the at-risk population. During emergency response operations it is pivotal that the truly exposed be quickly identified and separated out from the worried-well to receive timely treatment. In this scenario, a biomonitoring study would encompass a variety of factors. It would be necessary to determine the geographical range receiving water from this tainted source, measure the arsenic levels of individuals living in this area, report elevated results to medical professionals, and perform follow up testing once remedial actions have been performed to judge its effectiveness. The ability to quickly initiate a study such as this, to identify exposed individuals, is the foundation of the LRN-C.

Biomonitoring studies may also be employed to screen populations who may otherwise be unaware of their exposure to an environmental contaminate. Not every exposure will result in an individual being immediately symptomatic. When an agency or public health institution has reason to believe a certain demographic (e.g. occupation) or community is in danger of encountering a toxicant, a targeted investigation may be requested. Targeted investigations may be utilized in response to an exposure, such as the above example, or as a proactive measure geared towards identifying an at-risk population prior to a health-related issue arising. Often short exposure to a chemical of concern may go unnoticed; or the resulting symptoms are misdiagnosed. This can be problematic if the exposure occurs chronically through the day-to-day operations of employment as a cumulative health effect may impart a negative result later in life. Chemical exposures that are the result of the profession are referred to as an occupational exposure and are a public health area of concern. Many of the LRN-C core methods are applicable to identifying acute and chronic occupational exposures and can be employed in targeted investigations. For example, it has been well-documented that the first responder community, more specifically firefighters, are at an increased risk for encountering cyanide and a litany of volatile organic compounds (VOCs). The warning signs of exposure to these analytes include fatigue, lightheadedness, and nausea. It is easy to write off these symptoms as a normal response to the physical demands of the first responder occupation. A worthwhile endeavor would be to assess whether first responders in your local area are in fact at an increased risk of being exposed to these chemicals, which are often the product of combustion. The data obtained from a study such as this could be instrumental in improving existing safety protocols as well as educating the participants on the signs and symptoms of exposure to limit the possibility of recurrence.

While much of the data for biomonitoring studies are generated in the laboratory, a good biomonitoring program will encompass a diversified team across the many public health disciplines. The laboratory cannot do it all and by partnering with other state and local agencies, hospitals, academia, and/or various community officials you will significantly enhance the effectiveness of your program.

The National Biomonitoring Network (NBN)

In 2016, the APHL orchestrated the formation of the National Biomonitoring Network (NBN). The NBN is a collaboration of federal, regional, state, and local laboratories actively involved in biomonitoring for the purposes of public health practice and response to environmental emergencies.[2] The NBN functions to advance the science of biomonitoring, ensure quality practices, and promote the use of biomonitoring to answer questions relating to environmental health. The network will serve as a vector for members to identify best practices for study design, access harmonize laboratory methods, and learn how to communicate risks and results to stakeholders. Additionally, members will have access to a central repository for biomonitoring

1 https://www.aphl.org/aboutAPHL/publications/Documents/EH_2012_Guidance-for-Laboratory-Biomonitoring-Programs.pdf

2 https://www.aphl.org/programs/environmental_health/nbn/Pages/default.aspx

data. Laboratory membership in the NBN is based on programmatic activity, capabilities, infrastructure, and participation in proficiency testing programs. As of 2019, network membership is defined through a four-tiered system.

Tier 1: These are member laboratories that are actively engaged in biomonitoring activities encompassing surveillance, targeted studies, and emergency response.

Tier 2: These laboratories are engaged in biomonitoring activities related to targeted and emergency response, but on a smaller scale relative to Tier 1 members.

It is important to note that both Tier 1 and Tier 2 members must demonstrate successful participation in an established quality assessment (proficiency testing) program. Moreover, these programs will typically have a well-integrated team of personnel extending outside of the laboratory.

Tier 3: These are laboratories that possess the capabilities and infrastructure to conduct biomonitoring activities but are not currently engaged in any studies.

Tier 4: These are laboratories considering establishment of biomonitoring capabilities

NBN is currently limited to governmental laboratories integrated into the public health system but is designed to accommodate a variety of members with limited to extensive backgrounds. As the network grows, APHL's goal is to extend membership to private laboratories and laboratories within academia. The future of the network has incorporated a fourth tier to allow laboratories who are considering developing a biomonitoring program access to network resources.

Any laboratory that wishes to apply for Tier 1, 2 or 3 status may do so by visiting the NBN homepage and completing an online application.[3] Applications are assessed on a quarterly basis by panels of three reviewers and one chairperson.

Biomonitoring and the LRN-C

CDC recognizes that the LRN-C infrastructure provides critical laboratory capacity for addressing public health needs, including biomonitoring activities. CDC supports the use of PHEP funded personnel, reagents, and instrumentation for all public health programs requiring specialized laboratory testing. While the use of these resources is encouraged by CDC, the onus is on the laboratory to ensure that inventory is properly maintained to respond to chemical emergencies and meet LRN-C programmatic needs.

Funding

The CDC's Division of Laboratory Sciences provides funding and support in the form of state biomonitoring grants. In 2009, the CDC launched the State Biomonitoring Cooperative Agreement to increase state's capacity to perform targeted and population-based biomonitoring. Since then, eleven states have received multi-year funding to assess human exposure to environmental chemicals in their communities. The following highlights several of the recipients and some of the work they were able to accomplish as a result of this award.[4]

The Four Corners States Biomonitoring Consortium: The state public health agencies of Arizona, Colorado, New Mexico, and Utah organized a collaboration to leverage laboratory and epidemiology resources to address environmental health concerns common in all four states. Among the analytes of concern were metals, pesticides, herbicides, and phthalates.

California: California has engaged in various targeted studies. Featured projects include assessing exposure to metals, PFAS, PBDE, PCBs, and OCPs in maternal serum during pregnancy in addition to a PFAS exposure assessment with regional representative sampling across the entire state.

Massachusetts: The Biomonitoring Massachusetts Study is a population-based sampling system using the Behavioral Risk Factor Surveillance System Survey to recruit participants and assess exposure to toxic metals and polychlorinated biphenyls. Funds have also been allocated for emergency response operations to provide laboratory support for acute, chemical emergencies.

New Jersey: One of New Jersey's marque biomonitoring projects was Assessing Environmental Exposures of Expecting

3 https://www.aphl.org/programs/environmental_health/nbn/Pages/application.aspx

4 https://www.cdc.gov/biomonitoring/state_grants.html

Women in New Jersey to Toxic Metals, PCBs, and PFAS. This study measured pregnant women's exposure to environmental contaminants and offered intervention assistance.

Virginia: The Exposure of Firefighters to Toxic Combustion Products Study assesses firefighter exposure to cyanide and polycyclic aromatic hydrocarbons. Virginia also screens the general population for exposure to toxic metals and perchlorates.

See APHL's State Biomonitoring Programs page for more information.

Biosurveillance

Biosurveillance is a process of gathering, integrating, interpreting, and communicating essential information that might relate to disease activity and threats to human, animal or plant health.[5] An example of this would be screening emergency room patients believed to be experiencing an illicit drug overdose. Due to the ever-increasing opioid epidemic taking hold in the United States, the science of biomonitoring is beginning to take center stage. The LRN-C has taken a stance in responding to the opioid crisis by announcing their plan to roll out a standardized method for fentanyl analog detection. While the degree with which states choose to respond is ultimately left up to the state, the CDC allows the LRN-C infrastructure to be utilized to improve public health laboratories' response capabilities and will now incorporate fentanyl surveillance into the LRN-C supported operations. By partnering with public health epidemiologists and local hospitals, LRN-C laboratories may assist with the characterization of fentanyl analogs in clinical specimens to assist epidemiological investigations in identifying spatial exposure clusters.

Role of the Level 3 Coordinator

As the CT Coordinator in a Level 3 facility it is your responsibility to assist in the collection and shipping of clinical specimens when an exposure is believed to have occurred. This function is critical during a biomonitoring investigation. While the urgency will vary on a case-by-case basis, the CT Coordinator should maintain an up-to-date contact list of neighboring laboratories and be well-versed in their capabilities. By building relationships with area laboratories, regardless of LRN-C membership status, you will ensure that your region is able to respond appropriately to any emerging threat. The CT Coordinator should be looked upon as a valued resource; one who is able to provide subject matter expertise and serve as the liaison between your public health institution and the laboratory community.

5 http://archived.naccho.org/topics/emergency/biosurveillance/index.cfm

FAQ's for Level 3 Laboratories and First Responders

Question	What is the public health laboratory's role in the LRN-C?
Answer	Public health laboratories are dependent on clinical facilities or hospital laboratories to directly communicate with them during a chemical event and to properly label, collect and store patient specimens from potentially exposed individuals. Chain of custody begins with the facilities collecting patient specimens. LRN-C Level 3 laboratories are responsible for training, outreach, sample collection, and shipment. These laboratories assist in the development of coordinated response plans for the state and geographical regions. They assist with specimen collection by advising hospitals in clinical specimen collection, storage and shipment. LRN-C Level 2 laboratories are responsible for Level 3 activities and perform analyses to detect chemical agents with moderate complexity such as cyanides, heavy metals, ricinine, volatile organic compounds, organophosphate nerve agents and tetramine. These laboratories may be requested to provide surge capacity analysis. LRN-C Level 1 laboratories serve as surge-capacity laboratories for CDC, are able to detect not only the toxic chemical agents that Level 2 laboratories can detect but also can detect exposure to an expanded number of chemicals, including mustard agents, nerve agents, and other toxic industrial chemicals. Using unique high-throughput analysis capabilities, they expand CDC's ability to analyze large numbers of patient samples when responding to large-scale exposure incidents. Level 1 laboratories are also responsible for Level 3 activities..
Question	**Who should be contacted in the event of a chemical threat?**
Answer	State, territory, metropolitan and local public health laboratories should contact the CDC Emergency Operations Center (770.488.7100) and request to consult with the Division of Laboratory Services. Clinical facilities, such as hospitals and first responders, may contact the poison control center, state epidemiologist, department of health, laboratory or a chemical threat coordinator. All chemical exposures should be reported to the regional Poison Center at 1.800.222.1222.

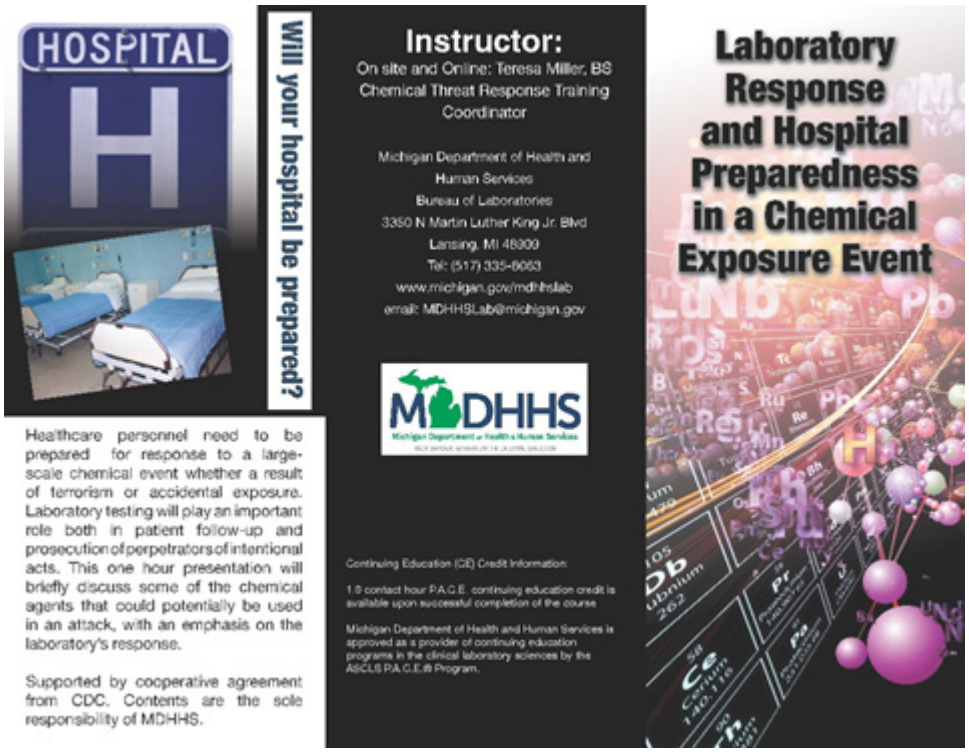
Question	What specimens should be collected?
Answer	Please see Appendix E. For the most recent version of this document and other related information, please visit http://emergency.cdc.gov/chemical/lab.asp. **Whole Blood** • Collect blood specimens from adults only unless you receive specific instruction from CDC to collect blood from pediatric patients. • All collection tubes for a single patient should be of the same lot number.* • Collect a minimum of 12 mL of whole blood per person. • Use three 4 mL or larger vacuum–fill only (unopened), non-gel, purple-top (EDTA) tubes. Use four tubes if using 3 mL tubes. • Using indelible ink, mark each purple-top tube of blood in the order collected, e.g., # 1, # 2, # 3. • Collect another blood specimen per person using one 3 mL or larger, vacuum- fill only (unopened), non-gel, green (sodium heparin or lithium heparin), or gray-top tube (sodium fluoride/potassium oxalate). • Allow the tube to fill to its stated capacity. • Refrigerate specimens at 1–10°C after collection. • DO NOT FREEZE BLOOD SPECIMENS! **Urine** • Collect at least 40-60 mL from each exposed and potentially exposed adults and children. • All urine cups should be of the same lot number (if possible).* • Use a sterile, screw-cap plastic container; do not overfill. • Freeze urine specimens as soon as possible to -70°C or use dry ice. • If other than "clean catch," note method of collection on the specimen cup, e.g., obtained by catheterization. ***NOTE:** • Blank cups and tubes must be included in the specimen shipping container. • For each lot number of tubes and urine cups used for collection, provide the following to be used as blanks for measuring background contamination: —Two (2) empty, unopened purple-top tubes. —Two (2) empty, unopened green- or gray-top tubes. —Two (2) empty, unopened urine cups.
Question	**When should the specimens be collected?**
Answer	Blood specimens should be collected as soon as a chemical exposure is realized. Ideally, urine specimens should be collected seven to eight hours post exposure (keeping in mind that the hospital may have to estimate the time of exposure).
Question	**What are the forensic requirements for specimen collection and shipment?**
Answer	A chain of custody form should be started with specimen collection. The specimen collector's initials, the collection date and time should be included on the specimen labels. All specimens should be stored in a secure location with restricted access. Evidence tape is critical in detecting/preventing tampering (see question "What are the packaging and shipping requirements"). Forensic handling requirements (evidence preservation) of the specimens are extremely important since cases may require prosecution of perpetrators.

Question	What are the specimen labeling requirements?
Answer	Label specimens with unique identifying information and follow CDC requirement procedures for proper specimen labeling. In addition to unique patient identifiers, e.g., medical records number or specimen identification number, labels should convey the collector's initials, date, and time of collection. If bar-coded labels are used, place the labels on blood tubes and urine cups so that when the specimen containers are upright, the bar code looks like a ladder and does not cover the fill line or the lot number and expiration date.
Question	**What are the specimen temperature requirements?**
Answer	Whole Blood - Always Refrigerate and keep specimens at 2–8°C. Ship on cold packs. Urine - Freeze specimens immediately at <-70°C or keep samples on dry ice. Ship using ice only (pelletized is preferred).
Question	**What are the packaging and shipping requirements?**
Answer	Please see Appendix F and G. For the most recent version of these documents and other related information, please visit https://emergency.cdc.gov/chemical/lab.asp. **Clinical Laboratories** State specific requirements: Follow the state specific instructions in accordance with IATA and DOT shipping regulations and requirements for UN 3373 Biological Substance, Category B and UN 1845 Class 9, Miscellaneous hazardous materials for dry ice. Secondary packaging must have its closure secured with a single strip of overlapping evidence tape initialed half on the packaging and half on the evidence tape by the person making the seal. **Territory, Metropolitan, Local or State Public Health Laboratories** Follow CDC Shipping Instructions in accordance with IATA and DOT shipping regulations and requirements for UN 3373 Biological Substance, Category B and UN 1845 Class 9, Miscellaneous hazardous materials for dry ice.
Question	**Where do we ship the collected specimens?**
Answer	Clinical laboratories will ship specimens to their territorial, local, regional or state public health laboratory unless directed otherwise. State, territorial, regional and local public health laboratories will ship specimens to CDC or to another LRN-C laboratory as directed by CDC.

Appendix A: Recommended Courses for the CT Coordinator

Courses	Host Organization	Contact Information
IS-3 Radiological Emergency Management	FEMA or state training center	https://training.fema.gov/emi.aspx
IS-100.c-Introduction to the Incident Command System, ICS-100	FEMA or state training center	https://training.fema.gov/emi.aspx
IS-200.c-ICS for Single Resources and Initial Action Incidents	FEMA or state training center	https://training.fema.gov/emi.aspx
IS-700.b - An Introduction to the National Incident Management System	FEMA or state training center	https://training.fema.gov/emi.aspx
IS-702.a – National Incident Management System (NIMS) Public Information Systems	FEMA or state training center	https://training.fema.gov/emi.aspx
IS-703.a-NIMS Resource Management	FEMA or state training center	https://training.fema.gov/emi.aspx
IS-706-NIMS-Intrastate Mutual Aid–An Introduction	FEMA or state training center	https://training.fema.gov/emi.aspx
IS-800.c-National Response Framework, An introduction	FEMA or state training center	https://training.fema.gov/emi.aspx
ICS-300-Intermediate ICS for Expanding Incidents	Local Emergency Management Agency	https://training.fema.gov/emi.aspx
ICS-400-Advanced ICS	Local Emergency Management Agency	https://training.fema.gov/emi.aspx
K0146 Homeland Security Exercise and Evaluation Program (HSEEP) Training Course	FEMA or state training center	https://training.fema.gov/emi.aspx

Appendix B: Example Training Brochure and Flyer



Michigan Department of Health and Human Services, Bureau of Laboratories

presents

Laboratory Response and Hospital Preparedness in a Chemical Exposure Event

Purpose:

Members of the health care team need to be prepared to respond to a large scale chemical event, whether a result of terrorism or accidental exposure. Laboratory testing will play an important role both in patient follow-up and prosecution of perpetrators of intentional acts. This one hour presentation will briefly discuss some of the chemical agents that could be used for terrorism with an emphasis on the laboratory's response.

Learner Objectives:

At the conclusion of this session, the learner will be able to:

1. List at least 2 types of agents that could potentially be used in a chemical terrorism attack.
2. Describe the role of the hospital and state laboratories in the Laboratory Response Network.
3. Identify what specimens to collect from people involved in a chemical exposure event.
4. Describe the forensic requirements for collection and handling of specimens following a chemical exposure event.
5. Define resources available for proper packaging and shipping of specimens.
6. Know whom to contact in the event of a chemical terrorism agent exposure.

Target Audience:

Learners should be any person responsible for ordering the collection of clinical (blood and urine) specimens and persons responsible for the actual collection, packaging, and shipment of clinical specimens.

Class Information:

One contact hour is awarded for completion of this course through P.A.C.E. ® This presentation is free of charge and your facility will receive a free chemical threat response kit.

To schedule ***"Laboratory Response and Hospital Preparedness in a Chemical Exposure Event"*** at your facility, please call (517) 241-0925 or email millert28@michigan.gov

Presenter: Teresa Miller, BS,
Chemical Threat Response Training Coordinator

Is your facility prepared to respond during a chemical exposure event?

Appendix C: List of Training Kit Materials Used by Other LRN-C Laboratories

Some LRN-C laboratories offer a supply kit for each clinical entity after training.

Examples of LRN-C Clinical Sample & Level 3 SPaSE-Related Supplies

Item	Category	Item Name	Item Description	Vendor(s)	Part/Catalog #	Part Type (i.e. case, pack)
1	Urine	Urine cups	Sterile urine dual click-tite cups (white cap) Polypropylene, 95kPa	Therpak	740006 74808S	4 bags of 47 (300/ cs)
			Non-sterile 120mL yellow cap cups	Fisher	1371157 or 010100	1 bag = 75 cups
			Sterile urine collection cups (Blue cap, wrapped)	Fisher	14-375-147	100 per case
2	Blood	Lithium Heparin (LH) Blood Tubes (green)	Vacutainer LH - 75 USP units plus blood collection tubes 4.0 mL (13 x 75 mm)	Fisher	REF: 367884	100 / pack
3	Blood	K2 EDTA Blood Tubes (purple)	Vacutainer K2 EDTA (K2E) 7.2 mg plus blood collection tubes. 4.0mL (13 x 75 mm)	Fisher	REF: 367844	100 / pack
4	Blood	Vacuatainer Holder	BD Vacuatainer One-use holder	Fisher	REF: 364815	250 per bag
5	Blood	Bandages	Sheer strip adhesive latex-free bandage (band-aids), sterile 3/4" x 3" with non-adherent pad	Fisher	1008	50 per box
6	Blood	Tourniquets	Tourniquets, Non-latex, 1" x 18"	Fisher	19-156-103, or 2203569	100 per pack
7	Blood	Alcohol Prep Pads	Medium Sterile Alcohol prep pads	Fisher	06-669-62 (box of 200), or 221-007 (box of 100)	06-669-62 (box of 200), or 221-007 (box of 100)
8	Blood	Needles	BD Vacutainer/Eclipse Blood collection needles 21G x 1-1/4"" (0.8 x 32 mm)	Fisher	REF: 368607	48 per box
9	Blood	Cotton Balls	Cotton Balls -Sterile & Absorbent	Fisher	79210500	box/bag = 500
10	Shipping	Small inner shipping box for URINE samples	Rectangular white inner shipping box. Holds 6 cups, with inside separator grid	Leigh Labs	BC368	25 each
11	Shipping	Small inner shipping box for BLOOD samples	Square white inner shipping box. 7x7 grid separator (A-G, 1-7)	Leigh Labs	95-064-949 BC5100	15 each
12	Shipping	Blood tube Cushioning / Absorbent	Therapak 6 blood tube holders. Cushion & absorbent	TheraPak	22-130-043 10316S	Pack of 300 strips (each strip holds 6 tubes)

Item	Category	Item Name	Item Description	Vendor(s)	Part/Catalog #	Part Type (i.e. case, pack)
13	Shipping	Large absorbent pads "Chucks"	Large blue absorbent pads (chucks) (17 x 24 inch)	VWR	56617-014	300 per case
14	Shipping	UN3373 Category B, Biological Substance Shipping Label	UN 3373 Category B label	U-Line	S-12521 (4 3/4 x 4 inch)	500 / roll
				TheraPak	54752S (89x102mm)	500 / roll
15	Shipping	UN1845 Miscellaneous Dangerous Goods (Dry Ice) Shipping Label	Class 9 misc haz label (Dry ice)	U-Line	S-2844 (6x6 inch)	500 / roll
				TheraPak	54530S (140mm)	500 / roll
16	Shipping	Overpack Shipping Label	Overpack label for if/when used with dry ice	Saf-T-Pak/ Inmark	S-10798	500 / roll
17	Shipping	Large white Tyvek bag	Large Tyvek (white) sealable bags	Saf-T-Pak/ Inmark	STP-740	50 / case
18	Shipping	Large clear 95kPa bag	Large Tyvek (clear) sealable bags	Saf-T-Pak/ Inmark	STP-741	50 / case
19	Shipping	Small specimen transport bag	Specimen transport bag with biohazard symbol and pouch	TheraPak	"16644S 16532"	1000 / case
20	Shipping	Specimen absorbent	Individual strips to surround each sample (needed for blood and urines)	Fisher	10300	1000 / case
				Can also use cut up paper towels		
21	Shipping	Gallon Ziplocks	Gallon sized ziplock bags	Grainger	32GM90	pack of 38
22	Shipping	Evidence tape	Evidence sealing tape (red) 1.375 inch x 108 ft	Safariland	1007919	each
			Evidence sealing tape (red) 108 ft	Sirchie	SM50002	each
23	Shipping	Category B box (insulated)	Large insulted Category B shipping container (Outer box) for frozen or refrigerated samples	TheraPak	56522S	each
				Saf-T-Pak/ Inmark	STP-320 / 34837	4 / case
24	Shipping	Filamentous packing tape	Filament (Strapping) tape for outer box	3M	897	each
25	Shipping	Freezable gel packs	Gel refrigerant packs (freezable)	TheraPak	56400S (250g, 152x102x19mm)	72 / case
26	Shipping	Dry ice	Dry ice	Check with local grocery stores		
27	Shipping	Double up arrow label	Double up arrow handling label for liquid samples	TheraPak	54635S (76x102mm)	500 / roll
28	General	Large tote style container for supply storage	Storage and carrying of all related supplies	multiple	multiple	multiple

Item	Category	Item Name	Item Description	Vendor(s)	Part/Catalog #	Part Type (i.e. case, pack)
29	General	LRN-C Training Manual	Provided by state/local LRN-C lab	N/A	N/A	N/A
30	General	CT Response Plan	Provided by state/local LRN-C lab	N/A	N/A	N/A
31	General	CDC LRN-C guidance documents	Blood and urine sample collection and packaging instructions	CDC LRN-C	CDC LRN-C	N/A
32	General	CDC LRN-C shipping manifests	Shipping manifest documents	CDC LRN-C	CDC LRN-C	N/A
33	General	Sharpies, pens & markers	Miscellaneous	multiple	multiple	multiple
34	General	Specimen holding racks	Miscellaneous	multiple	multiple	multiple

NOTE: *Above products listed are only examples and none are specifically being endorsed. Items listed are suggested references, and other equivalent sources exist.*

Last Inventory Check (Date):

Chemical Threat Response units may contain:

- File Tote w/Bonus Project Case
- Label the File Tote with Chemical Threat Response Toolkit- sticker
- Manual, Training
- Bag, Plastic, Ziploc, 10X12”
- Directions, Chemical Terrorism
- Kit order form
- Label, Combination-UN3373-Biological Substance
- Label, Combination, UN1845, UN3373, and DOT class 9 for dry ice
- Jacket, Paper File
- Form, Chain of Custody
- Sharpie
- Medium Point Ballpoint Pen
- 6 Grid Urine Box
- Strip, absorbent 50 mL
- Strip, absorbent 100 mL
- Bag, Plastic, 4X8”
- Label, Absorbents for Urine, Blood
- Kit, Foam Rack 40 place

Chemical Threat Response Shipper unit may contain:

- Ice, blue – 8 ounces
- Packaging, Secondary – two-part system biohazard bag and Tyvek bag
- Tape, Forensic Evidence
- Tape, Package strapping/filament
- Box, Corrugated, Overpack, with Styrofoam

Appendix D: Examples of Drills

Ideas for exercises can come from many well documented sources such as DHS/FEMA's HSEEP and from LRN-C partners. PHEP guidelines will have specific targets for exercises. This document can act as a guide for additional target areas for your own exercises Independent of established resources, below are some very simple exercises that could test operational process preparedness for chemical event response within the LRN-C Lab or with its partners:

1. Do you know where your chemical response kit is, and what's in it?
2. Exercise specimen collection in both emergency room settings and alternate collection sites for the worried well/ physiologically wounded to avoid over-crowding of hospital emergency rooms.
3. Test your courier(s) and include them when possible in exercises. Verify that couriers are properly trained in security awareness, safety, etc. Test specimen accessioning.
4. Notifications: Test telephone or other communication channels. Who is required to be, or should be notified in an LRN-C related event?
5. Coordinate and test interactions with the designated Poison Center.
6. Coordinate and test interactions for when Medical Counter Measures and/or the Strategic National Stockpile Program would be initiated.
7. Coordinate and test interactions with radiological and environmental health system programs.
8. Have LRN-C / Chemical Threat staff become more familiar with Category B level packaging and shipping requirements and shipments.
9. Coordinate with local and state, and hospital level emergency responders.

Appendix E: CDC Specimen Collection Protocol for a Chemical Exposure Event

From https://emergency.cdc.gov/chemical/lab.asp

CDC Specimen-Collection Protocol for a Chemical-Exposure Incident

See "Chemical Agents: Shipping Instructions for Specimens Collected from People who May Have Been Exposed to Chemical Agents" http://emergency.cdc.gov/labissues/specimens_shipping_instructions.asp

Collect blood and urine samples for each person involved in the chemical-exposure incident.

Note: For children, collect only urine samples unless otherwise directed by CDC.

Blood-Sample Collection

For each person, collect blood in glass or plastic tubes in the following order: 1st: collect specimens in three (3) EDTA (purple-top) 4 mL or larger plastic or glass tubes; 2nd: collect another specimen in one (1) gray- or green-top tube. Collect the specimens by following the steps below:

1 Collect a minimum of 12 mL of blood in three (3) 4 mL or larger glass or plastic tubes. If using 3 mL tubes, use four tubes.

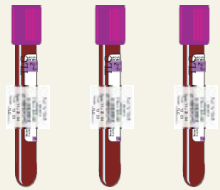
Do not use gel separators.

2 Mix contents of tubes by inverting them 5 or 6 times.

Tube #1 Tube #2 Tube #3

Label tubes in order of collection. #1, #2, #3

3 Place bar-coded labels on each tube, so that when the tubes are upright, the barcode looks like a ladder.



Tube #1 Tube #2 Tube #3

Store samples at 1°C to 10°C.
Do not freeze.

4 After collecting samples in the purple-top tubes, collect one (1) sample in a gray- or green-top tube (gray-top tube shown). Allow the tube to fill to its stated capacity.

Do not use gel separators.

5 Mix contents of the tube by inverting it 5 or 6 times.

6 Place bar-coded labels on the tube, so that when the tube is upright, the barcode looks like a ladder.

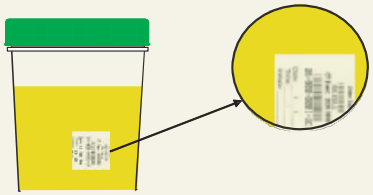
Store samples at 1°C to 10°C.
Do not freeze.

Urine-Sample Collection

For each person, collect 40 mL- 60 mL of urine in a screw-cap urine cup.

Label the urine cup with the appropriate bar-coded label as shown. Indicate on the cup how the sample was collected if the method was other than "clean catch" (i.e., catheterization).

Freeze samples (optimally at -70°C).



Place bar-coded labels on all cups so that when the cup is upright, the barcode looks like a ladder.

09 / 2015

Department of Health and Human Services
Centers for Disease Control and Prevention

Appendix F: Instructions for Shipping Blood Specimens to CDC after a Chemical Exposure Event

From https://emergency.cdc.gov/chemical/lab.asp

Chemical Agents:

Instructions for Shipping Blood Specimens to CDC after a Chemical Exposure Incident

Guidance in Accordance with Packaging Instructions International Air Transport Authority (IATA) 650 Biological Substance Category B. See "Chemical Agents: Shipping Instructions for Specimens Collected from People who May Have Been Exposed to Chemical Agents" http://emergency.cdc.gov/labissues/specimens_shipping_instructions.asp

Place purple- and gray- or green- top tubes by patient number into a gridded box lined with an absorbent pad.

Seal gridded box with one continuous piece of evidence tape.
The individual making the seal must initial half on the tape and half on the packaging.

Wrap gridded box in absorbent pad and tape to seal.
Seal gridded box inside a Saf-T-Pak clear inner, leak-proof polybag (or equivalent).

Place the sealed Saf-T-Pak inner leak-proof polybag (or equivalent) inside a white Tyvek ® outer envelope (or equivalent).

Note: Or equivalent packaging must meet USDOT Regulations (49 CFR 173.199) and IATA Packing Instruction 650 for transporting Biological Substance, Category B Specimens.

Seal the opening of this envelope with a continuous piece of evidence tape. Write initials half on the evidence tape and half on the envelope.

Use polystyrene foam-insulated, corrugated fiberboard shipper to ship boxes to CDC.
Place absorbent material in the bottom of the shipper.

Place refrigerator packs in a single layer on top of the absorbent material.

Place the packaged specimens in the shipper.
Use cushioning material to minimize shifting while box is in transit.
Place additional refrigerator packs on top of samples.

Place the blood shipping manifest in a sealable plastic bag and put on top of the Styrofoam lid of the shipper.
Keep your chain-of-custody documents for your files.

Secure the shipper lid with filamentous shipping tape.
Place your return address in the upper left-hand corner of the shipper top and put the CDC Laboratory receiving address in the center.

Add the UN 3373 label and the words "Biological Substance Category B" on the front of the shipper. UN 3373 is the code identifying the shipper's contents as "Biological Substance, Category B."

Send shipment via FedEx (or equivalent) to:
Centers for Disease Control and Prevention
CDC Warehouse
3719 N. Peachtree Rd.
Chamblee, GA 30341
ATTN: Chariety Sapp - (770) 488-0343

For questions concerning this process, please contact:

Centers for Disease Control and Prevention
Attn: Chariety Sapp
(770) 488-0343

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

08 / 2016

Appendix G: Instructions for Shipping Urine Specimens to CDC After a Chemical Exposure Event

From https://emergency.cdc.gov/chemical/lab.asp

Chemical Agents:
Instructions for Shipping Urine Specimens to CDC after a Chemical Exposure Incident

Guidance in Accordance with Packaging Instructions International Air Transport Authority (IATA) 650 Biological Substance Category B. See "Chemical Agents: Shipping Instructions for Specimens Collected from People who May Have Been Exposed to Chemical Agents" http://emergency.cdc.gov/labissues/specimens_shipping_instructions.asp

Place urine cups in a gridded box lined with absorbent material, or alternatively place each cup inside a leak-proof biohazard polybag (or equivalent) and then place wrapped urine cups into a box.

Use one continuous piece of evidence tape to seal the gridded box or the box containing wrapped urine cups. Write initials half on the evidence tape and half on the box.

Wrap the box with absorbent material and secure with tape. Seal the box inside a Saf-T-Pak inner leak-proof polybag (or equivalent).

Place the sealed Saf-T-Pak inner leak-proof polybag (or equivalent) inside a white Tyvek ® outer envelope (or equivalent).

Note: Or equivalent packaging must meet USDOT Regulations (49 CFR 173.199) and IATA Packing Instruction 650 for transporting Biological Substance, Category B Specimens.

Seal the opening of this envelope with a continuous piece of evidence tape. Write initials half on the evidence tape and half on the enevelope.

Use polystyrene foam-insulated, corrugated fiberboard shipper to ship boxes to CDC. Place absorbent pad in the bottom of the shipper.

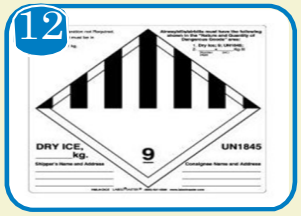
Place a layer of dry ice in the bottom of the shipper on top of the absorbent material. **DO NOT** use large chunks or flakes of dry ice.

Place the packaged urine cups in the shipper. Use absorbent material or cushioning material to minimize shifting while box is in transit. Place additional dry ice on top of samples.

Place the urine shipping manifest in a sealable plastic bag and put on top of the styrofoam lid of the shipper. **Keep your chain-of-custody documents for your files.**

Secure the outer container lid with filamentous shipping tape. Place your return address in the upper left-hand corner of the shipper top and put the CDC Laboratory receiving address in the center.

Add the UN 3373 label and the words "Biological Substance Category B" on the front of the shipper. UN 3373 is the code identifying the shipper's contents as "Biological Substance, Category B."



Place a Class 9/UN 1845 label on the front of the shipper. This label for dry ice MUST indicate the weight of dry ice (in kg) in the shipper and the proper name (either dry ice or carbon dioxide, solid).

Send shipment via FedEx (or equivalent) to:
Centers for Disease Control and Prevention
CDC Warehouse
3719 N. Peachtree Rd.
Chamblee, GA 30341
ATTN: Chariety Sapp - (770) 488-0343

For questions concerning this process, please contact:

Centers for Disease Control and Prevention
Attn: Chariety Sapp
(770) 488-0343

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Department of Health and Human Services
Centers for Disease Control and Prevention

Appendix H: CDC's SAMS Partner Portal for Access to the LRN Website and Results Messenger

The Secure Access Management System (SAMS) portal is a web site designed to provide centralized access to public health information and computer applications operated by CDC.

SAMS Partner Portal Registration

If you need to use CDC Partner Applications, you need a SAMS account. So, how do you get access to the SAMS Partner Portal?

Getting a SAMS portal account is straightforward. First, you must be identified by a CDC program as someone who needs partner application access. Then you will receive an invitation to register with SAMS online. In cases where you might be exposed to non-public information, you may also be required to prove your identity. Once you have completed registration, your account will be forwarded to an administrator for approval.

Invitations are created and sent to partners by CDC's public health program administrators. Your invitation will arrive by email from sams-no-reply@cdc.gov. The subject will be "US Centers for Disease Control: SAMS Partner Portal – Invitation to Register."

When your registration with the SAMS Partner Portal is finished, the CDC program administrator for your application will be notified to review and approve your access. Approval can take a few hours or a few days.

When the administrator receives your registration, a review is necessary to ensure that everything is complete, and you are eligible for permission to use the application(s) specific to your role in public health. You will receive your approval by email from sams-no-reply@cdc.gov. The subject will be "US Centers for Disease Control: SAMS Partner Portal – SAMS Activity Authorization." This email will contain web links to the SAMS Partner Portal and to the Application. You will also receive a welcome email confirming the activation of your SAMS Partner Portal account.

Appendix I: Examples of Events Opportunities to Promote

The following list provides examples of professional emergency responder groups that you may find useful to connect with via meetings, conferences or trainings.

Group	Description	Examples of Events	Where to Look
First Responders	Law enforcement, Fire/ HAZMAT, EH&S,	HAZMAT trainings, exercises, conferences	State, regional websites
State Emergency Services	Agencies dealing with all types of emergencies; funded by DHS	Meetings, trainings, conferences	https://www.dhs.gov/state-homeland-security-and-emergency-services
Emergency Medical Services	Closest partners for public health (Emergency medicine specialists from EMTs to local agencies and clinicians)	Meetings, trainings, conferences	State, regional and local office websites
Healthcare Coalitions	HPP funded; include government and hospital partners concerned with preparedness for health and medical disasters. Each HPP Coordinator works with hospital partners in their jurisdiction for preparedness activities	Meetings, conferences, trainings for healthcare, exercises	State and local health departments
Hospital Associations	Members are private sector healthcare systems, county hospitals, etc.	Conferences for disaster medicine or healthcare preparedness	State and regional websites
FBI	WMD directorate	Joint Criminal Epidemiology Investigations; other trainings for PH and Medical partners,	Schedule available from your local FBI WMD directorate and CDC Train website
Urban Areas Security Initiative (UASI)	DHS-funded preparedness program for high-risk urban areas. UASIs have Public Health and Medical Committees consisting of health agencies and healthcare leaders	Meetings, exercises	https://www.dhs.gov/keywords/uasi
Local Emergency Planning Committees (LEPC)	LEPCs consist of agencies, private sector and community groups; prepare and plan for incidents involving hazardous chemical releases, e.g. EPA, Coast Guard, Fire, HAZMAT, PD, FBI, CST, PH, etc.*	Meetings, conferences, exercises	https://www.epa.gov/epcra/local-emergency-planning-committees Under the Emergency Planning and Community Right-to-Know Act (EPCRA), LEPCs must develop an emergency response plan, review the plan at least annually, and provide information about chemicals in the community to citizens.
Poison Centers	Each state has their own (medical toxicologists and pharmacists)	Grand rounds, meetings	https://www.poison.org/18002221222

Appendix J: Webpage Template and Examples

Webpage Template

<table>
<tr><td colspan="3">State/department/section header or title of webpage</td></tr>
<tr><td>Pictures or designs/logos</td><td>Pictures or designs/logos</td><td>Pictures or designs/logos</td></tr>
<tr><td colspan="3">Title for the information displayed on this page?</td></tr>
<tr><td colspan="3">Information here:</td></tr>
<tr><td>Buttons with words or pictures for more information</td><td>Buttons with words or pictures for more information</td><td>Buttons with words or pictures for more information</td></tr>
<tr><td>Buttons with words or pictures for more information</td><td>Buttons with words or pictures for more information</td><td>Buttons with words or pictures for more information</td></tr>
<tr><td colspan="3">Facility contact information</td></tr>
<tr><td colspan="3">Webpage specific information</td></tr>
</table>

NPHL
Nebraska Public Health Laboratory

Dedicated to protecting the health and safety of Nebraskans through diagnostic laboratory science, technology, and education.

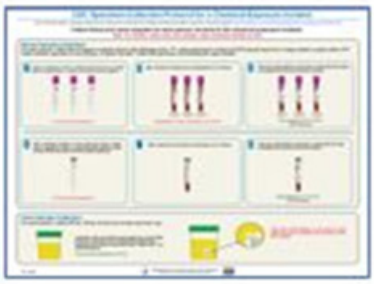
Preparedness - Chemical Events
LRN-C Protocols

Laboratorians play a crucial role in response to chemical emergencies by collecting, packaging, and shipping specimens to confirm potential chemical exposures. The CDC provides specific information about how to respond safely and effectively during a chemical emergency.

CDC's Laboratory Response to Suspicious Substances

(Link to https://emergency.cdc.gov/labissues/substanceresponse.asp)

CDC Specimen-Collection Protocol for a Chemical-Exposure Incident



(link to https://emergency.cdc.gov/labissues/pdf/Flowchart_ChemEvent_Specimen_collection.pdf)

Instructions for Specimens Collected from People Who May Have Been Exposed to Chemical Agents

(Link to https://emergency.cdc.gov/labissues/specimens_shipping_instructions.asp)

Chemical Categories

Fact Sheets on Specific Chemical Agents

(link to https://emergency.cdc.gov/agent/agentlistchem-category.asp)

Chemical Event Poster

(Link to http://nphl.org/documents/CTPoster2011Final.pdf)

Chemical Preparedness Training

(Link to NPHL training page)

Blood and Urine Sample Forms

Chemical Terrorism Testing Capabilities at NPHL, questions or comments, contact:
David Moran, MT (ASCP)
Phone: (402) 559-3557
Pager: 402-888-2969

Chemical Threat Response Training

There are unique requirements for specimen collection from individual potentially exposed to chemical agents. The Bureau of Laboratories (BOL) continues to offer training for hospital employees and other public health collaborators in the proper collection, storage, packaging, and shipment for chemical exposure clinical specimens.

Training Program Details	On-line Training Program	Forms and Documents
Training Program Details	Resources	What is the LRN?

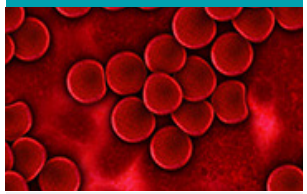
Facility Contact Information	(517) 335-8063	8am-5pm M-F
Michigan Department of Health and Human Services-Bureau of Laboratories	(517) 335-9030	After Hours
Chemical Threat Response Training Coordinator	(517) 241-0925	Office
	(517) 388-5648	Business Cell

Appendix K: Chemical Threat Agent Poster Template

CHEMICAL THREAT AGENTS

CALL POISON CONTROL 24/7 FOR TREATMENT INFORMATION **1.800.222.1222**

BLOOD



SYMPTOMS
- Vertigo
- Tachycardia
- Tachypnea
- Cyanosis
- Flu-like symptoms
- Nonspecific neurological symptoms

INDICATIVE LAB TESTS
- Increased anion gap
- Metabolic acidosis
- Narrow pO_2 difference between arterial and venous samples

DEFINITIVE TEST
- **Blood cyanide levels**

POTENTIAL AGENTS
- Hydrogen Cyanide
- Hydrogen Sulfide
- Carbon Monoxide
- Cyanogen Chloride

NERVE

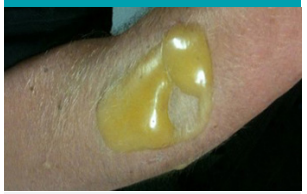
SYMPTOMS
- Diarrhea, diaphoresis
- Urination
- Miosis
- Bradycardia, bronchospasm
- Emesis
- Lacrimation
- Salivation, sweating

INDICATIVE LAB TESTS
- Decreased cholinesterase
- Increased anion gap
- Metabolic acidosis

DEFINITIVE TEST
- **Urine nerve agent metabolites**

POTENTIAL AGENTS
- Sarin/Soman
- Tabun/VX
- Organophosphate Pesticides

BLISTER



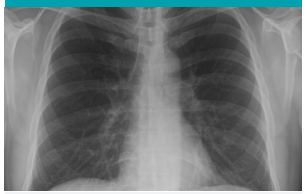
SYMPTOMS
- Itching
- Erythema
- Yellowish blisters
- Flu-like symptoms
- Delayed eye irritation

INDICATIVE LAB TEST
- Thiodiglycol present in urine

DEFINITIVE TEST
- **Urine blister agent metabolites**

POTENTIAL AGENTS
- Sulfur Mustard
- Nitrogen Mustard
- Phosgene Oxime
- Lewisite

PULMONARY



SYMPTOMS
- Upper respiratory tract irritation
- Rhinitis
- Coughing
- Choking
- Delayed pulmonary edema

INDICATIVE LAB TESTS
- Decreased pO_2
- Decreased pCO_2
- Arterial blood gas
- Chest radiography

No definitive tests available

POTENTIAL AGENTS
- Phosgene
- Diphosgene
- Chlorine
- Ammonia

METALS

SYMPTOMS
- Cough
- Metallic taste
- CNS effects
- Shortness of breath
- Flu-like symptoms
- Visual disturbances

INDICATIVE LAB TESTS
- Proteinuria
- Renal assessment

DEFINITIVE TESTS
- **Blood metals panel**
- **Urine metals panel**

POTENTIAL AGENTS
- Dimethylmercury
- Lead
- Copper
- Mercury
- Arsenic
- Cadmium
- Thallium

TOXINS

SYMPTOMS
- Shock
- Organ failure

INDICATIVE LAB TESTS
None Available

DEFINITIVE TESTS
- **Urine ricinine**
- **Urine abrine**

POTENTIAL AGENTS
- Ricin
- Abrin

Call the chemical threat laboratory at your state public health laboratory for appropriate specimen collection, packaging and shipping information:

Click to insert a LOGO/IMAGE To remove, click and select "Clear Image"

Organization Name
Phone:
Website:

Click to insert a LOGO/IMAGE To remove, click and select "Clear Image"

Organization Name
Phone:
Website:

APHL ASSOCIATION OF PUBLIC HEALTH LABORATORIES®
www.aphl.org

This publication was produced by APHL, supported by Cooperative Agreement #NU60OE000103 funded by the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC or the Department of Health and Human Services.

Appendix L: Important Acronyms

AAR	after-action report
AAR/IP	after-action report/improvement plan
APHL	Association of Public Health Laboratories
ASPR	Assistant Secretary for Preparedness and Response
BT	bioterrorism
CBRNE	chemical, biological, radiological, nuclear and explosive
C	Celsius
CDC	Centers for Disease Control and Prevention
CEU	continuing education units
CLIA	Clinical Laboratory Improvement Amendments
CME	continuing medical education
CMLE	continuing medical laboratory education
CMS	Centers for Medicare & Medicaid Services
CST	Civil support team
CT	chemical threat
DLN	Department of Defense Laboratory Network
DHS	Department of Homeland Security
DOD	Department of Defense
DOT	Department of Transportation
EHS	Environmental Health and Safety
EMT	Emergency Medical Technician
EDTA	Ethylenediaminetetraacetic acid
EPA	Environmental Protection Agency
ERLN	Environmental Response Laboratory Network
FAQ	frequently asked questions
FBI	Federal Bureau of Investigation
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FERN	Food Emergency Response Network
FD	Fire Department
HAZMAT	Hazardous materials
HHS	Health and Human Services
HPP	Hospital Preparedness Program
HSEEP	Homeland Security Exercise and Evaluation Program
IATA	International Air Transport Association
ICLN	Integrated Consortium of Laboratory Networks
ICS	incident command system
kg	kilograms
LEPC	Local emergency planning committees
LRN	Laboratory Response Network
LRN-B	Laboratory Response Network for Biological Terrorism
LRN-C	Laboratory Response Network for Chemical Threats
MACS	multiagency coordination system
MCI	mass casualty incidents
MCM	medical counter measures

mL	milliliter
MOU	memorandum of understanding
OEMS	Office of Emergency Medical Service
NAHLN	National Animal Health Laboratory Network
NBN	National Biomonitoring Network
NIMS	National Incident Management System
NPDN	National Plant Diagnostic Network
OCP	Octacalcium phosphate
PBDE	Polybrominated diphenyl ethers
PCB	Polychlorinated biphenyl
PD	Police Department
PFAS	Perfluoro Alkyl Substances
PH	Public health
PHD	public health department
PHEP	Public Health Emergency Preparedness
PHL	Public Health Laboratories
PRA	Physician's Recognition Award
PT	proficiency testing
SAMS	Secure Access Management System
SNS	Strategic National Stockpile
SPaSE	Specimen Packaging and Shipping Exercise
TEPW	Training and Exercise Planning Workshop
UASI	Urban Areas Security Initiative
UN	United Nations
URL	uniform resource locator
US	United States
USDA	United States Department of Agriculture
VOC	Volatile Organic Compounds
WMD	Weapons of Mass Destruction

Appendix M: Additional Contacts

APHL:

CDC Chemical Emergencies:

LRN-C QA Program:

State-specific Contacts (Your list):

Association of Public Health Laboratories

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

This project was 100% funded with federal funds from Cooperative Agreement #5NU60HM000803-03 from the US Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC or the Department of Health and Human Services.

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