First Aid for Pesticide Exposure[1]

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This document describes how to recognize the early symptoms of pesticide exposure and provide basic first aid for the treatment of victims. Initial treatment is not intended as a replacement for care administered by professional medical personnel; rather, initial treatment details the immediate action to take should an accident occur.

Pesticide Poisoning

Pesticide poisoning is a commonly under-diagnosed illness. Health care providers generally receive a limited amount of training in occupational and environmental health, especially in pesticide-related illnesses. Clinical toxicology is a dynamic field of medicine; new treatment methods are developed regularly, and the effectiveness of old as well as new techniques is subject to constant review. *Prevention* of pesticide poisoning remains a much surer path to safety and health than reliance on treatment. The first rule is to always read and follow the precautions on the pesticide product's label.

The following pesticide incident table illustrates which pesticides are most frequently implicated in incident reports to the National Poison Data System (Table 1). The table is not representative of all incidents because it shows only those that were reported to the database. The relative frequency of cases generally reflects how widely a class of pesticide is used. Organophosphate (OP) insecticides have historically topped the list of most commonly reported exposures. Environmental Protection Agency (EPA) risk mitigation measures have greatly diminished the use of OPs for residential, particularly indoor, use. In the United States, pyrethroids have largely replaced OPs in terms of widespread usage. As such, they now account for the most human case reports in the United States. Although they are less acutely toxic than their predecessors, some severe pyrethroid poisonings have similar signs and symptoms as that of OP poisonings, thus complicating the diagnosis process. The main purpose for maintaining such a list is to give physicians a sense of what types of cases they are most likely to encounter in their practice. The EPA provides a resource, *Recognition and Management of Pesticide Poisonings*, to aid in the diagnosis of pesticide poisonings.

Recognizing the Symptoms

Symptoms can be correlated with certain groups of pesticides. For example, borates (insecticides) tend to cause irritation to the skin, nose, and respiratory system, while some fungicides are irritants to the skin, eyes, and mucous membranes of the respiratory system. Anticoagulant-type rodenticides may cause bloody noses and bleeding gums. Organophosphate and carbamate insecticides may cause all of the systemic symptoms listed that could ultimately result in respiratory failure and death (Table 2). Symptoms associated with synthetic pyrethroid insecticides include nausea, dizziness, weakness, nervousness, and eye and skin irritation. 2,4-D and some other related herbicides (dicamba, MCPA, and MCPP) are irritating to the skin and mucous membranes; they can also cause vomiting, headaches, diarrhea, and confusion.

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General First Aid

The attending physician needs to know the pesticide ingredients to determine the proper course of treatment. It is a good idea to print off extra copies of the label and safety data sheet from the internet and place one copy in your service vehicle and one in your office for use during medical emergencies. Take the pesticide label to the medical facility with you, either a duplicate copy or the one attached to the container (or at least, the EPA registration number of the product).

Remember, certain symptoms are not always the result of pesticide exposure. Common illnesses such as the flu, heat exhaustion or heat stroke, pneumonia, asthma, respiratory or intestinal infections, and even a hangover can cause similar symptoms to that of pesticide exposure. Contact with certain plants such as poison oak or poison ivy can also produce skin effects like those resulting from pesticide exposure. However, when symptoms appear after contact with pesticides, always seek medical attention immediately.

First aid is the initial effort to help a victim while medical help is on the way. If you are alone with the victim, make sure he or she is breathing and is not being further exposed to the pesticide before you call for emergency assistance. Protect yourself from pesticide exposure prior to and while giving assistance. Make sure you wear the appropriate personal protective equipment (PPE), including a respirator, before assisting someone in an enclosed area. Apply artificial respiration if the victim is not breathing and is not vomiting.

Immediate action can indeed be a life-or-death matter in a pesticide poisoning. The product label is the primary source of information. Follow the label's specific first-aid instructions carefully. In addition, call a physician. First aid is only the first response and is not a substitute for professional medical help. It is very important to get the victim to a hospital without delay. The following are a few key points to remember when administering first aid during a pesticide emergency:

- If oral, ocular, or dermal exposure has occurred, the first objective is usually to dilute the pesticide and prevent absorption.
- Always have a source of clean water available. In an extreme emergency, even water from a farm pond, irrigation system, or watering trough could be used to dilute the pesticide.
- Never try to administer anything by mouth to an unconscious person.
- If inhalation exposure occurs, get the victim to fresh air immediately.
- Become familiar with the proper techniques of artificial respiration; it may be necessary if a person's breathing has stopped or becomes impaired.
- If there is a likelihood of first responders being directly exposed to a pesticide, be sure they wear appropriate PPE. If possible, decontaminate the victim while waiting for the first responders to arrive.

A well-stocked first aid kit will contain some of the supplies needed for treating pesticide exposure. Regularly inspect the first aid kit to be sure that it is adequately stocked and items have not passed their expiration dates. When setting up a first aid station for pesticide emergencies, be sure to include the following items:

- Eyewash bottle
- Plenty of clean water
- Activated charcoal powder
- Bottle of liquid detergent
- Disposable towels
- Clean change of clothes

Pesticide on the Skin

Proper hygiene helps to protect the skin from pesticide exposure. Always have an adequate water supply with you anytime that skin exposure is possible. If skin exposure occurs, follow these steps:

- Remove all contaminated clothing immediately.
- Wash the affected area, including the hair, with water and soap, then rinse well. Use of a shower is best. Avoid harsh scrubbing, which enhances pesticide absorption.
- Gently dry the affected area and wrap it in loose cloth or a blanket, if necessary.
- If the skin has chemical burns, cover the area loosely with a clean, soft cloth. Avoid using ointments, greases, powders, and other medications unless instructed to do so by a physician.

Clothing contaminated by pesticides regulated as solid waste (most pesticides) can be disposed of as solid waste (trash). Clothing contaminated by pesticides regulated as

hazardous waste must be disposed of as hazardous waste, if it is contaminated as a result of a spill or leak.

Pesticide in the Eye

Because the eyes readily absorb material that gets into them, fast action is required.

- Hold the eyelid open and immediately begin gently washing the eye with a steady drip of clean water. Do not use chemicals or drugs in the wash-water unless instructed to do so by a physician or a poison control center.
- Drip the water across the eye, not directly into the eye, or use an eyewash dispenser.
- Continuously rinse the eye for 15 to 20 minutes. If only one eye is involved, be careful not to contaminate the other eye.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing the eye.
- Flush under the eyelids with water to remove debris.
- Cover the eye with a clean piece of cloth and seek medical attention immediately.

Inhaled Pesticide

The basic first-aid procedure for someone who has inhaled a pesticide is to get the exposed person to fresh air.

- Immediately carry the victim to fresh air (do not allow the victim to walk or exert themselves).
- Do not attempt to rescue someone who is in an enclosed, contaminated area unless you are wearing appropriate PPE.
- If other people are in the area, warn them of the danger.
- Have the victim lie down and loosen clothing.
- Keep the victim warm and quiet. Do not allow him or her to become chilled or overheated.
- If the victim is convulsing, protect the victim's head and watch that breathing continues.
- Keep the person's chin up to ensure that air passages are open for breathing.
- If breathing stops or is labored, give artificial respiration.

Pesticide in the Mouth or Swallowed

If pesticide has gotten in the mouth but has not been swallowed, have the victim spit and rinse the mouth with plenty of water. Some labels state to have the victim sip a glass of water if they are able to swallow; other labels will state to not give any liquid to the person. If the pesticide is swallowed, one of the most critical first-aid decisions is whether to induce vomiting. Induce vomiting only if the label instructs to do so. Several pesticides cause more harm when vomited than if they remain in the stomach. To provide first aid for a swallowed pesticide, you must know the appropriate treatment. The decision to induce vomiting must be made quickly and accurately—the victim's life may depend on it.

Never induce vomiting if the victim

- is unconscious or having convulsions;
- has swallowed a corrosive poison, such as a strong alkali or acid, which can burn the throat and mouth as severely coming up as it did going down and can be aspirated into the lungs and cause more damage;
- has swallowed an emulsifiable concentrate or oil solution product, which is dissolved in petroleum solvents and may cause death if aspirated into the lungs during vomiting.

How to induce vomiting:

- Make sure the victim is kneeling forward or lying on his side to prevent vomit from entering the lungs and causing additional damage.
- First give the victim at least two glasses of water to dilute the product. Do not use carbonated beverages.
- To induce vomiting, put your finger or the blunt end of a spoon at the back of the victim's throat. Do not use anything sharp or pointed. Do not use salt water to induce vomiting.
- Collect some of the vomitus for the doctor, who may need it for chemical analysis.

Activated charcoal is another first-aid treatment that can be administered when a pesticide has been swallowed. Give the patient powdered activated charcoal per the product label directions. Activated charcoal acts as a magnet to adsorb many chemicals. Pharmaceutical-grade activated charcoal is available from most drug stores. Activated charcoal prepared for cleaning up pesticide spills may be

substituted in an emergency. Take the victim to a physician or hospital.

Conclusion

Pesticide handlers need to be aware of the symptoms of pesticide poisoning in order to know when to seek medical attention. Early recognition of symptoms of pesticide poisoning and proper first aid is the key to preventing the potential for further injury. Victims of single, acute toxic exposures must be assisted and taken to a physician or hospital immediately following any necessary first-aid procedures. The first-aid methods used depend on where and how the exposure occurred—to the skin, eyes, mouth, or by inhalation. The label often has important information on first-aid procedures for the particular pesticide product. Make sure a copy of the label is readily available whenever you are using pesticides and take the label to the physician if a poisoning incident occurs.

Additional Information

Fishel, F.M. 2009. *Pesticides and Cholinesterase.* PI221. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/pi221. Accessed September 2015.

Florida Poison Information Center: 1-800-222-1222. http://floridapoisoncontrol.org/ (accessed September 2015)

National Pesticide Information Center: 1-800-858-7378. http://www.npic.orst.edu/ (accessed September 2015)

United States Environmental Protection Agency Office of Pesticide Programs. 2013. *Recognition and Management of Pesticide Poisonings.* 6th edition.

Table 1. Pesticide exposures most commonly reported to the National Poison Data System (2010).

Rank	Pesticide or pesticide class	Child <5 years	6-12 years	13-19 years	≥20 years	Unknown age	Total
1	Pyrethrins and pyrethroids	7,717	1,672	1,222	14,800	2,706	28,117
2	Disinfectants	12,018	1,182	1,270	7,906	1,892	24,268
3	Rodenticides	10,961	293	162	1,046	408	12,870
4	Insect repellents	6,372	1,013	381	2,272	680	10,718
5	Herbicides	2,019	362	246	4,593	817	8,037
6	Borates and boric acids	4,270	92	62	466	110	5,000
7	Organophosphates	880	218	156	1,826	404	3,484
8	Carbamates	804	119	83	1,027	221	2,254
9	Fungicides	171	25	21	414	73	704
10	Organochlorines	182	30	15	245	58	530
11	Fumigants	48	19	14	213	56	350
All other insecticides (including unknown)		5,526	615	387	5,264	1,371	13,163
Total pesticides/disinfectants		**50,968**	**5,640**	**4,019**	**40,072**	**8,796**	**109,495**

Table 2. Symptoms associated with carbamate and organophosphate insecticide poisoning.

Degree of severity	Symptom
Mild poisoning	Fatigue Headache Dizziness Blurred vision Excessive sweating/salivation Nausea and vomiting Stomach cramps and diarrhea
Moderate poisoning	Inability to walk Weakness Chest discomfort Constriction of pupils Mild symptoms appear more severe
Severe poisoning	Unconsciousness Severe constriction of pupils Muscle twitching Runny nose and drooling Difficulty breathing Coma and death