

Pesticide-related illness and injury

PROTOCOL CHECKLIST

- Incident report received and logged
- Client interviewed
- Pesticide Incident Monitoring/Reporting Form filled out
- DOH bureau(s)/program(s) that were notified (Check all that apply):
 - Bureau of Environmental Public Health Medicine
 - Birth Defect Registry
 - Indoor Air Toxin
 - Migrant Housing
 - Chemical Disease Surveillance Program (CDSP)
 - Hazardous Waste Sites
 - Cancer Cluster
 - Bureau of Water
 - Other _____
- Local agency (ies) that were notified (Check all that apply):
 - Department of Agriculture and Consumer Services (DOACS)
 - a. Bureau of Compliance Monitoring
 - b. Bureau of Entomology and Pest Control
 - OSHA Area office
 - Department of Environmental Protection (DEP)
 - Other _____
- National agency (ies) that were notified (Check all that apply):
 - National Institute of Occupational Safety and Health (NIOSH)
 - National Center for Environmental Health (NCEH)
 - Environmental Protection Agency (EPA)
 - Other _____
- Medical record received
- Laboratory report received
- Field investigation report received
- Case report completed
- Case classified
- Case entered into Merlin
- Feedback provided
 - Investigation partners
 - Exposed person(s)/proxy(ies)
- Investigation closed

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1. DISEASE REPORTING

A. Purpose of reporting and surveillance

1. To identify high-risk pesticides and use practices.
2. To identify targets for intervention and prevention activities.
3. To provide education and support for physicians and other health care providers.

B. Legal reporting requirements

1. Laboratories, physicians, and emergency responders are required to report CO poisonings to the county health department (CHD) within one working day of identification/diagnosis.
2. CHD: All persons reported with pesticide-related illness or injury should be logged in the Chemical Disease Surveillance Program (CDSP) main case log by the CDSP administrative staff. Patients investigated by the CHDs must be entered into the Merlin reporting system. All case records will be reviewed by the CDSP Coordinator before being transferred to the main case log and the NIOSH SPIDER database.

C. County health department investigation responsibilities

1. Begin investigation on the same day as notification.
2. Utilize the phone numbers below for further information:
 - 1-800-222-1222 (Florida Poison Control Center, available 24/7)
 - 1-800-606-5810 (FDOH pesticide hotline, Mon-Fri 8 AM to 5 PM)

2. THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic agents

Pesticides are defined under the Federal Insecticide Fungicide and Rodenticide Act (FIFRA) as any substance or mixture of substances intended to prevent, destroy, repel or mitigate insects, rodents, nematodes, fungi, weeds, microorganisms, or any other form of life declared to be a pest by the Administrator of the U.S. EPA and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant. Pesticides include herbicides, insecticides, rodenticides, fungicides, disinfectants, wood treatment products, growth regulators, insect repellents, etc.

Please note that adverse health effects resulting from exposure to disinfectant products are not reportable in Florida because the volume of reports could overwhelm the state's surveillance system; therefore, these cases will not be routinely reported.

Common pesticides affecting human health are:

- **Organophosphate and carbamate poisonings:** affects cholinesterase level (acetylcholinesterase), which inactivates acetylcholine and results in pesticide-poisoning symptoms such as fatigue, lightheadedness, nausea, vomiting, headaches, and seizures.
- **Paraquat and diquat poisoning:** oxygen is contraindicated early in the poisoning due to the progressive oxygen toxicity to the lung tissue.

B. Identification

Pesticide related illnesses often have clinical manifestations similar to other common medical conditions (influenza, cold). An exposure and occupational history is critical for diagnostic, therapeutic, rehabilitative, and public health reasons. An adequate history is needed to determine an environmental or occupational exposure that could cause the illness or exacerbate an existing medical condition. It is also very important to obtain information on pesticide products to which the patient may have been exposed. It is also recommended that the following be obtained:

- Pesticides labels are required by the Environmental Protection Agency. The label provides the Registration Number that is very helpful when contacting the Poison Control Center (1-800-222-1222) or the National Pesticide Telecommunications Network hotline (1-800-858-7378) for assistance. Contact with the Poison Control Center also fulfills the health care provider's responsibility to report to the Department of Health (DOH).
- Material Safety Data Sheet (MSDS): all manufacturers are required to provide an MSDS for any chemicals they produce or import. Employers are required to keep copies of MSDS. These will contain material identification, ingredients, occupational exposure limits, and data on the following characteristics: physical fire and explosion, reactivity, health hazards, special protection, as well as spill, leak, and disposal procedures, special precautions and comments.

General management of acute pesticide poisonings must consider decontamination of skin concurrent to resuscitative and antidotal measures that are indicated. Caregivers should avoid direct contacts with contaminated clothing and vomitus. Rubber gloves are recommended over other types of gloves.

C. Reporting high priority incidents to CDC

High priority pesticide incidents are those that meet one or more of the following criteria:

1. Incidents that result in a hospitalization or death, or;
2. Incidents that involve four or more ill individuals, or;
3. Incidents that occur despite following pesticide label instructions, or;
4. Incidents that indicate the presence of a recurrent problem at a particular workplace and/or employer.

Note: these criteria should also be used to determine which incidents require a field investigation.

D. Pesticide-related illness in Florida

The National Institute of Occupational Safety and Health (NIOSH) have been collecting standardized information about acute occupational pesticide exposure from selected states since 1998 under the Sentinel Event Notification System for Occupational Risk (SENSOR) program. The Florida Department of Health (FDOH) annually reports aggregated data (without case identifiers) to the SENSOR program. From 1998 through 2009, 2,944 cases of pesticide-related illnesses and injuries were reported in Florida and 430 were identified as work-related.

3. CASE DEFINITIONS

A. Clinical description

Any acute adverse health effect resulting from exposure to a pesticide product (defined under the Federal Insecticide Fungicide and Rodenticide Act [FIFRA¹] with the exception that disinfectants are excluded) including health effects due to an unpleasant odor, injury from explosion of a product, inhalation of smoke from a burning product, and allergic reaction. Symptoms typically involve one or more of the following:

- Systemic signs or symptoms (including respiratory, gastrointestinal, allergic and neurological signs/symptoms)
- Dermatologic lesions
- Ocular lesions

B. Laboratory criteria for diagnosis

If available, the following laboratory data can confirm exposure to a pesticide:

- Biological tests for the presence of, or toxic response to, the pesticide and/or its metabolite (in blood, urine, etc.), which may include;
 - Measurement of the pesticide and/or metabolite(s) in the biological specimen
 - Measurement of a biochemical response to pesticide in a biological specimen (e.g., cholinesterase levels)
- Environmental tests for the pesticide (e.g., foliage residue, analysis of suspect liquid);
- Pesticide detection on clothing or equipment used by the case.

C. Case classification criteria

Provided below (criteria A, B, and C). Scores are either 1 or 2, and are assigned based on all available evidence. The classification matrix follows the criteria section (Table 1). The matrix provides the case classification categories and the criteria scores needed to place the case into a specific category.

Confirmed and probable cases (see the classification matrix) are reportable. Suspect (i.e. Possible and suspicious) cases are reportable for only occupationally (work-related) exposed or cluster (two or more related cases) associated cases.

D. Documentation of pesticide exposure:

1. Laboratory, clinical, or environmental evidence corroborates exposure (*at least one of the following must be satisfied to receive a score of A1*):

- analytical results from foliage residue, clothing residue, air, soil, water, or biologic samples;
- observation of residue and/or contamination (including damage to plant material from herbicides) by a trained professional²;
- biologic evidence of exposure (e.g., response to administration of an antidote such as 2-PAM, Vitamin K, or repeated doses of atropine);
- documentation by a licensed health care professional of a characteristic eye injury or dermatological effects at the site of direct exposure to pesticide product;

- clinical description by a licensed health care professional of two or more post-exposure health effects (at least one of which is a sign) characteristic for the pesticide.
2. Evidence of exposure based solely upon written or verbal report (*at least one of the following must be satisfied to receive a score of A2*):
- report by case;
 - report by witness;
 - written records of application;
 - observation of residue and/or contamination (including damage to plant material from herbicides) by other than a trained professional;
 - other evidence suggesting that exposure occurred.

E. Documentation of adverse health effect

1. Two or more new post-exposure abnormal signs and/or test/laboratory findings reported by a licensed health care professional (*this is B1 score*).
2. At least one of the following must be satisfied (*to receive a score of B2*):
- Two or more new post-exposure abnormal signs reported (when new post-exposure signs and test/laboratory findings are insufficient to satisfy a B1 score, they can be used in lieu of symptoms towards satisfying a B2 score);
 - Any new illness or exacerbation of pre-existing illness diagnosed by a licensed physician, but information on signs, symptoms and/or test findings are not available or insufficient for a B.1 or B.2.a score.

F. Evidence supporting a causal relationship between pesticide exposure and health effects

1. Causal relationship between pesticide exposure and health effects exists (*at least one of the following must be satisfied to receive a score of C1*):
- Health effects (in criteria B) are characteristic for the pesticide and the temporal relationship between exposure and health effects is plausible;
 - Health effects (in criteria B) are consistent with an exposure-health effect relationship based upon the known toxicology (i.e. exposure dose, symptoms, and temporal relationship) of the putative agent from commonly available toxicology texts, government publications, information supplied by the manufacturer, or two or more case series or positive epidemiologic studies published in the peer-review literature
2. Insufficient toxicological information is available to determine causal relationship between exposure and health effects. This includes circumstances where minimal human health effects data are available, or where there are less than two published case series or positive epidemiologic studies linking health effects to exposure to the particular pesticide product/ingredient or class of pesticides (*this is C2 score*).

Table 1 - Case Classification Matrix*

CLASSIFICATION CATEGORIES					
CLASSIFICATION CRITERIA	Confirmed Case		Probable Case	Suspect Case	
				Possible Case	Suspicious Case
A. Exposure	1	1	2	2	1or2
B. Health Effects	1	2	1	2	1or2
C. Causal Relationship	1	1	1	1	2

*Suspect (i.e., possible and suspicious) cases which are not part of a cluster (two or more related cases) or occupationally related pesticide exposures (typically limited household exposures) no longer need to be reported.

Comment

The Florida Poison Control Network (800-222-1222) can provide emergency information to physicians and the public. For information regarding Florida pesticide laws and regulations, contact the Florida Department of Agriculture and Consumer Services, Bureau of Compliance Monitoring at 850-488-3314. For information regarding this case definition, contact the Florida Department of Health, Bureau of Environmental Epidemiology, Pesticide Poisoning Surveillance Program at (850) 245-4117.

For information concerning regulation and use of pesticides, contact the U.S. EPA's Office of Pesticide Programs, at 703-305-5336. For information concerning Florida pesticide laws and regulations, contact the Florida Department of Agriculture and Consumer Services, Bureau of Pesticides at 850-617-7917.

¹ Pesticides are defined under FIFRA as any substance or mixture of substances intended to prevent, destroy, repel or mitigate insects, rodents, nematodes, fungi, weeds, microorganisms, or any other form of life declared to be a pest by the Administrator of the USEPA and any substance or mixture of substance intended for use as a plant regulator, defoliant, or desiccant. Pesticides include herbicides, insecticides, rodenticides, fungicides, disinfectants, wood treatment products, growth regulators, insect repellents, etc.

² Trained professional may be a plant pathologist, agricultural inspector, agricultural extension agent, industrial hygienist or any other licensed or academically trained specialist with expertise in plant pathology and/or environmental effects of pesticides. A licensed pesticide applicator may also be considered a trained professional.

4. LABORATORY TESTING

The presence of the pesticide or its metabolites in the biological specimen (blood, urine, etc.) is usually indicative of pesticide poisoning.

Note: There are specific laboratory tests done depending on the chemical class of the pesticide. See the EPA book on Recognition and Management of Pesticide Poisonings (Fifth Edition);

section II to IV for more details.

(<http://www.epa.gov/oppfead1/safety/healthcare/handbook/handbook.htm>)

Cholinesterase test results

(Depression in cholinesterase levels is indicative of poisonings due to exposures to organophosphate and carbamate insecticides. The cholinesterase test measures the biological response to pesticide exposure).

1. Upon receiving cholinesterase test results from the laboratory, review the test result and determine if there is a depression in the cholinesterase level of the patient.

A. With baseline test results for comparison

Note: the baseline cholinesterase level can be taken at pre-exposure or 60-90 days post exposure.

There is a depression in the cholinesterase level if:

For RBC, the test result is 30% from the baseline test result.

For Plasma, the test result is 40% from the baseline test result.

For DOH reporting, cholinesterase level > 20% below the baseline test result is considered as depression.

B. Without baseline test result for comparison:

There is a depression in the cholinesterase level if the test result (RBC or plasma) is > 15% below the laboratory normal (reference) range. The laboratory normal range is usually found on the report to the right of the test result. If not, contact the laboratory reporting the test result to find out the normal range for the different test specimens. (i.e., RBC and plasma)

2. If the cholinesterase level indicates a depression, contact the physician who ordered the test to determine if the test was done to confirm pesticide poisoning.
3. If the test was done to confirm pesticide poisoning, request the medical records. Review the exposure history in the medical records for details about the poisoning event. If the exposure history is absent from the medical records, inform the physician that you will be contacting the patient to find out more information about his/her exposure.
4. Interview the patient for additional information about the exposure and resulting illness or injury. Use the [Pesticide Incident Monitoring \(PIM\)](#) reporting form as a guide when conducting the interview.
5. If the test was done for purposes other than pesticide poisoning confirmation, no further action is required.
6. Follow step-wise procedure for investigating a case of pesticide exposure.

5. ROUTINE CASE INVESTIGATION

A. Case Investigation

1. Receive report

The process starts with a report about a suspected pesticide exposure incident and pesticide-related illness and injury.

- Log all pesticide-related incidents (as per witness/self report, health care provider, lab, media, etc.).
- Record the date and time of the report
- Ask questions about the exposure incident (e.g., when, where, and how)

2. Review report (e.g. media reports)

(i.e., determine if the incident is related to pesticide exposure)

- Check for key words or statements that may indicate pesticide exposure such as pesticide spray, drift, spill, etc.
- Check for occupation type (e.g., farm worker, pesticide applicator etc.)
- Check for length of time between exposure and health effects

3. Screening of suspected pesticide exposures

The information received should be screened to ensure that the exposure incident meets the surveillance requirements.

The investigator should ensure that:

- The report indicates a pesticide-related illness and injury as defined by the surveillance program (see [Case Definition](#))
- The exposure is recent, that is, occurred within the last 30 days
- There is temporal relationship between the exposure and the health effects:
 - i. The exposure must precede symptoms.
 - ii. For acute exposures the symptoms may be manifested between 24-48 hours. For reporting purposes this period may be extended to three months to include sub-acute conditions.

4. Record information pertinent to the case

Fill out a Pesticide Incident Monitoring (PIM)/reporting form:

If report is by telephone ask the caller additional questions that could be useful for the investigation, such as:

- Number of persons who were exposed.
- Were persons decontaminated?
- How many persons were hospitalized and ?
- Were children involved in the exposure incident?

Note: Ensure that information for all persons who were exposed is recorded. A separate PIM form should be completed for each person exposed and if possible, a separate interview should also be conducted (helpful if there is a cluster of exposed persons). If the exposed person is a minor (≤ 17 years old), interview the parent or guardian. Do not interview the minor without written consent of the parent or guardian.

Anonymous reports are accepted but it is essential that a telephone number of a proxy or contact person is available for follow up with the affected person(s). Interviews may be conducted over the phone or in person.

If report is self reported skip **step 5** and proceed to **step 6**

5. Verify report and update the initial incident/case report

(i.e., if evidence received is not substantial for illness/injury determination)

If the alleged exposed person cannot be contacted or the exposure cannot be verified **STOP** and file report as “insufficient information”.

6. Determine investigation pathway

- If the patient is related to an acute pesticide exposure, then go on to **step 7**.
- If the patient is related to a chronic pesticide exposure (e.g. birth defects, cancer cluster, mold remediation etc.) record relevant information and refer case to correct Department of Health (DOH) program coordinator who will assist in investigations on pesticide related issues.
- If the patient is not related to pesticide exposure **STOP**, refer report to the correct DOH program or state agency and file as “not a case”.
- If the patient is non-occupational, non-cluster related and had limited illness (recovered without any medical advice or treatment) **STOP**, as these cases do not match case classification for definite and probable cases (see case definition)

7. Request supporting documents (if missing from the initial incident report)

8. Assess case to determine if further investigation is needed

Consult with health department staff: supervisor (CHD) and/or CDSP Coordinator (state office).

9. Classify cases

Note: See case definition section for more complete definition of cases.

Record findings and actions taken. Log all investigation time. Proceed to **step 11**.

Note: For investigation of clusters or outbreaks, a more detailed investigation may be required. If this situation occurs then proceed to **step 10**.

10. Detailed Investigation of Clusters or Outbreaks

- Determine if cluster of cases exist (two or more related cases).
- If not a cluster, proceed to **step 11**.
- Broaden investigation to include all cases.
- Examine all possible sources of exposure
- Analyze data and present findings.

11. Complete final report and enter data in Merlin

- Report all cases of pesticide illness/injuries with definite and probable case classification (see case definition) in Merlin. Possible and suspicious cases are reportable for only occupationally (work-related) exposed or cluster (two or more related cases) associated cases. Attach complete Pesticide Incidence Monitoring /

Reporting Form along with other important documents (e.g., Laboratory test reports, field investigation reports etc.).

- Submit all other information on the case(s) to the CDSP at the state office by fax or mail.

6. MANAGING SPECIAL SITUATIONS

A. Coordinating the investigation process outside DOH

For confidentiality purposes, when a referral is made to an external agency do not release any personal identifier (i.e. name, address) of the exposed person unless he/she has agreed to the release of the information and agreed that the regulatory or enforcement agency may be contacted. The exposed person should also be told that he/she can contact the enforcement agency directly. An Enforcement Referral Form (contact the CDSP program for form) should be completed and sent to the agency indicating that verbal permission has been given. A written release may be required for legally sensitive cases. The exposed person(s) must be informed about their rights to confidentiality and that the enforcement agency may not be able to protect their confidential information.

DOH/CDSP shall initiate an investigation, without permission, if the exposure incident has serious public health implications. This is based on the perceived risk to other individuals, the nature of the exposure, and the severity of the illness or injury.

The following referral guideline should be adhered to for the incidents that involve Department of Agriculture and Consumer Services (DACS):

- i. For cases that relate to agricultural workers or are due to misuse of pesticides according to label requirements, contact the Bureau of Compliance Monitoring at 850-617-7850 or
- ii. For cases due to mosquito control activities, contact the Mosquito Control division or
- iii. For cases due to pests in the home or incidents involving licensed pest contractors, contact the Bureau of Entomology and Pest Control at 850-617-7997.

If the exposure incident falls outside the scope of DACS, contact the responsible state agency:

- Department of Environmental Protection should be contacted for non-agricultural related environmental issues. <http://www.dep.state.fl.us/>
- Occupational Safety & Health Association (OSHA) area office in Fort Lauderdale, Tampa or Jacksonville should be contacted for occupational exposures that do not involve farm workers. <http://www.osha.gov/osmdir/fl.html>
- Department of Business and Professional Regulations (DBPR) should be contacted for incidents involving patrons at a restaurant. <http://www.myfloridalicense.com/dbpr/>

Other state/local agencies and community organizations should be contacted for incidents that are not related to the aforementioned situations.

Note: All health-related issues should be investigated by DOH through the CDSP program and the CHDs.

Cases that require interagency investigations should be prioritized based on the sensitivity of the case and/or the national surveillance deadline for submitting cases to the aggregate database. This priority list should be communicated to the external agency to allow for consistency in meeting the time frame for completion of investigation and case closure.

The CDSP Coordinator should keep the external agency in updated on the investigation.

B. Coordinating the investigation process inside DOH

For incidents that involve non-regulatory and other environmental issues (e.g., indoor air quality, water contamination, migrant and seasonal workers, group care facilities, etc.) contact the appropriate bureau and program within the Division of Environmental Health for guidance and coordinate investigation with the DOH program coordinator/manager and CHD staff.

7. ROUTINE PREVENTION

Prevention tips for pesticide poisoning:

- A. When using pesticides:
 - Always read the label first.
 - Strictly follow the directions.
- B. Use pesticides safely:
 - Don't use products for pests that are not indicated on the label.
 - Don't use more pesticide than directed by the label.
 - Don't think that twice the amount will do twice the job.
- C. Use protective measures when handling pesticides as directed by the label:
 - Wear impermeable gloves, long pants, and a long-sleeve shirt.
 - Change clothes after applying pesticides.
 - Wash your hands immediately after applying pesticides.
- D. Before applying a pesticide (indoors or outdoors):
 - Remove children, their toys, and pets from the area to be sprayed.
 - Do not put items back until the pesticide has dried or as specified by label instructions.

UPDATES

- A. Go to pesticide poisoning surveillance web page for most recent information and additional details- <http://www.doh.state.fl.us/environment/medicine/pesticide/index.html>