NCPH North Carolina Public Health

Epi notes

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North Carolina Department of Health and Human Services | Division of Public Health | **www.epi.state.nc.us/epi**

Acute Pesticide Illness and Injury Surveillance in North Carolina 2007 - 2009

Pesticides are used widely in agriculture and in many other settings like homes, businesses and schools. These chemicals are designed to be toxic to certain life forms but can adversely affect nontarget species. Exposure potential is high due to North Carolina's agricultural prominence and number of farm workers and their families present here. The Occupational and Environmental Epidemiology Branch (OEEB) initiated surveillance in 2007 to monitor health effects related to pesticide use. Th s report summarizes surveillance fi dings for 2007 - 2009.

The primary source for pesticide acute poisoning reports is Carolinas Poison Center, as supported by a mandatory reporting law. Upon receipt, cases are evaluated, classifi d, and a severity score assigned. Severity is based on signs and symptoms and whether medical care was sought, the affected individual was hospitalized, or lost time occurred from work or usual activities. North Carolina uses a standardized case defin tion, classifi ation scheme, and severity index developed by the U.S. Centers for Disease Control and Prevention.

Occupational exposure:

There were 122 confi med cases from occupational exposure and most were of low severity. Low severity indicates that symptoms were mild and typically resolved without treatment or lost time from work or normal activities. Confi med cases were mostly white. Twenty-two percent were Hispanic. Most cases were between 20-29 years of age. Workers in agriculture accounted for approximately one third of all cases, followed by workers employed in landscaping and pest control. Farm laborers were the most affected group within agriculture. Most occupational cases were exposed when applying pesticides on the skin. Insecticide products accounted for most of the exposures; the majority of these were pyrethroid insecticides. Most exposures occurred during the summer months.

Nonoccupational exposure:

There were 1002 confi med cases from nonoccupational exposure and most were of low severity. Race and ethnicity data were too limited to report. Most cases were in people between 40 – 49 years old. Almost one in five individuals were children age 9 and below. The two deaths for the report period resulted from nonoccupational exposure; one involved a suicide and the other an accidental ingestion by a 7 year old boy.

Most exposures occurred at a residence and resulted from application of pesticides. Individuals were usually treating interior building surfaces or the structure and the primary route of exposure was inhalation. Insecticide products accounted for most exposures; the majority of these were pyrethroid insecticides. Most exposures occurred during the summer months.

Surveillance fi dings for 2007 – 2009 indicate that most pesticide exposures were nonoccupational, occurred in a residence and also occurred during the summer. Occupational exposures were less common than anticipated and typically occurred during the agricultural growing season. Most exposures were not serious. Insecticides were responsible for most exposure in both groups. Case counts are likely minimum estimates due to under-reporting.

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N.C. trends are similar to national data. Data show agriculture has the largest proportion of work-related pesticide poisoning cases, and these occur mostly during the summer months. Severity is low and insecticides are responsible for most exposures. Typically, workers are doing routine work instead of applying (Calvert et al., 2003). The high number of home-exposures are consistent with what is reported by other state surveillance programs (MI, 2009 & OR, 2010) and published use and incident data. EPA reports three-fourths of American households use pesticides (U.S. EPA, 2011). Pesticides rank 10th among substance categories most frequently involved in human exposures (Bronstein et al, 2010). The predominant source of exposure for pesticide poisonings in the United States is insecticides (Blondell, 2007). Pyrethroids have replaced more toxic pesticides for outdoor and indoor pesticide use over time. Much of the country's population is experiencing exposure to these products (CDC, 2005).

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Multiple Units Within the State Public Health Lab Involved in Suspicious Substance Investigation

On Wednesday, June 8, 2011 at 3:20 p.m., the Bioterrorism and Emerging Pathogens (BTEP) Unit received a call from a federal law enforcement office regarding a suspicious substance confiscated through a search warrant. The officer pened the package to fi d a brown powdery substance. It was determined to be a credible threat, and Regional Response Team 5 responded at the scene and performed a fi ld test. Initial testing indicated the presence of dyes and high concentration of protein. Because it was deemed a credible threat, testing would be performed by the BTEP Unit for biothreat agents and for narcotics. The FBI Weapons of Mass Destruction Coordinator and Public Health Preparedness and Response (PHP&R) lead were notifi d of the situation by 3:45 p.m.

Using standard chain of custody procedures, the sample was accepted by the BTEP Unit and testing began at 8:30 p.m. BTEP staff embers worked until 2:35 a.m. to provide preliminary results to the lead law enforcement agent, PHP&R and the NCSLPH chain of command. Because the sample had no detectable biological agents present, the officer equested that additional chemical characterization be performed. Testing by the Chemical Terrorism Unit (CT) and the Environmental Sciences Unit (ESU) began on Friday, June 10, using a variety of methods and instrumentation.

The CT Unit prepared five separate extracts of the light tan powder. Methylene chloride, methanol, hexane and water were used to dilute the powder, followed by analysis on a gas chromatograph/mass spectrometer for volatile organic compounds (VOCs) and for unknown compounds. All signifi ant peaks were compared to a NIST library. While no suspicious VOCs were detected in the prepared extracts, spectra consistent with a banned compound were observed in all extracts. The compound could not be quantitated due to lack of standards. The agent was notifi d of these results by phone on Monday, June 13.

The Environmental Sciences Unit (ESU) analyzed the sample by polarized light microscopy at 100X magnifi ation and with a Fourier Transformed Infrared Analyzer (FT-IR). A portion of the sample was digested in concentrated nitric acid for metals analysis using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Microscopy indicated crystalline structures 7.5 to10 µM in diameter, while FT-IR indicated a mixed chemical sample with low probability matches to compounds in the instrument library. No standards were available to reach valid conclusions. Analysis by ICP-MS identifi d sodium, magnesium and iron as the primary metals in the sample. These properties were inconsistent with commonly used paint pigments. The fi al reports were faxed to the lead law enforcement agency on June 15-16. Based on the chemistry results from the CT and Environmental Sciences Units, the federal agent had critical information to take forward in the investigation. The information provided by NCSLPH will inform any future forensic analysis by providing preliminary information as to the nature of the compound. Th s serves as a great example of collaboration within the laboratory to assist key partners in preparedness efforts.

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