

# Literature Review

The literature review conducted for this effort yielded a small selection of articles that point to the relatively limited knowledge of pesticides and pesticide-related illnesses on the part of primary health care practitioners. The studies conducted suffer somewhat from limited sampling strategies and response rates.

Ferguson et al (1991) examined over 1,026 suspected pesticide poisoning reports received at the regional Poison Control Centre at the Hospital for Sick Children in Toronto. The purpose of this study was to evaluate predictors for pesticide poisoning which included season, age, professional vs. lay caller, gender, and location (metropolitan vs. non-metropolitan). Variables mentioned were type of pesticide (insecticide or rodenticide), amount of exposure, symptoms, and treatment (measured as referral). Age was the strongest predictor for all the outcome variables. There was a ten-fold risk of pesticide poisoning symptoms for victims over five years of age as well as six times the likelihood of being referred for the same age group. The season predicted type of pesticide used. The major limitation of this study was that the investigators had no way of knowing if callers were truly pesticide-poisoned. Also, data reported are only for those with suspected poisoning. The implication for health care professionals is to be knowledgeable about pesticide exposure and outcome, and the need to provide adequate treatment.

Henry (1997) provides a good overview of pesticide symptoms seen in the primary care office. He notes that pesticide use is ubiquitous in the United States. The World Health Organization (WHO) estimates that there are 3 million severe, acute cases of pesticide poisoning annually worldwide. An estimated 2 million of these cases are the result of suicide attempts. WHO estimates that another 500 million are exposed less intensively (and thus generally know less about the hazards of pesticides and preventive measures than those who are more intensively exposed). In the United States, EPA estimates that up to 300,000 acute poisonings occur annually in agriculture workers. The wide range of the estimate is influenced by inaccurate diagnosis and underreporting. Sources of exposure are most frequently related to one's occupation or environment, with a third group of persons exposed by being family members of those occupationally exposed. Occupations at risk for pesticide exposure include, but are not limited to, the following: ranch and farm workers (including migrant workers), gardeners (home and professional), groundskeepers, florists, structural pest control workers, hunting and fishing guides, health care workers who deal with decontamination, and people employed in pesticide production, mixing, and application. Environmental exposures include treated foods and plants, ground- and/or well-water contamination, and breast milk and placental transfer.

Henry notes that at particular risk are household members who launder clothing worn during production, mixing, or application of pesticides. Second-hand exposure is related to storage of contaminated clothing and laundry practices of family members, as documented in a recent California study. Even though inhalation and ingestion of pesticides occurs, skin contact with topical absorption is the main source of exposure to pesticides. Skin may be sprayed during

application of chemicals to crops, or there may be absorption through permeable clothing. Clothing worn during pesticide application must be washed after each application. The primary care provider must be alert to both acute and chronic signs of pesticide poisoning. Sources of exposure in the home, community, and worksite must be identified.

Lessenger (1999) states that the family physician in the office environment is often the first professional to see a person who has been exposed to pesticides, and the author discusses the importance of being prepared to make a precise diagnosis and provide appropriate treatment. The author provides five representative case studies for review and analysis, citing the need to conduct a work-up in a thorough methodological manner with emphasis placed on assessment.

Sanborn (1998) reports that patients with illnesses that have environmental factors often turn first to family physicians. Family physicians thus have an excellent opportunity to provide information to patients about environmental health concerns. The environmentally competent clinician has been defined as one who can identify patients with environment-related illnesses and can provide clinical care and advice, including appropriate referral and follow-up assessment. The objectives of this study were to describe environmental health problems encountered in some Ontario family practices and to describe differences among physicians from urban (small and large) and rural practices. A self-completed questionnaire was mailed to 521 eligible community family physicians with a 41% (n=214) response rate. Environmental health problems encountered in family practice were determined using questions about:

- Concerns of physicians (health effects seen in practice)
- Reported patient questions
- Identified high-risk groups
- Environmental exposure-related problems
- Self-rated knowledge
- Priorities for public health control of environmental pollutants and
- Current and preferred sources of information

Family physicians surveyed in this study had a high level of concern about a range of health effects of environmental exposures with respiratory and carcinogenic effects of greatest concern. Pregnant women, agricultural workers, and children were considered important at-risk groups. Self-ratings of knowledge were generally very low. Rural physicians were concerned about agricultural pesticide exposure and their patients were concerned about moldy hay. Urban physicians had concerns about lead and reported patient concerns about chemical exposure from consuming Great Lakes fish. All groups use similar sources of current environmental health information. This study suffers from lack of demographic information about respondents as well as self-reported data without validation.

Watterson (1992) discusses training needs and available information for general practitioners regarding acute pesticide poisoning. A postal questionnaire was sent to 68 general practitioners in

a District Health Authority of the United Kingdom with an 82% (n=56) return rate. Watterson found that general practitioners do not have sufficient training and information needed to evaluate possible acute pesticide poisoning.

In the nursing area, Baker (1992) discusses the role of the community health nurse in assessing and preventing pesticide exposure in farmers: clinical health nurses practicing in rural emergency care settings are most likely to assess for signs and symptoms of moderately severe poisonings. Clinical health nurses practicing in clinics, community health practice, physician offices, and hospitals are most likely to encounter mild and/or chronic exposure signs and symptoms. Thus, the clinical health nurse must be able to differentiate between acute and chronic pesticide poisoning.

The clinical health nurse practices at all levels of prevention. The rural clinical health nurse might initiate prevention strategies by working with the county agricultural extension office, agriculturally based universities, pesticide dealers, and local concerned physicians and hospitals. Farm Bureau organizations, agriculture classes in the high schools, and 4-H clubs are target groups that could benefit from this information. In urban settings, clinical health nurses may work with garden clubs and plant nursery customers. Primary prevention through education of farmers regarding safety and health practices when using pesticides is the most effective means of dealing with pesticide health threats. Informing farmers of the dangers of ineffective protection against pesticide exposure is the first step. There are many resources available for the clinical health nurse to use in planning and implementing the teaching intervention. Pamphlets, slide presentations with scripts, and other materials, can be secured easily. Pesticide safety should be included in programs that address prevention of other farm accidents.

The clinical health nurse will encourage farmers to participate in secondary prevention strategies including baseline screening tests to detect certain pesticide-related illnesses (organophosphates, carbamates) and periodic screenings for comparison. At the tertiary prevention level, the clinical health nurse will assist the farmer with rehabilitation/disability management issues related to pesticide exposure.

Schnitzer et al (1999) describes the Texas Department of Health pesticide poisoning surveillance system. The authors compared cases seen in a 2-year period (1989-90) in 16 hospitals and migrant clinics to cases that had been reported to the surveillance system. They found underreporting by surveillance system in this time period (2 out of 10 cases). After instituting some changes (increased number of sentinel providers, periodic reviews of hospital records, interagency collaboration) to increase reporting, reporting was greatly improved. The investigators also found that this was mostly due to the involvement of other reporting agencies (Texas Dept. of Ag; Texas Workers Comp, Texas Poison Center Network) rather than individual provider reporting.

## References

- Baker JE. Primary, secondary, and tertiary prevention in reducing pesticide-related illness in farmers. *Journal of Community Health Nursing*, 9 (4): 245-54, 1992.
- Ferguson JA, Sellar C, McGuigan MA. Predictors of pesticide poisoning. *Canadian Journal of Public Health*, 82(3):157-161, 1991.
- Henry TK. Pesticide exposure seen in primary care. *Nurse Practitioner Forum*, 8(2):50-8, 1997.
- Lessenger JE. The pesticide-exposed worker: An approach to the office evaluation. *Journal of the American Board of Family Practice*, 6(1):33-41, 1993.
- Sanborn MD, Scott EAF. Environmental health concerns in urban and rural family practice. *Canadian Family Physician*, 44:1466-1472, 1998.
- Schnitzer PG and Shannon J. Development of a surveillance program for occupational pesticide poisoning: Lessons learned and future directions. *Public Health Reports*, 114(3):242-8, 1999.
- Watterson AE, Thomas HE. Acute pesticide poisoning in the UK and information and training needs of general practitioners: Recording a conundrum. *Public Health*, 106(6):473-80, 1992.