



January 07, 1994 / 42(51);993-995

Occupational Pesticide Poisoning in Apple Orchards -- Washington, 1993

During July-December 1993, the Washington Department of Health (WDOH) received and conducted follow-up investigations of 26 reports of occupational illness related to exposure to mevinphos (Phosdrin *), an organophosphate (OP) insecticide. The reports involved illnesses during June 13-August 18, 1993, in persons working in 19 different apple orchards; all involved use of mevinphos to control apple aphids. This report summarizes the results of these investigations by WDOH.

All the affected workers were men ranging in age from 19 to 72 years (median: 35 years). Eighteen (69%) were Hispanic; eight (31%) were non-Hispanic whites. Twenty-three (88%) of the workers were exposed during mixing/loading or application of mevinphos. The other three (12%) were exposed to mevinphos residues (two while working in close proximity to a recently treated orchard and one after reentering an orchard within 24 hours after it was sprayed).

Of the 23 workers exposed during mevinphos mixing/loading or application, 22 had worked on ground applications and used an airblast ** system; one worked on an aerial application. All 23 sought medical attention in emergency departments. Twenty-one workers had systemic manifestations characteristic of OP poisoning, including nausea (81%), vomiting (62%), dizziness (43%), visual disturbances (43%), muscle weakness (38%), abdominal pain (29%), headache (24%), sweating (24%), and excessive salivation (5%). Two persons had conjunctivitis only, which was attributed to direct ocular exposure to mevinphos.

Of the seven workers who were hospitalized, four required intensive care. Plasma and/or red blood cell cholinesterase activity was depressed to at least 25% below the lower limit of normal in 14 (88%) of the 16 workers tested; for one worker, the level of activity was depressed 97%, and for three, 75%-90%. Atropine was administered to all seven hospitalized workers and to four of the 14 workers with systemic illness who were treated in the emergency department and released. Eighteen (86%) of the 21 workers with systemic effects were exposed to mixtures of mevinphos and less toxic OP pesticides.

WDOH investigation of all the poisoning incidents determined that personal protective equipment had been available to all mixers/loaders and applicators,

but that in 78% of the incidents, U.S. Environmental Protection Agency (EPA) requirements regarding use of protective equipment *** had not been followed (e.g., respirators, gloves, or goggles had been removed during pesticide handling or leather {instead of rubber} footwear had been used).

On August 19, 1993, in response to these reports, the Washington State Department of Agriculture (WSDA) prohibited mixing/loading or application of mevinphos by unlicensed applicators. On August 30, use of mevinphos on apples and pears was temporarily suspended. WSDA will determine before the 1994 pesticide application season (i.e., late spring through late summer) whether this suspension will be permanent. Reported by: C Sagerser, V Skeers, MN, L Baum, MS, M Magana, MD, B Morrissey, MS, B Mason, Pesticide Section; JM Kobayashi, MD, State Epidemiologist, Washington Dept of Health. Surveillance Br, Div of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health, CDC.

Editorial Note

Editorial Note: Mevinphos is an acutely toxic (oral LD₅₀ 3.7-6.1 mg/kg, dermal LD₅₀ 4.2-4.7 mg/kg {rats}) broad-spectrum OP insecticide (1). EPA classifies mevinphos in its highest toxicity category (Class I), restricts its use to certified applicators or to persons directly supervised by certified applicators, and requires use of protective equipment and mandatory reentry intervals (i.e., time between mevinphos application and safe reentry onto treated fields without use of personal protective equipment). Toxicity of mevinphos is similar to that of ethyl parathion, an OP insecticide that in 1991 was removed from the market for most uses because of its high hazard potential. Like other OPs, mevinphos is readily absorbed through the lungs, gastrointestinal tract, and skin. Typical manifestations of poisoning include nausea, vomiting, miosis, dizziness, headache, muscle weakness and twitching, bradycardia, and generalized hypersecretion. Use of mevinphos is particularly hazardous for apple orchard workers because apples generally require ground (rather than aerial) application of pesticide, hand cultivation, and hand harvesting.

In May 1992, sale of phosphamidon, a less toxic OP insecticide used to control apple aphids, was discontinued by the manufacturer. When growers in Washington subsequently began to consider use of mevinphos for aphid control, the manufacturer of mevinphos recommended in early 1993 that WSDA institute additional restrictions on its use. WSDA issued emergency rules for the use of mevinphos on June 14, 1993, which included the requirements that an observer be present during all mixing/loading activities, the EPA-mandated reentry interval be extended from 48 to 96 hours, and warning signs be posted at all treated orchards. Despite these requirements, all but one of the poisonings described in this report occurred after these emergency rules were issued; 22% of the incidents apparently occurred despite reported adherence to all application requirements.

The detection of this outbreak and the resulting public health actions by WDOH and WSDA highlight the role of state-based surveillance systems in the recognition and prevention of occupational pesticide-related illness. The cases described in this report represent the first reported hospitalizations of workers in Washington associated with agricultural use of any OP insecticide since implementation of the WDOH pesticide surveillance system in 1990. Although mevinphos was mixed with other OP insecticides in most of the reported incidents, there were no reports to WDOH of severe occupational illness associated with individual use of other compounds. The magnitude of the risk for mevinphos poisoning among Washington agricultural workers cannot be estimated because the total number of workers who may be at risk for exposure to this pesticide is unknown.

Occupational poisonings with mevinphos (including fatalities) have been reported in California (2,3) and Florida (4). During 1982-1990, agricultural use of mevinphos in California was associated with 495 (43%) of 1154 reported cases of OP poisoning -- more than for any other OP pesticide (5) -- and during 1974-1982, mevinphos was among the six leading causes of hospitalization resulting from occupational pesticide poisoning nationally (6,7). As demonstrated by the Washington cases, even when use of mevinphos is strictly regulated and mandated precautions apparently are followed, poisonings occur.

Surveillance data have identified a high proportion of Hispanics among cases of agriculturally related pesticide poisoning. This most likely reflects Hispanic prevalence in the U.S. farmworker population (70% of U.S. farmworkers {8}), as well as previously documented risk factors for occupational disease and injury among migrant farmworkers (9), who are predominantly Hispanic (8).

In April 1993, EPA identified mevinphos as a pesticide warranting "immediate attention and the implementation of risk-reduction measures" and requested that manufacturers provide information to assist in characterizing the risks for U.S. agricultural workers (10). EPA will continue to assess the risks associated with exposure to mevinphos and the need for additional regulatory measures.

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 - Use of trade names is for identification only and does not imply endorsement by the Public Health Service or the U.S. Department of Health and Human Services. ** This application technique involves the use of a tractor-drawn sprayer with oscillating nozzles that are oriented in a flat plane and direct the spray mixture into the canopy of the trees for complete coverage. *** Protective suits, chemical-resistant gloves and shoes, goggles or face shields, and an approved respirator are required for ground application.

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