Hazardous Substances Emergency Events Surveillance (HSEES)-related injuries, fatalities, and evacuations in the State of Louisiana, 2002

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Louisiana ranks third in the United States for the production of natural gas, fourth in the production of crude oil[1], and second in the primary production of petrochemicals[2]. In the 2002 Toxics Release Inventory (TRI), there were 376 facilities in Louisiana reported in TRI data[3]. Nationally, Louisiana ranked 16th for total on- and off-site releases of chemicals and 11th for total on-site releases of chemicals[4]. In addition, the state ranked second in the nation for production-related waste managed[4]. Louisiana is a heavily industrialized state with many industries located in populated areas. Unplanned chemical releases can affect the health of a large number of people including industry workers, the general public, first responders, and health care providers. Data collected through surveillance can lead to the targeted development of prevention strategies to reduce the risk of a hazardous exposure as well as assist facilities to better prepare for releases of hazardous substances in the future.

Since 1990, the Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Department of Health and Human Services has maintained an active, state-based Hazardous Substances Emergency Events Surveillance (HSEES) system to describe the public health consequences associated with the acute release of hazardous substances in select U.S. states. The Louisiana Department of Health and Hospitals (LDHH) has participated in this surveillance system since January of 2001. In 2002, there were 15 participating states. This report summarizes the characteristics of events occurring in Louisiana with an emphasis on events with injuries, fatalities, and/or evacuations reported to the surveillance system by the LDHH during January 1, 2002 through December 31, 2002.

Methods

A hazardous substance release qualifies as a HSEES "event" if it is an uncontrolled or illegal release which requires removal, cleanup, or neutralization according to federal, state, or local law. A substance which can be reasonably expected to cause injury or death to an exposed person is considered to be hazardous. Threatened releases are also included if the event meets two criteria: 1) an action such as sheltering in place or

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[1] Louisiana Mid-Continental Oil and Gas Association (LMCOGA), 2004. "LA Oil & Gas Industry Overview." Available: http://www.lmoga.com/industryoverview.html.

[2] INFOLouisiana, 2004. Available: http://www.state.la.us/about_economy.htm.

[3] Louisiana Department of Environmental Quality (LDEQ), 2004. "2002 Louisiana Environmental Inventory Report, A compilation of data from: Toxics Release Inventory Toxic Emissions Data Inventory Emissions Inventory." 2nd Annual Edition. Baton Rouge, LA: Louisiana Department of Environmental Quality.

[4] U.S. Environmental Protection Agency (EPA), 2003. "2001 Toxics Release Inventory Public Data Release State Fact Sheets." EPA 260-F-03-002. Washington, D.C.: U.S. Environmental Protection Agency, Office of Environmental Information.

evacuation is taken to protect public health and 2) the amount threatened to be released would have required removal, cleanup, or neutralization. Events where a hazardous substance is threatened to be released to air or water and would have required removal, clean up, or neutralization if it had been released on land are eligible for inclusion if the other criteria are also met. In accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) petroleum exclusion clause, petroleum which has not been refined to a single hazardous chemical is not eligible for inclusion, i.e. releases of petroleum only are excluded.

Multiple sources of data are utilized to investigate these events and collect data. Principal sources of data are the Louisiana State Police, the National Response Center, and the Louisiana Department of Environmental Quality. Environmental data is collected along with public health data to provide a context for the public health data. The type of data collected includes event location and geographical characteristics of the surrounding area; time and date of occurrence; type of industry; factors contributing to the release; the substance released including quantity and release medium; victims including demographics, severity, adverse health effects, decontamination, and if personal protective equipment (PPE) was worn; public health actions resulting from an event such as sheltering in place or evacuations; and follow-up activities such as environmental sampling.

Acute events captured by HSEES are classified according to whether they occur at fixed facilities or during transportation. Fixed-facility events involve hazardous substances released at industrial sites, schools, farms, or other permanent facilities; transportation events involve hazardous materials released during transport by surface, air, or water. Victims are defined as individuals with symptoms (including psychological stress) or injuries (including death) that result from the event. Victims who receive more than one type of injury are counted once in each applicable type of injury.

Results

In 2002, 752 events qualified for the surveillance system in Louisiana. Six-hundred thirty events (83.8%) occurred in fixed facilities, and 122 (16.2 %) were transportation-related. There were a total of 30 victims in 20 events (2.7% of all events). Of the twenty events with victims, 65.0% involved only one victim, and 95.0% involved either one or two victims. Of the transportation events, 8.2% (10 of 122 events) involved victims while only 1.6% (10 of 630 events) of the fixed-facility events involved victims. Forty percent of the victims were injured in transportation events, and 60% were injured in fixed-facility events.

The types of adverse health effects sustained by victims are shown in Figure 1. The most commonly reported adverse health effects in fixed-facility events were burns (38.9%), all of which were chemical-related. Trauma (33.3%) was reported as the most common adverse health effect in transportation events. In some instances trauma may have been caused by the sequence of events (for example, a motor vehicle accident) leading to the release of a hazardous substance and not by exposure to the hazardous substance itself.

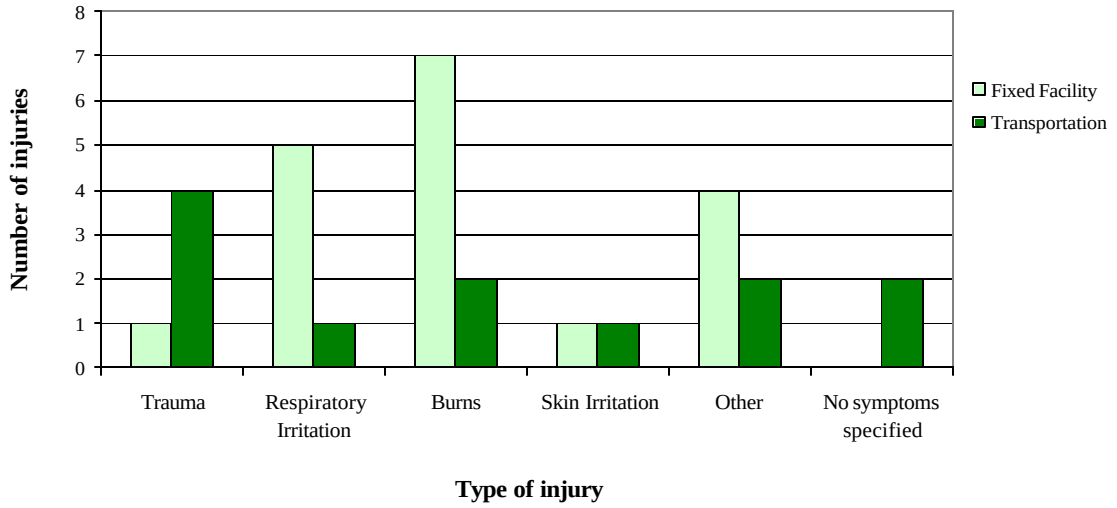

Figure 1. — Distribution of injury types, by type of event, Hazardous Substances Emergency Events Surveillance, Louisiana, 2002.

Out of 30 victims, 16 (53.3%) were male, one (3.3%) was female, and the sex of the other 13 (43.3%) were unknown. Age was unknown for all but 2 victims; however, all but 4 victims can be presumed to be adults given their victim category. The medical outcomes of the 30 victims are shown in Figure 2. Most victims for which severity was known were treated at a hospital and either admitted (43.3%) or treated and released (16.7%).

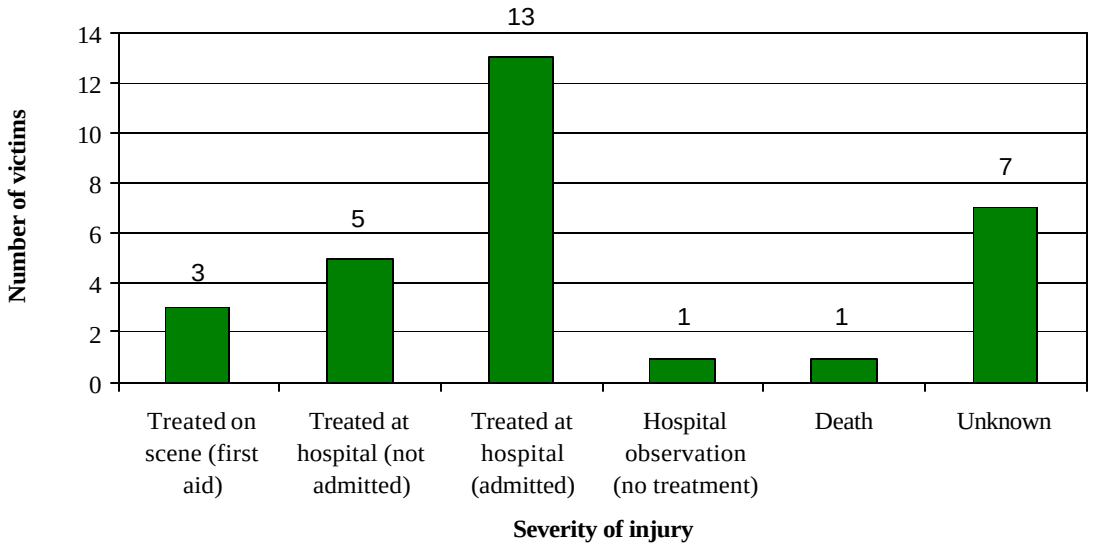

Figure 2 — Medical outcomes, Hazardous Substances Emergency Events Surveillance, Louisiana, 2002.

Among the 30 victims, 24 (80.0%) were employees, 2 (6.7%) were career firefighters, one (3.3%) was a member of the general public, and the category of 3 (10.0%) victims was unknown. Of the 24 employees, 16 (66.7%) were reported as not wearing any personal protective equipment (PPE), 5 (20.8%) were only wearing hard hats, and the type of PPE worn was unknown for 3 (12.5%) employees. Chemical-related burns were

reported as an adverse health effect for 4 (25.0%) of the employees not wearing any PPE and all 5 (100.0%) employees wearing hard hats. One career firefighter experienced trauma which was not chemical-related during a fixed-facility event and was wearing firefighter turn-out gear with respiratory protection. The second career firefighter experienced respiratory symptoms resulting from a fixed-facility event during which ammonia was released and he was wearing firefighter turn-out gear without respiratory protection.

The one fatality involved an accident between a car and an insecticide truck. The truck overturned into a ditch, spilling its contents, and fatally injuring the driver. The fatality resulted from the accident, not the insecticide.

The number of total releases compared with releases resulting in victims by substance category is presented in Table 1. The most frequently released substances were not necessarily the most likely to result in injury. Though the substance categories for "chlorine" and "acids" have the same number of releases resulting in victims, there are less chlorine releases in total than acid releases for the entire year. Acids were released 47 times with 4 (8.5%) of those releases resulting in injury. Conversely, chlorine was released in only 30 events, 4 (13.3%) of which resulted in injury, the highest percentage of injuries from a substance category.

Table 1 – Number of hazardous substances released in all events and releases with victims by substance category, Hazardous Substances Emergency Events Surveillance, Louisiana, 2002.

	Total Releases		Releases with Victims		
Substance Category	**Number**	**Percentage**	**Number**	**Percentage**	**Percentage by substance category**
Acids	47	3.9	4	20.0	8.5
Ammonia	33	2.7	2	10.0	6.1
Bases	22	1.8	2	10.0	9.1
Chlorine	30	2.5	4	20.0	13.3
Other Inorganics	508	42.2	3	15.0	0.6
Paints & Dyes	19	1.6	0	0.0	0.0
Pesticides	36	3.0	2	10.0	5.6
Volatile organic compounds	336	27.9	1	5.0	0.3
Other	24	2.0	1	5.0	4.2
Mixture (across categories)	9	0.7	0	0.0	0.0
Hetero-Organics	11	0.9	0	0.0	0.0
Hydrocarbons	25	2.1	0	0.0	0.0
Oxy-Organics	55	4.6	1	5.0	1.8
Polymers	48	4.0	0	0.0	0.0
Indeterminate	2	0.2	0	0.0	0.0
Total*	**1205****	**100.1**	**20**	**100.0**	

* Total may be greater than 100% due to rounding.
** Total of 1205 releases exceeds the total number of 752 events because more than one substance could be released per event.

Evacuations were ordered in 9 (1.2%) events. Among the 9 evacuations, 5 (55.6%) were of a building or the affected part of a building, 2 (22.2%) were reported as having no criteria, one (11.1%) was of an affected circle or radius, and one (11.1%) was a circle radius and downwind/downstream. An official ordered in-place sheltering in an additional 8 events. During an order to "shelter-in-place," officials request people within a specific distance of an event to remain indoors and discontinue air intake through mechanisms such as air conditioning to prevent exposure to harmful levels of hazardous substances.

Conclusions

The data collected through the Louisiana HSEES Program are used to develop strategies and prevention activities to decrease the injuries and fatalities resulting from these events by employees, first responders, and the general public. Providing educational materials such as chemical fact sheets and materials safety data sheets (MSDS) will assist in reducing the number of events which occur. However, these materials lack the specificity of the Louisiana HSEES data and often do not provide enough information about risk factors to decrease the associated adverse effects. Data collected and materials developed through the Louisiana HSEES Program are especially important to the state. Louisiana HSEES data provide valuable, state-specific information about hazardous substances emergency events and the contributing factors of these events to residents of Louisiana.

When hazardous substances are released, there may be a potential for negative public health impact such as victims or evacuations. Analysis of 2002 HSEES data highlighted that even though more people were injured in fixed-facility events, injuries were more likely to result from transportation events. Trauma was the most frequent adverse health effect in transportation events. However, the trauma may have been caused by the sequence of events (for example, a motor vehicle accident) leading to the release of a hazardous substance and not by exposure to the hazardous substance itself. The one fatality in a hazardous substance emergency event involved trauma and was not chemical-related. The most frequent adverse health effects in fixed-facility events were chemical-related burns.

Approximately 87.5% of the employee victims were not wearing any PPE or were only wearing a hard hat. Of the employee victims either not wearing PPE or only wearing a hard hat, 9 (42.9%) experienced chemical-related burns. This illustrates that PPE should be worn to prevent injuries. It is recommended that safety managers use Louisiana HSEES data during employee training to illustrate the importance of wearing PPE, when appropriate, and to raise the awareness of employees about hazardous substance events that frequently result in victims. Further research should be performed to determine what factors lead employees not to utilize PPE.

While acid events were more frequent than chlorine events, both types of events had the same number of victims. This indicates that chlorine events resulted in the highest percentage of victims in 2002. It is recommended that safety managers make the maintenance of processes involving chlorine a priority and thoroughly train employees on

procedures to undertake when a chlorine event occurs. This recommendation may reduce the likelihood of future injuries or evacuations associated with chlorine releases.

There is a need for increased awareness of hazardous substance emergency events in Louisiana in order to reduce the occurrence of acute releases of hazardous substances and prevent injury and illness related to these events. The Louisiana HSEES Program's ultimate goal is to prevent injuries and fatalities that result from exposure to hazardous substances. In collecting, analyzing and disseminating health specific data, Louisiana HSEES strives to improve chemical safety and reduce or minimize public health consequences from releases of hazardous substances.