contact could not be directly assessed. Finally, because several fomites were cleaned before sampling and not all fomites were sampled, the extent of environmental contamination and the possible transmission role of fomites unrelated to computers could not be characterized.

Proper washing with soap and water can eliminate norovirus from hands (*4*); alcohol-based sanitizers also reduce feline calicivirus on hands (*8*). Potentially (but nonvisibly) soiled surfaces are best disinfected with a solution of 1:50 to 1:10 concentration of household bleach in water (1,000–5,000 ppm chlorine) by vigorous wiping for ≥10 seconds (*4,9*). However, because a 1:10 household bleach solution is caustic, only corrosion-resistant surfaces should be cleaned with this concentration. Laptop computer keyboards have been shown to withstand >300 disinfections with 80 ppm bleach solution without visible deterioration (*5*). When cleaning environmental surfaces that are visibly soiled with feces or vomitus, masks and gloves should be worn, a disposable towel soaked in dilute detergent should be used to wipe the surface for ≥10 seconds, and a 1:10 household bleach solution should then be applied for ≥1 minute (*4,9*). Disposable towels used to clean visibly soiled surfaces should be discarded appropriately after use because they can transfer norovirus to fingers and other surfaces (*4*). Although quaternary ammonium compound-based cleaners typically are not recommended for eliminating norovirus, certain newer formulations* are effective; alcohol-only cleaners are less effective (*10*).

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*A list of cleaning products effective against norovirus approved by the Environmental Protection Agency is available at http://www.epa.gov/oppad001/list_g_norovirus.pdf.

Acute Pesticide Poisoning Associated with Pyraclostrobin Fungicide — Iowa, 2007

Pyraclostrobin is an agricultural pesticide product used to kill fungi (e.g., blights, mildews, molds, and rusts). Hazards to humans from pyraclostrobin exposure include eye injury and skin irritation (*1*). In July 2007, the Iowa Department of Public Health (IDPH) received reports of five events involving pyraclostrobin that sickened 33 persons, including 27 migrant workers who were exposed in a single incident during aerial application (i.e., crop dusting). This report describes those five events and provides recommendations for preventing additional illnesses associated with exposure to pyraclostrobin.

Event A. On July 23, 2007, IDPH received media reports that migrant workers in a field had been inadvertently exposed to pyraclostrobin fungicide by a crop-duster plane on July 22. An IDPH investigation identified 27 cases of acute illness among the potentially exposed workers; all illnesses were associated with off-target drift of the pyraclostrobin to an adjacent field, owned by a different grower, where workers were detasseling field corn. IDPH learned that the pilot had seen the nearby workers yet proceeded to apply the fungicide. Some workers reported feeling wet droplets on their skin and seeing mist coming from the aircraft.

All 27 persons with acute illness were Hispanic and residents of Texas. Twenty were male, and seven were female; median age was 46 years (range: 15–74 years). All received skin decontamination on-site by a hazardous materials team before being transported to an emergency department for observation until their symptoms resolved. All cases were

categorized as being of low severity.* The most common symptom was upper respiratory tract pain or irritation (26 patients), followed by chest pain (20 patients). Three patients had nausea, and one patient each had pruritis, skin redness, eye pain, weakness, headache, dizziness, and chest pain.

The Iowa Department of Agriculture and Land Stewardship (IDALS) began an investigation on July 23 that included collection of soil and vegetation samples from the cornfield where the detasselers had been working and samples of worker safety glasses and hats. All samples tested positive for pyraclostrobin, even though the samples were collected the day after pyraclostrobin application and after substantial evening rainfall. Before this incident, the field had not been treated with pesticide (i.e., herbicides containing atrazine and topramezone) for 40 days. On August 1, IDALS suspended the commercial pesticide applicator license of the crop-dusting company that applied the fungicide; an administrative law judge later revoked the license.

Event B. On July 20, a crop-duster pilot aged 55 years visited an emergency department with first-degree chemical burns after skin and inhalational exposure to pyraclostrobin fungicide that occurred when his plane crashed during takeoff, spilling the liquid fungicide. Emergency department personnel consulted the Iowa Poison Center (IPC), and IDPH was notified of the case. The pilot was admitted to the hospital for observation for 2 days, and the case was categorized as being of moderate severity. Although inhalational exposure occurred, the pilot reported no respiratory symptoms.

Events C, D, and E. During July 2007, IPC notified IDPH of three additional events involving five cases of acute pesticide poisoning associated with pyraclostrobin exposure that resulted from off-target drift of pyraclostrobin from nearby aerial applications. All five illnesses were of low severity; all persons who were exposed consulted IPC but did not otherwise seek medical care. On July 5, a man aged 54 years experienced headache and eye pain after pyraclostrobin exposure while riding a motorcycle near a field. On July 12, a woman aged 40 years reported eye pain and headache, and a man aged 49 years reported eye pain, headache, and dizziness after pyraclostrobin drifted into the yard of their home. On July 14, a man and woman both aged 20 years reported eye pain and conjunctivitis after pyraclostrobin drifted into the yard of their home. In all five of these cases, symptoms subsided after the exposed persons moved indoors or away from the pyraclostrobin-treated fields.

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Editorial Note: The cases described in this report are the first published accounts of human illness caused by exposure to pyraclostrobin or any of the other strobilurin chemical compounds used as agricultural fungicides. Pyraclostrobin has a toxicity category of II†; the product label warns that pyraclostrobin exposure can cause substantial, although temporary, eye injury and skin irritation but can be fatal if swallowed (*1*). Contact with eyes, skin, or clothing should be avoided. After a cornfield has been treated with pyraclostrobin, workers should be prohibited from entering that field for 7 days to perform detasseling unless they are wearing appropriate personal protective equipment (i.e. coveralls and chemical-resistant gloves) (*1*). Although upper respiratory symptoms are not mentioned on the product label warnings, 26 of the 27 workers exposed in event A experienced these symptoms, perhaps as a result of irritation of the upper respiratory mucosa by a mechanism similar to that causing skin and eye irritation.

The strobilurin fungicides, including pyraclostrobin, are relatively new to the U.S. agricultural market. Pyraclostrobin was approved for sale in the United States in 2002 for use on a limited number of crops but was not approved for use on corn until December 2004. During 2007, the first year of widespread use on field corn, pyraclostrobin was applied to an estimated 1.5 million acres of corn in Iowa (C. Eckermann, IDALS, personal communication, 2007). Increased use of pyraclostrobin on corn likely is attributable to several factors, including increased planting of corn in the same field in successive seasons, which is associated with increased fungal disease risk to the corn plant; high demand for corn to produce corn-based ethanol; and aggressive fungicide marketing by agricultural-chemical dealers (*2,3*). In addition, strobilurin fungicides, especially

* Severity was categorized by using the standard index of the National Institute for Occupational Safety and Health (available at http://www.cdc.gov/niosh/topics/pesticides). Moderate-severity illness or injury consists of non–life-threatening health effects that generally are systemic and require medical treatment. No residual disability is detected, and time lost from work or normal activities usually does not exceed 5 days. Low-severity illness or injury includes illnesses manifested by skin, eye, or upper respiratory irritation. These illnesses might also include fever, headache, fatigue, or dizziness. Typically, the illness or injury resolves without treatment, and time lost from work or normal activities is <3 days.

† The Environmental Protection Agency classifies pesticides into one of four toxicity categories based on established criteria (40 CFR § 156.62). Pesticides with the greatest toxicity are in category I, and those with the least toxicity are in category IV. Additional information is available at http://a257.g.akamaitech.net/7/257/2422/08aug20031600/edocket.access.gpo.gov/cfr_2003/julqtr/pdf/40cfr156.60.pdf.

pyraclostrobin, might increase corn yield in the absence of disease by directly stimulating plant growth, although field trials to document this have produced inconsistent results (*4*). No cases of illness related to exposure to trifloxystrobin and azoxystrobin, the other two strobilurin fungicides licensed in Iowa, were reported to IDPH during 2006 or 2007.

The 27 workers sickened in event A were detasseling corn (i.e., removing tassels from corn plants to prevent autopollination and enable hybridization). Although the field where these workers were detasseling had been treated previously with atrazine and topramezone, both of which can produce mucosal irritation, 40 days had elapsed since that treatment. Workers may return to a field 12 hours after such treatments. Therefore, these herbicides were unlikely to be responsible for the illnesses reported July 22.

In the United States, cases of pesticide-related illness and injury are identified through state-based surveillance systems, several of which are supported by the National Institute for Occupational Safety and Health (NIOSH) through the Sentinel Event Notification System for Occupational Risk (SENSOR)-Pesticides program.[§] Data from SENSOR-Pesticides and the California Department of Pesticide Regulation were reviewed to identify cases associated with pyraclostrobin exposure through 2005. A total of 12 cases were identified; however, only one of these cases was associated with pyraclostrobin application to corn. The other cases were associated with applications to grapes (five cases), other fruits (four), almonds (one), and tomatoes (one). One case occurred in 2003 in Michigan, three cases occurred in 2004 in California, and eight cases occurred in 2005 in California (six cases), Florida (one), and Washington (one). All cases were work related; six occurred among pesticide handlers, five occurred during routine agricultural work (not involving pesticide application), and one occurred in a mosquito-control worker in a vineyard treated with pyraclostrobin. Patients reported combinations of skin, eye, respiratory, gastrointestinal, nervous system/sensory, and systemic symptoms. Two cases were of moderate severity, and 10 were of low severity. None of the patients were hospitalized.

The events described in this report reinforce the importance of compliance with existing pesticide regulations and pesticide label requirements. Pesticide applicators must avoid aerial applications of pesticides when workers are in nearby fields, application methods must minimize off-target drift of pesticides, and farmers should consider the potential adverse health effects on humans when weighing the risks and benefits of pesticide use. Greater use by crop-dusting pilots of educational programs offered by the National Agricultural Aviation Association (e.g., Professional Aerial Applicator Support System[¶]) also might help reduce the incidence of acute illnesses resulting from exposure to pesticide.

[§] Through SENSOR-Pesticides, NIOSH provides funding and technical support to state health departments to conduct surveillance of acute, occupational, pesticide-related illness and injury. Health departments in 10 states (Arizona, California, Florida, Louisiana, Michigan, New Mexico, New York, Oregon, Texas, and Washington) participated through 2005. Iowa joined the program in October 2006. Additional information is available at http://www.cdc.gov/niosh/topics/pesticides.

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[¶] Information available at http://www.agaviation.org/paass.htm.

Notice to Readers

Requirements for Use of a New International Certificate of Vaccination or Prophylaxis for Yellow Fever Vaccine

In response to the 2005 revision of the International Health Regulations (IHR 2005), as of December 15, 2007, a new International Certificate of Vaccination or Prophylaxis (ICVP) has replaced the old certificates (*1*). The new certificate provides space for potential certification of additional types of vaccination or prophylaxis to protect against newly emerging or reemerging diseases or other events of public health importance. However, the only vaccination currently required to be indicated on the ICVP is for yellow fever.

Yellow fever vaccine is required under IHR 2005 by certain countries for entry, and the new ICVP is required for any yellow fever vaccination administered beginning December 15, 2007. Persons vaccinated before that date may use the old certificate until it expires 10 years from the date of vaccination.

The new certificates are available to health-care providers through the U.S. Government Printing Office (GPO).