

Competency II: Diagnosis and Assessment

II-1. Environmental History: Be able to take an environmental history.

When considering taking an environmental history related to pesticide exposure, it is useful to compare it to the chances of finding relatively uncommon diseases in a lifetime of general practice. Although one may obtain thousands of complete blood counts to find one case of childhood leukemia, we are taught to include such illnesses in a differential diagnosis. If we don't consider the uncommon illness in the diagnosis, one day it might be missed. Similarly, if pesticide poisoning is not considered in a patient's differential diagnosis, it will surely be missed.

Content

- Know sources of additional information relevant to a patient history:
 - ▶ Pesticide labels: www.CDMS.net/pfa/LUpdateMsg.asp
 - ▶ Material safety data sheets (MSDS): For a list of sites with MSDS information, go to: www.phys.ksu.edu/area/jrm/Safety/msds.html
 - ▶ Agency for Toxic Substances Disease Registry (ATSDR) (www.atsdr.cdc.gov)
 - ▶ Pesticide manufacturer: Contact information should be on the label, or go to: <http://npic.orst.edu/manuf.htm>
- Be able to complete a detailed environmental history for the adult patient when indicated, to include the following elements:
 - ▶ Occupation, including length of time on job, nature of work, involvement with hazardous materials, use of protective equipment, habits at worksite (eating, smoking), and prior jobs
 - ▶ Home environment, including presence of or use of pesticides in house, lawn, garden; use on pets; storage of pesticides; location of home in relation to industries, dump sites, farms
 - ▶ Source of drinking water
 - ▶ Food sources
 - ▶ Relocation of home due to health problems
 - ▶ Source of heat in home (e.g., wood stove)
 - ▶ New/recent construction or new materials (e.g., carpets)
 - ▶ Medical condition and symptoms, including temporal relationship to any given place or time, others with similar problems (co-worker or family member)
 - ▶ Use of tobacco, alcohol, other drugs (illegal, prescription, and over-the-counter), constant exposure to second-hand smoke
 - ▶ Recreational activities and hobbies of the patient or family
- Be able to complete a detailed environmental history for the pediatric patient, to include the following elements. (Under most circumstances, similar items in the adult history should be covered, from the child's perspective.)

- ▶ Occupation / hobbies of parents and other guardians or individuals living in the home to a level of detail similar to above. If the child spends time with a sitter or another person's home, inquire about occupations, hobbies, etc., in those homes as well.
 - ▶ Use of pesticides in home/play areas; child's play activities in relation to areas treated; protection of toys and surfaces during pesticide application
 - ▶ Proper washing of food (eggs, raw fruits, vegetables)
 - ▶ For infants: if bottle-fed, inquire into source of water for formula; if breast-fed, consider maternal exposures
 - ▶ Proper storage of dangerous chemicals (i.e., is home properly "child proofed")
 - ▶ Amount of food consumed by child, and relationship between amount of exposure / body weight for child compared to that of an adult
 - ▶ Be able to do developmental history (e.g., infants crawling on the floor, walking, getting into objects)
 - ▶ Pesticide use on pets
- *Know specific questions for agricultural workers and their families:
 - ▶ Is there spraying going on while you are in the field?
 - ▶ Do you feel sick while in the fields?
 - ▶ Were the fields wet when you were picking? (Note: Dry fields can be a source of residues and are potentially hazardous with certain crops such as citrus, grapes.)
 - ▶ Do your children play in the fields?
 - ▶ Do you have lunch in the fields?
- *Be able to complete a brief screening environmental history: (This is reserved for residents, nurse practitioners, and midwives. All students should first learn to do a complete environmental history before being able to use a screening history to determine whether further history is necessary based on risk factors.)
 - ▶ Occupation (or parents' occupation)
 - ▶ Temporal relationship of patient's symptoms to either home, school, day care or work environment
 - ▶ Known exposure of patient to pesticides, solvents, or other chemicals

Points of Insertion

- Nursing
 - ▶ Assessment courses, both baccalaureate and master's level
 - ▶ Adult Health Nursing courses (didactic and clinical)
 - ▶ Community Health or Public Health Nursing courses (didactic and clinical)
 - ▶ Occupational Health Nursing clinical rotations
- Medicine
 - ▶ Undergraduate Medicine
 - ▶ 1st or 2nd year Introduction to Patient Assessment/ Clinical Medicine, etc.
 - ▶ Material should be reinforced during 3rd year clinical rotations

* An asterisk denotes material for residents and nurse practitioner students over and above that of the undergraduate.

II-2. Differential Diagnosis: Be able to consider pesticides in a differential diagnosis of poisoning.

Content (Medicine and Advanced Practice Nurses)

- Know that pesticide exposures may result in health effects similar to other diseases. Signs and symptoms of pesticide over-exposure may be non-specific. With few exceptions, there are no pathognomonic signs of pesticide exposure.
- *Knowing that many signs and symptoms of pesticide-related illness are non-specific and may be due to a variety of causes, it is important for the clinician to be able to consider pesticides in the differential diagnosis. Know agents that cause:
 - ▶ Cardiac arrhythmias
 - ▶ Altered mental status
 - ▶ Seizures
 - ▶ Pulmonary edema
 - ▶ Bloody diarrhea
- *Know some of the most helpful diagnostic signs and symptoms (These are common examples rather than a comprehensive list; these signs and symptoms are also not exclusive to the pesticides listed.)
 - ▶ Miosis: cholinesterase inhibitors
 - ▶ Mydriasis: cyanide / fluoride
 - ▶ Peripheral neuropathy: arsenic and organophosphates
 - ▶ Methemoglobin: sodium chlorate, creosote
 - ▶ Paresthesias: pyrethroids
- *Know the indications of when to perform cholinesterase testing.

Points of Insertion

- Nursing
 - ▶ Assessment courses at master's level
 - ▶ Adult Health Nursing courses (didactic and clinical)
 - ▶ Child Health / Pediatric courses (didactic and clinical)
 - ▶ Community Health or Public Health Nursing courses (didactic and clinical)
 - ▶ Occupational Health Nursing courses (didactic and clinical)
- Undergraduate Medicine
 - ▶ 2nd year, Pharmacology, Pathology, and Physical Diagnosis courses
 - ▶ 3rd year during clinical rotations
 - ▶ ER rotations, Environmental Medicine elective during 4th year
- Residents
 - ▶ ICU rotations, ER and inpatient rotations

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II-3. Signs and Symptoms: Recognize signs and symptoms of pesticide over-exposure, especially widely used cholinesterase-inhibitors and pyrethroid insecticides.

Content (Medicine)

- Cholinesterase inhibitors (organophosphates and carbamates)
 - ▶ Acute Poisoning: Know that patient will exhibit signs and symptoms of cholinergic toxicity, including salivation, lacrimation, diarrhea, nausea and vomiting, miosis with blurred vision, fasciculations, seizures, bradycardia, bronchorrhea, pulmonary edema, bronchospasm, dizziness, headache, toxic psychosis.
 - ▶ Tachycardia and hypertension may initially occur due to ACh stimulation of nicotinic fibers.
 - ▶ Life-threatening presentation includes a loss of consciousness, incontinence, seizures, and respiratory depression.
 - ▶ *Children: Know that children's presentation may be different from adults:
 - ▶ Children are much more likely to present with lethargy, coma, seizures than adults
 - ▶ Other typical cholinergic signs, especially the hyper-secretory signs, were found less likely to occur at initial presentation in several case series
 - ▶ *Chronic pesticide toxicity may go unrecognized because of failure to obtain a thorough exposure history. Some exposures are complex, signs and symptoms are nonspecific, and may be similar to other chronic illnesses. Consultation with specialists may be indicated for timely or optimal diagnosis and treatment.
 - ▶ Know what organophosphate-induced delayed neuropathy (OPIDN) is:
 - ▶ Chiefly manifested by weakness, paralysis, and paresthesias, especially of lower extremities
 - ▶ Other symptoms of chronic toxicity to organophosphates may include headache, blurred vision, muscle weakness, depression, memory and concentration problems, irritability, and intolerance to selected chemicals
- Pyrethroids
 - ▶ Know that within the class of pyrethroids, the sub-category of cyano-pyrethroids is more toxic.
 - ▶ Know that the most severe toxicity is to the central nervous system, but that it occurs less frequently than other signs and symptoms.
 - ▶ Seizures and disturbed level of consciousness are the chief signs.
 - ▶ Know that paresthesias are a common presenting sign.
 - ▶ Know that sensitization and allergic reactions also have been reported.
 - ▶ *Know that several additional signs and symptoms may mimic organophosphate toxicity:
 - ▶ Vomiting and diarrhea
 - ▶ Salivation and pulmonary edema
 - ▶ Muscle fasciculations
 - ▶ *Know that pyrethroid poisoning has been misdiagnosed as organophosphate poisoning

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and that patients have been given very high doses of atropine, unnecessarily resulting in atropine toxicity.

Points of Insertion

- Undergraduate Medicine
 - ▶ 2nd year Pharmacology and Pathology courses
 - ▶ 3rd year clinical rotations
 - ▶ 4th year ER rotations and Environmental Medicine elective (or equivalent)
- Residents
 - ▶ ICU rotations
 - ▶ ER and inpatient rotations
- Nurse Practitioners

Resources for Competency II

ATSDR Case Studies in Environmental Medicine, Agency for Toxic Substances and Disease Registry, www.atsdr.cdc.gov/HEC/CSEM

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Osorio AM. Environmental and occupational history. In: Reigart JR, Roberts JR. *Recognition and Management of Pesticide Poisoning*, 5th ed. Washington, DC: U.S. Environmental Protection Agency; 1999. EPA#735-R-98-003.

Reigart JR, Roberts JR. *Recognition and Management of Pesticide Poisonings*, 5th ed. Chapters 3-5, 8, Index of signs and symptoms, pp. 210-22. Washington, DC: U.S. Environmental Protection Agency; 1999. EPA#735-R-98-003. Online: <http://npic.orst.edu/rmpp.htm>

Rosenstock L, Cullen M. *Textbook of Clinical Occupational and Environmental Medicine*, Chapter 1. Philadelphia, PA: W.B. Saunders Company; 1994.

Savage E, Keefe T, Mounce L, et al. Chronic neurological sequelae of acute organophosphate pesticide poisoning. *Archives Environmental Health* 1988;43:38-45.

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