

Pharmacists crucial in plan for terrorist chemical weapons

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Terrorist attacks with chemical weapons are a real possibility, according to a study that appears in the online open access journal, *Journal of Pharmacy Practice*, published by SAGE. Thanks to their extensive knowledge of toxic agents, and how to treat those who have been exposed, pharmacists are an invaluable resource in the event of an actual or potential chemical weapons attack.

Chemical weapons act on their victims through a number of mechanisms. They include nerve agents, chemicals that cause blistering (vesicants), choking agents, incapacitating agents, riot control agents, blood agents, and toxic industrial chemicals. With their knowledge of chemistry, [microbiology](#), [pharmacology](#), [toxicology](#), and therapeutics, pharmacists are a valuable asset to [health care facilities](#) and [government agencies](#) planning for the unthinkable – a terrorist attack with chemical weapons.

In his article, clinical [pharmacist](#) and forensic pharmacologist Peter D. Anderson details the clinical effects chemical weapons, and their treatment. [Nerve agents](#) work by blocking the actions of acetyl cholinesterase (the chemistry involved is similar to how many pesticides kill). These toxins include sarin, tabun, VX, cyclosarin, and soman. Vesicants like sulfur mustard and lewisite produce blisters and damage the upper airways. Choking agents, which cause fluid to build up in the lungs (pulmonary edema), include phosgene and chlorine gas.

Incapacitating agents are temporary and "non-lethal," and include

fentanyl and Adamsite. Mace and pepper spray are familiar riot control methods. Blood agents include cyanide, which works by blocking oxidative phosphorylation in the body. Toxic [industrial chemicals](#) such as formaldehyde, hydrofluoric acid, and ammonia also merit consideration as terrorist weapons.

"Potential chemical weapons are in no way limited to the traditional agents that we think of as chemical weapons," Anderson explains.

The good news is that there are potential antidotes to these chemical agents, which can save lives if they are used quickly and correctly. Pharmacists need to work in their hospitals to prepare emergency plans, and with the pharmacy and therapeutic committees to stock for a potential chemical accident or terrorist attack. In the US, for example, The Centers for Disease Control and Prevention (CDC) maintains a Strategic National Stockpile of pharmaceuticals, medical equipment and supplies that can be sent in an emergency to any US state within 12 hours.

The threat from chemical agents may appear to be a symptom of our modern society, but the idea has been around since antiquity. Solon of Athens is said to have used hellebore roots (a purgative) to contaminate the water supply in the Pleistrus River during the Siege of Cirrha as long ago as 590 BC. Modern chemical warfare during World War I included the release by German soldiers of 150 tons of chlorine gas near Ypres, Belgium, and phosgene and nitrogen mustard also played a role in the conflict. Choking agents, vesicants, blood agents, and nerve gas joined the range of chemical weapons available by World War II. Even though conflicting nations produced these in large quantities, no major chemical weapon events occurred during World War II.

The Chemical Weapons Convention was finalized in 1993, prohibiting development, production, stockpiling, and use of chemical weapons. The

treaty also mandated weapons destruction. 130 countries signed the convention (excluding Iraq and North Korea).

Although the article is about chemical weapons, Anderson emphasizes that pharmacists can also be a resource for biological, radiological and nuclear attacks as well as natural disasters.

More information: Emergency Management of Chemical Weapons Injuries by Peter D. Anderson is published in the *Journal of Pharmacy Practice*. The article is free to access here:

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