Through evidence,
change is possible.

Physicians for Human Rights

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Nerve Agent Exposure and Collection of Forensic Evidence

The following outline is meant for general informational purposes only. This document does NOT seek to represent guidelines on how to collect evidence of chemical warfare agents, but rather to inform on the dangers associated with these types of weapons.

Exposure risks and symptoms

Chemical warfare agents (CWA) can be highly lethal and pose serious acute and long-term physical and psychological effects. The nerve agent Sarin, one of the most deadly types of warfare agents, causes severe disruption to the nervous system and interferes with muscle control and organ function. It can be absorbed into the body through inhalation, ingestion, or skin or eye contact. Evidence collection of the use of such weapons requires highly specialized procedures and equipment. Proper evidence collection is necessary not only to determine who is responsible for the deployment of such chemical agents, but also to ensure the appropriate medical treatment of victims and the protection of first responders and others in the immediate affected environment.

Even at extremely minute levels of concentration, Sarin can be deadly. Some people exposed to Sarin may lose consciousness, and some may experience respiratory failure leading to death. Damage can occur within one minute of exposure. Signs and symptoms that can appear within one minute of exposure include:

- Eye irritation, including pinpoint pupils, blurred vision, pain, or excessive tearing
- Heavy sweating and drooling
- Respiratory distress, described as a tightness and cough
- An altered mental status
- Twitching and seizures

Even in the smallest doses, Sarin exposure can be lethal or cause irreversible health effects in those who survive. The effects of Sarin exposure vary in degree according to the outside temperature (vaporizing the liquid), the amount delivered, the delivering device, the prevailing winds, and one's distance from the site. Some scientific studies have shown that those who survive exposure to Sarin may experience long-term neurological and psychological effects. The Centers for Disease Control (CDC) note that people subject to mild exposure of Sarin resulting in minimal negative health effects can usually recover completely while those with more severe exposure, such as those severely convulsing, are less likely to survive.

Sarin also poses risks to first responders and those in the vicinity of a Sarin attack. The agent settles in low areas near the ground and can remain in clothing, causing secondary contamination. An individual can become contaminated by handling Sarin-impregnated clothing, shoes, and other items, or by coming into contact with Sarin in the environment. As a result, first responders and people in the vicinity of a Sarin attack must remain cognizant of the danger of secondary contaminations, which can lead to additional casualties.

For instance, a physician treating a patient who has not been decontaminated (clothing removed and washed with soap and water) runs the risk of being contaminated with Sarin from the victim's clothing or skin.

Therefore, it is critical that emergency responders, medical caregivers, and those who are collecting evidence on the use of such chemical warfare agents are aware of these dangers and are provided with the means to protect themselves.

Under certain conditions and without proper decontamination, Sarin can remain in the environment at dangerous levels.

For more information, please visit the CDC Emergency Response and Safety Database.

Evidence Collection

Physical evidence of CWAs may be collected from the following:

1. Victims
    a. The first evidence will be collected when diagnosing victims who have died or are suffering health consequences after being exposed to a chemical weapon agent. The following physical evidence can be collected:
        i. Biological samples – primarily blood & urine, as well as samples of hair (even if washed previously)
        ii. Articles of clothing worn by the victim
        iii. Tissue samples from deceased

2. Environment
    a. Soil samples
    b. Swabs of areas suspected to have been contaminated
    c. Blood or urine samples from animals can be just as valuable as from humans

3. Munitions
    a. The delivery device or munition itself can:
        i. Be sampled for chemical analysis
        ii. Provide manufacturer markings (serial numbers and/or specialized production characteristics)
        iii. Be sampled for handling – e.g. fingerprints, DNA of anyone who might have handled the device/munition
        iv. Provide characteristics of delivery device could indicate source or perpetrator
    b. Impact craters can:
        i. Indicate the direction from which a particular projectile impacted an area
        ii. Be sampled for detection/identification for chemical analysis
        iii. Be analyzed for the type of explosion that occurred (e.g. fragmentation or simple impact without explosion)

Best Practices

In each of the above cases, those collecting evidence must wear personal protection equipment, set up decontamination corridors, and properly package contaminated evidence. If the level of remaining contamination is unknown and adequate precaution is not taken, secondary contamination is likely. An outline of best practices is available on the U.S. Department of Health & Human Services' website.

Any forensic evidence (or contaminated items to be disposed of) must be packaged in sealed airtight containers, not only for safety reasons, but also to ensure that any chemical present that may evaporate is also contained and available for analysis. These airtight containers must then be packed in another container, ideally filled with an absorbing material. Contaminated items should be placed in heavy plastic bags (6 mil) or sealable plastic containers, which once sealed, are then washed/decontaminated on the

exterior and then placed in another clean container containing an absorbing material (e.g. vermiculite) and sealed.

For forensic purposes, chain of custody measures must be implemented to ensure that the origin and subsequent handling of packaged evidence is appropriately documented. For more information, please see: http://strongpointsecurity.co.uk/site/wp-content/uploads/2013/08/Kaszeta-CW-Forensics.pdf.

Chemical Weapon Treaties and International Humanitarian Law

The use of chemical weapons is prohibited under a number of treaties, namely the Geneva Gas Protocol of 1925 and the Chemical Weapons Convention (CWC) of 1997. The absolute prohibition in the CWC applies in all situations, including both international and non-international armed conflict, and is mirrored in many national laws and military manuals. Given widespread adherence to the norm of the prohibition of chemical weapons and extensive international consensus on this ban, the prohibition of the use of chemical weapons is also recognized as a part of customary international humanitarian law, which is binding on states whether or not they are party to relevant treaties (see https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_rul_rule74). Customary international humanitarian law also mandates that parties to a conflict allow rapid and unimpeded access of humanitarian assistance for civilians in need, including the unrestricted movement of medical workers and the free passage of medicines and supplies (see https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_cha_chapter17_rule55?OpenDocument&highlight=humanitarian,assistance).

Physicians for Human Rights' Related Work on Chemical Weapons

- In 1988, a PHR team traveled to the Turkey-Iraq border to investigate claims that Saddam Hussein's government had devastated Kurdish villages with poisonous gas. The resulting report, Winds of Death, provided evidence that Iraq had used mustard gas and likely an unidentified nerve agent in attacks on civilians in dozens of Kurdish villages. In 1992, a team that PHR helped to assemble collected and sent soil samples to the Chemical and Biological Defense Establishment of the British Ministry of Defense, which found evidence of Sarin and mustard gas. PHR's vigorous advocacy for sanctions against Iraq and for an updated chemical arms control agreement helped the passage of the 1993 Chemical Weapons Convention, which outlawed the production, stockpiling, and use of chemical weapons, and moved the world closer to eliminating this grave violation of human rights.

- In 1989, a PHR team traveled to Tbilisi, Georgia, weeks after an alleged poison gas attack against demonstrators by Russian security agents left several dead and dozens ill. PHR's toxicologists identified the banned WW I toxic agent chloropicrin and also determined that the patients were suffering from emotional trauma that carried physical symptoms which PHR called "poison gas syndrome," which remarks on the extreme fear and panic induced in a population when unknown toxic agents are dispersed. Public information in coordination with Georgia's Ministry of Health quickly resolved the hospital cases.

- In April 2013, PHR produced chemical weapons fact sheets in order to help medical professionals diagnose, treat, and document chemical weapons. PHR has been distributing those through our network in Syria and the surrounding region.