



Center *for*  
Rural Health

University of North Dakota  
School of Medicine & Health Sciences

<http://medicine.nodak.edu/crh>

## Pesticide Contamination in Rural Areas: Are EMS Providers Prepared?

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Kyle Muus, Ph.D.

Patricia Moulton, Ph.D.

Tim Shea, NREMT-P

*Connecting resources and knowledge to strengthen  
the health of people in rural communities.*



### Center *for* Rural Health

- Established in 1980, at the University of North Dakota School of Medicine and Health Sciences in Grand Forks, ND
- Focuses on:
  - Education, Training, & Resource Awareness
  - Community Development & Technical Assistance
  - Native American Health
  - Rural Health Workforce
  - Rural Health Research
  - Rural Health Policy
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## Background

- Hundreds of toxic chemicals are commonly used across the country for a variety of purposes.
- Agriculture workers and pesticide handlers are at greatest risk for pesticide exposure and contamination.
- Pesticide-contaminated individuals are a challenge for health care providers.
- EMS training curricula typically possess little content on safely providing care to patients with exposure to hazardous materials.



## What are Pesticides?

- Herbicides
- Insecticides
- Rodenticides
- Fungicides





... . Agriculture ... .

### Review of Pesticide Education Materials for Health Care Providers Providing Care to Agricultural Workers

Ann E. Hott, MD,<sup>1</sup> Sara A. Quandt, PhD,<sup>2</sup> Julie Early, MS,<sup>2</sup> David S. Jackson, MD,<sup>1</sup> and Thomas A. Arcury, PhD<sup>1</sup>

**ABSTRACT:** *Context:* Pesticide exposure is an important environmental and occupational health risk for agricultural workers and their families, but health care providers receive little training in it. *Objective:* To evaluate the medical resources available to providers caring for patients, particularly farmworkers, exposed to pesticides and to recommend a selective bibliography for use in educating clinicians about pesticides and health care. These resources are divided into 3 domains: (1) the working knowledge, (2) the skill set, and (3) the references needed to care for these patients. *Methods:* We searched library databases dating back to 1995, as well as conference materials and Internet resources. We were included only if they were readily available, customary sources. Materials were randomly assigned to 2 groups. Two authors wrote detailed reviews of each group. The remaining authors read each document review, making changes that were agreed upon jointly. Review procedures were standardized to the contemporary relevance, quality, and overall and weaknesses of the material relative to goals developed for each domain. These guidelines were developed from the authors' experience, nation groups, and literature review. *Results:* While resources adequately address all needs, a main resource was identified addressing the category working knowledge, skill set, and reference material of providers treating farmworkers. Additional resources are needed.

Pesticide exposure is recognized as an important health risk in the United States as well as in other regions of the world. While virtually all persons can be exposed to pesticides through residential, garden, and food-borne pesticides, farmworkers are particularly at high risk because of the added occupational exposure. Pesticides include any substance or mixture of substances intended

preventing, destroying, repelling, or mitigating any pest. Pests can be insects, mice and other animals, unwanted plants (weeds), fungi, or microorganisms like bacteria and viruses.<sup>1</sup> Pesticides include insecticides, as well as herbicides, fungicides, rodenticides, nematocides, plant regulators, defoliants, desiccants, and disinfectants.

Health care providers receive little training in general environmental health issues, and they receive almost no training in the recognition and treatment of illness resulting from pesticide poisoning.<sup>1,2</sup> While concern about health effects resulting from pesticide exposure has increased, these resources found and

### IMPLEMENTATION PLAN National Strategies for Health Care Providers: Pesticides Initiative

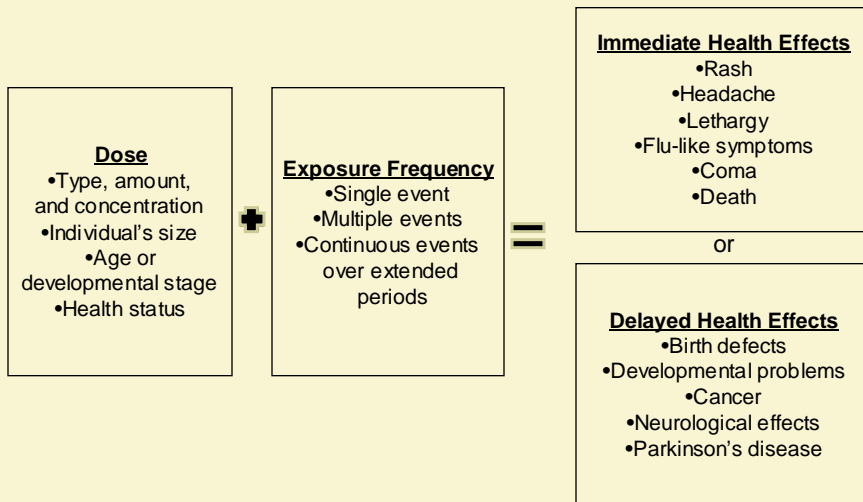
MARCH 2002



N-R-E-H-T-P UNDA EPA



## Relationship of Pesticide Dose and Exposure to Health Effects



Source: Hiott et al. (2006). Review of Pesticide Education Materials for Health Care Providers Providing Care to Agricultural Workers. *Journal of Rural Health*, 22, 17-25.



## Study Details

### Research Questions

- o How common are pesticide calls and secondary exposure?
- o What is their level of perceived preparedness for managing pesticide-contaminated patients (adults and children)?
- o What demographic and practice attributes are related to self-preparedness rating scores?

### Method

- Mailed survey to 1,639 EMS providers in Spring 2005; randomized selection process accounted for state quadrant, urban/rural location, and EMS certification.
- 427 surveys were returned (26% response rate)



## Study Setting: North Dakota

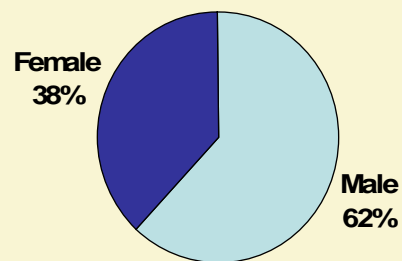


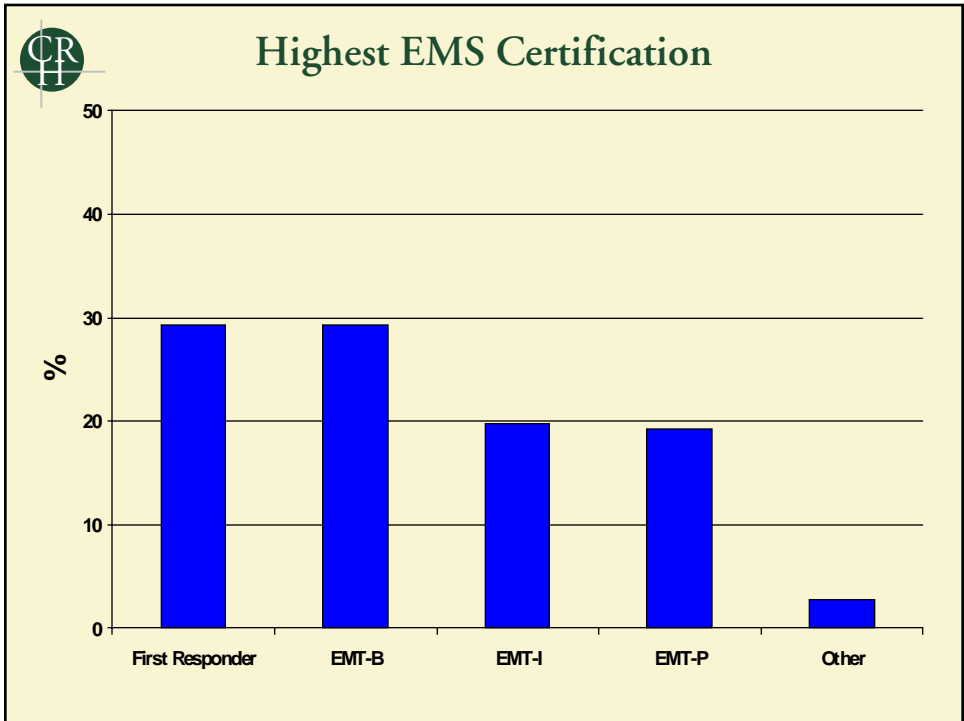
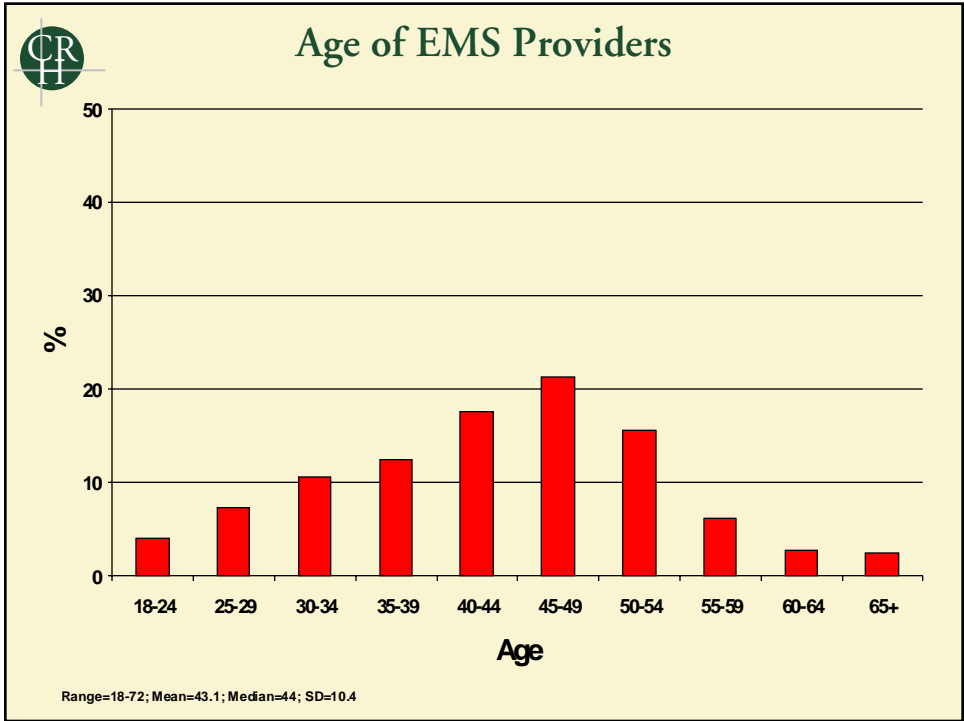


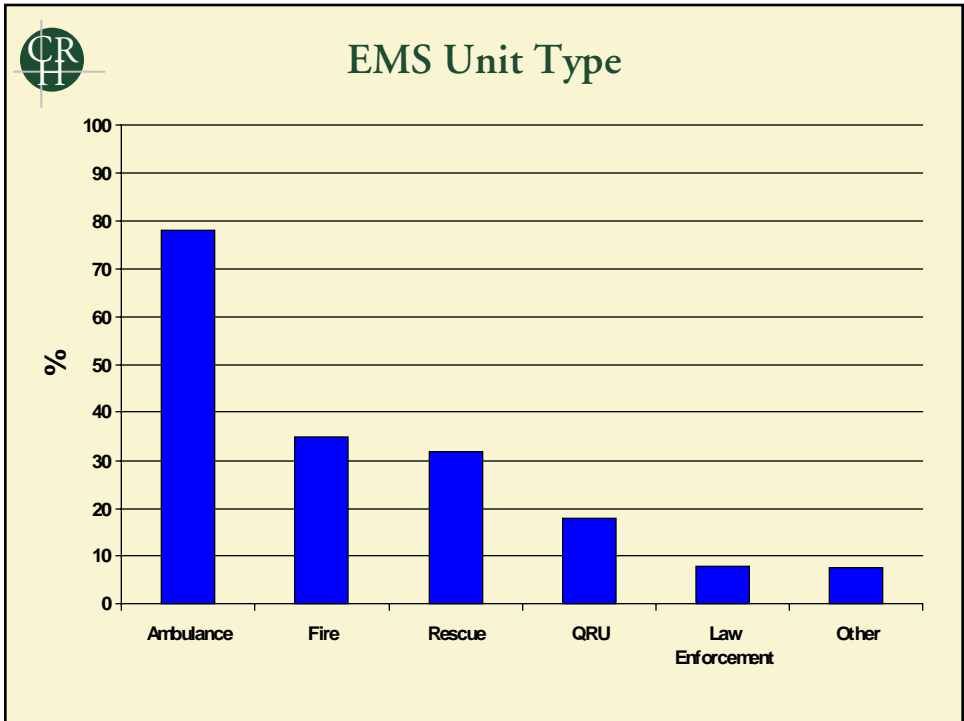
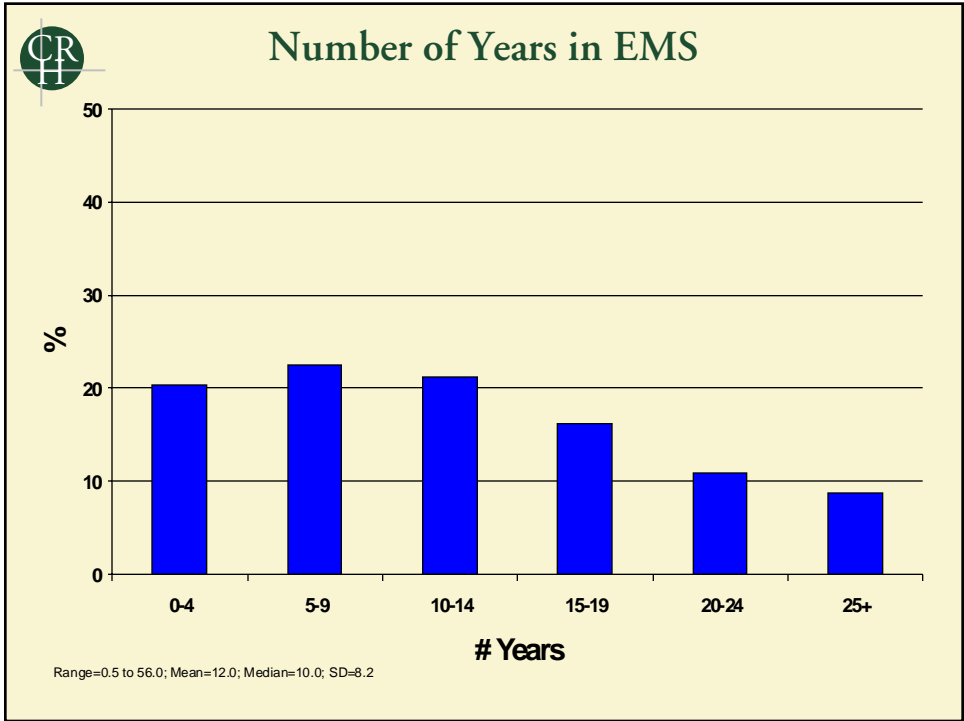
## Sample Demographics



## Gender of EMS Providers (N=415)





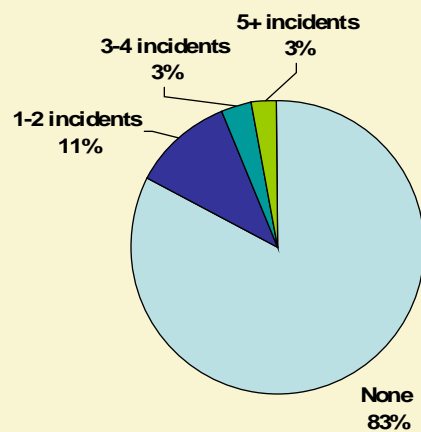




## Experience with Pesticide Exposure

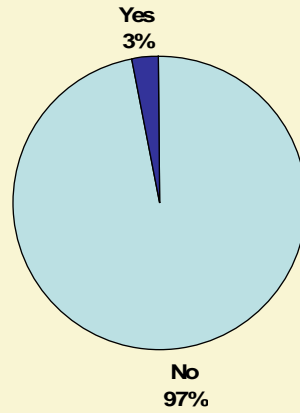


## Number of Pesticide Incidents in EMS Career

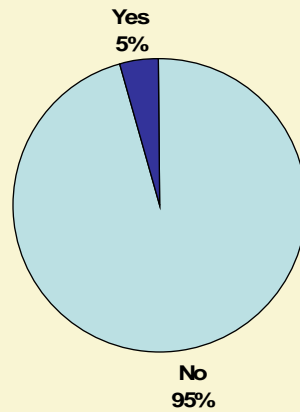




### Pesticide Incident in 2004?

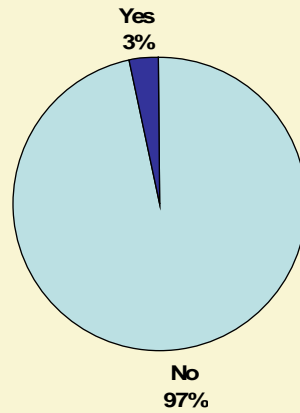


### Ever Responded to a Scene Involving Pesticide Exposure/Contamination of Multiple Persons?

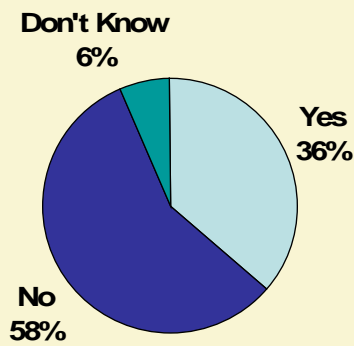




### Ever Been Contaminated While Providing EMS Care to a Pesticide-Contaminated Patient?

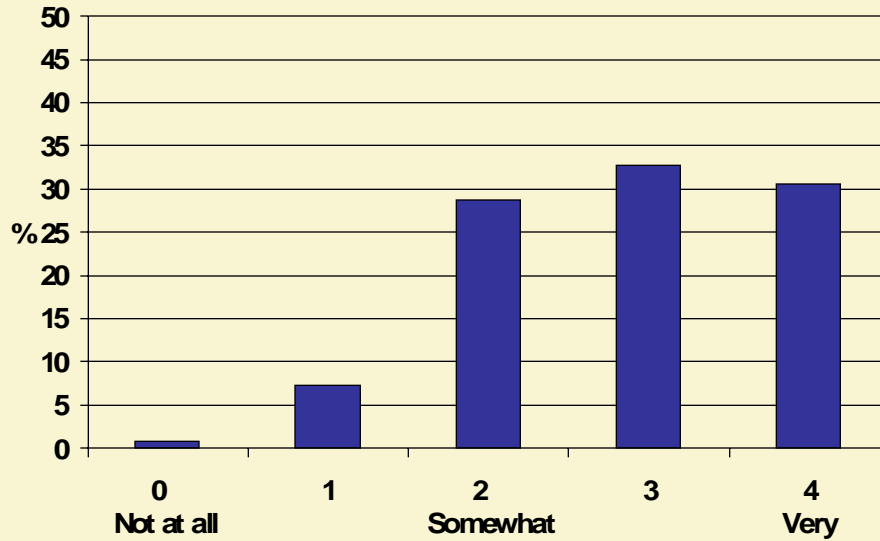


### Pesticide Treatment Protocols Readily Available at your Practice Location? (N=383)





## How important is pesticide-related knowledge and patient care skills to your EMS work?

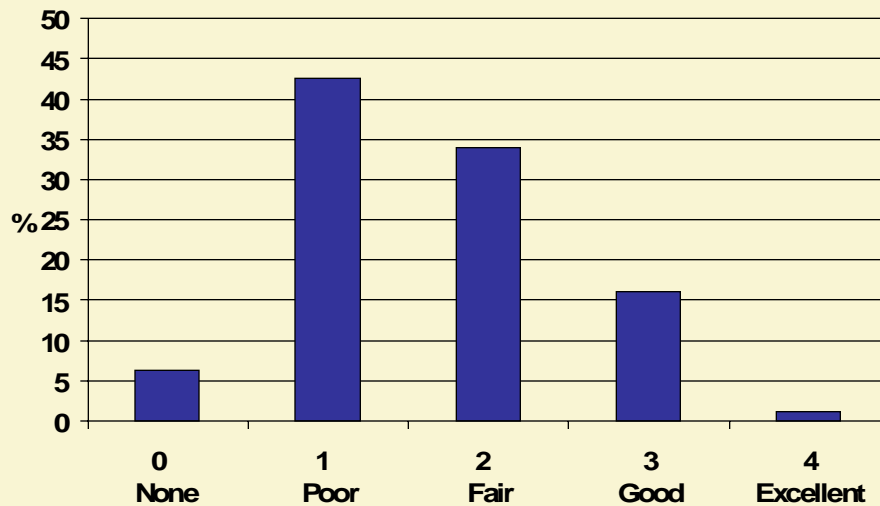


## EMS Provider Preparedness for Pesticide Incidents

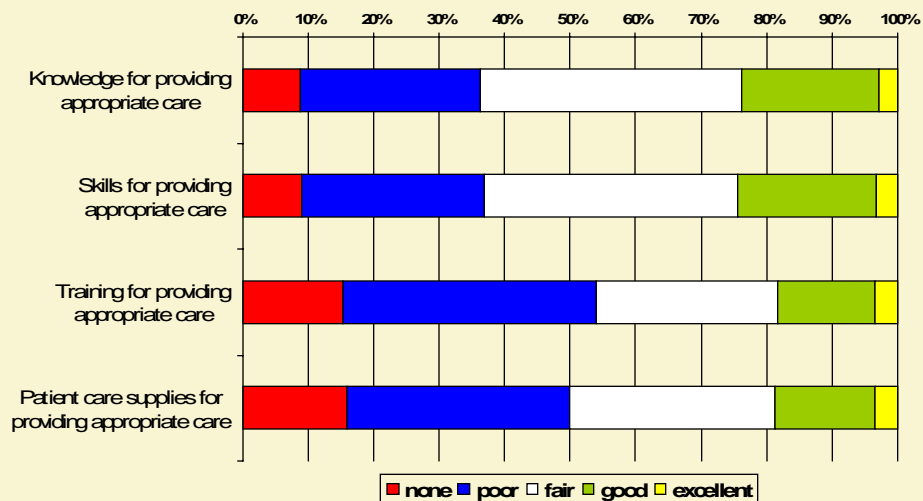




### My Level of Preparedness for Providing Appropriate Care to Patients Involved in My Most Recent Pesticide Incident (N=94)

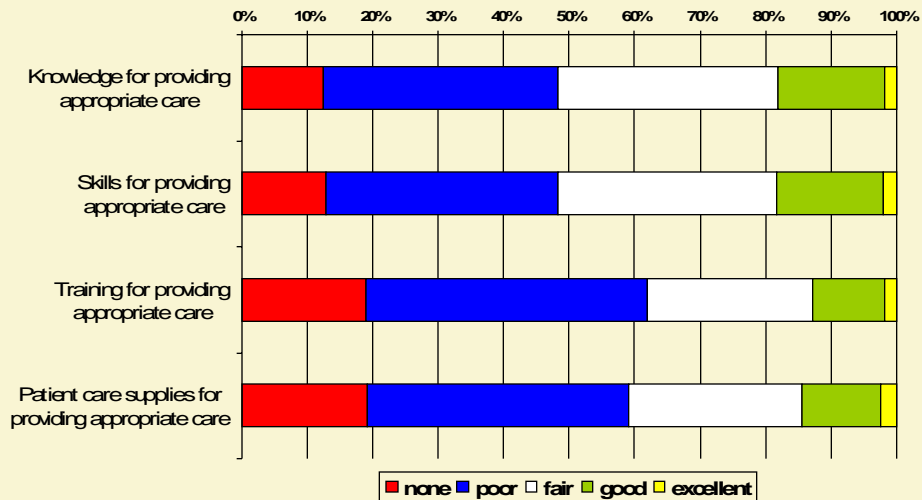


### EMS Providers' Self-Perceived Preparedness for Providing Appropriate Care to Pesticide-Contaminated *Adult* Patients

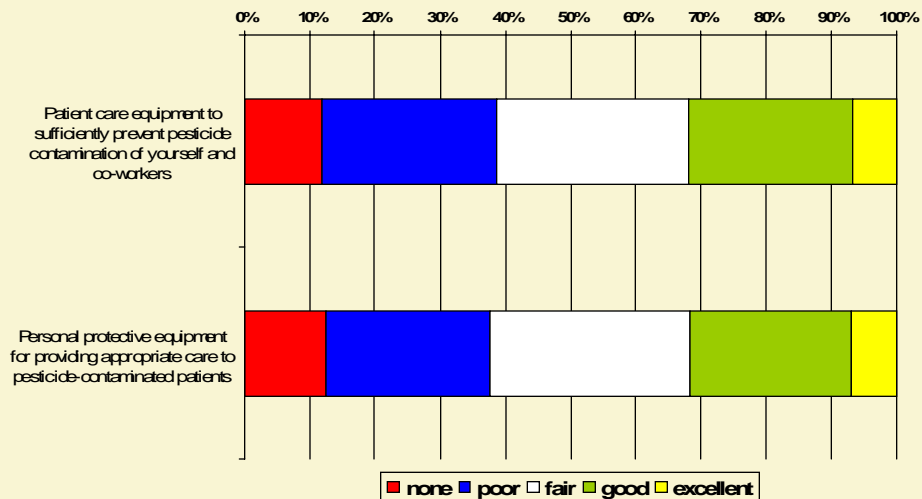




## EMS Providers' Self-Perceived Preparedness for Providing Appropriate Care to Pesticide-Contaminated *Pediatric* Patients



## EMS Providers' Self-Perceived Preparedness for Personal Protection in Treating Pesticide-Contaminated Patients





## Factors associated with *low* self-ratings of pesticide preparedness included:

- Being female
- Having been pesticide-contaminated on one or more occasions
- Not having readily accessible pesticide treatment protocols
- Membership in a fire or law enforcement unit
- No membership in a rescue unit

Note: Results from Least-Squares Linear Regression analyses  
No differences were noted by respondents' age, EMS certification level, and rurality.



## Conclusions

- Many North Dakota EMS providers feel they are ill-prepared to manage pesticide-related incidents and provide care to contaminated patients, especially children.
- State and local efforts should be directed to ensure these front-line health personnel are sufficiently educated about pesticide-related issues through increased education on environmental health and pesticides in coursework and clinical curricula.



## Suggested Education Components

**Table 1. Domains of Competence in Caring for Patients With Pesticide Exposure**

Domain	Definition	Examples
Working knowledge	Information providers need to immediately care for exposed patients	Acute toxicity, general effects/epidemiology Differential diagnosis Pesticide classes (symptoms and treatment) Growing evidence of chronic effects Special populations Prevention (practices/policies that alter risk)
Skill set	Skills needed to immediately care for exposed patients	How and when to obtain an occupational and environmental exposure history How to read a pesticide label How to handle a contaminated patient How to prevent others from contamination
Reference	Where information can be found while caring for exposed patients	EPA Manual manual "Recognition and Management of Pesticide Poisonings" EXTOXNET American Academy of Family Physicians' AG-MED www.neetf.org Cooperative Extension Service Textbooks

Source: Hiott et al. (2006). Review of Pesticide Education Materials for Health Care Providers Providing Care to Agricultural Workers. *Journal of Rural Health*, 22, 17-25.



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For more information contact:

Center for Rural Health  
University of North Dakota  
School of Medicine and Health Sciences  
Grand Forks, ND 58202-9037



Tel: (701) 777-3848

Fax: (701) 777-6779



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