

A Family Outbreak of Acute Organophosphate Poisoning: A Diagnostic Challenge

William M. Simpson, Jr., MD

ABSTRACT. Acute pesticide poisonings may present with vague symptoms and signs and may require a high index of suspicion for diagnosis. In some instances exposures may be unreported out of ignorance or fear of legal consequences by the patients. Pesticide label information and manufacturer's hotline support can be invaluable in providing optimal care for poisoned patients. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: <getinfo@haworthpressinc.com> Website: <http://www.HaworthPress.com>]*

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Organophosphates are the most commonly used insecticides in the world. They are also the most common cause of insecticide poisoning in the United States.¹ While only six deaths occur per 100,000 population for all kinds of poisoning and almost half of those deaths are intentional,² pesticide poisonings, especially in the under four-year-old age group, occur all too frequently (~550 cases/100,000 population).³

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Diagnostic Challenge

Most acute poisonings are produced by direct exposure (dermal and/or respiratory routes) or ingestion⁴ and are usually recognized by history alone. The challenge in these instances is proper management. In some cases, the diagnosis is not straightforward. Circumstances of exposure may be unrecognized or perhaps even denied out of ignorance or fear of legal consequences by the patients. Here the challenge is diagnosis.

The following case report illustrates several problems in the recognition of acute pesticide poisoning in primary care. In the discussion which follows, emphasis will be placed on recognition of poisoning and sources of assistance, rather than treatment of the particular pesticide involved.

The household consists of JT(30), his wife VT(29), VT's sister PC(23), and four children, FT(13), VT(12), TT(8) and LT(4).

At noon on the first day of recognized illness in early spring, four-year-old LT developed sleepiness and vomiting. After presentation to the emergency room of a local hospital, she became obtunded, required ventilatory support, had moderate salivation, muscle fasciculations, vomiting and pinpoint pupils. Meningitis was suspected and a lumbar puncture was performed. Following the spinal puncture, the father asked, "Could it be the chemical?" He stated that he had placed an insecticide in a cough-and-cold liquid bottle, planning to use it outside his home for cockroaches. Organophosphate poisoning was suspected and atropine was administered. On becoming more alert, LT admitted that she had "tasted something funny."

Later that evening, 12-year-old VT, presented to the emergency room with nausea and vomiting. Another physician saw VT, diagnosed gastroenteritis and treated him symptomatically. VT's relationship to LT was not elicited and the family did not volunteer this information.

On the following morning, eight-year-old TT was seen in her physician's office with fever and a virus-like syndrome. A temperature of >102 degrees F prompted an evaluation which included a chest x-ray and complete blood count, both of which were normal. TT was sent home with instructions to the parents to treat her fever and return if her condition worsened.

In mid-afternoon TT and VT were brought back to the physician's office and from there taken to a nearby hospital emergency room. TT was unconscious with pinpoint pupils and generalized muscle fasci-

culations. VT had continued progressive weakness. Organophosphate therapy was begun with atropine in the hospital's intensive care unit and the children were moved to the children's hospital.

Consulting Agromedicine reviewed the pesticide label itself could not be identified. The manufacturer's toxicology report indicated Bidrin®-dicrotophos, an organophosphate with excellent supportive care.

Because of the likelihood of exposure, the children were advised to vacate their home. The children were obtained from all family rooms and surfaces were disinfected on various surfaces.

Plasma cholinesterase was measured in the family and significant depression was noted on surfaces in the kitchen and living room. The adults complained of symptoms consistent with toxic sequelae. Their red blood cell counts were normal, consistent with acute poisoning.

Recommendations for decontamination were obtained from the pesticide manufacturer and the National Pesticide Program. In spite of this, the family was advised to move to a trailer several miles away.

DISCUSSION

The children in this far-flung case represent a large percentage of morbidity associated with the problem or less. The children who died resulted in mortality or permanent disability of the remainder of the family. Whether that patient, whether that patient,

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culations. VT had continued to have nausea, vomiting and developed progressive weakness. Organophosphate poisoning was suspected and therapy was begun with atropine. VT was admitted to the local hospital's intensive care unit and TT was transferred to the regional children's hospital.

Consulting Agromedicine Program physicians suggested that the pesticide label itself could provide valuable information and the manufacturer's toxicology hotline was utilized. The chemical was Bidrin[®]-dicrotophos, an organophosphate insecticide. The children, with excellent supportive care, recovered over the next several days.

Because of the likelihood of environmental exposure the family was advised to vacate their home. Blood levels for cholinesterase were obtained from all family members and pesticide residues were measured on various surfaces within and outside the home.

Plasma cholinesterase was markedly decreased in all members of the family and significant Bidrin[®] residues were found on all tested surfaces in the kitchen and bedroom prior to clean-up. None of the adults complained of symptoms nor were they recognized to have toxic sequelae. Their red cell cholinesterase activities were all within normal limits, consistent with acute exposure.

Recommendations for decontamination of the home were received from the pesticide manufacturer's toxicologist and the Agromedicine Program. In spite of this, the family chose to leave this home and move to a trailer several miles away.

DISCUSSION AND CONCLUSIONS

The children in this family represent the tip of the proverbial iceberg of morbidity associated with pesticides. Further delay in recognition of the problem or less optimal medical support might have resulted in mortality or permanent neurological damage. Recognition of the remainder of the iceberg is essential for optimal care of the "patient," whether that patient is an individual, a family or a community.

A high index of suspicion is needed in cases such as this in order to make the correct diagnosis. In this case, several aspects should bring poisoning to mind. This is a rural, farm family; it is spring (the usual period of highest pesticide use); the onset of illness is sudden and unexplained and several members of the same family are symptomatic

at one time (without the usual delay which occurs when a contagious illness is passed from one member of the family to another).

There is a need to be conscious of the possibility of hidden information. Early in this case the father admitted that he had obtained the agricultural chemical to use outside his house for control of roaches. The mother denied using the chemical inside the house. Based on plasma levels of cholinesterase and pesticide residues from surfaces in the home, the pesticide was widely and heavily applied. The parents were fearful of repercussions of the misuse and so denied it. The physician's index of suspicion of poisoning must be high enough to ignore the denial temporarily and proceed as if the exposure could have occurred.

The manufacturer's hotline can provide useful information for the physician in a timely fashion. Hence the importance of the pesticide label both as a source for acute toxicity management information and the toll-free number for background and further toxicologic information.

In a situation of an acute, unexplained illness consider these three questions:

1. Could this presentation be due to an exposure?
2. If it is a possible exposure to a chemical, where is the label?
3. If it is a possible exposure, who else might have been exposed?

If the caregiver considers only the identified patient, he or she risks missing a potentially large portion of those at risk and those for whom prevention may be applied.

REFERENCES

1. Carlton FB, Simpson WM, Haddad LM: The organophosphates and other insecticides. *Clinical Management of Poisoning and Drug Overdose*. Haddad LM, Shannon MW, Winchester JF(eds). Philadelphia, WB Saunders Co, 3rd Ed. 1998, 836-844.
2. Fingerhut LA, Cox CS, Warner M: International comparative analysis of injury mortality, findings from the ICE on injury statistics. *Advance Data* 1998; 303:1-3.
3. National Center for Health Statistics. *Healthy People 2000 Review 1994*. Hyattsville, Maryland: Public Health Service, 1995, 54.
4. Hayes WJ: Dosage and other factors influencing toxicity. *Handbook of Pesticide Toxicology. Volume 1 General Principles*. Hayes WJ, Laws ER(eds). San Diego, Academic Press, Inc. 1990, 74.

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