

# Pesticide Poisoning

## Investigative Guidelines

October 2019

### 1. DISEASE REPORTING

#### 1.1 Purpose of Reporting and Surveillance

1. To delineate the epidemiology of pesticide poisoning
2. To identify occupational practices associated with increased risk to workers
3. To identify and refer cases of interest to other government agencies for appropriate follow up by coordinating with the Pesticide Analytic and Response Center (PARC).
  - a. To identify occupational exposures for investigation and enforcement action by Oregon Occupational Safety and Health Division.
  - b. To identify potential pesticide label violations for enforcement action by Oregon Department of Agriculture.
3. To inform the public of any continuing hazards.
4. To inform the policy and prevention efforts of state, local and federal regulatory and public health agencies.

#### 1.2 Laboratory and Physician Reporting Requirements

1. Laboratories must report detection of pesticides in urine or blood.
2. Providers must report any suspected pesticide poisoning cases to the Oregon Public Health Division (OPHD) within 24 hours.<sup>1</sup>

#### 1.3 Local Public Health Authority Surveillance and Investigation Responsibilities

1. Provide OPHD immediately with any reports of pesticide poisoning they receive.
2. Assist in case investigations during public health emergencies and when OPHD identifies exposure of multiple households to pesticides from a single incident.

### 2. THE DISEASE AND ITS EPIDEMIOLOGY

#### 2.1 Etiologic Agent and Sources

Pesticides include (a) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest; and (b) any substance or mixture of substances intended for use as a plant regulator, defoliant, or

<sup>1</sup> ORS 413.042, 433.004 & 437.010; OAR 333-018-0000 through 333-018-0015; and OAR 333-018-0020

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desiccant, as defined in Oregon Revised Statute (ORS) 634.006. Pesticides include herbicides, insecticides, rodenticides, fungicides, wood treatment products, and antimicrobials (disinfectants and sanitizers). Legally, pesticides used in Oregon must be registered by the U.S. Environmental Protection Agency (U.S. EPA) and the Oregon Department of Agriculture. Registration includes labeling requirements and descriptions of allowable uses. More than 13,000 pesticides are registered in Oregon. Product licensing may allow use of pesticides for management of agricultural, structural, nursery, lawn and landscape, veterinary or human pest problems. Occasionally an older product lacking a current license turns up in a new incident, such as chlordane or dichloro-diphenyl-trichloroethane (DDT). In addition to active pesticide ingredients, products contain “inert” ingredients that function as solvents, carriers, surfactants and binding agents. These compounds may be as toxic as the active ingredients.

### 2.2 Description of Illness

Illness from pesticide exposure often mimics the signs and symptoms of many common illnesses. For example, a person exposed to an organophosphate may develop nausea, vomiting and diarrhea that can mimic food poisoning. Exposure to pyrethrins can cause an itchy throat and eyes and be mistaken for an allergy. A pesticide-related heart attack may be mistaken for one stemming from more typical causes.

Children are more susceptible to pesticide illness because their smaller sizes result in larger per-kilogram doses from any given exposure. Children have less developed kidneys, livers and immune systems that offer less protection from poisoning. During critical periods of human development, exposure to a toxin can cause permanent damage. Exposure to some pesticides harms child development and leads to chronic effects in adults and children. People with asthma or other respiratory disease also have more susceptibility to pesticide-associated illness. Finally, the elderly are also more susceptible to pesticide poisoning.

In January 2013, U.S. EPA published the 6th Edition of Recognition and Management of Pesticide Poisonings (RMPP), an important resource for providers who diagnose and treat acute pesticide-related illness and injury.

Pesticide exposure can be acute or chronic.

#### 1. Acute disease

- Effects vary, depending upon the class of chemical.
- The latency period varies with the product and dose. The acute effects of pesticide exposure may occur within seconds or up to 12 hours after an acute exposure.

#### 2. Chronic disease

- Oregon’s surveillance system does not capture chronic health effects from pesticide exposure. Low-level chronic exposure to pesticides may manifest only after days, weeks, or years of exposure. The latency period for chronic

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health effects associated with pesticide exposure varies with the specific chemical and the effect, and in many cases is not well-established.

- Investigation of chronic health problems resulting from pesticide exposure requires documentation and staff resources outside the scope of OPHD's current pesticide program.

### 2.4 Sources and Routes of Exposure

In general, pesticide exposure is through ingestion, inhalation, skin absorption, injection (very rarely) or ocular contact, depending on the product's chemistry, physical form, and method of application. Many exposures involve multiple routes of exposure.

- Exposure can result from spills or not having the right protective gear while mixing, loading or applying pesticides.
- Drift from aerial application or air-blast spraying to nearby workers or bystanders is also common, as these application methods are difficult to control.
- Touching residue or inhaling pesticides remaining in the air after an application can lead to an exposure.
- Intentional and accidental ingestion in the home environment is a common route of exposure. Eating fruit or vegetables inappropriately treated with pesticides also causes outbreaks of illness, such as occurred in an Oregon outbreak involving aldicarb on watermelons.
- Children are more susceptible to pesticide exposure from surface treatments and foggers for home pests because they spend more time at floor level, resulting in more dermal contact than adults in the same home would have. Children also put things in their mouths or play on the floor, increasing accidental exposures.

### 2.5 Treatment

Treatment for pesticide poisoning varies based on the type of pesticide, the route and duration of exposure (inhalation, oral, dermal, ocular or injection) and any underlying health conditions. Treatment often includes decontamination and supportive care.

For organophosphates or carbamates, providers may administer atropine to treat respiratory secretions from muscarinic effects.

## 3. DIAGNOSIS, CASE DEFINITIONS AND LABORATORY SERVICES

### 3.1 Diagnosis and Case Definitions

For reporting purposes, "pesticide poisoning" includes any suspected or confirmed illness or condition related to pesticide exposure.

A "confirmed case" includes a case classified by the OPHD as a Definite, Probable or Possible case using guidelines established by the National Institute

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for Occupational Safety and Health (NIOSH).<sup>2</sup> Such cases have a reasonable link between the reported or proven exposure and the symptoms experienced.

Evaluation of each pesticide case hinges on documentation of exposure, documentation of health effects and evaluation of a causal relationship between the exposure and the health effects.

### 1. Documentation of Exposure

The degree of certainty regarding a person's exposure to pesticides is classified as follows:

1. Confirmed by
  - positive environmental sample;
  - residue/damage professionally observed;
  - clinical exposure evidence;
  - injury at contact site; or
  - two or more findings (at least one of which is a signed) by medical staff.
2. Reported by
  - the case;
  - a witness;
  - written application records;
  - residue or damage observed by a non-professional; or
  - other evidence.
3. Strong evidence of no exposure
4. Insufficient data (unknown chemical, type or date of exposure and effects, etc.)

### 2. Documentation of Health Effects

The degree of certainty regarding a person's pesticide-related health effects is classified as follows:

1. Two or more signs or lab findings noted by a licensed health care professional
2. Either: (a) Two or more systemic symptoms or (b) any new illness or exacerbation of pre-existing illness diagnosed by a licensed physician
3. No postexposure findings
4. Insufficient data

### 3. Evaluation of Causal Relationship

The degree of certainty regarding causation of the person's symptoms by the exposure to one or more pesticides may be classified as follows (1a. and 1b. have the same level of certainty):

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<sup>2</sup> [www.cdc.gov/niosh/topics/pesticides/pdfs/casedef.pdf](http://www.cdc.gov/niosh/topics/pesticides/pdfs/casedef.pdf)

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1a. Characteristic signs and symptoms as found in Appendix 2 of the NIOSH case classification protocol.<sup>3</sup>

1b. Signs and symptoms consistent with the literature

2. Inconsistent cause effect

3. Cause-effect relationship ruled out

4. Insufficient data

The final case classification is based on the information about exposure to the pesticide or pesticides, the documented health effects and the evaluation of a causal relationship between the exposure and the health effects, using the matrix in the table below. The OPHD Pesticide Exposure Safety and Tracking Program (PEST) makes the ultimate case classification. OPHD's PEST program also conducts a separate evaluation of case severity.

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<sup>3</sup> [www.cdc.gov/niosh/topics/pesticides/pdfs/pest-cd2app2v2.pdf](http://www.cdc.gov/niosh/topics/pesticides/pdfs/pest-cd2app2v2.pdf)

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**Table. Pesticide certainty case classification matrix**

A. Documentation of Exposure	B. Documentation of Health Effects	C. Evaluation of Causal Relationship	
A = 1	B = 1	C = 1	Definite
A = 1	B = 2	C = 1	Probable
A = 2	B = 1	C = 1	
A = 2	B = 2	C = 1	Possible
A = 1	B = 1	C = 4	Suspicious
A = 1	B = 2	C = 4	
A = 2	B = 1	C = 4	
A = 2	B = 2	C = 4	
A = 1	B = 1	C = 2	Unlikely
A = 1	B = 2	C = 2	
A = 2	B = 1	C = 2	
A = 2	B = 2	C = 2	
A = 4	B = X*	C = X*	Insufficient Information
A = X*	B = 4	C = X*	
A = X*	B = 3	C = X*	Exposed/ Asymptomatic
A = 3	B = X*	C = X*	Unrelated
A = X*	B = X*	C = 3	

*\* X can be any element of the classification (i.e., 1, 2, 3 or 4) but it does not alter the classification determination. Determination, in this case, is driven by the remaining elements in the same row.*

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### 3.2 Commercial/reference Laboratory Testing

Many commercial clinical laboratories offer plasma or red blood cell cholinesterase testing to evaluate exposure to organophosphate or N-methyl carbamate insecticides. Some commercial laboratories offer testing for pesticide residues or metabolites in blood or urine. Healthcare providers needing these tests should contact the National Pesticide Information Center at 1-800-858-7378 or [npic@ace.orst.edu](mailto:npic@ace.orst.edu) for a current listing of such labs.

## 4. ROUTINE CASE INVESTIGATION

Routine case investigation should determine the incident location, the duration of the exposure to one or more pesticides, and pesticide types (including U.S. EPA numbers and/or U.S. EPA PC Codes); document the reported health effects and any medical attention sought; and obtain occupational information if the exposure was work-related.

For occupational exposures, OPHD will notify Oregon Occupational Safety and Health (OR-OSHA) with permission from the patient.

## 5. MULTI-HOUSEHOLD EXPOSURES

If multiple people at two or more locations report exposure to the same pesticide release, Local Public Health Authority (LPHA) staff should contact OPHD's Pesticide Exposure Safety & Tracking (PEST) Program immediately at 971-673-0400. After hours, LPHA staff should contact OPHD's Emergency Preparedness Duty Officer at 971-246-1789.

## REFERENCES

- Roberts JR, Reigart JR. *Recognition and Management of Pesticide Poisonings: 6<sup>th</sup> Edition*. Environmental Protection Agency; 2013. Available at [www.epa.gov/pesticide-worker-safety/pesticide-poisoning-handbook-complete-document](http://www.epa.gov/pesticide-worker-safety/pesticide-poisoning-handbook-complete-document)
- CDC National Institute for Occupational Safety and Health. Available at [www.cdc.gov/niosh/topics/pesticides/case.html](http://www.cdc.gov/niosh/topics/pesticides/case.html)

## UPDATE LOG

October 2019 – Updated method of notification and simplified case definition section (Weston).