

Chemical Hazards: Preparedness and Response Tools

As threats to national security emerge and evolve, ASPR, CDC, and other federal partners are collaborating to help prepare and protect our communities. In this article, Susan Cibulsky, PhD, a Senior Policy Analyst with ASPR and Susan Gorman, PharmD, MS, Associate Director for Science and Science Branch Chief for Strategic National Stockpile, ASPR discuss tools and resources that can help emergency responders and healthcare providers learn more

about and respond to chemical incidents involving industrial chemicals, chemical warfare agents, and emerging threats.

John Hick (JH): *What are some of the gaps you see in chemical incident preparedness on the community level?*

Susan Gorman (SG): I don't think chemical preparedness gets the same level of attention as biological preparedness. In general, communities conduct

Nerve agent antidotes are needed very soon after an exposure, before Strategic National Stockpile (SNS) delivery can take place. State and local governments had limited or no chemical/ nerve agent antidote stocks. Hospitals carried very limited supplies of treatments for nerve agent exposures. Nerve agent antidotes are costly and have variable shelf lives (not an easily sustainable resource).

The CHEMPACK program was created in 2002 to address these issues and:

- ▶ Provide, monitor and maintain a nationwide program for the forward placement of nerve agent antidotes.
- ▶ Provide state and local governments a sustainable resource and improve their capability to respond quickly to a nerve agent incident; and
- ▶ Ensure storage of antidotes under conditions that allow their shelf lives to be extended.

Taken from <https://chemm.nlm.nih.gov/chempack.htm#provisions>



Photo courtesy of Strategic National Stockpile.

fewer exercises and awareness activities on chemical incidents. And yet, the breadth of chemicals that can be released is much larger than the biological threats we are preparing for, and there are not many antidotes for all the chemicals that can pose a threat.

Susan Cibulsky (SC): There is also more of a burden on local communities because in many cases chemical incidents proceed rapidly and the acute health effects can be seen in a very short period of time (minutes to hours). There is not enough time for the federal government to move resources long distances to participate in the initial response. Generally speaking, local communities bear the responsibility to respond on their own.

JH: *And because of that, some federal resources need to be pre-deployed. Can you comment a bit on [CHEMPACK](#)? Have the plans received the attention/exercises or other things that other mass casualty or biological plans have? How do you see it moving forward and what do communities have to do to integrate CHEMPACK in their pre-hospital response plans?*

SG: CHEMPACKs are forward deployed throughout the U.S. We worked with each state and territory early on to give them a chance to choose the number and types of CHEMPACKs they wanted based on the population-related budgets they received. States also got to choose where the CHEMPACKs would be placed in conjunction with the Strategic National Stockpile. They may be housed in different locations. We did not dictate to them how they need to use or integrate them. We wanted them to integrate them in their all hazards or HAZMAT response plans in ways that would best serve their communities, so this may differ widely throughout the U.S.

For example, in Georgia, the GA Poison Center is the hub for any requests for CHEMPACKs. In a nerve agent or organophosphorus incident, a call would be placed to the center and they would quickly locate the nearest CHEMPACK, connect the affected area to that location, and help make transport arrangements.

Consequently, they do their own exercising. There is no national exercise program for CHEMPACK containers; we want their exercises to complement their local response plans. We do have a few training containers that states can request; these containers have replica cases of materials participants can break down.

It's incumbent on local areas to exercise their plans and [ensure](#) that these types of steps are clear.

JH: *How have CHEMPACK contents changed recently, and do you anticipate more changes?*

SG: We recently added midazolam to the CHEMPACK containers—the hospital containers now have some diazepam multi-dose vials and some midazolam (Seizalam) multi-dose vials, as well as atropine and pralidoxime vials. The EMS containers primarily hold auto injectors (either Mark 1 kits, Antidote Treatment-Nerve Agent, Autoinjector [ATNAA], or pralidoxime autoinjectors, as well as different types of atropine auto injectors) plus all have midazolam multi-dose vials. Due to some manufacturing challenges in the U.S., we were able to import atropine auto injectors from Israel.

Hospital containers no longer have auto injectors in them. The autoinjector quantities were backfilled to include additional multi-dose vials of pralidoxime, atropine, and diazepam. There are

RELATED RESOURCES

The 2nd edition of PRISM decontamination guidance is provided in three volumes:

1. [Strategic Guidance](#)
2. [Tactical Guidance](#)
3. [Operational Guidance](#)

The “Algorithm Suggesting Proportionate Incident Response Engagement” ([ASPIRE](#)), a decision-aid for PRISM, was created to help identify the need for patients exposed to chemical agents to undertake wet decontamination.

The Wireless Information System for Emergency Responders ([WISER](#)) can also help responders in HAZMAT incidents.

ASPR TRACIE's [Pre-Hospital Patient Decontamination and Hospital Patient Decontamination](#) Topic Collections contain additional resources, including OSHA's [Best Practices for Hospital-Based First Receivers of Victims from Mass Casualty Incidents Involving the Release of Hazardous Substances](#).

Learn more about your state [Poison Control Centers](#).

[AskRail](#) allows qualified responders to access information on hazardous train cargo being transported through their communities.

no other major changes anticipated for the program at this time.

SC: CHEMPACK still only contains medical countermeasures for nerve agents and other organophosphorus compounds. But in another recent change to the [Strategic National Stockpile](#) (SNS), Silverlon was approved by the FDA for treating cutaneous injuries as a result of sulfur mustard exposure. Silverlon had already been stockpiled in the SNS burn blast kits to treat thermal burn injuries; this new FDA approval expands the product's utility.

JH: *Going back to the concept of “all response is local,” one of the issues that comes up a lot is effective pre- and hospital decontamination. Can you talk about the PRISM documents and how they were developed?*

SC: [Primary Response Incident Scene Management](#), or PRISM, guidance is based on several years of research funded and overseen by BARDA. The recommendations are evidence-based and centered on the goal of decontaminating people as quickly as possible. EMS engages the patients themselves and instructs them on moving away from the site, removing their clothing, and doing some dry decontamination with any type of absorbent material. This can all be accomplished before specialized decontamination equipment arrives and is set up. PRISM work

has shown that clothing removal and dry decontamination can remove most of the contamination if done correctly. This approach is applicable to a wide variety of chemicals and exposure scenarios, making patient decontamination a broad spectrum medical countermeasure.

JH: *That’s really important—it’s the first time we have had data that supports that clothing removal and dry decontamination is effective. And sometimes wet decontamination is not possible in a pre-hospital environment based on climate, the amount of time and resources available, and the like. If you have some dry decon kits and clothes for people to change into, it can minimize injury and exposure to both the patients and first responders. What about hospital-based issues with HAZMAT incidents?*

SC: The PRISM guidance can be incorporated at hospitals as well—as we’ve learned, many patients will likely go directly to hospitals without first being evaluated or decontaminated at the scene. Hospitals need to plan to receive potentially contaminated patients. They can establish areas for dry decontamination to initiate the process while simultaneously setting up their triage, wet decontamination, and evaluation

systems. In the [guidance that ASPR and the Department of Homeland Security published](#) prior to PRISM, we also emphasize that field responders and hospitals should plan and train together to ensure a common approach. Knowing each other before an incident and having confidence in the pre-hospital decontamination that has already been done is invaluable.

JH: *Can CHEMPACKs be used to treat an incident of organophosphate exposure—regardless of whether it’s an accident or a terror incident—in the event that the local stock of antidotes is insufficient? And once a container is opened, what happens next?*

SG: Yes. The containers are federally owned, but locally managed. They are monitored for temperature so that the contents may be placed into the federal shelf life extension program to extend the life of the product. Local officials in charge of the CHEMPACKs do not have to ask federal permission to open the container once the local supply of antidotes has run out. Once the door is opened, the SNS will receive a notification alarm, but at that point, they can take out the contents and distribute them to the field and/ or to hospitals as needed. After the incident is over, SNS is responsible for replacing



Photo courtesy of Strategic National Stockpile.

the content of the CHEMPACK (pending availability of product and funds) and resealing the container. The CHEMPACK training containers do not hold actual product. They just have empty cases; training auto-injectors are not included.

JH: *Have CHEMPACKs been used in response to any incidents?*

SG: No, they have not yet been used.

JH: *Do you keep track of CHEMPACK exercises, or how often the training materials are used?*

SG: The training containers with the empty cases are not often requested, and unless we are invited to participate in the exercises, we do not track them. We do participate in state-level exercises for various [threats](#); if a request comes in, we do our best to support it.

JH: *It's certainly incumbent upon local jurisdictions to make chemical preparedness*

a priority. Toxic industrial chemicals are a matter of significant concern from both an accidental and intentional standpoint. Can you both discuss the guidance available for these types of incidents?

SG: It's important for communities to know what they have in their location and conduct a hazard risk analysis to know what to be prepared for. For example, if they know that trains carrying chlorine traverse their community, they could better prepare for a related incident. While SNS is not a first response mechanism, we do have materials we could use to provide backup and resupply should the local cache run out (e.g., airway management supplies and ventilators that could be used for pediatric and adult patients).

SC: It is so important to conduct these analyses to identify risks unique to each community. Communities should be familiar with their nearest poison control center—they can always reach out to poison control for medical treatment advice.

Check out ASPR TRACIE's [Hazard Vulnerability Assessment Topic Collection](#) and our [Evaluation of Hazard Vulnerability Assessment Tools](#) for related resources.

JH: *From a planning standpoint, some communities have very active local emergency planning committees, but integrating the healthcare coalition can also be beneficial and help members understand the risks, hazards, and assets available to the community.*

SG: Yes, and I would strongly encourage state and local planners to find out where their CHEMPACKs are and what the plans are to access them. I would also encourage them to use the [CHEMM website](#) for planning and information-gathering purposes.

SC: Engaging with law enforcement and other public safety agencies can help the healthcare community (and the community at large) stay informed about emerging chemical threats and hazards. For example, we are in the midst of an opioid public health crisis and large amounts of highly potent illicit drugs are easily accessible to the public. New variants of such drugs are continuously being synthesized for illicit purposes. Staying vigilant and aware can help us prepare for and manage the effects of these and other threats to our nation's health. ■