

Introduction

These guidelines form one of two documents that outline the competencies and skills that health care professionals should have in the pesticides/environmental health area. This document focuses on the knowledge base that should be mastered by students as part of medical or nursing training. The companion document defines the skills and knowledge base that should be mastered and demonstrated by primary care physicians and nurses in the practice arena. The authors of both documents collaborated to ensure consistency across both documents.

The two documents were developed specifically for everyday, frontline health care professionals, rather than for specialists and researchers. The Educational Competency guidelines are aimed at basic and advanced components of educational institutions, rather than specialties such as occupational and environmental medicine. Similarly, the Practice Skills guidelines are aimed at primary care providers, rather than medical toxicologists or specialists in occupational or environmental medicine.

As faculty and administrators in medical and nursing schools decide how to incorporate pesticide-related information, it is hoped that these national guidelines and the larger initiative on pesticides and health care providers will serve as a model for integrating other environmental health issues into health care provider education and training.

Background on Pesticides and Health Care Providers

The need for improvements in environmental health training has been expressed by a number of health professional groups, academic institutions, as well as government and community organizations. In 1994, the American Medical Association adopted a resolution urging Congress, government agencies, and private organizations to support improved strategies for the assessment and prevention of pesticide risks. These strategies included systems for reporting pesticide usage and illness, as well as educational programs about pesticide risks and benefits.

In a number of studies published in the 1990s, the Institute of Medicine expressed its concern that health care providers are not prepared to manage this problem, focusing on the issue of environmental health education and the roles of nurses and physicians (IOM 1988, IOM 1991, IOM 1993, Pope et al, 1995). Each report outlined the deficits in current educational curricula for environmental medicine, and recommended improvements. At a minimum, primary care physicians and nurses should be able to identify possible occupationally or environmentally induced conditions and make appropriate referrals (IOM 1988). The 1993 report offered additional recommendations: eliciting a detailed environmental history, recognizing signs and symptoms, understanding the relevant toxicology and exposure factors, identifying the available resources for assistance, and understanding legal and ethical responsibilities.

The *National Strategies for Health Care Providers: Pesticides Initiative* (<http://www.neetf.org/Health/providers/index.shtml>) began in 1998 and is a partnership of the U.S. Environmental Protection Agency (EPA) and The National Environmental Education & Training Foundation (NEETF), in collaboration with the U.S. Department of Health and Human Services (DHHS), the U.S. Department of Agriculture (USDA), and the U.S. Department of Labor (DOL) .

From the outset, this national interagency initiative has been conceived of as a long-term effort. Working with an expert panel and multiple workgroups, the initiative sought a broad-scale involvement of stakeholders, including federal agencies, academic institutions, professional organizations, foundations, farmworker and farm groups, industry and trade associations. As part of this initiative, EPA issued a substantially revised edition of *Recognition and Management of Pesticide Poisonings* (Reigart and Roberts, 1999), a landmark handbook used by health care professionals around the world. In 2002, the *Implementation Plan: National Strategies for Health Care Providers: Pesticides Initiative* was published (NEETF, 2002). It outlines a set of strategies to move the initiative forward in education, practice, and resource development.

Role of Health Care Providers

Primary care providers are on the frontlines of health care. Patients and communities often look to their primary care providers as important sources of information and guidance on suspected pesticide-related health conditions. Primary care providers can play a key role in identifying and ameliorating potential pesticide poisonings and exposure – but only if they are prepared for this role and know where to turn for assistance. Providers must be able to problem solve with patients who think an exposure has occurred. With the potential effects of pesticide exposure on health so widespread and consequential, an understanding of the pathophysiology and management of pesticide exposure and toxicity is important in all areas of health care practice (general and advanced/specialty), including assessment, diagnosis, planning intervention/treatment, and evaluation (IOM 1993, Pope et al, 1995).

Prevention, health maintenance, and illness and injury management are included in the management of pesticide exposure. Essential skills include a basic understanding of the health hazards of pesticides, prevention and abatement methods, recognition, diagnosis, and treatment of pesticide exposure, and utilization of resources for referral and assistance at both a patient and community-based level. In addition to direct patient interventions, health care providers may assume the role of educator, advocate, and policy planner on behalf of an individual patient or population of patients.

When pesticide toxicity is discussed, most people usually think of an acute pesticide poisoning incident in an agricultural setting. However, pesticide exposure regularly occurs in settings outside agriculture as well, including urban environments, homes, and schools. Pesticides are also of concern because of potential chronic health effects from long-term exposures. This is particularly important for children, given their developmental risks for pesticide exposure and due to pesticide residues on food.

Health care providers must be aware of the potential effects of pesticide exposure on high-risk groups such as infants, children, the elderly, and those with compromised immune systems. The

issue of children's susceptibility prompted Congress to enact the Food Quality Protection Act of 1996, the highlights of which are discussed in Competency I-3 of this document. Epidemiological studies tend to focus on worker exposure. Since the majority of the pesticide applicator work force is overwhelmingly male, studies of women exposed to pesticides at work are few. In the absence of good data, pregnant women should take extra care to avoid exposure to pesticides.

A comprehensive approach to nursing and medical practice requires awareness, recognition, and treatment of critical factors that affect individual and community health, even if these factors are not obvious at first to patients or providers. This initiative recognizes the unique role and functions served by registered nurses and advanced practice nurses. In urban, suburban, and rural settings, nurses are often the initial, and sometimes only, points of contact for people seeking health care. In the context of a busy medical practice, physicians often rely on nurses to provide more in-depth patient education on many preventive issues, and pesticide-related exposures may be included among these. Community or home health nurses also may visit patients in their homes, workplaces, and local communities, thus gaining firsthand knowledge of potential pesticide exposures in these settings (Pope et al, 1995). Where possible, the physician should maintain community contacts as well, as is the case with those with particular expertise in environmental health and occupational medicine. The opportunity for close interactions when health care providers are "onsite" provides a better chance of detecting previously unrecognized health problems related to pesticide exposure.

Finally, health care providers have a role to play in minimizing the unnecessary use of pesticides. Integrated Pest Management (IPM) is a sustainable approach aimed at providing effective control of pest populations while minimizing economic, health, and environmental risks. Rather than relying solely on pesticide applications, IPM employs other tactics as well, including biological control controls (parasites and predators); cultural controls such as mulching to prevent weeds, varying planting dates to avoid susceptible windows for pest infestation, etc; and physical controls such as installation of screens, improved sanitation practices, etc. Based on the identification of pests, monitoring of pest populations, assessment of damage levels, and knowledge of available pest management strategies, an IPM specialist can provide intelligent advice. Many successful IPM programs have reduced energy inputs and pesticide use. Health care providers should encourage patients and communities to contact their local Cooperative Extension offices (see the county listings of the local telephone book) for advice on IPM programs and strategies suitable for their homes, yards, schools, and communities.

Incorporation into the Curriculum

Although some progress has been made in introducing environmental health issues into the curriculum of medical and nursing schools, more remains to be done. And yet, it is hard to find space in the already crowded curricula of medical and nursing schools for new topics and subject areas. To facilitate integration, this document notes possible "Points of Insertion" for each competency. We strongly recommend that pesticide content be integrated into *existing* adult health, pediatric, research, ethical/legal units of instruction and community health nursing courses, both didactic and clinical. This can be done, for example, by using pesticides to enhance existing case studies, or as exemplars.

The changing worlds of medical and nursing education present a challenge in identifying where in the curriculum a particular pesticide topic would be most appropriate. Curricula are highly variable in the form and substance of topics. Some schools of nursing and particularly some schools of medicine have adopted Problem Based Learning or other case-based methods or organ system approaches to all or most of their curricula. Many schools continue to use a traditional curriculum and maintain a traditional governance structure based on departmental control of curriculum structure. A topic such as pesticides may be adapted by faculties with either style of curriculum, but the vehicle used may require modification of the teaching method and style.

In suggesting points of insertion into the curriculum, we have included such components as environmental or preventive medicine electives, public sector medicine courses, etc. These serve only as examples; many schools will have other courses or departments that the material could fit into equally well. Schools that do not have such courses in place are certainly encouraged to consider adding them.

The competencies proposed in this document recommend integration of content into medical and nursing curricula at all levels. Competency I, Knowledge and Concepts of Pesticides, is considered the most important and basic level that should be incorporated into *all* curricula as a top priority. Content items marked with an asterisk (*) are considered appropriate for the more advanced health care student (i.e., residents or nurse practitioner students), in addition to the other content items.

The role of faculty development in advancing a pesticide-related curriculum cannot be over-emphasized. If one or more faculty members are identified as having a special interest or ability in Environmental Health/ Toxicology, those members may serve as a resource for other faculty members, especially when the small group clinical case scenario method is used.

The next section of this document contains a brief “primer” on pesticides, with background material on pesticide regulation, uses, exposures, and absorption. The remainder of the document outlines the five educational competencies – the information content, suggested points of insertion, and a sampling of relevant resources. Readers are encouraged to consult the extensive resources available on the Internet. Useful starting points include: the National Pesticide Information Center (<http://npic.orst.edu>), and NEETF’s Online Pesticide Resources Library (www.neetf.org/Health/Resources/healthcare.htm).

References

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