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# Pharmacists' Role in Emergency Preparedness and Response

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# Pharmacists' Role in Emergency Preparedness and Response

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## Abstract

Over the past decade, an increased recognition of the need for budgeting and planning in case of terrorist attacks, use of infectious agents as weapons or major weather disasters has brought emergency preparedness to the forefront within health care systems and federal organizations. Pharmacists have taken active roles in activities related to emergency preparedness and response. New training initiatives and a comprehensive understanding of the overall needs in emergency situations enables pharmacists to utilize their drug knowledge and accessibility to the public to provide vital medical care in stressful situations.

## Background

Pharmacists are taking a more active role and becoming involved in numerous areas of health care and public health.<sup>1</sup> As one of the most accessible and trusted health care professionals, pharmacists have responsibilities that extend beyond the more "traditional" realms of community or hospital-based pharmacy practices. One of these responsibilities includes taking action in disasters and public health emergencies. During a public health emergency, a pharmacist can take on a variety of roles, including clinical and specialized response tasks.

## Types of Public Health Emergencies

The Centers for Disease Control and Prevention (CDC) recognizes six specific public health emergencies: natural disasters, bioterrorism, chemical emergencies, disease outbreaks, radiation emergencies and mass casualties.<sup>2</sup> Health care professionals, including pharmacists, can play a critical role in preparing for and responding to these emergencies.

## Natural Disasters and Severe Weather

Natural disasters and severe weather cover a large variety of emergency scenarios.<sup>3</sup> Hurricanes, tsunamis and tornadoes can easily be identified as natural disasters, but events such as thunderstorms, floods and extreme temperatures can also result in emergency situations. After a natural disaster strikes, general public safety concerns include illness and injury, as well as decreased access to resources due to power outages and destruction.<sup>4</sup> Populations may become displaced to a new geographical area, lack adequate food and water, and suffer from both physical and mental health effects. Although the consequences of a natural disaster can impact all populations, those with the most need for health care services are generally children, the elderly and the poor. Because of the increased demand for medical services accompanying a natural disaster, health care professionals, such as pharmacists, must be prepared to respond efficiently to changes in patient volume and health care needs.

Reports from Hurricane Katrina, a devastating storm which hit the Gulf Coast of the United States in 2005, can provide valuable insight into the roles of pharmacists during public health emergencies and how pharmacists can be better prepared for similar emergencies in the future.<sup>5,6</sup> The two main issues facing pharmacists after this disaster were setting up a functional pharmacy to support a makeshift hospital and a significantly increased workload in community pharmacies in unaffected areas nearby. In general, pharmacists who volunteer to work in a makeshift hospital must be prepared to take on additional responsibilities besides medication dispensing.<sup>5</sup> Pharmacists can act as the first-line health care professional to assess the needs of evacuees, determine the urgency of care and provide therapy recommendations. The role of medication dispensing in this setting cannot be overlooked, as the pharmacy must be built from scratch. Refrigerators, shelving, medical references, counting trays, labels and prescription vials are just a few of the basic items that must be brought in to facilitate the dispensing process. The initial supply of medications may be provided by the Strategic National Stockpile, a CDC-run program equipped to supplement medical facilities during a public health emergency when approved by federal and local authorities, and additional samples may be provided by pharmaceutical manufacturers.<sup>5,6</sup> As pharmacies within the community may feel the pressure of an increased prescription volume, pharmacists must be knowledgeable about their state's emergency refill laws.<sup>6</sup> These laws outline which classes of medications can be dispensed without a refill prescription and the number of days for which an emergency supply can be dispensed. New temporary refill protocols may be put into place expanding day-supply limits and requiring referrals to physicians for some requests. No matter the practice setting after a natural disaster, a pharmacist must have a plan in place to triage evacuees, be prepared for a strain on resources, consider how to provide care when medical records are unavailable and stay up-to-date on changes in dispensing and prescribing laws.<sup>5,6</sup>

## Bioterrorism/Chemical Emergencies

Although the majority of people rarely consider themselves at risk of a bioterrorism attack, the threat is more real and more complex than many would like to think. In the event that a biological agent—specifically, a bacterial agent, virus or an agent derived from a living organism such as botulinum toxin or ricin—is intentionally released, pharmacists will bear a large responsibility in treating, educating and counseling those affected.<sup>7,8</sup> It is not unlikely that an attack may go unnoticed for days or weeks until the symptoms of those affected are attributed to a biological agent, by which time the infection may have spread far beyond the initial site of release. Bioterrorism agents are classified into one of three

categories, depending upon the ease of spread and the severity of infection. Table 1 provides examples of biological

organisms that represent each category as well as clinical presentation.

**Table 1. Biological Organisms**

Category <sup>a</sup>	Biological Agent <sup>a</sup>	Clinical Presentation <sup>7, 12, 14-16</sup>
<b>A</b> — pose the highest risk for morbidity, have the highest rates of mortality, and spread easily throughout the population	<i>Bacillus anthracis</i> (Anthrax)	<u>Inhalational</u> : fever, malaise, fatigue, chest pain, cough, respiratory distress, septicemia, shock, meningitis <u>Cutaneous</u> : vesicles that become black scabs (eschar), may progress to systemic disease similar to inhalational anthrax
	<i>Yersinia pestis</i> (Plague)	Fever, chills, weakness, swelling of affected lymph nodes (eventually become necrotic); secondary sepsis <u>Pneumonic plague</u> : fever, cough, dyspnea, GI symptoms; profound respiratory insult may cause death within 2-4 days
	<i>Variola major</i> (Smallpox)	<u>Early</u> (incubation period, approximately 12 days): malaise, fever, vomiting, headache <u>Late</u> : maculopapular rash that spreads, becomes vesicular, then pustular; scabbing after 1 week
	<i>Clostridium botulinum</i> toxin (Botulism)	Bilateral descending muscle paralysis, starting with eyes (visual disturbances), face, respiratory failure, etc.
	<i>Francisella tularensis</i> (Tularemia)	Abrupt onset of fever, headache, chills, weakness, weight loss, and upper respiratory symptoms (including cough) that progress to pneumonia
	Viral Hemorrhagic Fever (Ebola, Marburg virus, etc.)	Myalgias, fever, prostration, conjunctival injection, mild hypotension, flushing, petechial hemorrhaging that can progress to shock
<b>B</b> — cause moderate incidences of illness and fewer deaths but do not spread as easily as Category A agents	<i>Ricinus communis</i> toxin (Ricin)	Derived from castor beans Fever, weakness and cough followed by hypotension and cardiovascular collapse
	<i>Coxiella burnetii</i> (Q-Fever)	Fever, chills, headache, fatigue, diaphoresis (excessive sweating), malaise, anorexia, myalgias; cough with chest pain in some cases; complications include hepatomegaly, splenomegaly, jaundice
<b>C</b> — may pose a risk in the future due to availability, ease of production and spread of infection, as well as potentially high rates of death and infection	Nipah virus	<u>Early</u> : fever, headache, drowsiness, disorientation and mental confusion (encephalitis), respiratory symptoms <u>Late</u> : coma
	Hantavirus	<u>Early</u> : fatigue, fever, myalgias, headache, dizziness, chills, nausea/vomiting/diarrhea <u>Late</u> : cough, shortness of breath, tightness in chest, fluid-filled lungs

Chemical emergencies are similar to bioterrorism but have a few distinct differences. Due to the number of chemical agents used in the United States every day, from pesticides and household cleaners to pharmaceuticals and food preservatives, there are infinite opportunities that a chemical emergency, whether isolated or widespread, may occur and have significant impact on the exposed individuals.<sup>9</sup> In the case of a chemical emergency, fewer people are typically affected than in a bioterrorism attack because chemical agents tend to act more quickly than biological agents, usually within minutes to hours. Because this will often put first responders such as police and paramedics at a higher risk of injury, pharmacists can be involved in the direct care and

triage of first responders and can provide care to patients who may not be able to get to a hospital or emergency care facility.<sup>11</sup> Like infectious agents that may become bioterrorist weapons, the different types of chemicals that can precipitate emergency situations are extremely varied. Table 2 lists the different types of chemical agents that may be responsible for an emergency, provides examples of some of the different agents in each class and details the chemicals' general effects.

Pharmacists are often the most accessible health care professionals and, during a bioterrorism attack or a chemical emergency, they can fill several major roles both as medical specialists and as professionals.<sup>8</sup> Personal preparedness is a

**Table 2. Chemical Agents<sup>3,6</sup>**

Type of Chemical Agent	Examples	Clinical Effects
<b>Nerve Agents (cholinomimetics)</b>	Organophosphate fertilizers, sarin, tabun, soman	<u>Nicotinic</u> : tachycardia, muscle paralysis <u>Muscarinic</u> : diarrhea, urination, miosis, bradycardia, bronchoconstriction and increased bronchial secretions, lacrimation, sweating
<b>Blistering Agents</b>	Nitrogen and sulfur mustard, lewisite, phosgene oxime	React with skin, eyes, and airways, causing erythema, burns and blisters, damage to eyes, vomiting, and bone marrow suppression
<b>Pulmonary (Choking) Agents</b>	Chlorine gas, phosgene	Pulmonary edema, coughing, wheezing, irritation of eyes and mucous membranes, headache, possible respiratory distress, tachycardia, and cyanosis
<b>Blood Agents</b>	Cyanide, arsine, stibine	<u>Cyanide</u> : bradycardia, hypotension, metabolic acidosis, seizures <u>Arsine</u> : weakness, fatigue, headache, muscle cramps, dark or red urine, renal failure, jaundice, convulsions, respiratory failure, paralysis
<b>Incapacitating Agents</b>	Anticholinergics, fentanyl derivatives, lysergic acid diethylamide, benzodiazepines, $\alpha_2$ -agonists	Delirium, mydriasis, tachycardia, flushing, urinary retention, hallucinations, impaired memory, respiratory distress
<b>Riot Control Agents</b>	Chloracetophenone, chlorobenzylidene malonitrile	Lacrimation, burning of mucous membranes, blurred vision, rash, drooling, nausea, vomiting
<b>Toxic Industrial Chemicals</b>	Fluorine, ammonia, formaldehyde, sulfuric acid	Cardiac arrhythmias

vital first step. All pharmacists should be up-to-date with immunizations, CPR certification and be first-aid trained and certified. It is also important to be prepared with appropriate attire and the proper protective equipment (gloves, mask, gown, etc.) to safely allow direct contact with patients.<sup>11</sup> In keeping with their regular duties, pharmacists are also responsible for ensuring that affected patients receive the most appropriate drug therapy, taking into account the susceptibility of the biological agent and choosing the safest drug that is likely to be effective in each patient.<sup>7</sup> Dispensing emergency prescriptions may also be an important duty for a pharmacist during an emergency (in these cases, pharmacists must be aware of emergency dispensing laws and protocols).<sup>8</sup> Pharmacists' extensive training in managing chronic drug therapy also makes them good candidates for managing treatment in patients with chronic conditions like hypertension, heart failure, and diabetes, and in those with acute conditions that may impact tolerance and appropriateness of therapy.<sup>11</sup> In the event of a biologic or chemical emergency where certain drugs are scarce or unavailable, a pharmacist may help to choose safe and effective alternatives in patients with chronic diseases.<sup>8</sup> Pharmacists can also help with mass administration of prophylactic agents and immunizations, as well as identification of patients who are the best candidates for prophylactic treatment (for example, those who are immune-compromised or HIV-positive) and screening patients for possible contraindications that may prohibit administration of certain vaccines or medications.

Community pharmacists, with their increased accessibility to the public, should assume the responsibilities of providing education on the appropriate ways to self-treat symptoms using over-the-counter agents or supportive therapy and keeping patients calm and informed about the situation and the treatments used.<sup>10,11</sup> It is also important for pharmacists to discourage patients from attempting to stockpile medications and treat themselves without the assistance of a health care professional, which can result in adverse drug reactions, interactions, and other negative outcomes.

The effects of a bioterrorism attack or a chemical emergency can be greatly minimized with awareness of global events and of potentially harmful agents and an understanding of the best method of treatment for each agent.<sup>10</sup> All pharmacists should make an effort to prepare for emergencies by establishing emergency protocols and staying informed about national, state and regional guidelines for responding. Before emergencies arise, pharmacists may be recruited to help select which drugs to keep on hand in the event of a bioterrorism attack or a chemical emergency. A pharmacist's role does not always come to an end with the resolution of a biological attack or a chemical emergency. Community and health-system pharmacists must work with physicians and other health care providers to improve the transition of care from the emergency room or hospital and properly follow up with the affected patients to ensure that their recovery continues.

### Large-Scale Outbreaks

Outbreaks of diseases and infections can be classified as a

public health emergency, especially when they have the potential to reach epidemic or pandemic proportions. Concerns for outbreaks and epidemics often vary by country. According to the World Health Organization's (WHO) Department of Pandemic and Epidemic Diseases, top-priority diseases include, but are not limited to avian influenza, severe acute respiratory syndrome, cholera, yellow fever and viral hepatitis.<sup>17</sup> Worldwide, the influenza virus is one of the most recognized threats to cause a pandemic due to its route of transmission through respiratory droplets and its ability to quickly mutate.<sup>18-20</sup> Non-human influenza viruses, such as the avian flu strains H5N1 and H7N9, are particularly dangerous, as humans have little natural immunity against infection from these strains.<sup>18</sup> Because pandemics are not confined to a local area, health resources, including vaccines and antiviral medications, can be in short supply.<sup>20,21</sup> Public health officials may be forced to make decisions regarding which groups within a population are defined as high-risk and should receive first access to care. Patients will likely have uncertainties when they hear of a influenza pandemic, and some may become panicked. They will heavily rely on health care professionals, such as pharmacists, for medical advice and treatment.

In 2009, the WHO confirmed a pandemic involving the H1N1 swine influenza virus.<sup>18,21</sup> The public health response was well-documented, and this real-world example can be used to explain the role of a pharmacist in influenza pandemics. Pharmacists can be classified as first responders due to their accessibility to and direct interaction with patients. Because of this, they can have a profound impact on the course of the pandemic by helping to efficiently immunize the population.<sup>20,21</sup> The laws regarding influenza vaccines given by pharmacists may vary by state, so pharmacists should stay educated on the laws of the specific area. Particularly affected are pharmacists in a community setting, who will need to respond to a sharp rise in demand for services while dealing with inadequate staff and possible medication shortages.<sup>19-21</sup> To combat these issues, prior to the influenza season, all health care employees should be immunized and contingency plans with manufacturers and wholesalers should be reviewed.<sup>19</sup> Pharmacists must maintain sufficient stock of commonly used medications and supplies such as gloves, masks, disinfectants and antibacterial soaps.<sup>18,19</sup> Within the pharmacy, symptomatic patients may be required to wear masks or be placed in a separate waiting area to prevent the spread of the influenza virus.<sup>19</sup> Because the course of a pandemic can be unpredictable, lack of supplies and manpower may force pharmacies to consolidate to a few critical sites to more effectively serve the patient population.

### Radiation Emergencies

A radiation emergency involves the release of radioactive materials into the environment, which can result from an accident, a natural event or an act of terrorism.<sup>22</sup> The CDC classifies radiation emergencies into two main categories: exposure and contamination. Exposure is described as energy in the form of radiation penetrating the body, such as x-rays. Contamination involves radioactive material being in or on a person and is often more severe than exposure. Re-



ardless of the classification, health care professionals are key players in response to radiation emergencies.

A 2013 CDC summary report states that the United States has been working since the Japan nuclear accident in 2011 to find the most efficient process to respond to a radiation emergency.<sup>22</sup> The report included the data from a panel with frequently asked questions and discussion topics regarding the incident in Japan from the American Association of Poison Control Centers (AAPCC) and from poison center (PC) toxicologists. Based on the data collected from the two above sources and from previous CDC reports, PCs are the primary resources for communication and response to radiation emergencies. However, PCs have limited experience in reacting to such emergencies, and only a few centers have specific protocols for radiation emergencies. In these centers, the roles of a pharmacist include serving as a source of communication and information as well as responding to emergencies as needed.

In the 2013 CDC summary report, the panel defined two main goals of a PC during a radiation emergency: 1) triage information (i.e. phone calls, communication with state public health departments and radiation control programs) and 2) find and utilize current guidelines and recommendations and act accordingly.<sup>23</sup> Currently, PC members have limited knowledge and experience in responding to radiation emergencies. The 2013 CDC article emphasizes the urgency for PC personnel to complete specialized response training and for PCs to improve collaboration with local, state and federal agencies. Table 3 below lists various sources for information on radiation emergency response.

### Mass Casualty Event

The CDC classifies a mass casualty as an event that causes injury, such as bleeding wounds, shrapnel embedded in the body or burns to a large group of people after an intentional or unintentional explosion.<sup>24</sup> Usually, if a weapon is used, it is a bomb or some other type of explosive. As medical professionals in a mass casualty emergency, health care providers must be prepared for a second attack where more injury can occur.<sup>25</sup> In many cases, injuries are non-life threatening. Many people are in shock after the explosion, leading to communication difficulties as victims may be temporarily deaf or have ringing in their ears. If major injury does occur, the most imperative injury to treat is a punctured lung because patients must be stabilized quickly in order to restore adequate breathing. It is vital to stay updated with the situation from emergency officials, and this can be done through the CDC's Health Alert Network.<sup>26</sup> This network was established to communicate information about an emergency from the federal, state and local levels to the general public. It is important to stay informed in order to know if the explosion released a biological or radiological agent, and if any changes in medical treatment are warranted.<sup>25</sup> To preserve resources at the site of attack, only triage the critically injured first and instruct the less severely injured patients to go to a nearby medical facility for treatment. If necessary, health care professionals working at hospitals experiencing excessive patient volume due to the event can send less severely injured patients to hospitals farther away in order to help as many critically injured people as possible. For patients with wounds that broke the skin, Hepatitis B and tetanus vaccinations should be administered if the patient is not up-to-date. Although the roles of a pharmacist in this type of emergency

**Table 3. Radiation Response Information Sources**

Resource	Information	Website
Centers for Disease Control (CDC)	Emergency preparedness and response information	<a href="http://www.bt.cdc.gov/radiation">http://www.bt.cdc.gov/radiation</a>
Conference of Radiation Control Program Directors (CRCPD)	Professional agency for radiation prevention	<a href="http://www.crcpd.org/">http://www.crcpd.org/</a>
National Poison Data System (NPDS) – American Association of Poison Control Centers (AAPCC)	Comprehensive poison exposure surveillance database	<a href="http://www.aapcc.org/data-system/">http://www.aapcc.org/data-system/</a>
Oak Ridge Institute for Science and Education (ORISE)	Resource for emergency medical consultation	<a href="http://orise.ornl.gov/reacts/default.aspx">http://orise.ornl.gov/reacts/default.aspx</a>
Radiation Emergency Medical Management (REMM)	Diagnosis and treatment information	<a href="http://www.remm.nlm.gov/">http://www.remm.nlm.gov/</a>

**Table 4. Emergency Preparedness Training Opportunities for Health care Professionals (non-exhaustive list)<sup>27</sup>**

Agency	Information	Overview
Centers for Disease Control and Prevention: emergency preparedness and response	<a href="http://www.bt.cdc.gov/training">www.bt.cdc.gov/training</a>	Emergency specific training opportunities
Emergency Management Institute, Department of Homeland Security	<a href="http://www.training.fema.gov">www.training.fema.gov</a>	Portal for multiple government groups that offer emergency preparedness training
Center for Public Health Preparedness, School of Public Health, University at Albany	<a href="http://www.ualbanycph.org">www.ualbanycph.org</a>	Training opportunities focused on public health and community response
Northwest Center for Public Health Practice, University of Washington	<a href="http://www.nwcphp.org/training/opportunities">http://www.nwcphp.org/training/opportunities</a>	Access to online and on-site training for emergency response

event can vary, they can help to ensure that all victims of the event receive proper psychological treatment even if there was no physical injury. Unaddressed stress after a traumatic event can lead to major psychological issues in the future if left untreated.

### Final Considerations

Pharmacists are one of the most accessible health care professionals in a community and they have the opportunity to use their skills to better serve patients in emergency preparedness and response.<sup>27</sup> As the drug experts among health care professionals, pharmacists should play an integral part in creating public health guidelines. Pharmacists can especially influence protocol regarding drug supply and distribution during an emergency situation.<sup>28</sup> These guidelines should encompass both the national and local level responses and how to prepare a stockpile of medications and other supplies in coordination with the local plan. (Individual pharmacists or specific pharmacies should not create their own stockpile).<sup>29</sup> The formulated guidelines must be shared with other health care professionals along with information about specific disaster response systems for their area and ways to access answers for any questions that they might have regarding the drug recommendation and usage. Pharmacists can take charge in the education of other health care professionals and advise them on how to use stockpiled medications properly in case of an emergency. Pharmacists

can also become involved in organizations such as the National Pharmacy Response Team or the Medical Reserve Corps.

In order to be adequately prepared, pharmacists should be well aware of the surroundings in which they live and know if the area is prone to natural disasters or severe weather.<sup>28,30</sup> It is also important to be generally prepared for emergencies that can happen anywhere, such as mass casualty or bioterrorism. Table 4 is a non-exhaustive list of the training opportunities that pharmacists and other medical care professionals can attend to become proficient in using their skills in an emergency situation.

Finally, pharmacists should be aware of state and local laws and regulations, which may authorize a change in scope of practice during an emergency. Through preparation and training, pharmacists can be equipped to improve and protect public health in the case of an emergency.

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