Evaluating and Responding to Chemical Emergencies: The Role of Poison Control Centers and Public Health Labs

Moderator: Leticia R. Davila

Presenter: Dr. Rudy Johnson, PhD and Dr. Robert J. Geller, MD

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Coordinator:

Welcome and thank you for standing by. All participants are on a listen-only mode until the question-and-answer session of today's conference. During that time, if you would like to ask a question you may press star 1. Today's call is being recorded. If you have any objections you may disconnect at this time. Now I would like to turn the call over to your host for today, Miss Leticia Davila. Ma'am you may begin.

Leticia Davila:

Thank you Amy. Good afternoon, I'm Leticia Davila, and I am representing the Clinician Outreach and Communication Activity, COCA, with the Emergency Communication System at the Centers for Disease Control and Prevention.

I am delighted to welcome you to today's COCA webinar, Evaluating and Responding to Chemical Emergencies: The Role of Poison Control Centers and Public Health Labs. We are pleased to have with us today Dr. Rudy Johnson from the Centers for Disease Control and Prevention, and Dr. Robert Geller, from the Georgia Poison Center. They will discuss biomedical testing for chemical agents, state-level poison control center practices, and clinical resources for chemical emergencies. You may participate in today's presentation by audio only via webinar, or you may download the slides if you are unable to access the webinar. The PowerPoint slide set and the webinar link can be found on our COCA web site at emergency.cdc.gov/coca. Click on COCA Calls. The webinar link and slide set can be found under the call-in number and call passcode.

At the conclusion of today's session the participant will be able to one, identify three services a biomedical laboratory can provide during a chemical emergency; two, describe the role of poison control centers in evaluating and responding to chemical emergencies; and lastly, describe the key functions of the joint State-Federal collaborative program, CHEMPACK.

In compliance with continuing education requirements, all presenters must disclose any financial or associations with the manufacturers of commercial products, suppliers of commercial services or commercial supporters as well as any use of an unlabeled product or products under investigational use.

CDC, our planners and the presenters for this presentation do not have financial or other associations with the manufacturers of commercial products, suppliers of commercial services or commercial supporters. This presentation does not involve the unlabeled use of product or products under investigational use. There was no commercial support for this activity.

At the end of the presentation you will have the opportunity to ask the presenters questions. On the phone dialing star 1 will put you in the queue for questions. You may submit questions through the webinar system at any time during the presentation by selecting the Q-and-A tab at the top of the webinar screen and typing in your question.

Our first presenter, Dr. Rudy Johnson, is a laboratory chief of the Emergency Response Branch at CDC's Division of Laboratory Sciences, National Center for Environmental Health. Dr. Johnson oversees the development of diagnostic methods for quantifying human exposure to chemical agents and also supervises the emergency laboratory support team. He works closely with CDC's Laboratory Response Network to develop these diagnostic methods and to transfer the methods to other laboratories within the network.

Our second presenter, Dr. Robert Geller, is the medical director of the Georgia Poison Center and has served in this position for more than 25 years. He is a key planner in the state of Georgia, chemical emergency response planning, and in the state of Georgia CHEMPACK program, planning and implementation. He is also Professor of Pediatrics at Emory University. Dr. Geller is the author of more than 50 publications, which include publications on the poison center role in public health preparedness and response. Again, the PowerPoint slide set and the webinar link are available from our COCA web page at emergency.cdc.gov/coca. At this time, please welcome our first presenter, Dr. Rudy Johnson.

Dr. Johnson:
Hi, well, good afternoon and thank you very much for inviting me to talk. So today I'm going to spend some time and talk about the functional laboratory and what we do. We're currently located in the Chamblee campus, near Spaghetti Junction, and the laboratory primarily was established to address chemical exposures from agents that are listed in the UN or OPCW Schedule 1 list of agents.

Those are chemicals that are, there's really no purpose for anyone to have those except for the use of chemical weapons. And then that has expanded somewhat to address some national threats. But you'll see a basis of the items that we work with as chemical warfare agents from World War I, and then you'll see other select toxins that have been added as needed throughout time.

So some of the current threats that we have, some are natural, some are man-made. As an example, you can see Maine has some issues with the shellfish poisoning, saxitoxins, as does Alaska and California.

So saxitoxin coincidentally is also a Schedule 1 agent used as a chemical warfare agent, but Mother Nature gives us plenty of practice nowadays with the red tide and how the toxin pre-concentrates in the shellfish, and people eat it and they get sick.

Another way that people are exposed to chemical warfare agents are through the old munitions that were thrown into the ocean and are in the seabeds that people fish off of. So a fishermen off of the coast most recently in I believe it was New Jersey and New York as well as Delaware have had exposures when they pulled up old munitions, looked at them and they've leaked on their hands, and then they've thrown them back overboard.

So that's another way that people are exposed to these munitions. In the news a lot of countries that are developing or have a smaller military like the idea of chemical warfare agents because they're relatively inexpensive. Unfortunately, they're very hazardous and as the countries are destabilizing, those weapons become more and more available to the terrorists as we frequently call them and that's a hazard we have as well.

And also in the case of, we call them lone actors or lone wolf people. They get interested in extracting ricin. They've looked at old books such as The Anarchist Cookbook are famous ones. And those documents people use to extract ricin and for no real good reason. And in a recent case we had a gentlemen who was in a coma in Las Vegas hotel room, and the police entered and they needed to know what was going on there.

So we do get a variety of exposures in the chemical terrorism laboratory. It's also known as the Emergency Response Branch. And these are from Mother Nature or residual issues from World War I or World War II, evolving threats from other countries and just the fact that some people are extracting toxins that they shouldn't.

So the goals in our laboratory when addressing these threats and human exposures is to produce interpretable laboratory results on a representative number of clinical samples as quickly as possible. So somebody's been exposed to a chemical warfare agent, they want a response quickly to figure out what it was, how much they've been exposed to. But also, the interpretation's the big deal.

So for example I'm a chemist but I work very closely with the medical community, a toxicologist who interprets the data that I have. So if you go to an emergency room, you don't call a chemist for a diagnosis, you talk to a doctor. And so I work at the interface of chemistry and medicine, and I rely heavily on the medical community for interpretation. And also the fact that we have to maintain a flexible laboratory, that's very important because you'll never get an event that happens the way you expect it.

So the big issue is we produce interpretable results. We focus only on clinical samples. We don't do environmental samples or clothing or anything like that, or food. Although our methods could directly apply to those, so we do help other agencies. And we are flexible in our response to make sure that we can be a usable resource.

So what information can we provide to you? A big issue for us is providing clear, understandable results from biomedical samples. So people ask straightforward questions, you need to give them straightforward answers. The first thing we generally provide to people is the identity of the chemical agent that they've been exposed to.

We determine who has been exposed so in any event if there is a media release, You know people on the news say if you were in the subway today and you're suffering from severe headaches, you may have been exposed to an agent. So a lot of people will be concerned following an exposure event, and they will want to know if they need treatment or not.

So that's a large part of our business model there is to make sure that we can help with what's frequently called the worried well. And then whenever it's possible we report actionable results. Some chemical weapons, they just have supportive care as treatment, there's not a whole lot you can do there as far as countermeasures or medicines that are applied. But whenever there are results that can be used for treatment, those are provided.

So if there is a chemical exposure event, we have to ensure that we have the ability to collect samples promptly. Following the attacks on September 11, we discovered that when they shut down the air transportation system they also shut down our ability to collect samples. So CDC has its own contracted

airplane with its own deployment team that will go to a remote location, collect samples and bring them back.

It should be pointed out that even though there's air transport and a team that deploys, they rely heavily on the state public health system and the medical care providers in the hospital to collect those samples and then just provide them. So we don't actually do blood draws or urine collections. We go to the location where they've been previously collected. Also this team is not designed to go into hazardous areas where perhaps there could be explosives in the area or any criminal activity. They primarily deploy to the hospitals or the state public health laboratories.

They are available for rapid deployment 24 hours a day, they have two hours' notice to get in the plane and have wheels up. There's about three teams total, 20 people each. Each one has a role of collection, packaging and aliquoting the samples out for analysis.

Another big deal is chain of custody, making sure everything is labeled properly, and that can be, it doesn't sound that complicated but it can be, especially when you consider that samples are collected and then divided up in sometimes 30 or 40 different ways for analysis, and making sure you have the correct tracking identification for not only the patient but the initial collection sample as well as each of the aliquots. And then if there's extra material left over from the aliquot, what do you do with that. And so, having proper labeling and chain of custody is a key part of what we do to make sure there's no confusion.

So we make sure that our personnel are ready to deploy by exercising our capabilities. Here are some examples here, the pictures of our team. They have real-time communication back and forth to CDC. The ability to print new labels as needed, and this is a, it took a long time to get a lot of these capabilities in place. It used to be that when you wanted labels you had to print them in the laboratory and then take them in the field.

Well, if you print 100 labels and you have only 30 samples, or have 300 samples, you're labeling won't match. So it's the ability to actually have labels printed real-time and have data transferred back and forth in real time has been a logistical challenge. Not very exciting but something that's definitely required to make sure we have a high quality product at CDC.

So how do we, what are we looking for in the clinical samples. We have different biomarkers for different times post-exposure. We look at short-term biomarkers in some cases those are the toxic agent or urinary

biomarkers. Medium-term biomarkers are generally urinary markers. And long-term biomarkers are generally those found in the blood adducted to other proteins.

So examples of the types of biomarkers we look at in the case of a toxic compound, if you have something that's stable in the body, it will stay in its original form but oftentimes it will hydrolyze or adduct to something else. So the toxic compound generally doesn't stick around very long.

The urinary metabolites are formed then, and those are excreted. Generally, we can monitor urinary metabolites for two or three days, depending on the amount of exposure it could be much longer than that. We've had cases where we've monitored up to eight or ten days post-exposure.

Our methods tend to be extremely sensitive. The main issue is whether or not the patient wants to continue to provide specimens or not. And the blood adducts that we look at, primarily the limitation on time after exposure, you can monitor with those, is based on the turnover of those, so where the toxic compound may be present for a day or two, urinary metabolites are two or three days or more, blood adducts are three or four weeks, depending on what you're adducted to. If you're looking at a serum protein adduct, it's generally 28 days. If you're looking at something adducted to a red blood cell, it's usually about three weeks.

I'm sorry, so that's the, those are the time limitations. So if someone says, "Can you measure something in the body, you know," and they say "Well, it's been three weeks since it's been exposure" and they'd like to provide a urine sample, that doesn't do any good. So some of the guidance that we provide is that if you think you have an exposure, collect a sample right away, because you do have transient signatures for the exposures.

So when the samples do arrive at the CDC, we have what's collectively called the Rapid Toxic Screen. The Rapid Toxic Screen is a series of reference methods and those methods are focused primarily on the traditional agents of vesicants, the sulfur mustards, that'd be HD, Lewisite, which is arsenical vesicant, and nitrogen mustards. And sometimes those are found in mixtures and that provides attribution to the source of the actual agent.

Interestingly, it's very interesting to notice in the vesicants, some of the blisters don't appear for up to 24 hours post-exposure. So a lot of people think chemical weapons, you have an immediate reaction to them. Chemical weapons are actually designed to bog down your medical system to provide very difficult detectability initially, and then they bog down everything without actually killing people. That's the goal is just to bog down your military through the exposures.

Cholinesterase inhibitors, those are your traditional nerve agents, the G series are the ones that were initially developed by the Germans, and GB is sarin, GD soman, GF cyclosarin. VX and Soviet VX or Russian VX are the newer types of agents. The G series are offensive nerve agents, those are the ones that are designed to go into an area and they're volatile and then they'll dissipate, so if you want to occupy a building you would use one of those after eliminating anybody in it. A V-series agent is a defensive weapon, which is primarily loaded in the soil, so that if you're retreating an enemy crossing the soil contaminated with VX will be poisoned.

So there's different reasons why each one of these weapons was developed. And sometimes the nerve agents are mixed with other things as well. Toxic metals are something we look at, lead, mercury, arsenic, most people know about those. And then we have a variety of other methods, cyanide is a very common one that we look at. Incapacitating agents in general, if you just want to incapacitate someone, you could think of the chemical equivalent of say, Spider Man and his webs. Your idea is to immobilize people but not kill them.

Drugs of abuse are something that we're concerned with, volatile organic compounds from the chemical industry. Rodenticides are a big deal, and of course there's always a new threat that we have to consider out there.

So, a few things I wanted to briefly mention about diagnostic methods. That's not the point of this talk to go too deeply into that, but there's some key features of our diagnostic methods that are different from other ones in the field.

We use isotopic dilution as our quantitative tool, so that means that we actually go out and synthesize the agent or metabolize that we're interested in. And we change the isotopes, not to radioactive isotopes but to stable isotopes like carbon-13. So normally carbon is carbon-12, we change it to carbon-13, which has the same chemistry as carbon-12, but it's just heavier. We don't use carbon-14, That would be radioactive.

So the use of different isotopes is very helpful and then it has the same extraction efficiency in any matrix and gives us the best quantitative accuracy possible. So essentially I'm explaining that we synthesize reference materials so we have the best quality data to generate reference data from a national laboratory.

We also have a fast sample preparation, some laboratories have sample preparation capability in place but it might take them two to three or four days in order to run a sample based on how they prepare things. Our sample throughput is generally about 100 samples every few hours. That's kind of where we're leaning towards for throughput. If you do have a lot of people that are exposed, they don't want to wait around for the data.

We also have chromatography. Chromatography is a close relative of sample preparation. Basically it has a certain level of selectivity of it, chromatography is the close relative of distillation in our laboratory, where essentially you're isolating out interferences from the compound of interest based on different chemical properties, or in some cases interactions with antibodies on a substrate.

And then tandem mass spectrometry is our workhorse instruments. Those are the ones that provide actual analysis of the mass of the compounds. And just briefly to mention mass spectrometry. Mass spectrometry is a whole field unto itself. They have national conventions with these things where 20, 30, 40,000 people show up, almost like the auto show or the boat show in Atlanta. It's a huge market and there's a lot of complexity associated with it.

But briefly if I were to explain tandem mass spectrometry, the selectivity is based on a lot of ways the same way a slot machine is operated. If you have three different mass spectrometers lined up, in order to have the proper response which we measure and report to the patient, you have to have the same response like a slot machine from all three parts of the instrument providing a positive result.

If you don't have the right combination, you don't get a result, and that's the basis of a lot of the selectivity in the laboratory are these multiple stages of selectivity.

So basically, to summarize how our methods are focused, we have isotopic dilution, which is a very tedious, expensive internal standard but provides the best information possible. We tend to generate those and provide them commercially to other people so we help improve the health care field in general. Our sample preparation's fast, chromatography is selective, and the tandem mass spectrometry is selective as well.

So what happens if the CDC has a large number of samples that's overwhelming? What we would do is turn to our state lab partners and the state lab partners comprise what's known as collectively the Laboratory Response Network. The Laboratory Response Network has two main types of function. One is the biological side and the other one is the chemical side. So I'm referring here to the chemical side of the LRN.

So the LRN network is designed around the concept of CDC being the reference laboratory. And Level 3 laboratories are the laboratories which have very minimal diagnostic capability. And their primary minimal function is the ability to collect samples following an event and distribute them to either the CDC or other neighboring laboratories that can provide assistance.

The Level 2 laboratories have all the same capabilities as Level 3 but have incorporated also toxic industrial analysis, so a lot of them have industrial areas and this capability allows them to monitor exposures following perhaps a leak, or in the case of the hurricane that hit New Jersey, the rail car that was leaking into the river. New Jersey was able to provide diagnostic level support there as well. And in Level 1, Level 1 laboratories are our Cadillac laboratories, best way of explaining it, where they have the ability of Level 3 plus Level 2, plus they can look at more selective chemical warfare agents.

Across the nation we have roughly 45 laboratories and it depends from year to year on their proficiency testing capability, but there's about 45 active laboratories plus the difference being the Level 3 labs. And the map here shows you roughly where they're located. There's a total of 62 laboratories, and that includes different areas like American Samoa, and also some states have more than one state public health laboratory that participates, like California.

The shipping and packaging exercise as it turns out is a key part of what we do because the diagnostic capability really doesn't do you any good if you can't send samples properly. So if you have samples that are shipped and are leaking or are not at the right temperature, or they cross-contaminate each other, any data that you generate is suspect, it's kind of the old adage of you can't clean a window with a dirty rag, it's the same thing with shipping. If you can't ship your samples properly and they leak or whatever problem they have, you won't have a good end result.

Proficiency testing is a huge deal for us, because the state laboratories each have a different configuration, different staff, some turnover. On different equipment is also a big deal. We're a performance-based laboratory network, so proficiency testing is the cornerstone of performance, where three times a year each laboratory receives 10 unknown samples, they're tested and their results are compared to other laboratories. And then that's how they determine if they're passing or not at any given time.

So the proficiency testing is three times per year plus one surprise proficiency test and participation in any required exercises. Most laboratories run the three required PTs for up to 13 methods, that's quite a few

proficiency tests, plus they have exercises with about 500 samples each that they give in a weekly period of time.

The network, I'll have to tell you even though you have a large number of laboratories each with a different capability and different level of training, work extremely well. Our state lab partners do a great job and I'm very appreciative of what they do and their results are very impressive. So there should be a lot of confidence in our network, in our partners.

The materials program also enables a performance-based network because you provide everyone with a consistent level of materials, this is sort of, I always think of these as the technology you would find in a can of paint. There's a lot of technology behind it but all you have to do is open it up and use it. In the case of our materials program, we provide the correct metabolites, matrix stability information and internal standards, and the end user has a lower workload to get things done. And this is the cornerstone of our performance as well.

We have communication data transfer, we have secure avenues of transmitting data, that's a big deal for us. And we have a dedicated training and support staff, so if there is a need for a state laboratory to receive additional training or they've had a staff turnover, we can definitely provide that support. We also have federal lab partners and state lab partners that request additional training even if perhaps they're not in the network.

A big part of what we do is to help improve the quality of the Laboratory Response Network and public health in general, and sometimes providing training outside of the normal group is a good thing for us.

We coordinate with other federal partners, EPA, Department of Homeland Security, the FDA, Department of Defense and the FBI are some of them. But honestly we've worked with quite a few in a variety of modes. In some cases we just provide our methods to them, some cases we run samples for them. It all depends on the mission and what they're looking for.

But to summarize, everything in the laboratory that we look at, chemicals arise continually, these are naturally occurring, these are old man-made issues and current man-made issues as well. Emergency preparedness is based around routine testing and routine exercises and the rapid toxic screen. And we are constantly working on novel method development.

Proficiency testing is the cornerstone of a performance-based network, so it's important that everybody's compliant. These are all CLEA-audited laboratories. State capacity and training is key especially for large-scale response, and we have domestic and international collaborators.

Thank you.

Dr. Geller:
So good afternoon, this is Dr. Robert Geller and I am going to turn the information and our focus to a state program that works collaboratively with the federal assets we've talked about. And we're going to talk today about the Georgia Poison Center, our role in response to a chemical incident and about the CHEMPACK program logistics.

So it's worthwhile to remember that a disaster is an unexpected event that overwhelms the capability of the existing infrastructure to respond to it in a competent and comprehensive manner. This definition is useful because it tells us that if we can improve the capability of the infrastructure, we can avert disaster.

Many of us think of disaster as something that happens when you've got thousands and thousands of patients. But we know from our personal experience that one patient more than we can handle can create a disaster by interfering with patient care, by creating injury to bystanders and staff, and to other patients. And so even a single patient can be a problem.

Many of you on the call may think of chemical disasters as things that occur in transit. But actually most chemical events occur at fixed facilities, but they can occur of course during transit, during public events and at public locations.

So the strategy for incident management that occurs has to be a strategy of first of all recognizing we have a problem, secondly responding to the problem by identifying the cause and treatment, and providing accurate information to the public and thirdly, having a plan for remediation which involves both stopping further illness and then providing treatment to those who are already sick and then interrupting spread from time to time.

So the recognition step, we can break down further into recognizing we have a problem, but the question is does it need public health or public safety response. Recognizing as best we can what are the causative agent or agents. There's no guarantee that it's only one thing. And in most jurisdictions, if not all, contacting the poison center will reach medical toxicology assistance and by reachback, public health officials.

The response step asks the question, “Okay, so we now know we have a chemical event. Is there an antidote that’s needed, and if so is hospital coordination needed?” And remediation at the scene, first of all may require treatment at the scene. It may require triage at the scene, and then the question is, if you have contaminated patients, do we need to create, carry out decontamination of patients at the scene prior to transport, because generally speaking, transporting contaminated patients just spreads the contamination back to the hospitals and health treating facilities.

So, if we want to provide treatment at the scene, and that is a choice of the event managers based on the scope of the event and the stability of the patients, medical treatment may require the use of assets, antidotes brought to the site. And the CHEMPACK program, as we’ll learn shortly more, can bring assets to the site. But if we choose to provide remediation at the hospital, the same questions present themselves, but the CHEMPACK program can also supplement assets at the hospital by assets brought to the emergency department to assist in patient care.

So at this point we ask ourselves the question, Why is there a CHEMPACK program and what is it? Many of you are aware of the Strategic National Stockpile program, which has many drugs and medical material necessary to respond to a large outbreak of illness. However, the response time to get that to a given venue is eight to 12 hours, which in the case of some chemical events is much too long to provide optimal patient care.

Therefore, we need to say, “Well, what is available locally?” and unfortunately, state and local governments have only limited or no chemical or nerve agent antidote stocks available and because of both the cost of some of these agents, some of these treatment agents, some of these treatment pharmaceuticals and the fact that these events are rare, most hospitals carry very limited if any supplies of some of these drugs.

And furthermore, even after the costs, many of these things may expire on the shelf if they were not used and therefore that cost would be, go to waste and therefore hospitals are reluctant to do that.

So the CHEMPACK program is a national program, carried out between, a partnership between the federal government and each state to supply a local cache of antidotes for treating organophosphate toxicity. Organophosphates were specifically chosen as a target for this program, because organophosphates respond readily to timely treatment, but with delay of treatment prove more difficult to treat and have more prolonged illness.

Organophosphates include the categories of nerve agents, as Dr. Johnson already discussed, but also include commercially available organophosphates such as malathion, acephate and others used widely in agriculture.

It's important to note to avoid confusion that fertilizers and weed-and-feed products are not what we're talking about. We're specifically talking about the organophosphate insecticides. And some of the same properties shared by organophosphates and nerve agents are shared by carbamates and related agents.

So CHEMPACK containers are self-contained units that can be placed in centralized locations to enable the quicker administration of pharmaceuticals to treat organophosphate poisoning. But they're really not helpful for anything other than the organophosphate class of agents. And as those of you may recall, organophosphates have a wide variety of toxicity and potency, and mostly used nowadays as commercial and agricultural insecticides. They're heavily restricted and generally rarely sold now for home use.

However, many homes will have products that they were bought previously that are organophosphates that are still available at the home setting. And these agents include such things as malathion, previously sold as insecticides for roses, diazinon, previously sold as insecticides for fire ants, and other agents.

So nerve agents, we've talked about GA, GB, GD and VX before. And all of them function by inhibiting the class of human enzymes called cholinesterases. The normal purpose of cholinesterase is to break down acetylcholine and prevent your nerves from being jammed as it were in the on position. However, these agents stop the cholinesterase present in your body from doing their job and therefore leave you with excess of acetylcholine present.

Initially the treatment for these agents is reversible, but the weak bond that initially occurs soon becomes covalent and the time it takes for aging, what we refer to as aging to occur may lapse from minutes for some of the nerve agents to several days for some of the commercial insecticides.

So this is a cartoon demonstrating what we've just described, showing that acetylcholine being released from one nerve ending here, travels into the synapse, normally goes to the receptor, and which triggers an activity of the post-synaptic nerve. However, in the setting where acetylcholinesterase cannot do its job, this breakdown never occurs and this neuron is left in the on position.

So there's additional information here about the chemistry, which is there available for your reference. And organophosphates in the body are efficiently absorbed both by inhalation, ingestion, and even

through intact skin. So it's easy to deploy them and they redistribute to the brain and fatty sites, where they create their activity and remain until they're metabolized by the liver.

Principally they're exhaled or eliminated in the urine. Most of the activity breaks down in the urine, so urinary based methods will pick these up for a period of time based on the description, but again it depends on how long a time lapse that occurs and the specific sample.

So making the diagnosis is generally done by clinical symptoms, especially in the setting where we have a compatible exposure such as mass illness occurring in a public place that is outdoors or you might have exposure to a single point of transmission.

So clinical lab data traditionally available through hospitals can support the diagnosis but doesn't actually confirm it. Specialty diagnostic methods such as those discussed by Dr. Johnson will confirm these tests. But in the meantime, the clinicians generally make a diagnosis based on the setting of clinical symptoms and response to therapy.

So the therapy required, first of all is to prevent further exposure and then to administer atropine. Atropine normally creates certain effects in the body which many of you are well familiar with, which will include enlargement of pupils, speeding up of the heart rate, drying up of secretions, and in the setting of exposure here, we would expect people who are currently having symptoms would have drying of secretions in response to atropine.

If people don't have the expected response, it suggests that something is blocking the activity of atropine and therefore supports the diagnosis clinically. Once the diagnosis is clinically supported, supplying a second-tier agent called pralidoxime helps to reactivate inherent cholinesterase activity and improve patient outcomes.

For some of the organophosphates, particularly nerve agents, seizures have been described and the use of diazepam is the currently preferred treatment for treating these seizures. But it's important to remember that nerve agents will persist longer than diatripine and diazepam, both of which have short periods of activity in the body and therefore repeat those things generally necessary to improve patient outcomes.

So if we look at what's stocked locally, that's generally driven as we discussed before with, by cost and availability and storage space. The likelihood of getting these to the patient quickly is poor unless it's locally available, and then we need adequate supplies locally to start patient care and then the CHEMPACK program can kick in supplies, and then federal programs can kick in supplies after that.

So our next slide shows us that getting antidotes, the time required to get antidotes from the strategic national stockpile is generally eight to 12 hours, and the CHEMPACK program aims to fill this gap by supplying antidotes more quickly to supplement local stocks until national stockpile can be accessed if necessary.

In Georgia, we've set ourselves the internal goal of getting antidotes anywhere in our state within one hour after request.

So, in Georgia the plan works by having the poison center as the central requesting place, and the central processing place and coordination place. Some states operate this way, other states are using other venues to provide this function. But I'll explain during this next few minutes why we think this works well here.

So the Georgia Poison Center typically receives calls from every hospital in the state concerning potentially poisoned patients. And so we think that this represents a way in which people behave normally and that in a disaster enhancing the way they behave normally and saying that what you do normally would also work, works well here. And so based on that logic, the poison center is the place to call for assessment.

And if they call and say "Gee, we think we have a mass outbreak and we need some help," we will assess that situation as we'll discuss a little bit further in detail, contact the nearest CHEMPACK site in Georgia, there are more than 50 across our state, and many of you will recall that Georgia has the largest land mass east of the Mississippi of any state. We will link the releasing site with a site that has the material, and the releasing site will use its pre-arranged transport plan to pick up material and deliver it to the site, where the material's needed, while maintaining a chain of custody.

So, first the local requirement is that we have to recognize that there is a need for resources that is not going to be met by routine stockpiles. And if so, the people needing materials will call the poison center. The poison center provides clinical consultation and if it seems reasonable to provide this material based on the clinical story, we'll locate and contact the appropriate CHEMPACK site, provide ongoing consultation and coordinate information sharing with public health so that the site with all the patients doesn't have to do as much information management and can spend their staff time on dealing with actual patients themselves.

So our plan says that anyone can request a CHEMPACK who knows what the material is, but they can also, they don't have to necessarily be the person in charge, they don't have to be a health care professional depending on what's most appropriate, as long as they represent somebody who's responsible for the assets involved.

So we would like to know, have the requests come directly to the poison center but we have allowed for the possibility that someone knows that there are materials stocked at their own hospital, and therefore calls directly over to the pharmacy or whoever's holding that material, and we do have a plan in place that says if that happens then we would still like to have coordination so there's still one central place that knows what's going on.

So the poison center locates the assets, we will contact the site to confirm that they're still available and haven't been released unbeknownst to us, and then provide the consultation and the connection. Our goal is to avoid opening unnecessarily CHEMPACK sites, because once you open them, the federal shelf life extension program that makes this a very cost-effective material becomes inactive and therefore all the materials now have to be used up fairly quickly or be lost to expiration.

And our goal is to keep as much assets available and therefore, but also to release an amount adequate for patient care. So we know CHEMPACKs are very large and our goal is not to move the entire CHEMPACK to treat five patients, because a CHEMPACK is designed to treat anywhere between 400 and 1,000 patients.

So we will coordinate release of material and we may not release an entire CHEMPACK, but we will move entire boxes at the same place. We do have a plan in place that says what happens if a place that stocks material has released its material and needs material itself, and we have a plan to backfill.

In general, we're going to release things in full case boxes to simplify the process and avoid the need to count contents, because time is of the essence, but we do have a plan to make an exception if appropriate.

Our goal in general is to release two to two and a half doses per expected patient, which will think will buy us eight to 12 hours until you can get the strategic national stockpile, or until we can deliver more material, if that proves necessary.

So, transport is coordinated by the releasing sites. The Georgia plan calls for using lights and sirens, vehicles in general, to make transport more efficient, and again we can transport material to a scene or to a hospital or to both as most clinically appropriate.

We also can deliver to a secondary care site such if there's an arena being set up to handle the less, the worried well and those people with minor illness and we may retain the capability of the emergency departments to provide care to those most ill.

So federal law requires that these materials be delivered to someone with the ability to legally handle restricted drugs, and so we in general prefer to have that happen, but we do have a plan built in case the materials delivered to a scene where there is no licensed individual present and we do have a plan to handle that as well.

So our, all of our stocking sites are required to have a pre-arranged transport plan, both a primary and a secondary plan if the primary isn't working.

So in summary, after a request is made, the Georgia Poison Center assesses the need, locates nearby assets, contacts the host of the access and authorizes release, conferences the host with the requestor, who jointly arranged transport details between those who have the stuff and those who need it. The poison center, meantime is notifying the state CHEMPACK emergency coordinator while the material is actually being delivered. And the poison center's toxicologists remain available for consultation and remains in consultation with all those involved.

So at this point, I'd like to open the presentation over to questions, either to my piece or to Dr. Johnson's piece and I'd like to thank you for your attention.

Coordinator:
Thank you. We will now begin the question-and-answer session. If you would like to ask a question from the phone, please press star 1. Please unmute your phone and record your first and last name clearly when prompted. To withdraw the request you may press star 2. Again, if you would like to ask a question, please press star 1. One moment please. Again, if you would like to ask a question, please press star 1.

Leticia Davila:
We do have one question from the webinar system. How do state poison centers work with CDC and federal agencies during a chemical response?

Dr. Geller:

This is Dr. Geller, let me speak to that first. So that's a great question. All of the poison centers have linkback capability to CDC when appropriate. In Georgia, we may be somewhat unique in that we're in the back yard of CDC as it were, but I believe that all of them do have relationships. We've had meetings with CDC and various poison centers, and there is direct linkback capability for the situation when it's needed.

Dr. Johnson:

This is Dr. Johnson, I think that's, that about covers it.

Leticia Davila:

Thank you.

Coordinator:

We do have one question that has come in from the phone, however, no name was recorded, the line is open. If you have, press star 1 for a question, your line is now open. Your line is open.

Dr. Christensen:

Yes, this is Dr. Doran Christensen from (REACTS) in Oak Ridge, Tennessee.

Leticia Davila:

Yes, go ahead.

Dr. Christensen:

Yes, I wanted to ask Dr. Johnson is the, I understand that you have some laboratories that will do analyses of materials that are radioactive, and I understood that was in Dr. Robert Johnson's laboratory. So I may have my facts confused, but I'm interested in what the capabilities are of the CDC and NCEH for evaluation of samples for radioactive materials.

Dr. Johnson:

Okay, sure, so, no, rad work is done with Dr. Robert Jones. My group manages the retrieval of materials that may, clinical samples only that may contain radioactive components, and then those are then alliquoted and sent up to his laboratory. And he has the ability to look at a variety of different exposures but I'd have to refer you to him for more detail.

Dr. Christensen:

Very well, thank you so much, I appreciate it.

Dr. Johnson:
Yep.

Leticia Davila:
We have another question from the webinar system. How is rotation of stock issues handled?

Dr. Geller:
This is Dr. Geller. Presuming that you're talking about the CHEMPACK, so what happens is that annually a sample of materials stocked in the CHEMPACK conditions is carried out. If they meet the initial proficiency, sorry the potency and purity requirements of the FDA, then they are left in stock for another year. However, if they fall below the levels of potency and purity required, then CDC rotates them out during the annual rotation of stock. So in short, the stock is rotated when it falls below clinical standards usually used.

Dr. Johnson:
As far as the Laboratory Response Network goes for diagnostic reference materials, those generally have a two-year lifespan. They're stored at minus 70 degrees Celsius and then a lot of new material is generated.

Coordinator:
We do have another question from the phone. The next question is from (Ibad Khan), your line is open.

Ibad Khan:
Thank you, this question is for Dr. Geller regarding the role of CHEMPACK in chemical incidents. As far as the CHEMPACK rule go, which chemical agents, the different classes that you discuss, do you most routinely see the use in?

Dr. Geller:
Well, at least to my knowledge the use of CHEMPACK in the field has not happened often, we're fortunate in that regard, but it is designed to treat anything in the organic clinically that the body recognizes as an organophosphate or a carbamate, i.e., something inhibiting one or more of the cholinesterase enzyme systems. So that includes all the organophosphates, does not much matter which one, carbamates, and anything else that would be an acetylcholinesterase-inhibiting compound.

The ones that is designed specifically to treat our organophosphates but it would be useful for the atropine in treating carbamate poisoning but carbamate poisoning probably does not need the pralidoxine contained within the CHEMPACK.

Ibad Khan:
Thank you.

Coordinator:
Again, if you would like to ask a question from the phone, please press star 1. Our next question is from Dr. (Norman Cassell), your line is open.

(Dr. Cassell):
Yes, I'm just wondering if there are now tight controls on these toxic substances such as the DEA has for Schedule 1 and Schedule 2 agents. I ask because some years ago my sister had a sick houseplant. She was funding executive at a major university, and they handed her some parathion for her plant. There were no toxic consequences, but I was very upset that they just gave it out.

Also, as you mentioned, I'm one of those people who has malathion down in my garage that my wife got from a garden center. So this stuff is still around.

Dr. Geller:
So this is Dr. Geller so yes, this stuff is still around. Over the years, I can't tell you an exact year but over the past 10 to 20 years as we've recognized increasingly the potential toxicity of these compounds, they have moved from the homeowner use as sold by the typical residential stores and those targeting residential customers to those targeting professional applicators and commercial users.

The availability of agents is typically governed by either the US Department of Agriculture or the US Environmental Protection Agency. But they are typically regulated at this point to professional use only for most of these agents. However, there are no regulations forcing anyone to turn them in, nor for that matter do we have a system of collecting them and then safely disposing of them if someone were to try to get rid of them, except on a state or local level.

(Dr. Cassell):
Regarding professional users, when I was in my post-graduate years down in the South Florida area, they were using parathion on field crops and there was no one supervising the safe use of it. The field workers

were exposed to it regularly, they had their lunch in the fields, so they were eating there. We had a little clinic where we treated them. Is there any supervision to make sure that people don't do that anymore?

Dr. Geller:
So that is typically either at the state, local or federal level. It possibly would have supervision from Occupational Safety and Health, but many states it's deferred to state or local jurisdiction, so it's going to vary from setting to setting. Unfortunately I suspect that what you described is still happening, but I don't have any personal information to tell you how often it happens or doesn't happen.

(Dr. Cassell):
Okay, thank you.

Leticia Davila:
We have another question from the webinar system. Who pays for the antidotes when requested from SNS?

Dr. Geller:
So my understanding, this is Dr. Geller again, so my understanding is that antidotes requested from the SNS are federal assets. Therefore, when they are released they are actually delivered and do not have a charge attached to them because we've released federal assets. Now the charge to the patient may occur from their administration but not from the assets themselves.

However, it's unclear to me at this point if you consumed federal assets, who exactly would pay for replacing them at the stocking point, is an issue that I don't know the answer to and I suspect would be a better question to ask to the state and federal partners who operate the logistics of supply.

Leticia Davila:
Thank you. We have one more, sorry.

Coordinator:
Go ahead.

Leticia Davila:
We have one more question from the webinar system. Does each state poison control center work the same way in distributing CHEMPACK?

Dr. Geller:
This is Dr. Geller, absolutely not. Some states have other stocking plans, I was talking to somebody just earlier this week who told me that in their state this is handled on a regional basis by regional emergency management, and that the poison center is a consultant but not the central (nidus).

I know that in some states it's handled through a central state emergency management agency. I know that in some other states it is handled similar to what we're describing. We're describing this because I wanted to show a very concrete example beyond the ethereal statement of "Oh well, a poison center has experts in consultation who know a lot about chemicals," and didn't seem like that made for a very good presentation. I wanted to give you a very specific example of how we can bring something to the table that fits with the emergency response theme of this presentation.

But it is true that every poison center in every state has medical toxicologists available to provide consultation real-time in the event of a suspected chemical event. And that is true nationwide, every one of our poison centers.

Leticia Davila:
Thank you.

Coordinator:
Again, if you would like to ask a question from the phone, please press star 1. The next question is from (Stefan Ceravia), your line is open.

(Stefan Ceravia):
This question I believe probably would be best answered by Dr. Geller, but I'm curious as to your thoughts about how you see our country as being prepared for other potential chemical releases. For instance, you know, cyanide or other radioactive materials, since those materials and those antidotes are not in the CHEMPACK.

Dr. Geller:
Well, I'll give you my opinion, I'm going to turn the question back to Dr. Johnson as well from a analytical standpoint, but from a therapeutic response standpoint, the reason organophosphates were chosen here is because time, quick delivery of these antidotes makes a big difference. For many of the other chemical events you would talk about, they fall into one of two categories. People who are overwhelmed by dead at the scene, and there's not a whole bunch we're going to do about it, or they're going to get better on their own.

That's one set of chemicals. Another set of chemicals is, as some of the things he described, symptoms are not manifest for 12 to 24 hours and so we have 12 to 24 hours to get antidote. And so neither one of those requires this intermediate level of chemical antidote availability.

So from a response standpoint, I think there are many plans. I can tell you that Georgia has many, many plans to respond to many issues but none of them fit into this paradigm of we need something locally stocked to get to you quickly.

So I think that would be my answer is yes. I think there's a lot of preparedness but we haven't talked about it during this talk. Dr. Johnson, perhaps you want to talk about analytical capabilities.

Coordinator:
Dr. Johnson, I believe you might be muted.

Dr. Johnson:
Yeah, I think you're right. Thank you. I think the state laboratory network is in pretty good shape. The laboratories have a very strong communication program with their different counterparts throughout the state, and the diagnostic tools are in place for when they're needed.

But there is that issue of whether or not something is further investigated after an exposure event. So if it's relatively small scale, usually it's a follow-up testing, but if it's something that's perhaps not accompanied by initial. That's the thing, if you have a covert or an overt exposure event, if it's overt and someone makes an announcement and there's a big bang and people are poisoned, it's something that's pretty obvious what's going on.

But if it's a case where people are being poisoned and no one's quite sure what's happened, the clinical laboratory can take the lead for providing results that are needed to investigate what's going on.

So the state laboratories are prepared for either one of those and have staffing in place for that, and they're quite good in that regard.

Coordinator:
Our next.

Leticia Davila:

I have another question from the webinar system. In terms of environmental samples, what is the value of testing environmental samples versus testing biomedical samples, and are there particular challenges?

Dr. Johnson:
Sure, so on the case of environmental the great thing about those is if there's something in them, it can be present at a relatively high concentration, much higher than you would find in a clinical sample. However, environmental samples are not where we work, that's where the EPA comes in.

Biomedical samples are quite good because if you don't know where someone was poisoned, the person themselves is a sampling device. So in the case of a marine toxin poisoning, we know the person's been poisoned but you may not be able to go back and pinpoint or even reproduce the environmental conditions that caused that.

So the two of them, obviously you need the environmental component to cause the exposure, but there's not necessarily a connection between if you can find the environmental samples that caused that. So sometimes the biomedical is all you have, and sometimes people rely only on the environmental depending on what's going on.

Leticia Davila:
Thank you. Operator we will take one more question.

Coordinator:
Our next question is from Ibad Khan. Your line is open.

Ibad Khan:
Yes, I have a question about the use of diazepam for treating the nerve agent-induced seizures. Is there any plan in place in case of a shortage or lack of availability of diazepam to use midazolam and not only for a shortage but also if you have seizures that may be refractory to diazepam.

Dr. Geller:
So this is Dr. Geller, so first of all diazepam is one of the things that's in the CHEMPACK, so if there were a shortage it's available through the CHEMPACK system. Diazepam is the only benzodiazepine currently approved by the FDA for treating nerve agent-induced seizures. So given that the CHEMPACK system is a federal asset, under joint federal and state control, you can see why diazepam would be the drug chosen.

However, and I will tell everyone that this is an off-label statement, which is not approved by FDA, there's no clinical reason to suspect that midazolam or lorazepam would not work equally well.

Ibad Khan:

Thank you.

Leticia Davila:

Thank you. On behalf of COCA, I would like to thank everyone for joining us today with a special thank you to our two presenters, Dr. Johnson and Dr. Geller. We invite you to communicate to our presenters after the webinar. If you have additional questions for today's presenters, please e-mail us at coca@cdc.gov. Put "January 31 COCA Call" in the subject line of your e-mail, and we will ensure that your question is forwarded to them for a response.

Again that e-mail address is coca@cdc.gov.

Coordinator:

Thank you for participating in today's conference you may disconnect at this time.

END