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Acute Pesticide Exposures Clinical Guidelines

INTRODUCTION

Pesticides are heavily used in agricultural settings and pesticide exposure is therefore a significant environmental and occupational health risk for agricultural workers and their families. Victims of acute poisonings occurring in the field are likely to present to the nearest or most familiar healthcare facility, including primary care settings.

PURPOSE

Settings where healthcare services are provided to agricultural workers or others at risk for over-exposure to pesticides need to be prepared for patients with acute over-exposure to toxic pesticides. In cases of accidental over-exposure, multiple victims may present, dictating an organizational response that will trigger procedures requiring rapid assessment, treatment and reporting, as well as protection of healthcare personnel.

DEFINITIONS

A pesticide is defined as any substance that is used to kill or otherwise control a pest. The term “pesticide” includes insecticides, herbicides, fumigants, fungicides, repellents, rodenticides, and disinfectants.

Decontamination is the process of rendering an object, person or area free of a harmful substance such as bacteria, poison, gas, or radioactive material.

PROCEDURE

Note: The actions listed will not necessarily be performed in sequence, since the needs of individual situations will vary.

I. Crisis Response

1. Protect responders and/providers with gloves, protective clothing and respirators if needed.
2. Provide immediate first aid measures: establish airways, breathing, and circulation.
3. Decontaminate (see Section II below).
4. Identify patient(s) and label patient’s valuables.
5. Keep records of actions and patient care. See *Pesticide Exposure Assessment* form (See Resources, pg. 5).
6. Identify chemical, location and exposure.
7. Establish chain of command.
8. Set up triage area: stabilize, monitor and evacuate.
9. Alert referral hospital(s).
10. Consult/link with specialists: Toxicologist and/or Occupational and Environmental Medicine Specialists.
11. Coordinate transportation of non-critical patients and linking of families for retrieval of referred patients after discharge from hospital.

12. Report incident to appropriate officials. See *Pesticide Reporting Map*.
13. Follow-up planning, retesting, etc.

II. Decontamination

Decontamination measures are dependent on the route of contamination or poisoning. Be sure that those conducting decontamination are protected from overexposure.

1. If ingested:
 - Call Poison Control **800.222.1222**
2. Skin Contamination:
 - Remove clothes
 - Rinse pesticide from hair, skin and clothes immediately
 - Bag all clothes to prevent others from exposure
 - Preserve specimen of clothing for analysis
3. Eye Contamination:
 - Rinse eyes immediately with clean water or an eye wash
[Note: Alkaline exposure requires aggressive irrigation]
4. Inhalation:
 - Remove from fumes and get victim in fresh air
 - Supply oxygen if appropriate
 - Monitor victim's breathing status

III. Data Collection on an Acute Pesticide Exposed Patient

See *Pesticide Exposure Assessment* form (See Resources, pg. 5)

1. Patient identification: Name/Age/Sex/Occupation
2. Place of employment
3. Initial and subsequent symptoms and signs*
4. Name of pesticide product including active ingredients, their concentration and EPA registration number
5. Date, time and location when over-exposure occurred
6. How the pesticide was applied, when applied and on what crop or for what use
7. Route(s) of exposure: dermal, ocular, oral, respiratory
8. How much of the product was ingested, if ingested
9. Circumstances of exposure—intentional or accidental, occupational or non-occupational
10. A detailed description of how the exposure happened
11. Others affected or witnessing incident (at work site, home, etc.)
12. If female, assess pregnancy status
13. Treatment already received:
 - a. Skin exposure:
 - Was affected area washed? If so, when? If not, proceed with skin decontamination procedures
 - Was any clothing contaminated?
 - If so did they change clothes?
 - b. Ocular exposure:
 - Were the eyes irrigated?
 - If so, with what and for how long?

* For the pediatric patient, note parents' occupations and child's appearance compared to his/her usual baseline. It is important to ask if the child is acting normally, if there is an abnormal gait, stumbling or ataxia; and if the child has experienced excessive sleepiness, irritability or other personality changes.

- c. GI exposure:
 - Were any emetics used?
 - Were any absorbents used?
 - Were any home remedies used? (e.g., water, milk, lemon juice)
 - Was there any emesis before arrival?

14. Materials to be gathered:**

- a. A copy of the pesticide label and/or a copy of the Material Safety Data Sheet (MSDS)
- b. A copy of the pesticide application record (tank mix, concentration, etc.), if applicable. This should be available from the pesticide applicator or the grower.
- c. 10 cc whole blood, anticoagulated with sodium heparin. *Refrigerate.*
- d. 5 cc plasma anticoagulated with sodium heparin. *Spin and refrigerate.*
- e. A fresh urine sample. *Label and freeze.*
- f. Any contaminated clothing, hats, foliage from the site. *Place in clean sealable plastic bag; label, seal and freeze.*
- g. Other options:
 - i. Fingernail residue. If the worker handled the pesticide or materials with pesticide residue, some pesticide may be lodged under the fingernails. Clean under the nails. *Place in clean sealable plastic bag, label, seal and freeze.*
 - ii. Saliva sample. Some pesticides can be detected in saliva. Have the patient spit repeatedly into a clean glass or plastic container. *Seal the container, label and freeze.*
 - iii. Hair sample, if the head was exposed. *Place in clean sealable plastic bag; label, seal, and freeze.*
 - iv. Skin wipe Use a newly opened alcohol wipe. Wipe an area of skin and if possible estimate the size of the area wiped and record this on the sample label. Try to focus on an area that is likely to have been contaminated in the exposure. *Place wipe in clean sealable plastic bag, label, seal and freeze.*

IV. Physical Exam

Following proper decontamination, for each case of suspected pesticide exposure the provider's note should document examination of the following areas:

1. Skin
2. Eyes
3. Mucous membranes (especially mouth, nose and throat)
4. Lungs
5. Heart (especially rate and rhythm)
6. Neurologic exam (specifically pupillary response, distal sensory exam, motor exam and coordination)

V. Lab Tests

Lab tests are important in documenting toxic exposure to organophosphates (OP) and carbamates and should be ordered in each case of suspected toxic exposure to these chemicals. They should also be ordered when the offending agent has not been identified.

1. Cholinesterase Testing (RBC or AChE and Plasma or BuChE or PChE)
 - Cholinesterase is most useful in comparison to baseline. Baselines are recommended while the patient is not working, if this is possible.

** Recall that workers' compensation and legal cases require objective data to prove over-exposure as the cause of illness. Preserving samples may be very important for future litigation or filing a worker compensation claim.

- The normal range is wide, and a given individual may vary 20% from his own baseline even without exposure. A drop of >20% from the patient's own baseline reliably indicates exposure.
 - Patients may not become symptomatic until cholinesterase levels are depressed by >50%.
 - If no baseline is available, but OP exposure is clinically suspected, use reverse logic. Allow the worker to rebound to his own baseline by restricting from further potential exposure. Recheck cholinesterase levels weekly until level has stabilized for two to three weeks and compare values. $\text{Baseline—acute level} \times 100 = \% \text{ depression}$.
 - For additional information about cholinesterase monitoring see *Cholinesterase Testing Protocols for Healthcare Providers* and *Cholinesterase Testing Protocol Algorithm*.
2. Other tests as indicated: Depending on the type of exposure and class of pesticide, blood tests such as CBC and liver function tests, may be indicated. Chest x-ray and pulmonary function tests would be advisable in poisonings with paraquat. Refer to “Materials to be gathered” for additional suggestions (see 14 in section III. Data Collection on an Acute Pesticide Exposed Patient).

VI. Treatment

For treatment information for specific chemicals, consult EPA’s *Recognition and Management of Pesticide Poisonings* (6th ed., 2013). <http://www2.epa.gov/pesticide-worker-safety/recognition-and-management-pesticide-poisonings>

VII. Reporting and Documentation

Each state has its own reporting rules. Use Migrant Clinicians Network’s *Pesticide Reporting Map* to determine requirements and location for reporting. *In states where reporting is required, HIPAA limitations on releasing PHI do not prohibit reporting.*

Every case of suspected pesticide exposure should be reported to:

Agency: _____

Phone number: _____

Website: _____

1. Reporting of exposure should be documented in progress note on chart.
2. When reporting to the above agency, providers should be prepared to answer all questions found on the form entitled *Pesticide Exposure Assessment* form (See Resources, pg. 5).
3. Cases should be reported without naming or implicating the patient (guard the patient’s anonymity as if you are guarding his/her job) or the patient’s consent to report should be documented.
4. Pesticide exposure should always be recorded as a diagnosis on the encounter form in order to allow internal tracking of data related to pesticide exposures.

RESOURCES

- Poison Control Center: **800.222.1222** American Association of Poison Control Centers www.aapcc.org.
- *Recognition and Management of Pesticide Poisonings*, 6th ed., EPA, 2013).
<http://www2.epa.gov/pesticide-worker-safety/recognition-and-management-pesticide-poisonings>.
- National Pesticide Information Center: 800-858-7378 www.npic.orst.edu. Provides evidence-based pesticide information, consultations for healthcare providers, and lists of state and regional poison control centers.
- Migrant Clinicians Network www.migrantclinician.org.
 - *Cholinesterase Testing Protocols for Healthcare Providers and Cholinesterase Testing Protocol Algorithm*, 2012. National Farm Medicine Center, AgriSafe Network and Migrant Clinicians Network.
www.migrantclinician.org/toolsource/tool-box/cholinesterase-testing-protocols-and-algorithm-healthcare-providers.html.
 - *Pesticide Exposure Assessment*, Migrant Clinicians Network, 2013. www.migrantclinician.org/pesticideform.
 - *Pesticide Reporting Map*, Migrant Clinicians Network www.migrantclinician.org/exposurereportingmap.
- *National Pesticide Practice Skills Guidelines for Medical & Nursing Practice*. The National Environmental Education & Training Foundation, January 2003. www.neefusa.org/health/pesticidesguidelinepublications/practice.htm.

Sources:

Pesticide Clinical Guidelines, Dennis H. Penzell, DO, MS, 2001.

Pesticide Clinical Guidelines, Migrant Clinicians Network, 2007.

Data Collection on an Acute Pesticide Exposed Patient, Matthew C. Keifer MD, MPH, 2011 in *Recognition and Management of Pesticide Poisonings*, 6th Ed., Environmental Protection Agency, 2013.

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