

# Competency I: Knowledge and Concepts of Pesticides

## I-1. Principles of Environmental and Occupational Health Related to Pesticides.

### I-1a. Understand basics of environmental and occupational health.

#### Content

- The student should know the primary environmental health effects that patients encounter today, including issues in their local community as well as national and international environmental health problems.
- Know likely household exposures.
- Know the primary issues that are unique to children, vulnerable populations at disproportionate risk, and the elderly.
- Know the primary occupational health hazards that workers face. Know how to take an Occupational and Environmental Medicine (OEM) history.

#### Points of Insertion

- Nursing
  - ▶ Community Health or Public Health Nursing courses, both didactic courses and clinical rotations
  - ▶ Home Health Nursing courses (didactic and clinical)
  - ▶ Adult Health Nursing or Occupational Health Nursing courses
  - ▶ Units of instruction on health promotion, protection and prevention of illness and injury
  - ▶ Units of instruction on current trends and issues in nursing practice
- Medicine
  - ▶ 3rd year medical school clerkship in Pediatrics, Family Medicine, and Internal Medicine may all have components for such clinical and epidemiological information
  - ▶ A 4th year elective in the medical school curriculum on Environmental Health, Preventive Health, Epidemiology, or similar subject may be considered or already exist in a school's curriculum

## I-1b. Understand the broad spectrum of chemicals classified as pesticides and their areas of use.

### Content

The student should be aware of various types of pesticides, especially the following categories and selected agents within each category. Students should be aware that brand names for pesticide products change from year to year, therefore the focus should be on active ingredients.

#### ■ Insecticides

- ▶ Agents that inhibit cholinesterase: organophosphates and n-methyl carbamates
- ▶ Pyrethrins (ocloresin extract of chrysanthemum) and pyrethroids (the synthetic derivative of natural pyrethrins. A clinically recognizable example of a pyrethroid is permethrin (Nix®, Elimite®); however, there are many other brand names of permethrin, and many other pyrethroids.
- ▶ Organochlorines
- ▶ DEET
- ▶ Boric Acid
- ▶ Fluorides
- ▶ Nicotine (There were still reports of toxicity in the 1990s from old stores of nicotine.)
- ▶ Arsenicals (Rarely used anymore, with the exception of some ant bait stations.)

#### ■ Herbicides

- ▶ Chlorophenoxy herbicides (2-4D, mecoprop are both widely available)
- ▶ Paraquat and diquat
- ▶ Pentachlorophenol and dinitrocresol (wood preservatives)
- ▶ Copper chromium arsenate (Primary source of wood preservative for decks, fences, and children's wood playground sets – discontinued in 2003.)

#### ■ Fumigants

- ▶ Include: cyanide, 1, 3-dichloropropane, metam-sodium, methylbromide, naphthalene, phosphine gas (from aluminum phosphide)
- ▶ Accidental dermal exposure and inhalation, especially after premature re-entry, can cause severe toxicity. Most fatalities are due to suicidal ingestion, because of the high concentration of exposure.

#### ■ Rodenticides

- ▶ Warfarin-related compounds: warfarin, coumarins, brodifacoum, difenacoum (so-called "super warfarins")
- ▶ Others: thallium, zinc phosphide, sodium fluoroacetate

#### ■ Fungicides

- ▶ Include: hexachlorobenzene, thiram, maneb, methylmercury compounds

## ■ Disinfectants

- ▶ Agents used for sanitization and sterilization in the home and hospital
- ▶ Registered as pesticides by the U.S. EPA
- ▶ Examples include alcohols, chlorhexidine, hypochlorites, iodines, phenols, and pine oil.

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## I-1c. Understand mechanisms and pathways of exposure.

### Content

#### ■ Know the most common patterns of exposure:

- ▶ Unintentional (common exposure pattern in children)
  - ▶ For acute poisoning, pathway is generally intestinal absorption from unintentional ingestion.
  - ▶ Inhalation exposure and dermal from surrounding environment
  - ▶ Hand to mouth activity in children
- ▶ Occupational
  - ▶ Inhalation is a common pathway.
  - ▶ Dermal exposure is important, especially for pesticide applications.
  - ▶ Ingestion is less common in the occupational setting, but can occur through failure to wear protective gloves and following poor hygiene practices.
- ▶ Intentional (suicide attempt/intentional abuse)
  - ▶ Ingestion is primary pathway.
  - ▶ Inhalation is another pathway, although primary agents of abuse in this manner are non-pesticide chemicals (aromatic solvents).

#### ■ Know the biochemical mechanism of action for organophosphates/ carbamates.

- ▶ Understand that there are many different pesticides with different methods of action.
- ▶ Organophosphates and carbamates:
  - ▶ Mechanism of action: Inhibition of the enzyme acetylcholinesterase (AChase)
  - ▶ This is accomplished by the binding of the pesticide to the AChase, forming either a carbamyl-AChase complex or a phosphoryl-AChase complex.
  - ▶ Result is an accumulation of ACH at synapse site, causing unopposed cholinergic stimulation.
- ▶ Know that pyrethroids may sometimes present with similar clinical findings as cholinesterase inhibitors, but the method of action is entirely different.

### \*I-1d. Understand temporal relationship between exposure and symptom.

#### Content

- Know that onset of symptoms of acute poisoning will occur shortly (within 24-48 hours) after exposure.
- Know that some chronic symptoms may follow an acute exposure, such as organophosphate-induced delayed neuropathy with onset a few weeks after exposure.
- Know that in cases of continued but lower level exposure (chronic or subacute exposure), symptoms may present much later. Examples include possible links to cancer following long-term pesticide exposure.

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### \*I-1e. Understand advanced toxicology, specifically related to organophosphates, carbamates, and pyrethroids.

#### Content

- Know that cholinesterase inhibition is readily and spontaneously reversible with carbamate poisoning. Poisoning due to carbamates therefore does not require the use of pralidoxime. However, cholinesterase inhibition due to organophosphate poisoning is less reversible. The enzyme can be reactivated by pralidoxime, especially in the first 48 hours following organophosphate poisoning.
- Know that pyrethroids are rapidly metabolized in the mammalian liver, accounting for their relatively lower toxicity than organophosphates.
- Know that cyano-pyrethroids are more toxic than other pyrethroids.

#### Points of Insertion for I-1 (b-e)

- Undergraduate Nursing
  - ▶ Pathophysiology course unit
  - ▶ Pharmacology course unit
  - ▶ Community Health or Public Health Nursing courses (didactic and clinical)
- Advanced Practice Nursing
  - ▶ Environmental Health or Occupational Health program course, including a course in Toxicology and applied in Environmental or Occupational Health Nursing didactic and clinical courses
- Undergraduate Medicine
  - ▶ Pharmacology class in 2nd year
  - ▶ Clinical rotations tailored to specific patient encounters during 3rd year
  - ▶ ER rotation in 4th year

## ■ Residency

- ▶ Elective in Toxicology or Environmental Medicine, ER rotation, clinical patient case discussions

## Resources for Competency I-1 (a-e)

### ■ Online Resources:

- ▶ State and Regional Poison Control Centers: <http://npic.orst.edu/poison.htm>
- ▶ National Pesticide Information Center (EPA-funded): <http://npic.orst.edu>
- ▶ EPA's Pesticide Management Resource Guide (PMReG): [www.epa.gov/oppfead1/pmreg/index.html](http://www.epa.gov/oppfead1/pmreg/index.html)
- ▶ NEETF's Pesticides Resource Library: [www.neetf.org/Health/Resources/healthcare.htm](http://www.neetf.org/Health/Resources/healthcare.htm)

### ■ Publications:

- ▶ Committee on Environmental Health. *Handbook of Pediatric Environmental Health*. Washington, DC: American Academy of Pediatrics; 1995.
- ▶ Dorman DC, Beasley VR. Neurotoxicology of pyrethrin and the pyrethroid insecticides. *Vet Hum Toxicol* 1989;63:33:238-43.
- ▶ Hayes W, Laws E, eds. *Handbook of Pesticide Toxicology*. San Diego, CA: Academic Press; 1991.
- ▶ LaDou J, ed. *Occupational and Environmental Medicine*, 2nd ed. Stamford, CT: Appleton & Lange; 1997.
- ▶ ATSDR Case Studies in Environmental Medicine, Agency for Toxic Substances and Disease Registry, [www.atsdr.cdc.gov/HEC/CSEM](http://www.atsdr.cdc.gov/HEC/CSEM)
- ▶ Marrs TC. Organophosphate poisoning. *Pharmac Ther* 1993;58:51-66.
- ▶ Pope AM, Rall DP, eds. for Committee on Curriculum Development in Environmental Medicine, Institute of Medicine. *Environmental Medicine: Integrating a Missing Element into Medical Education*. Washington, DC: National Academy Press; 1995.
- ▶ Pope AM, Snyder M, Mood L, for Committee on Enhancing Environmental Health Content in Practice, Institute of Medicine. *Nursing, Health and the Environment: Strengthening the Relationship to Improve the Public's Health*. Washington, DC: National Academy Press; 1995.
- ▶ Reigart JR, Roberts JR. *Recognition and Management of Pesticide Poisonings*, 5th ed. Washington, DC: U.S. Environmental Protection Agency; 1999. EPA#735-R-98-003.
- ▶ Risher JF, Mink FL, Stara JF. The toxicologic effects of the carbamate insecticide aldicarb in mammals: A review. *Env Health Persp* 1987;72:267-81.
- ▶ Rosenstock L, Cullen M. *Textbook of Clinical Occupational and Environmental Medicine*, Chapter 1. Philadelphia, PA: W.B. Saunders Company; 1994.
- ▶ Wang S, Lui L, et al. Clinical manifestations and diagnosis of acute pyrethroid poisoning. *Arch Toxicol* 1989;63:54-8.
- ▶ Zahm S, Ward M. Pesticides and childhood cancer. *Env Health Persp* 1998;106:893-908.

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

## I-2. Individual Patient Knowledge and Skills.

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### I-2a. Relate the environment in which the patient (and family) lives, works, and plays to potential hazards and exposures.

#### Content

- The student should know about the common pesticide hazards associated with major rural and urban industries, occupations, and avocations, including commercial agriculture, farming, grounds keeping, plant nursery maintenance, general lawn care, structural pest control / exterminators, parks, playgrounds, home or apartment yards, in-house treatments for pests (e.g., ants, roaches), home and gardens, schools and day care centers.
- Numerous pesticides are used for public health protection, including water purification, sewage treatment, vector control.
- Be aware that the vast majority (80-90%) of pesticides produced are used for commercial agriculture; the remainder are used for structural pest control, horticulture, and consumer home and garden purposes.
- Be aware that health care professionals typically use and are exposed to a large number of registered pesticides on a regular basis.
- Understand that children are at risk for greater pesticide exposure from residuals in food than are adults due to greater consumption per kilogram of body weight, and that prevention of this excess exposure is addressed by the Food Quality Protection Act of 1996.

#### Points of Insertion

- Community Health and Public Health Nursing courses (didactic and clinical)
- Public Sector Medicine rotation
- 4th year medical school elective in Environmental or Preventive Medicine

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### I-2b. Identify risk factors for occupational pesticide exposures.

#### Content

- Understand that commercial preparations of pesticides may be more concentrated, and therefore pose greater risk to someone in an occupational setting (particularly manufacturing) than the use of a diluted final product.
- Understand that highest risk of exposure is faced by individuals working in agricultural pest control operations: mixing, loading, applying, and flagging. Mixers and loaders are exposed to concentrated pesticides and large volumes.

- Understand strategies for reducing the risk of exposure, including engineering controls, such as closed systems for loading pesticides into tanks, and correct use of personal protective clothing and devices.
- Know that pesticide handlers and workers on farms, forests, greenhouses, and nurseries are required to be supplied with appropriate protective gear by their employers.
- Understand that pregnant women who work with pesticides are at high risk and should consider switching to other tasks, if possible, at least during the first trimester of pregnancy, or should maximize their use of personal protective clothing.
- Understand that workers are at risk of exposure if insufficient time is allowed before re-entry to treated fields.
- Understand need for proper removal and handling of contaminated clothing and showering prior to going home to reduce risk of exposure to residuals on clothing and skin.

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## I-2c. Identify risk factors for pesticide exposures at home.

### Content

- Understand that women, especially those who are pregnant, and children of farming families are vulnerable to pesticide exposure even if they don't work in the fields. Migrant workers and their families may also suffer from poor living conditions, lack of command of the English language, and sporadic medical care.
- Know that homes located near farmlands may constitute a particular hazard (above the baseline risks of personal pesticide application to yards).
- Know that children family members on farms are at risk for exposure to concentrated agents and old supplies of chemicals that are no longer used. Children playing in or near the fields while their parents work are at risk for exposure to pesticides.
- Emphasize to families that care should be taken to reduce exposure to pesticides in areas where food is prepared and consumed, and in children's play areas.
- Be aware that pesticides used by consumers for home and garden are often nearly identical in formulation as those used by professional applicators or differ only in reduced strength of active ingredient.
- Be aware that pesticide residues are implicated in chemical sensitivities reported by patients who may experience symptoms in multiple systems in response to exposures to chemicals and environmental agents widely tolerated by a majority of people.
- Know that children incur more risk than adults due to the immature nature of their immune system, larger surface area to body weight ratio, higher metabolic rate, different diet patterns and activities, different exposure profiles, and hormonal changes at puberty.

- Be aware that children are more apt to have extended contact with ground level surfaces and may have extended contact with pets. Properly applied spot treatments, directed or crack and crevice sprays, baits, gels, and pastes pose less potential for exposure than broadcast treatments.
- Know that contamination of food, clothing, and other objects can occur through improper application of pesticides in homes, or if items are not removed or covered prior to treatment of the area.
- Know that improper practices, including use of food or drink containers to store pesticides, reuse of empty pesticide containers, and failure to lock pesticides away from children, have resulted in serious illnesses and injuries to children.
- Recognize that consumers generally have less education and training on how to properly apply pesticides than farmers or commercial applicators.
- Be aware that residues may be carried into homes on shoes worn across treated surfaces (lawns) or on clothing worn to apply pesticides.

#### Points of Insertion

- Nursing
  - ▶ Community Health Nursing and Primary Care rotations
  - ▶ Maternal / Child Health Nursing
  - ▶ Medical / Surgical Nursing
  - ▶ Psychiatric / Mental Health Nursing rotation
  - ▶ Unit on Oncology
- Medicine
  - ▶ Public Sector Medicine rotation
  - ▶ Primary Care rotations
  - ▶ Psychiatric /Mental Health rotation
  - ▶ Oncology rotation
  - ▶ 4th year elective in Environmental or Preventive Medicine

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### **I-2d. Recognize that other family members may be ill from pesticide exposure in addition to index patient.**

#### Content

- Understand that family members, including women and children, of exposed individuals are at risk for exposure to reproductive and childhood toxicants due to residues “brought home” on clothing, shoes, etc.
- Understand the epidemiological concept of “disease clustering” and that a single exposure may result in numerous family / household members being sick.

- Understand risks of perinatal exposure and implications for pregnancy outcomes, fetal effects, lactation, and child development / developmental disabilities, elderly, individuals with chemical sensitivities, and other vulnerable populations.
- Understand risks of consuming foods that contain residues of pesticides while working / harvesting agricultural products.

### Points of Insertion

- Nursing
  - ▶ Community Health or Public Health Nursing rotations
  - ▶ Maternal / Child Health units of instruction
  - ▶ Psychiatric / Mental Health units of instruction
- Medicine
  - ▶ Public Sector Medicine rotations
  - ▶ Pediatric and Obstetrical rotations
  - ▶ 4th year elective in Environmental or Preventive Medicine

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## I-2e. Understand potential moral, ethical, and legal implications for *patients of reporting and referral*.

### Content

- Know state-specific reporting requirements for the workers' compensation system or surveillance system. Be able to list which states have mandatory pesticide case reporting and the process for reporting.
- Understand that health care providers are often the first to identify a sentinel health event. Understand the need to recognize such an event and the process for reporting.
- Understand workers' reluctance to get involved in pesticide case reporting, ranging from fear of retaliatory actions such as loss of job or pay cuts, to fear of complete closure of an operation with the loss of many jobs. Therefore, consent of the patient should be obtained prior to reporting.
- Understand that pesticide contamination at sites such as schools, daycare centers, and businesses have additional consequences beyond individual health effects. Such legal and financial issues may affect willingness to report and disclose.
- Be able to describe the health care provider's role in assuring follow-up of patients with pesticide exposure, in order to reduce the risk of re-exposure or return to work sites where re-exposure is likely.
- Learn how to access state data on pesticide use and pesticide poisonings, where available.

## Points of Insertion

### ■ Nursing

- ▶ Community Health or Public Health Nursing rotation
- ▶ Units of instruction on ethical/legal issues in nursing; patient advocacy role of the nurse
- ▶ Advanced Nursing Practice courses (e.g., graduate midwifery, FNP, PNP) addressing ethical, legal, public policy issues in health care and role of nursing

### ■ Medicine

- ▶ Ethical, legal issues of medical practice
- ▶ Public Sector Medicine rotation
- ▶ 4th year elective in Environmental or Preventive Medicine
- ▶ Occupational Medicine

## Resources for Competency I-2:

### ■ Code of Ethics for specific disciplines

### ■ Websites:

- ▶ Occupational Safety and Health Administration (OSHA): [www.osha.gov](http://www.osha.gov)
- ▶ National Pesticide Information Center, Technical Pesticide Information: <http://npic.orst.edu/tech.htm>

### ■ Pesticide Information Databases:

- ▶ Extension Toxicology Network (EXTOXNET): <http://ace.ace.orst.edu/info/extoxnet>
- ▶ Crop Data Management Systems (CDMS) database: [www.CDMS.net/pfa/LUpdateMsg.asp](http://www.CDMS.net/pfa/LUpdateMsg.asp)
- ▶ Integrated Risk Information System (IRIS): [www.epa.gov/ngispgm3/iris](http://www.epa.gov/ngispgm3/iris)  
An electronic database, maintained by EPA, on human effects that may result from exposure to various chemicals in the environment. Provides hazard assessment and dose-response assessment information.

### ■ Publications:

- ▶ ATSDR Case Studies in Environmental Medicine, Agency for Toxic Substances and Disease Registry, [www.atsdr.cdc.gov/HEC/CSEM](http://www.atsdr.cdc.gov/HEC/CSEM)
- ▶ Epidemiologic Notes and Reports Organophosphate Insecticide Poisoning Among Siblings – Mississippi. *MMWR* 1984;33(42):592-4.
- ▶ *Farm Chemicals Handbook*. Meister Publishing. Annual.
- ▶ Frazier L, Hage M. Reproductive Hazards of the Workplace. Philadelphia, PA: Van Nostrand Reinhold; 1998.
- ▶ LaDou J, ed. *Occupational and Environmental Medicine*, 2nd ed. Stamford, CT: Appleton & Lange; 1997; Table 32-1, p. 532, Table 32-3, pp. 536-40, Table 32-4, pp. 542-3.
- ▶ Mardowitz SB. Poisoning of an urban family due to misapplication of household organophosphate and carbamate pesticides. *J Clin Tox Clin Tox* 1992;30:295-303.
- ▶ Pope AM, Snyder M, Mood L, for Committee on Enhancing Environmental Health Content

in Practice, Institute of Medicine. *Nursing, Health, and the Environment: Strengthening the Relationship to Improve the Public's Health*. Washington, DC: National Academy Press; 1995; p. 45, Box 3.1.

- ▶ Reigart JR, Roberts JR. *Recognition and Management of Pesticide Poisonings*, 5th ed. Washington, DC: U.S. Environmental Protection Agency; 1999. EPA#735-R-98-003.
- ▶ Rosenstock L, Cullen M. *Textbook of Clinical Occupational and Environmental Medicine*, Chapter 1. Philadelphia, PA: W.B. Saunders Company; 1994.

## I-3. Population-Based Health Knowledge and Skills.

### I-3a. Understand the concept of population-based health as it pertains to pesticide exposure.

#### Content

- Understand the key components of the Food Quality Protection Act of 1996 and how it pertains to prevention of excessive pesticide exposure to children:
  - ▶ Establishes a single, health-based standard for all pesticide residues in food.
  - ▶ Requires a re-evaluation of all tolerances (maximum amount of pesticide allowed on food) by August 2006.
  - ▶ Requires that EPA use an additional 10-fold safety margin when setting standards for pesticides on foods to protect children, and allows EPA to use a different margin of safety only if, on the basis of reliable data, such a margin will be safe for children.
  - ▶ Requires that EPA ensure that there is a reasonable certainty that no harm will result to infants and children from aggregate exposure to the pesticide residue (including from other sources such as water, residential, etc.).
  - ▶ Requires that EPA consider the cumulative effects from all pesticides that share a common mechanism of action.
  - ▶ Provides certain right-to-know provisions for consumers.
- Understand the context of community population-based health. Know that the populations of entire neighborhoods and regions can be affected by pesticide contamination of the environment.
- Understand that issues of public health must be approached from a population-based primary, secondary, and tertiary prevention perspective.
- Understand the use of epidemiologic data to support presumed causal relationships between an exposure and an outcome.

#### Points of Insertion

- Nursing
  - ▶ Community Health or Public Health Nursing courses (didactic and clinical)
  - ▶ Advanced Nursing Practice courses addressing ethical, legal, or public policy issues

- Medicine
  - ▶ Public Sector Medicine rotation or Evidence-Based Medicine
  - ▶ 2nd year Introduction to Clinical Medicine
  - ▶ 4th year elective in Environmental or Preventive Medicine

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### I-3b. Recognize socioeconomic impacts of pesticide-related illness.

#### Content

- Be aware of socioeconomic implications of pesticide-related illness on each of the following groups:
  - ▶ Individual / family (e.g., impact on a head-of-household earning minimum wage)
  - ▶ Employers and related businesses (e.g., loss of business, employees, customers)
  - ▶ Community (e.g., well water contamination, drinking water supplies)
  - ▶ Society (e.g., contamination of underground water reserves, lakes, waterways)
- Understand potential economic impacts on workers who cannot return to jobs, temporarily or permanently, due to pesticide exposure and poisoning. Give at least three specific examples: migrant farmworker, mixer/loader, and applicator.
- Understand the role of advocacy and justice in environmental and occupational health, and workers' compensation.

#### Points of Insertion

- Nursing
  - ▶ Community Health or Public Health Nursing courses
  - ▶ Units of instruction on ethical, legal aspects of nursing
  - ▶ Units of instruction on health policy and client advocacy in nursing
- Medicine
  - ▶ Public Sector Medicine rotation
  - ▶ 4th year elective in Environmental or Preventive Medicine
  - ▶ Ethical, legal, advocacy issues of medical practice

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### I-3c. Understand potential moral, ethical and legal implications for *the community of reporting and referral*.

#### Content

- Understand barriers and challenges to providing optimal care to migrant farmworkers, other transient populations, and individuals without U.S. citizenship, green cards, work permits, etc., since they are often the most vulnerable populations for exposure.
- Understand how economic, workplace issues sometimes outweigh health issues for vulnerable populations.

- Know that health care providers are obligated to report pesticide-related illness in some states.
- Be able to describe Healthy People 2010: National Health Promotion and Disease Prevention Objective 10 relative to reducing the morbidity and mortality of the population due to toxic exposures.

#### Points of Insertion

- Nursing
  - ▶ Community Health or Public Health Nursing courses (didactic and clinical)
  - ▶ Ethical, legal aspects of nursing / medicine
  - ▶ Health policy courses at both undergraduate and graduate levels
- Medicine
  - ▶ Public Sector Medicine rotation
  - ▶ 4th year elective in Environmental or Preventive Medicine

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### I-3d. Possess a basic awareness of the role of prevention and benefits of alternatives to conventional pest control.

#### Content

- Be able to provide appropriate anticipatory guidance to individuals and families regarding appropriate use of pesticides and products. (For example, be able to advise family on appropriate concentrations of DEET.)
- Know to advise family to contact local county Cooperative Extension services (check local telephone directory blue pages under county Cooperative Extension) or National Pesticide Information Center (<http://npic.orst.edu>) for information regarding integrated pest management (IPM) and alternatives to pesticide use for control of insects, weeds, etc.
- Be able to describe the goals of Healthy People 2010 relative to the health promotion, health education, and prevention of illness relative to pesticide exposure.
- Be able to teach individuals and families to read labels and follow directions when using products containing pesticides.

#### Points of Insertion

- Nursing
  - ▶ Ethical, legal aspects of nursing at both undergraduate and graduate levels
  - ▶ Role courses at both undergraduate and graduate levels
  - ▶ Community Health or Public Health Nursing courses (didactic and clinical)

## ■ Medicine

- ▶ Ethical, legal aspects of medicine at both undergraduate and graduate levels
- ▶ Public Sector Medicine
- ▶ 4th year elective in Environmental or Preventive Medicine
- ▶ Occupational Medicine
- ▶ Agromedicine if available in curriculum

### Resources for Competency I-3:

#### ■ Online:

- ▶ U.S. EPA: Integrated Pest Management: [www.epa.gov/oppbppd1/ipm/index.htm](http://www.epa.gov/oppbppd1/ipm/index.htm). Read the Label First, [www.epa.gov/pesticides/label/](http://www.epa.gov/pesticides/label/) ("Interactive label" shows pop-up text that explains the basic statements found on pesticide product labels.)
- ▶ National Pesticide Information Center, General Pesticide Information: <http://npic.orst.edu/gen.htm#ps>.

#### ■ Publications:

- ▶ Department of Health and Human Services. *Healthy People 2010: National Health Promotion and Disease Prevention*. Washington, DC: Dept. of Health and Human Services; 2000.
- ▶ Hennekens CH, Buring JE. Chapter 3: Statistical association and cause and effect relationships. In: Mayrent SL, ed. *Epidemiology in Medicine*. Boston, MA: Little, Brown and Company; 1987: 30-41.
- ▶ Hitchcock J, Schubert P, Thomas S. *Community Health Nursing*. Albany, NY: Delmar Publishers; 1999;15-16.
- ▶ Institute of Medicine. *Role of the Primary Care Physician in Occupational and Environmental Medicine*. IOM Report, Division of Health Promotion and Disease Prevention, Washington, DC: National Academy Press; 1988.
- ▶ Pope AM, Snyder M, Mood L, for Committee on Enhancing Environmental Health Content in Practice, Institute of Medicine. *Nursing, Health, and the Environment: Strengthening the Relationship to Improve the Public's Health*. Washington, DC: National Academy Press; 1995; 17-8.
- ▶ Rogers B. *Occupational Health Nursing Concepts and Practice*. Chapter 1, 2, 5. Philadelphia, PA: W.B. Saunders Company; 1994.
- ▶ Rosenstock L, Cullen M. *Textbook of Clinical Occupational and Environmental Medicine*, Chapters 1-2. Philadelphia, PA: W.B. Saunders Company; 1994.
- ▶ Reigart JR, Roberts JR. *Recognition and Management of Pesticide Poisonings*, 5th ed. Washington, DC: U.S. Environmental Protection Agency; 1999. EPA#735-R-98-003.
- ▶ U.S. Environmental Protection Agency. *The Worker Protection Standard for Agricultural Pesticides*. Washington, DC: U.S. EPA; 1994.