Pesticide Illness and Injury Surveillance in Michigan 2015–16

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Division of Environmental Health
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Pesticide Illness and Injury Surveillance in Michigan: 2015–16

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Contents

Summary

The Michigan Department of Health and Human Services (MDHHS)[1] has been conducting surveillance for acute work-related pesticide illnesses and injuries since 2001. MDHHS began collecting data on non-occupational cases in 2006. The Public Health Code grants Michigan the authority to do public health surveillance for work-related conditions (PA 368 of 1978, Part 56, as amended) and chemical poisoning (R325.71-R325.75). This is the thirteenth report on pesticide-related illnesses and injuries in Michigan (MDHHS, 2001–03, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015–16) including 16 years of data.

From 2001 through 2016, there were 1,181 confirmed cases of occupational pesticide-related illnesses or injuries. Sixty-nine of those confirmed cases were reported in 2015, and 47 were reported in 2016. There has been a downward trend in the number of cases since 2008. Disinfectants continued to be the cause of almost half of all the confirmed occupational cases (48 percent from 2001–2016), and were the cause of 55 percent of confirmed occupational cases in 2015–16. A number of these cases would not have occurred if disinfectants were used only in situations where their use was recommended.

Where activity of the exposed person was known, 36 percent of confirmed occupational cases were exposed to pesticides inadvertently while doing their regular work that did not involve applying pesticides. The most common contributing factor for confirmed occupational cases was a spill or splash of liquid or dust. The most common occupation was 'Building and Grounds Cleaning and Maintenance', comprising 25 percent of the confirmed cases in 2015–16. Of those, 59 percent were cleaners, housekeepers or maintenance workers and 41 percent were pest control operators.

From 2006 through 2016, there were 2,330 confirmed cases of non-occupational pesticide-related illnesses or injuries. One hundred seventy-six of those confirmed cases were reported in 2015 and 146 were reported in 2016.

In 2015–16, disinfectants accounted for 33 percent of confirmed non-occupational cases. Again, many of these cases would not have occurred if disinfectants were only used in situations where their use was recommended.

Where activity of the exposed person was known, 69 percent of confirmed non-occupational cases were involved in applying the pesticide themselves. 'Bystander' exposure was also important, with 31 percent exposed inadvertently while doing normal activities, not involved in the application of pesticides.

Three events were reported to the National Institute of Occupational Safety and Health (NIOSH) and forwarded to the Environmental Protection Agency (EPA). One event was referred to the Michigan Department of Agriculture and Rural Development (MDARD) and two to the Michigan Occupational Safety and Health Administration (MIOSHA). These events are described on page 17.

[1] In 2015 the Michigan Department of Community Health merged with the Michigan Department of Human Services and was named the Michigan Department of Health and Human Services.

Background

Pesticide poisoning is a potential public health threat due to widespread pesticide use. According to the U.S. Environmental Protection Agency (EPA), more than 1.1 billion pounds of conventional (not disinfectant) pesticides were used in the United States in 2012, the last year of published data.[2]

The term pesticide includes insecticides, herbicides, fungicides, rodenticides, disinfectants, and various other substances used to control pests.

Pesticides are a category of chemicals that are used to kill or control insects, weeds, fungi, rodents, and microbes. There are over 16,000 different pesticides registered for sale in Michigan, containing over 600 different active ingredients.

Evidence has linked pesticides with a variety of acute health effects such as conjunctivitis, dyspnea, headache, nausea, seizures, skin irritation, and upper respiratory tract irritation (Roberts and Reigart, 2013). The effects of chronic or long-term exposures include cancers, immune function impairments, neurological disorders, reproductive disorders, respiratory disorders, and skin disorders. (Schenker et al, 2007).

Acting on concerns about acute occupational pesticide-related illness, NIOSH began collecting standardized information about acute occupational pesticide exposure from selected states in 1998[3] under the Sentinel Event Notification System for Occupational Risk (SENSOR) program. An analysis of 1998-99 data provided by the SENSOR states demonstrated that the surveillance system was a useful tool to assess acute pesticide-related illness and to identify associated risk factors (Calvert, et al 2004).

Agriculture is the second largest income producing industry in Michigan and pesticide use is widespread in this industry. Currently there are more than 16,000 different pesticides registered for sale and use in Michigan. There are more than 2,000 businesses licensed to apply pesticides and approximately 22,000 certified applicators in Michigan.

Recognizing the extent of pesticide use in Michigan, in 2001 MDHHS joined other NIOSH-funded states to institute an occupational pesticide illness and injury surveillance program. In 2006, MDHHS added surveillance of non-occupational pesticide exposures. The intent of this surveillance is to identify the occurrence of adverse health effects and then intervene to prevent similar events from occurring in the future. MDHHS recognizes the need for data on pesticide exposures and adverse health effects in Michigan. The surveillance data are used to:

- Identify groups at risk for pesticide-related illnesses;
- Identify clusters/outbreaks of pesticide-related illnesses;
- Detect trends;
- Identify high-risk active ingredients;
- Identify illnesses that occur even when the pesticide is used correctly;
- Identify and refer cases to regulatory agencies for interventions; and
- Provide information for planning and evaluating intervention programs.

[2] https://www.epa.gov/sites/production/files/2017-01/documents/pesticides-industry-sales-usage-2016_0.pdf
[3] http://www.cdc.gov/niosh/topics/pesticides/

Methods

Pesticide poisoning is reportable under the Public Health Code (Part 56 of Act 368 of 1978 as amended and R 325.71-5). These two parts of the public health code require health care providers (including Michigan's Poison Control Center), health care facilities, and employers to report to the state information about individuals (including names) with known or suspected pesticide poisoning. From 2001-2006 MDHHS only conducted occupational pesticide illness and injury surveillance. Beginning in 2006, non-occupational cases were included in the surveillance system. At that time, poison control began reporting cases in which the reason for exposure was coded "Unintentional – Environmental." To fully capture all environmental exposures, beginning in 2012 reporting included the exposure reasons of "Unintentional – General", "Unintentional – Misuse" and "Unintentional – Unknown".

In addition to information from reports submitted under the Public Health Code, the surveillance system collects information on individuals with pesticide exposures who have been reported to the Pesticide and Plant Pest Management Division of the Michigan Department of Agriculture and Rural Development (MDARD). MDARD receives complaints about pesticide misuse and health effects and is mandated to conduct investigations to address potential violations of pesticide laws. Other data sources include coworkers and worker advocates.

The MDHHS pesticide poisoning surveillance system is a case-based system. A person who has been exposed to a known pesticide and develops two or more signs or symptoms after that exposures that could be related to the exposure based on known toxicology is considered a confirmed case. See Appendix I for more details of the case definition. An event is the incident where the case was exposed. More than one person may be exposed at an event. Data are collected according to standardized variable definitions in a database developed for states that are conducting pesticide surveillance and reporting them to NIOSH.

Reported occupational cases are interviewed to determine the circumstances of the reported pesticide exposure, the symptoms they experienced, the name of the pesticide, the name of the workplace where the exposure occurred, and other details about the incident. When possible, medical records are obtained to confirm and clarify the conditions reported. Non-occupational reports are not followed up on, due to resource constraints.

Reported cases are then classified based on criteria related to (1) documentation of exposure, (2) documentation of adverse health effects, and (3) evidence supporting a causal relationship between pesticide exposure and health effects. The possible classifications are: definite, probable, possible, suspicious, unlikely, insufficient information, exposed but asymptomatic, or unrelated.[4] Cases classified as definite, probable, possible, or suspicious (DPPS) are included in all data analyses. For simplicity, we refer to them as confirmed cases.

Confirmed cases are evaluated regarding the severity of the health effect: low, moderate, high and death. The severity index is based on the signs and symptoms experienced, whether medical care was sought, if a hospital stay was involved, and whether time was lost from work or daily activities.[5]

[4] ibid, pages 2-3
[5] http://www.cdc.gov/niosh/topics/pesticides/pdfs/pest-sevindexv6.pdf

Practices where workers or the general public may be at risk are identified. When appropriate, referrals are made to two other state agencies with regulatory responsibility for worker health and/or pesticide use: the Michigan Occupational Safety and Health Administration (MIOSHA) in the Michigan Department of Licensing and Regulatory Affairs (LARA) and MDARD.

MIOSHA enforces state and federal workplace standards on exposure limits, education, and personal protective equipment (PPE) and performs training in safety and health.

MDARD enforces state and federal legal requirements for the sale and use of pesticides, including label violations and instances of human exposure. MDARD also enforces the federal EPA's Worker Protection Standard, which includes requirements to protect agricultural workers from adverse health effects of pesticides.

In addition, NIOSH is provided information about high priority events, both occupational and non-occupational. The criteria for defining high priority events are:

a. events that result in a hospitalization or death;
b. events that involve four or more ill individuals;
c. events that occur despite use according to the pesticide label; or
d. events that indicate the presence of a recurrent problem at a particular workplace or employer.

With prompt reporting of these events by states involved in pesticide illness and injury surveillance, NIOSH can refer cases to the EPA as needed, identify clusters across states, and identify the need for national level interventions.

Finally, if appropriate, MDHHS surveillance staff provide educational consultations to reported individuals and/or their employers about reducing hazards related to pesticide exposures.

An office manager for a soup kitchen in her 30s accepted a donation of a mattress which she thought had bed bugs. Her boss gave her an insecticide to use, but the sprayer didn't work so they put it in another sprayer that created a fine mist instead of droplets and she inhaled the mist. She developed a sore, swollen throat, nasal burning, difficulty breathing, a cough and laryngitis. She went to an emergency department. She later developed sinusitis and bronchitis and lost five days of work. MDHHS staff sent her a copy of our "Bed Bugs & Mattresses" fact sheet and a link to the department's bed bug website.

Results

Section I. All Reports

From 2001 through 2016, 3,511 individuals with reported pesticide exposure and related illnesses and/or injuries met the criteria for confirmed cases. See Table 1.

Table 1: Case Confirmation by Work-Relatedness, 2001–16

Status	Occupational	Non-Occupational	Total
Definite Case	117	43	160
Probable Case	277	469	746
Possible Case	770	1,753	2,523
Suspicious Case	17	65	82
Total	**1,181**	**2,330**	**3,511**

As shown in Table 2, persons of all ages are exposed to pesticides.

Table 2: Confirmed Cases by Age Group and Gender

	Cumulative 2001-–16			2015–16		
Age Groups	**Female**	**Male**	**Unknown**	**Female**	**Male**	**Unknown**
00-<1 (Infants)	6	12	1	2	1	0
01-02 (Toddlers)	33	49	0	8	6	0
03-05 (Preschool)	32	47	0	4	7	0
06-11 (Child)	77	61	0	7	4	0
12-17 (Youth)	72	79	1	8	9	0
18-64 (Adult)	1,341	1,239	0	156	168	0
65+ (Senior)	130	113	0	16	16	0
Unknown age	103	73	37	9	5	2
Total	**1,794**	**1,673**	**39**	**210**	**216**	**2**

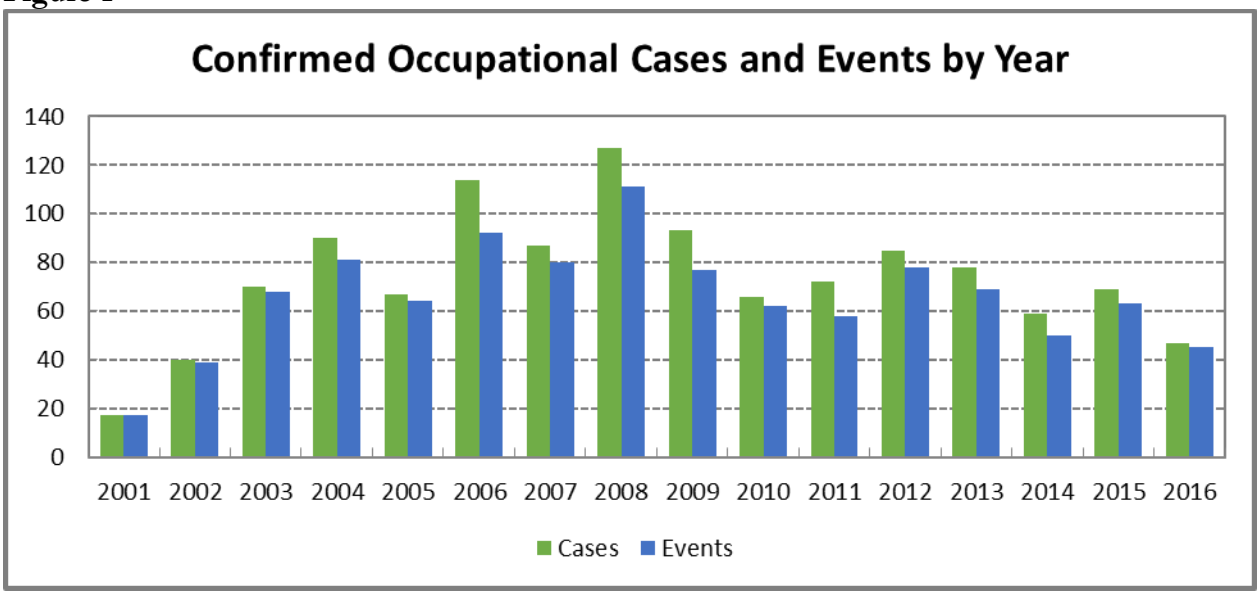
A supervisor of a donut shop in her teens dropped a bottle of sanitizer causing the cap to break. Sanitizer splashed in her face. She had second degree burns on her face and it was red, painful and itchy. She went to an urgent care center and followed up with her doctor the next day.

A dairy farm worker in his 20s was attempting to syphon a fungicide through a hose when he ingested a small amount. He fainted and was taken to an emergency department by ambulance. He initially had an elevated blood pressure. He developed throat irritation, nausea, vomiting, and a cough. He was not a certified or registered applicator nor was he under the direct supervision of a certified applicator. He had not received any pesticide safety training that season.

Section II. Occupational Pesticide Illnesses and Injuries

This section describes the 1,181 confirmed occupational cases only. Figure 1 shows the number of cases and events. There were 69 cases from 63 events in 2015 and 47 cases from 45 events in 2016.

Figure 1



People

Occupational pesticide cases occur in people of a wide variety of ages. See Table 3. In 2015–2016 women were less likely to be confirmed occupational cases than men (43 percent vs. 57 percent in 2015 and 40 percent vs 55 percent in 2016). Most (68 percent) cases in 2015–16 were of low severity, 29 percent were moderate severity and 3 percent were high severity.

Table 3: Confirmed Occupational Cases by Age Group and Gender

	Cumulative 2001–16			2015-16		
Age Groups	**Female**	**Male**	**Unknown**	**Female**	**Male**	**Unknown**
10-19	44	63	0	2	4	0
20-29	144	199	0	14	26	0
30-39	101	126	0	10	12	0
40-49	104	119	0	10	9	0
50-59	79	71	0	9	9	0
60-69	11	20	0	1	3	0
70-79	2	5	0	0	0	0
80+	1	0	0	0	0	0
Unknown	37	42	13	3	2	2
Total	**523**	**645**	**13**	**49**	**65**	**2**

In 2015–16 race was unknown for 41 percent of cases; when race was known most cases (83 percent) were white, while 10 percent were black, and 7 percent were mixed or other. In 2015–16 ethnicity was unknown 43 percent of the time. When known, most (76 percent) were Not Hispanic while 24 percent were Hispanic. See Table 4.

Table 4: Confirmed Occupational Cases by Race and Ethnicity

	Cumulative 2001–16			2015-2016		
Race	Hispanic	Not Hispanic	Unknown	Hispanic	Not Hispanic	Unknown
American Indian/Alaskan	0	6	0	0	0	0
Asian/Pacific Islander	0	2	3	0	0	1
Black	0	41	29	0	6	2
White	20	407	106	7	43	5
Mixed	2	20	2	0	1	0
Other	4	0	1	3	0	0
Unknown at this time	53	0	485	6	0	42
Total	**79**	**476**	**626**	**16**	**50**	**50**

Confirmed cases were identified as people in a wide variety of occupations working in a variety of industries. Table 5 shows the occupation of the worker based on the 2002 Census Occupation Codes. In 2015–16, the most common occupation was 'Building and Grounds Cleaning and Maintenance' which includes structural pesticide applicators. This category was 25 percent of all occupational cases and 35 percent of cases where the occupation was known.

Table 5: Confirmed Occupational Cases by Occupation

	Cumulative 2001–16		2015–16	
Occupation	Count	Percent	Count	Percent
Building and Grounds Cleaning and Maintenance	217	18.4%	29	25.0%
Agriculture Workers including Supervisors	65	5.5%	8	6.9%
Food Preparation and Serving Related	50	4.2%	7	6.0%
Professional and Related Occupations	50	4.2%	3	2.6%
Sales and Related Occupations	48	4.1%	2	1.7%
Management, Business, and Financial	42	3.6%	3	2.6%
Transportation and Material Moving	36	3.0%	4	3.4%
Production	33	2.8%	5	4.3%
Protective Service	30	2.5%	3	2.6%
Office and Administrative Support	28	2.4%	4	3.4%
Healthcare Support	27	2.3%	4	3.4%
Personal Care and Service	26	2.2%	6	5.2%
Construction and Extraction	17	1.4%	4	3.4%
Installation, Maintenance, and Repair	10	0.8%	1	0.9%
Military	2	0.2%	0	0.0%
Unknown	500	42.3%	33	28.4%
Total	**1181**	**100%**	**116**	**100%**

Table 6 below shows the industry involved in occupational cases, based on NIOSH industry sectors.[6] 'Services' includes 'Accommodation and Food Services' as well as 'Building Services'. It was the most common sector in 2015–16 (45 percent).

Table 6: Confirmed Occupational Cases by Industry Sector

	Cumulative 2001–16		2015–16	
Industry Sector	**Count**	**Percent**	**Count**	**Percent**
Services (excluding Public Safety)	474	40.1%	52	44.8%
Healthcare & Social Assistance	161	13.6%	15	12.9%
Agriculture, Forestry, Fishing	130	11.0%	11	9.5%
Wholesale & Retail Trade	93	7.9%	5	4.3%
Manufacturing	73	6.2%	12	10.3%
Transportation, Warehousing, Utilities	35	3.0%	2	1.7%
Construction	30	2.5%	4	3.4%
Public Safety	21	1.8%	1	0.9%
Unknown	164	13.9%	14	12.1%
Total	**1181**	**100%**	**116**	**100%**

A structural pest control company owner was getting an insecticide out of his truck and some splashed on his skin. It became red, irritated, and swollen. He called poison control.

Events

In 2015–16, when the person's activity at the time of exposure was known, most exposures (69 or 64 percent) occurred when a person was involved with pesticide application, such as mixing or applying a pesticide, cleaning or maintaining equipment, or some combination of these activities. Another 38 or 36 percent happened to bystanders who were doing routine work, not related to the application.

Table 7 shows the type of pesticide to which people were exposed. In 2015–16, the most common exposure was to disinfectants (55 percent), followed by insecticides (23 percent). Some products contain more than one type of pesticide and some exposures involve more than one product so the number of types listed is greater than the number of exposures.

A production worker in her 50s was on an assembly line all day preparing bottles of a disinfectant for shipping. She was wearing gloves and did not notice any spill or leak, but somehow got disinfectant on her hand. That evening her hand started blistering. By morning it was red, burning, blistering, swollen, and there were red streaks up her arm. She went to an emergency department and was admitted overnight. She lost three months of work as her hand and arm remained painful.

[6] http://www.cdc.gov/niosh/nora/sector.html

Table 7: Confirmed Occupational Cases by Pesticide Type

	Cumulative 2001–16		2015–16	
Pesticide Type	**Count**	**Percent**	**Count**	**Percent**
Disinfectant	606	48.0%	68	55.3%
Insecticide	321	25.4%	28	22.8%
Herbicide	169	13.4%	13	10.6%
Other	118	9.3%	8	6.5%
Multiple	49	3.9%	6	4.9%
Total	**1263**	**100%**	**123**	**100%**

Identification of factors contributing to the exposure assists with the development of prevention strategies. Up to five contributing factors were coded for each case. In 2015–16, spills and splashes (21 percent) were the most common contributing factor for occupational pesticide cases, followed by required eye protection not worn or inadequate (11 percent).

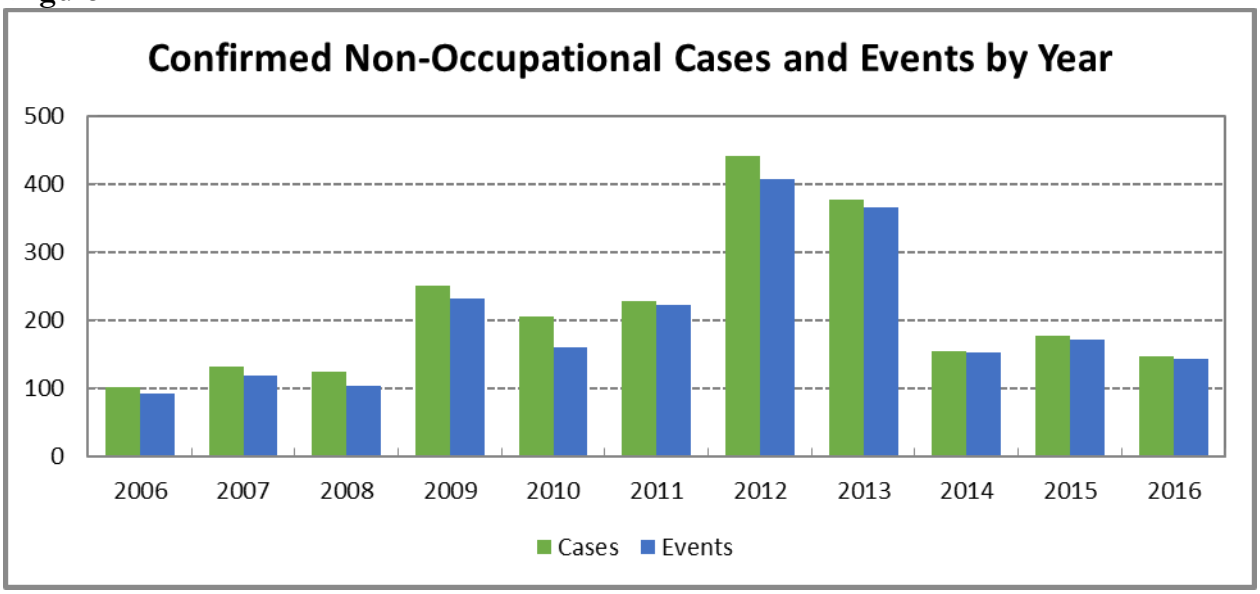
Table 8: Contributing Factors in Confirmed Occupational Cases

	Cumulative 2001–16		2015–16	
Contributing Factor	**Count**	**Percent**	**Count**	**Percent**
Spill/Splash of liquid or dust (not equipment failure)	341	22.3%	32	21.2%
Mixing incompatible products	159	10.4%	12	7.9%
Label violations NOS	103	6.7%	12	7.9%
Application equipment failure	97	6.3%	6	4.0%
Required eye protection not worn or inadequate	90	5.9%	17	11.3%
Decontamination not adequate or timely	88	5.7%	13	8.6%
No label violation identified but person still exposed / ill	78	5.1%	3	2.0%
Drift contributory factors	75	4.9%	9	6.0%
Excessive application	64	4.2%	3	2.0%
People were in the treated area during application	41	2.7%	2	1.3%
Applicator not properly trained or supervised	36	2.4%	4	2.6%
Notification/posting lacking or ineffective	34	2.2%	4	2.6%
Required gloves not worn or inadequate	33	2.2%	4	2.6%
Structure inadequately ventilated before re-entry	21	1.4%	2	1.3%
Within reach of child or other improper storage	21	1.4%	2	1.3%
Early re-entry	19	1.2%	2	1.3%
Required respirator not worn or inadequate	13	0.8%	0	0.0%
Other required PPE not worn or inadequate	8	0.5%	0	0.0%
Intentional harm	4	0.3%	0	0.0%
Illegal pesticide used / Illegal dumping	1	0.1%	0	0.0%
Other	52	3.4%	12	7.9%
Unknown	153	10.0%	12	7.9%
Total	**1531**	**100%**	**151**	**100%**

Section III. Non-occupational Pesticide Illnesses and Injuries

This section examines non-occupational cases. To provide a more complete characterization of the impact of pesticide use in Michigan, the MDHHS pesticide surveillance program began collecting information about non-occupational exposures in 2006. The same case definition and report sources were used for occupational and non-occupational cases. In 2012, three additional non-occupational exposure categories from poison control were added, but beginning in 2014, because of limited resources, data entry was limited to cases who visited a health care provider. There were 312 confirmed cases from 305 events entered into the database in 2015–16 (Figure 2). There were another 645 confirmed non-occupational cases from 597 events who had not seen a provider and were therefore not entered in the database. Suicide attempts using pesticides are also excluded from this report. There is no follow-up for additional information with non-occupational cases so some cases may have been missed because we did not know that there was more than one sign or symptom or because we did not identify the pesticide (both required for case confirmation).

Figure 2



A woman in her 40s was cleansing her bathroom with bleach for a few hours. The door and window were closed. After cleaning, she developed jerking in her extremities, tunnel vision, balance problems, a cough with green sputum, shortness of breath, and wheezing. She went to an emergency department and was hospitalized for 10 days.

A man in his 80s sprayed for bed bugs. He became dizzy and nauseous and went to an emergency department.

People

Table 9 shows confirmed non-occupational cases by age and gender. In 2015–16, women and men were almost equally likely to have a non-occupational pesticide exposure (52 percent and 48 percent, respectively). Race and Ethnicity data are rarely available for non-occupational cases.

Table 9: Confirmed Non-occupational Cases by Age Group and Gender

	Cumulative 2006–16			2015–16		
Age Groups	**Female**	**Male**	**Unknown**	**Female**	**Male**	**Unknown**
<1 (Infants)	6	12	1	2	1	0
1-2 (Toddlers)	34	50	0	9	7	0
3-5 (Preschool)	32	47	0	4	8	0
6-11 (Child)	78	60	0	8	4	0
12-17 (Youth)	61	59	1	7	8	0
18-64 (Adult)	873	667	0	117	105	0
65+ (Senior)	127	102	0	17	17	0
Unknown age	65	31	24	5	3	0
Total	**1,276**	**1,028**	**26**	**169**	**153**	**0**

Most (62 percent) cases in 2015–16 were of low severity, 37 percent were moderate severity, and there were four (1 percent) high severity cases.

A father twice sprayed his toddler's coat with an insect repellent. She had a seizure after the first exposure and two seizures after the second exposure, a few days later.

Events

In 2015–16, when the person's activity at the time of exposure was known, most exposures (213 or 69 percent) occurred when a person was involved with a pesticide application, such as mixing or applying a pesticide, disposing of a pesticide, or some combination of these activities. Another 96 or 31 percent happened to bystanders.

A man in his 30s used a rodent smoke bomb in his yard. He pulled it out of the ground and some blew in his face. He developed second and third degree chemical and thermal burns to his eyes and eyelids, and corneal abrasion. He went to an urgent care center where his eyes were rinsed. He was then sent to an emergency department.

Table 10 shows the types of pesticide to which people were exposed. Some products contain more than one type of pesticide and some exposures involve more than one product so the number of types of products is greater than the number of exposures. In 2015–16, the most common exposure for non-occupational cases was to disinfectants (34 percent), followed by insecticides (33 percent).

Table 10: Confirmed Non-occupational Cases by Pesticide Type

	Cumulative 2006–16		2015–16	
Pesticide Type	**Count**	**Percent**	**Count**	**Percent**
Disinfectant	998	40.9%	111	32.7%
Insecticide	783	32.1%	130	38.3%
Insect Repellent	190	7.8%	21	6.2%
Herbicide	170	7.0%	18	5.3%
Rodenticide	25	1.0%	5	1.5%
Fungicide	22	0.9%	0	0.0%
Other	64	2.6%	11	3.2%
Multiple	151	6.2%	26	7.7%
Unknown	39	1.6%	17	5.0%
Total	**2442**	**100%**	**339**	**100%**

A woman in her 50s mixed two bathroom cleaners with bleach. She developed difficulty breathing, a burning sensation in her lungs, and was sleepy and lethargic. She went to an emergency department.

Contributing factors provide additional information about the cases and assist with developing prevention strategies. Up to five contributing factors can be coded for each case.

Table 11: Contributing Factors in Confirmed Non-occupational Cases

	Cumulative 2006–16		2015–16	
Contributing Factor	**Count**	**Percent**	**Count**	**Percent**
Mixing incompatible products	410	15.5%	50	13.9%
Label violations not otherwise specified	355	13.4%	41	11.4%
Spill/Splash of liquid or dust (not equipment failure)	266	10.1%	39	10.8%
Excessive application	236	8.9%	20	5.6%
No label violation identified but person still exposed/ill	189	7.1%	29	8.1%
Within reach of child or other improper storage	174	6.6%	35	9.7%
Drift contributory factors	103	3.9%	7	1.9%
People were in the treated area during application	102	3.9%	15	4.2%
Decontamination not adequate or timely	91	3.4%	13	3.6%
Structure inadequately ventilated before re-entry	73	2.8%	5	1.4%
Early re-entry	68	2.6%	16	4.4%
Notification/posting lacking or ineffective	49	1.9%	8	2.2%
Application equipment failure	36	1.4%	2	0.6%
Required eye protection not worn or inadequate	17	0.6%	3	0.8%
Required gloves not worn or inadequate	13	0.5%	2	0.6%
Other	82	3.1%	15	4.2%
Unknown	382	14.4%	60	16.7%
Total	**2646**	**100%**	**360**	**100%**

Outreach, Education, and Prevention Activities

Publications, Presentations, and Other Outreach Activities
Staff members of Occupational Pesticide Illness and Injury Program used a variety of avenues to provide information about the program and pesticide safety to stakeholders and the general public. In 2015 and 2016:

- A staff member of the surveillance program represented MDHHS on the MDARD Pesticide Advisory Committee (PAC) and provided an activity report each quarter.

- The MDHHS Pesticide Information webpage provided links to all previous annual reports, a pesticide education booklet, "What You Need to Know about Pesticides and Your Health", several fact sheets, and over 100 other sites with information about pesticides and their safe use.

- A press release about Poison Prevention Week was provided to the MDHHS communications officer and released each March.

- A press release about recreational water safety was provided to the MDHHS communications officer and released before each Memorial Day weekend.

- Safety information was sent to occupational cases and employers as needed.

- MDHHS staff participated with the Michigan Primary Care Association's Migrant Health Network. Letters and emails with information about pesticide safety and reporting were sent to the community health centers that care for migrant farmworkers in Michigan.

- MDHHS staff chaired the pesticide coding committee of the SENSOR-Pesticides states, which worked on data quality assurance and made revisions to the standardized variable document.

- MDHHS staff attended the annual NIOSH sponsored meeting of pesticide surveillance states.

- The MDHHS staff coauthored two articles with NIOSH and other states about pesticide-related illnesses and injuries for the MMWR summary of occupational notifiable non-infectious conditions. (Calvert et al 2015, Calvert et al 2016).

- The MDHHS staff coauthored an article with NIOSH and other states about pesticide-related illnesses and injuries for the MMWR summary of non-occupational notifiable non-infectious conditions. (Namulanda et al 2016).

- MDHHS staff coauthored an article with NIOSH and other states about acute paraquat- and diquat-related illnesses. (Fortenberry et al, 2016)

- Two events were reported to the CDC waterborne illness surveillance program.

- Information about pesticides and the surveillance program was distributed at the Michigan Safety Conference and the Michigan Farmworker, Service Provider, and Grower conference.

NIOSH Reports
In 2015–16, two events met NIOSH's priority reporting criteria.

These events were reported because four or more persons became ill.

- Five workers at a meat processing plant were working near a room that was being sanitized. Either the door was opened, or some product leaked through the seal. The workers developed symptoms such as nausea and respiratory distress. They went outside and called an ambulance. Four were taken to an emergency department and decontaminated there.

- One event involved 28 blueberry pickers who were in a field when a neighboring field was sprayed with an insecticide (signal word: Warning). The signal word is an indication of the toxicity of the pesticide. One woman fainted, had difficulty breathing, and went to an emergency department. Other pickers had a coughing/choking sensation, eye irritation, and vomiting. All the workers went home early and showered, and all returned to work the next day, including the woman who fainted. No samples were taken because the incident didn't get reported to MDARD until eight months later. The wind speeds were low, but the wind direction was consistent with drift according to the investigation report.

This next case, which did not qualify for a priority report, was sent to NIOSH and EPA because the person had a safety suggestion.

- An electrical pole worker sprayed for bees with an insecticide (signal word: Caution) while on a ladder and was exposed to spray back from the wind. He said this happens a lot but that this time he was using a product that irritated his skin more than other products, so he called poison control. He suggested that the sprays come with a small-bore tube the way WD40 is packaged to focus the delivery of the spray.

MDARD Referral

- Ten migrant workers were working when an adjacent field was crop dusted with an insecticide (signal word: Warning). The wind changed direction and blew over them. They were decontaminated on-site after the employer contacted the manufacturer for recommendations. Two workers developed symptoms. According to the MDARD investigation, drift could not be confirmed and wind speeds were zero at time of spray. A warning letter was issued because the application records were incomplete.

MIOSHA Referrals

- The event with the five workers at a meat processing plant above was referred to MIOSHA. No violations were found.

- A production line worker was preparing bottles of a disinfectant (signal word: Danger) for shipping. She got some disinfectant on her hand. That evening her hand started blistering. By morning it was red, burning, blistering, swollen and there were red streaks up her arm. She was wearing gloves, which must have had a leak. Gloves were required by the label, but not by the company. The case was referred to MIOSHA because of the lack of safety information at the packaging company. No violations were found.

Discussion

Surveillance Data

There were 69 confirmed occupational cases in 2015 and 47 in 2016. This is consistent with the range from previous years of surveillance (17-127) but lower than the average of those years (76). Due to staff changes, some hospital cases may not have been forwarded to the pesticide surveillance program in 2016. The number of confirmed occupational cases peaked in 2008.

There were 176 confirmed non-occupational cases in 2015 and 146 in 2016. This is consistent with the range from previous years of surveillance (101-441) but lower than the average of those years (224). There was an increase in non-occupational case reports in 2012 and 2013 because the coding of cases we reviewed from the poison center exposure reasons was expanded to capture all non-occupational cases. The number went down again in 2014 because, due to the limited resources of the pesticide surveillance program, it was decided to only include non-occupational cases who sought additional medical care. These changes in reporting make it impossible to determine if there is any real change in the number of non-occupational confirmed cases.

The number and proportion of confirmed cases related to disinfectant exposures remained high and continued to be an area of ongoing concern. In 2015–16, 55 percent of occupational cases and 34 percent of non-occupational cases were exposed to a disinfectant. We have long advocated limiting the use of disinfectants to where and when there is evidence that they are effective in preventing infection.

While antiseptics used in soaps and oral hygiene products are not pesticides, and are regulated by the Food and Drug Administration (FDA) rather than the EPA, the FDA shares concerns about the overuse of products containing the same active ingredients. In 2016, the FDA issued a final rule establishing that over-the-counter consumer antiseptic wash products containing any of a list of 19 active ingredients can no longer be marketed because they have not been found to be Generally Recognized as Safe and Effective (GRAS/GRAE). In 2018, the FDA issued a final rule banning 24 active ingredients from use in over-the-counter healthcare antiseptics. Evidence-based recommendations/regulations are still needed regarding the use of cleaning products containing disinfectants in food establishments. In addition, education is needed to provide guidance about how to clean, when disinfectants/pesticides are recommended, and how to use them properly.

When looking at factors contributing to pesticide exposures in 2015–16, spills/splashes were the most common factor for confirmed occupational cases (21 percent), followed by not wearing required eye protection, or eye protection being inadequate (11 percent). The most common factors contributing to non-occupational exposures were mixing incompatible products (14 percent), followed by spills and splashes (11 percent). Better education and labeling might help to reduce the number of exposures.

Many confirmed cases in 2015–16 were "bystanders," i.e., engaged in work or living activities not related to the pesticide application (36 percent of occupational cases and 27 percent of non-occupational cases). Better education on safe pesticide application is needed to prevent inadvertent exposures, as well as the exposures to applicators.

Interventions
MDHHS continued to refer cases to other state and federal agencies as appropriate. MDHHS also worked to improve pesticide education for individuals, employers, health care providers, and other stakeholder groups through the distribution of fact sheets and the presentation listed above.

Challenges to Surveillance
Pesticide poisoning is a complex condition for surveillance. The potential for pesticides to harm people depends in part on the dose (length of exposure and chemical concentration) and the route of entry into the body. Pesticides have a range of toxicity, from practically nontoxic (no signal word required) through slightly toxic (signal word: Caution), moderately toxic (signal word: Warning) and most toxic (signal word: Danger). Pesticide products are often mixtures including one or more active ingredients, as well as other "inert" ingredients that have no effect on the target pest but may have adverse human health effects. Depending on the chemicals involved, pesticides can have short- and long-term adverse health effects on different organ systems, including the skin, gastrointestinal, respiratory, nervous, and reproductive systems.

The problem of identifying pesticide-related illness for public health surveillance begins with difficulties in recognition and diagnosis, because the diverse signs and symptoms of pesticide toxicity are the same that occur with common conditions such as allergies, acute conjunctivitis, or acute gastrointestinal illness. Health care providers receive limited education in the recognition and diagnosis of the toxic effects of pesticides and the role of pesticides may not be considered when evaluating patients with signs/symptoms that can be caused by common medical conditions. Besides problems in recognition by health care providers, patients may not seek medical care (Calvert, 2004). Migrant workers face additional barriers such as language difficulties, lack of access to care, and fear of job loss or deportation if they are not legal residents (Prado et al, 2017). Finally, even when diagnosed, pesticide-related illnesses and injuries may not be reported due to reluctance on the part of workers and their health care providers to involve state agencies, the busy work schedules of providers or lack of knowledge of the public health code reporting requirements (Calvert et al, 2009).

More outreach is needed to educate health care providers on the importance of recognizing and reporting instances of occupational pesticide illnesses and injuries. In 2015–16, 82 percent of confirmed occupational cases and 63 percent of the non-occupational cases were reported by the State's poison control center.

Like data from other occupational injury and illness surveillance systems, (Azaroff et al, 2002) the Michigan occupational pesticide surveillance data are probably a significant undercount of the true number of work-related pesticide poisoning cases in Michigan. A 2004 study done in the State of Washington found that the primary barrier for migrant farm workers in seeking health care was economic. Workers could not afford to take time off to seek medical care and were afraid that they might lose their jobs if they did so. That study also found that only 20-30 percent of pesticide-related illnesses among farm workers who filed a workers' compensation claim were given a diagnosis code that indicated pesticide poisoning (Washington Department of Health, 2004). Michigan's workers' compensation data identify poisonings as a group but are not specific enough to capture pesticide exposures.

This surveillance system continues to face challenges due to the time lag between the occurrence and the reporting of the incident from hospital and MDARD reports. This presents difficulties in following up with reported cases because of worker mobility, especially among seasonal farm workers. PCC reports are received promptly, but do not always contain sufficient information to allow contact with the exposed individual. Lack of information for follow-up often results in a case classification of "insufficient information" and an inability to refer cases to regulatory agencies in a timely manner.

Notwithstanding these limitations, the Michigan occupational pesticide surveillance system is receiving and investigating reports of occupational pesticide illness and injury, including follow-up prevention activities. There has been an apparent downward trend in this decade and we will continue to conduct surveillance to monitor this.

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Additional Resources

MDHHS Division of Environmental Health pesticide information: www.michigan.gov/mdch-toxics

NIOSH occupational pesticide poisoning surveillance system: www.cdc.gov/niosh/topics/pesticides/

Pesticide-Related Illness and Injury Surveillance: A How-To Guide for State-Based Programs DHHS (NIOSH) publication number 2006-102. October 2005: http://www.cdc.gov/niosh/docs/2006-102/

MDARD Pesticide and Plant Pest Management Division (for information on licensing and registration for pesticide application businesses, credentials for certified technicians, and laws and regulations for pesticide application):
http://www.michigan.gov/mdard/0,4610,7-125-1572_2875-8324--,00.html

Michigan State University's Pesticide Education Program: www.pested.msu.edu

Information on pesticide products registered for use in Michigan: http://state.ceris.purdue.edu/

EPA Pesticide Product Label System:
http://oaspub.epa.gov/apex/pesticides/f?p=PPLS:1

Extoxnet Pesticide Information Profiles: http://extoxnet.orst.edu/pips/ghindex.html

Information on the federal Worker Protection Standard (worker exposure to pesticides in agriculture):
https://www.epa.gov/pesticide-worker-safety

Recognition and Management of Pesticide Poisonings, Sixth Edition:
http://www2.epa.gov/pesticide-worker-safety/recognition-and-management-pesticide-poisonings

To report occupational pesticide exposures in Michigan:
https://oem.msu.edu/index.php/work-related-injuries/report-occupational-exposure

Appendix I

Case Definition for Acute Pesticide-Related Illness and Injury Cases Reportable to the National Public Health Surveillance System

Clinical Description

This surveillance case definition refers to any acute adverse health effect resulting from exposure to a pesticide product (defined under the Federal Insecticide Fungicide and Rodenticide Act [FIFRA]1) including health effects due to an unpleasant odor, injury from explosion of a product, inhalation of smoke from a burning product, and allergic reaction. Because public health agencies seek to limit all adverse effects from regulated pesticides, notification is needed even when the responsible ingredient is not the active ingredient.

A case is characterized by an acute onset of symptoms that are dependent on the formulation of the pesticide product and involve one or more of the following:

- Systemic signs or symptoms (including respiratory, gastrointestinal, allergic and neurological signs/symptoms)
- Dermatologic lesions
- Ocular lesions

This case definition and classification system is designed to be flexible permitting classification of pesticide-related illnesses from all classes of pesticides. Consensus case definitions for specific classes of chemicals may be developed in the future.

A case will be classified as occupational if exposure occurs while at work (this includes: working for compensation; working in a family business, including a family farm; working for pay at home; and, working as a volunteer Emergency Medical Technician (EMT), firefighter, or law enforcement officer). All other cases will be classified as non-occupational. All cases involving suicide or attempted suicide should be classified as non-occupational.

A case is reportable to the national surveillance system when there is (see the Classification Criteria section for a more detailed description of these criteria):

- Documentation of new adverse health effects that are temporally-related to a documented pesticide exposure; AND
- Consistent evidence of a causal relationship between the pesticide and the health effects based on the known toxicology of the pesticide from commonly available toxicology texts, government publications, information supplied by the manufacturer, or two or more case series or positive epidemiologic investigations; OR
- Insufficient toxicologic information available to determine whether a causal relationship exists between the pesticide exposure and the health effects

Laboratory criteria for diagnosis
If available, the following laboratory data can confirm exposure to a pesticide:

- Biological tests for the presence of, or toxic response to, the pesticide and/or its metabolite (in blood, urine, etc.);
    - Measurement of the pesticide and/or its metabolite(s) in the biological specimen
    - Measurement of a biochemical response to the pesticide in a biological specimen (e.g. cholinesterase levels)
- Environmental tests for the pesticide (e.g. foliage residue, analysis of suspect liquid);
- Pesticide detection on clothing or equipment used by the case subject.

Classification Criteria

Reports received and investigated by state programs are scored on the three criteria provided below (criteria A, B and C). Scores are either 1, 2, 3, or 4, and are assigned based on all available evidence. The classification matrix follows the criteria section (Table 1). The matrix provides the case classification categories and the criteria scores needed to place the case into a specific category. Definite, probable, possible and suspicious cases (see the classification matrix) are reportable to the national surveillance system. Additional classification categories are provided for states that choose to track reports that do not fit the criteria for national reporting. Appendix 2 of "Pesticide-Related Illness and Injury Surveillance: A How-To Guide for State-Based Programs" lists the characteristic signs and symptoms for several pesticide active ingredients and classes of pesticides.

A. Documentation of Pesticide Exposure

1. Laboratory, clinical or environmental evidence corroborate exposure (*at least one of the following must be satisfied to receive a score of A1*):

a. analytical results from foliage residue, clothing residue, air, soil, water or biologic samples;
b. observation of residue and/or contamination (including damage to plant material from herbicides) by a trained professional [Note: a trained professional may be a plant pathologist, agricultural inspector, agricultural extension agent, industrial hygienist or any other licensed or academically trained specialist with expertise in plant pathology and/or environmental effects of pesticides. A licensed pesticide applicator not directly involved with the application may also be considered a trained professional.];
c. biologic evidence of exposure (e.g. response to administration of an antidote such as 2-PAM, Vitamin K1, Vitamin E oil preparation, or repeated doses of atropine);
d. documentation by a licensed health care professional of a characteristic eye injury or dermatologic effects at the site of direct exposure to a pesticide product known to produce such effects (these findings must be sufficient to satisfy criteria B.1 under documentation of adverse health effect);
e. clinical description by a licensed health care professional of two or more post-exposure health effects (at least one of which is a sign) characteristic for the pesticide as provided in Appendix 2.

2. Evidence of exposure based solely upon written or verbal report (*at least one of the following must be satisfied to receive a score of A2"*):

a. report by case;
b. report by witness;
c. written records of application;
d. observation of residue and/or contamination (including damage to plant material from herbicides) by other than a trained professional;
e. other evidence suggesting that an exposure occurred.

3. Strong evidence that no pesticide exposure occurred.

4. Insufficient data.

B. Documentation of Adverse Health Effect

1. Two or more new post-exposure abnormal signs and/or test/laboratory findings reported by a licensed health care professional.

2. At least one of the following must be satisfied to receive a score of B2:

a. Two or more new post-exposure abnormal symptoms were reported. When new post-exposure signs and test/laboratory findings are insufficient to satisfy a B1 score, they can be used in lieu of symptoms toward satisfying a B2 score.
b. Any new illness or exacerbation of pre-existing illness diagnosed by a licensed physician, but information on signs, symptoms and/or test findings are not available or insufficient for a B1 or B2a score.

3. No new post-exposure abnormal signs, symptoms, or test/laboratory findings were reported.

4. Insufficient data (includes having only one new post-exposure abnormal sign, symptom, or test/laboratory finding).

C. Evidence Supporting a Causal Relationship Between Pesticide Exposure and Health Effects

1. Where the findings documented under the Health Effects criteria (criteria B) are:

a. characteristic for the pesticide as provided in Appendix 2, and the temporal relationship between exposure and health effects is plausible (the pesticide refers to the one classified under criteria A), and/or;
b. consistent with an exposure-health effect relationship based upon the known toxicology (i.e. exposure dose, symptoms and temporal relationship) of the putative agent (i.e. the agent classified under criteria A) from commonly available toxicology texts, government publications, information supplied by the manufacturer, or two or more case series or positive epidemiologic studies published in the peer-reviewed literature;

2. Evidence of exposure-health effect relationship is not present. This may be because the exposure dose was insufficient to produce the observed health effects. Alternatively, a temporal relationship does not exist (i.e. health effects preceded the exposure or occurred too long after exposure). Finally, it may be because the constellation of health effects are not consistent based upon the known toxicology of the putative agent from information in commonly available toxicology texts, government publications, information supplied by the manufacturer, or the peer-reviewed literature;

3. Definite evidence of non-pesticide causal agent;

4. Insufficient toxicologic information is available to determine causal relationship between exposure and health effects. (This includes circumstances where minimal human health effects data is available, or where there are less than two published case series or positive epidemiologic studies linking health effects to the particular pesticide product/ingredient or class of pesticides.)

Case Classification Matrix:

CLASSIFICATION CATEGORIES [1]											
CLASSIFICATION CRITERIA	Definite Case	Probable Case		Possible Case	Suspicious Case	Unlikely Case	Insufficient Information		Not a Case		
									Asymptomatic[2]	Unrelated[3]	
A. Exposure	1	1	2	2	1 or 2	1 or 2	4	-	-	3	
B. Health Effects	1	2	1	2	1 or 2	1 or 2	-	4	3	-	
C. Causal Relationship	1	1	1	1	4	2	-	-	-	-	3

1 Only reports meeting case classifications of Definite, Probable, Possible and Suspicious are reportable to the National Public Health Surveillance system. Additional classification categories are provided for states that choose to track the reports that do not fit the national reporting criteria.
2 The matrix does not indicate whether asymptomatic individuals were exposed to pesticides although some states may choose to track the level of evidence of exposure for asymptomatic individuals.
3 Unrelated = Illness determined to be caused by a condition other than pesticide exposure, as indicated by a >3' in the evidence of >Exposure= or >Causal Relationship= classification criteria.

Appendix II

Case Narratives, 2015–16 Confirmed Occupational Cases

Below are descriptions of the confirmed occupational cases reported in 2015 and 2016. The narratives are organized by pesticide type and occupation. They include a description of the signs and symptoms that resulted from the exposure and medical care received. Where known, age range, gender, industry, and occupation are included. In addition, more specific information about the product such as the signal word for acute toxicity assigned by the EPA, is provided when known. The signal word is assigned based on the highest hazard of all possible routes of exposure. "Caution" means the product is slightly toxic if eaten, absorbed through the skin, or can cause slight eye or skin irritation. "Warning" means the product is moderately toxic if eaten, absorbed through the skin, or can cause moderate eye or skin irritation. "Danger" means the product is highly toxic, is corrosive, or causes severe burning to the eye or skin that can result in irreversible damage.

<u>Insecticides/insect repellents/insect growth regulators</u>

Agriculture

MI04245 – An adult blueberry picker was one of 28 pickers who were picking blueberries when a neighboring field was sprayed. She felt the insecticide (signal word: Warning) spray hit her and developed a cough and eye irritation. All the workers went home early that day to shower and all returned to the field the next day. The incident was reported to MDARD eight months later. No violations were found

MI04246 – An adult blueberry picker was one of 28 pickers who were picking blueberries when a neighboring field was sprayed. He felt the insecticide (signal word: Warning) spray hit him and developed a cough and eye irritation and he vomited. All the workers went home early that day to shower and all returned to the field the next day. The incident was reported to MDARD eight months later. No violations were found

MI04247 – A blueberry packer in her 30s was one of 28 workers in a blueberry field when a neighboring field was sprayed. She felt the insecticide (signal word: Warning) spray hit her and felt weak and anxious, was tachypnic, had difficulty breathing, tachycardia, a headache, and painful, itchy eyes. She was taken by EMS to an emergency department. The incident was reported to MDARD eight months later. No violations were found.

MI04256 – A crop farmer in his 50s was putting insecticide (signal word: Warning) in a tank. He was in a hurry and was not wearing his gloves or eye protection. His eyes began to itch and he rubbed them with his hand, which must have had some of the insecticide on it. His eyes were burning and tearing. His wife irrigated his eyes and he called poison control.

MI04271 – A farm worker in his 20s was one of 10 working in an onion field when an adjacent field was being crop dusted with a pyrethroid insecticide (signal word: Warning). The wind shifted and it blew over them. They were all decontaminated on-site. His throat was irritated and he vomited once. He was taken to an emergency department. One other worker went to an emergency department

(see below MI04272). The other eight had a skin rash and did not seek medical care. The event was referred to MDARD and they did not find evidence of drift. (Event MI03833)

MI04272 – A farm worker in her 20s was one of 10 working in an onion field when an adjacent field was being crop dusted with a pyrethroid insecticide (signal word: Warning). The wind shifted and it blew over them. They were all decontaminated on-site. Her throat was irritated and she vomited once. She was taken to an emergency department. The other eight had a skin rash and did not seek medical care. The event was referred to MDARD and they did not find evidence of drift. (Event MI03833)

Landscaping

MI04308 – A groundskeeper for an apartment complex in his 20s was spraying for bees when a gust of wind blew some of the mist back in his eye. His eye was itchy and irritated, and he called poison control.

Structural pest control

MI04485 – A structural pest control company owner in his 30s who was certified and licensed was training a new employee. While getting an insecticide (signal word: Caution) out of his truck some splashed on his skin. It became red, irritated, and swollen and he called poison control.

Miscellaneous/unknown

MI01497 – A contractor in his 20s was doing repair work in rental house. He did not know a fogger (signal word: Warning) had been set off. He developed shortness of breath, red eyes, anxiety, and a headache. He went to an emergency department.

MI04259 – A plumber in his 50s was working in a garage, putting a faucet on a sink. He was kneeling, facing the front of the garage, and the garage door was part way up. Someone outside was spraying an insecticide (signal word: Caution) and it got on him. His pants became wet from the spray. He developed shortness of breath, a headache, coughing, wheezes, and a rash all over his body. The rash continued to come and go when interviewed four months later. He went to an urgent care center and they called poison control. He also followed up with his primary care provider.

MI04307 – A worker in her 20s was splashed in the face with an insecticide bait (signal word: Caution) that was on a conveyor belt. She did not wash up until she reached home three hours later. The next day her face was red and the following day her skin began to peel. She called poison control.

MI04320 – A worker in her 20s got insect repellent in both her eyes. Her eyes became red and irritated and her vision was blurry. She irrigated her eyes and called poison control.

MI04323 – A utility pole inspection contractor in his 30s was drilling a utility pole and stirred up yellow jackets. About 30 landed on him. Since he's allergic to bees he had his coworker spray him with an insecticide (signal word: Caution). The spray was on his skin 5-6 hours before he reached home and could wash it off. He developed a red, itchy, rash and called poison control.

MI04346 – An office manager for a soup kitchen in her 30s accepted a donation of a mattress which she thought had bed bugs. Her boss gave her an insecticide (signal word: Caution) to use, but the sprayer didn't work so they put it in another sprayer that created a fine mist instead of droplets and she inhaled the mist. She developed a sore, swollen throat, nasal burning, difficulty breathing, a cough and laryngitis. She went to an emergency department. She later developed sinusitis and bronchitis and lost 5 days of work. MDHHS sent her a copy of our Bed Bugs & Mattresses fact sheet and a link to the department's bed bug website.

MI04376 – A worker in his teens was getting rid of spiders at work with an insecticide (signal word: Caution). He may have had some back spray on hands. He drank from cup without washing his hands and developed dizziness, sweating, and nausea. He called poison control.

MI04378 – A mosquito sprayer in his 20s was spraying up in trees and got mist on himself. That evening his skin became red and was burning. He called poison control.

MI04496 – A university worker was in an office when an insecticide (signal word: Caution) was sprayed outside near the building air intake vent, causing a strong odor in the office. Seven workers were exposed. This worker was one of three who became nauseous and had eye irritation.

MI04497 – A university worker was in an office when an insecticide (signal word: Caution) was sprayed outside near the building air intake vent, causing a strong odor in the office. Seven workers were exposed. She was one of three workers who became nauseous and had eye irritation. She was pregnant and left the building.

MI04498 – A university worker was in an office when an insecticide (signal word: Caution) was sprayed outside near the building air intake vent, causing a strong odor in the office. Seven workers were exposed. This worker was one of three who became nauseous and had eye irritation.

MI04508 – A self-employed pet groomer in her 40s stored a flea spray (signal word: Caution) in a cabinet. The spray leaked from the nozzle and there was a pool of liquid in the cabinet, of which she unaware. She also used the spray around her home. She developed a headache and dizziness and went to an emergency department.

MI04526 – A worker in her 50s was present when building was sprayed with insecticide (signal word: Caution). She developed a headache, nausea, and throat tightness, which alerted her to ask if the building had been sprayed because she had a similar reaction the year before. The next day she was still nauseous and had a scratchy throat and sinus congestion. She called poison control.

MI04534 – A barber in his 30s sprayed insecticide (signal word: Caution) for about 20 minutes around his barber shop. It was windy and some of the spray blew in his face. He developed a cough, scratchy throat, and itchy eyes. He called poison control and went to an emergency department.

MI04535 – A worker in his 50s was exposed to an insecticide (signal word: Caution) when it was poured around his office, which has poor ventilation. He developed a cough, eyes and nasal burning, throat irritation, tiredness, loss of appetite, and a bad odor from his skin. He went to his doctor, who called poison control.

MI04541 – A pet store cashier in her 20s was helping a customer. She held the insect repellent spray (signal word: Caution) and turned it around to show the customer the ingredients. Some spray went into her face, with some into her mouth. She developed a bad taste that wouldn't go away and her mouth was tingly. She called poison control.

MI04553 – A driver in his 20s was driving a truck with insecticide (signal word: Caution) in the back of the truck. He could smell the pesticide when in the truck. He became dizzy and nauseous, and his eyes were tearing. He pulled over and called an ambulance. EMS noticed the tank was open and venting into the cab. He was taken to an emergency department.

Herbicides

Landscaping

MI04229 – A day laborer in his teens for a landscaping company was trying to refill an herbicide container. It decompressed when he took the top off and some went into his face, nose, and mouth. He developed trouble breathing and a sore throat. He went to his doctor.

MI04248 – A landscaper in his 20s was applying an herbicide (signal word: Caution) to hotel grounds. He had no training. He inhaled some of the vapors and developed nausea, vomiting, a headache, dizziness, and difficulty breathing. He called poison control.

MI04255 – A crew leader for a landscaping company in his 20s was pulling weeds on a farm about 30 minutes after it was sprayed with an herbicide (signal word: Caution). He developed nausea, loss of appetite, headache, dizziness, weakness and a cough. He went to an emergency department and later to an urgent care clinic. He lost two weeks of work.

MI04301 – A worker in his 20s was using an herbicide (signal word: Caution) while doing a landscaping job. That night he had severe throat irritation and diarrhea. Two days later he had stomach cramping, an achy body, and was coughing up brown and green mucous. He called poison control.

MI04310 – A landscape foreman in his 30s was pouring concentrated glyphosate into another container using a funnel that was too large for the opening. He was not wearing gloves and some got on his hands. He washed his hands, but not for the recommended 15 minutes. He developed a headache and was dizzy and nauseated. He called poison control.

MI04317 – A landscaper was working near a coworker who was spraying a lawn with herbicides. He developed confusion, blurry vision, headache, diarrhea, nausea, fatigue, and one pupil was enlarged. He went to an emergency department.

MI04333 – A landscape worker in his 30s was splashed with an herbicide (signal word: Caution) in his face and eyes when a nozzle malfunctioned due to too much pressure. He flushed his eyes with saline at work and again in an urgent care center and then the emergency department. He initially had eye pain and blurry vision. The skin on his face became red and was painful. He had worn goggles, although not required.

MI04505 – An applicator for a lawn care company in his 30s applied a mixture of herbicides and an insecticide to lawns and then walked barefoot through the wet grass. He developed decreased

urinary production, dark urine, a skin rash on his extremities and abdomen, and pupil constriction. He called poison control.

MI04533 – A yard hand in his 30s was spraying weeds around a building. The pressure release valve on a 5-gallon sprayer popped and some herbicide (signal word: Caution) splashed on his face and into his eyes. He inhaled it and might have ingested a small amount. He had been wearing safety glasses but pushed them to the top of his head to see better when he was refilling the container. No protective equipment was required. He developed eye and throat pain, difficulty swallowing, and had dry heaves. He went to an occupational health clinic and was diagnosed with a corneal abrasion.

Miscellaneous/unknown

MI04322 – A letter carrier walked on grass that was still wet from an herbicide application. The next day he told the homeowner that his skin above the sock line was red and irritated. The homeowner called poison control.

MI04495 – A male worker in his 20s was using an herbicide to spray weeds. The wind changed and blew some in his face. He developed a cough, shortness of breath and pain with deep breathing. He went to an emergency department.

MI05415 – A worker in his 20s used an herbicide (signal word: Caution) and some leaked on his left hand. He was not wearing gloves, which were not required. His hand became weak and his skin was rough and hyperpigmented. He also had headaches. Three weeks after the exposure he went to an emergency department since the symptoms had not resolved.

MI04517 – A construction contractor in his 30s was getting rid of roots in a drain field. He re-filled a hole he'd dug by adding dirt and root killer in layers. He used a 5-cup measuring cup to add the root killer (signal word: Danger). Later that day he developed shortness of breath, a cough and a sore throat. He saw his doctor and lost three days of work.

Disinfectants

Cleaner/housekeeper/janitor/custodian

MI04105 – A hospital housekeeping worker was cleaning toilets with bleach pads (signal word: Caution) and the bathroom was not well ventilated. The fumes caused her to cough and have pain when breathing. She went to the emergency department.

MI04125 – An office cleaner in her 40s unintentionally mixed bleach and toilet bowl cleaner. She developed shortness of breath, a cough, wheezing and chest tightness. She went to an emergency department.

MI04198 – A hotel cleaner in her 30s was splashed in the eye and on the skin with concentrated sodium hypochlorite. Her eye became red and her vision was blurry. She went to an emergency department.

MI04370 – A worker in her 20s cleaned at work and in her home for four hours with bleach, Ajax, and an unknown oven cleaner. She developed chest pain, nausea, shortness of breath, headache, dizziness, sore throat, cough, and burning eyes. She went to an emergency department.

MI04381 – A custodian in his 60s used a disinfectant to clean a shower head and was letting it stay on to loosen deposits. He then used a grout and tile cleaner to scrub grout in floor. The floor pitched to one drain where both mixed. He was overcome by fumes, and had difficulty breathing. He was coughing, sweating, and his skin, eyes, throat and lungs burned. He was taken by EMS to a hospital and the building was evacuated. When he returned to work the next week, he developed symptoms again and was off work for a total of two weeks.

MI04406 – A resort housekeeper in her 50s was cleaning a bathtub with bleach and inhaled the fumes. The room was not well ventilated. She developed shortness of breath and a sore throat. She went outside for fresh air, but still couldn't catch her breath so she went to an emergency department.

MI04466 – A hospital environmental services technician (cleaner) in her 20s was cleaning a hospital room using a rag that she had not been wrung out enough. The rag was too wet and some diluted disinfectant (Signal word Danger) splashed in her eye. She was not wearing required eye protection. Her eye was painful, red, and tearing and she went to the emergency department where she was diagnosed with a corneal abrasion. She had a follow-up visit with an ophthalmologist.

MI04469 – A school custodian in her 50s was changing a product out, and heard a click behind her. She turned around and a container of disinfectant (signal word: Danger) was falling off a five foot high shelf. When it hit bottom, some splashed out of an inserted tube onto her face, eyes and mouth. She had a red, irritated eye and blurry vision. She went to an emergency department.

MI04493 – A hospital housekeeper in her 40s was splashed in her eye with disinfectant (signal word: Danger) while cleaning lights above her head. She had a red, irritated eye and went to the emergency department.

MI04519 – A medical center custodian in her 30s reached up to get a gallon container of disinfectant (signal word: Danger) down from an overhead shelf. It spilled on her face and head. She washed right away and showered when she went home. The next morning she woke up with a rash on her face, blisters that were draining, and sores on her head. She called poison control and went to see her doctor.

Food service/production

MI03990 – A manager of a restaurant/office/condo building in his 30s was exposed to a mixture of bleach and drain cleaner. Once a week he puts bleach down all the drains. Cleaners had put a drain cleaner down one of the drains, but he didn't know that at the time. When he smelled the fumes, he tried to dilute it by adding water and the fumes became worse. He was exposed about 20 minutes. He called the fire department and they evacuated the building. He developed a cough, chest tightness, shortness of breath, pain when breathing, sinus irritation, mucus, wheezing and high blood pressure. An ambulance took him to an emergency department.

MI04020 – An assistant manager at a bar in his 20s was cleaning. He wrung out towels from a bucket of diluted sanitizer (signal word: Danger) and sanitizer splashed into both his eyes. He was not wearing required eye protection. He developed eye pain, blurry vision, and corneal burns. He went to an emergency department.

MI04126 – A breakfast bar staff person at a motel in her 40s cleaned with bleach and developed asthma exacerbation with shortness of breath, wheezing, rapid breathing, chest tightness and a cough. She was taken by EMS to a hospital where she was seen in the emergency department and admitted to the ICU.

MI04186 – A teenage worker in a pizzeria was filling bottles with a disinfectant (signal word: Danger). Some splashed in his eye. He irrigated his eye for 15 minutes but his eye was red and irritated. He called poison control.

MI04189 – A supervisor of a donut shop in her teens dropped a bottle of sanitizer (signal word: Danger) and the cap broke and sanitizer splashed in her face. She had second degree burns on her face and it was red, painful and itchy. She went to an urgent care center and followed up with her doctor the next day.

MI04224 – A general worker in her 60s was one of about five workers for a meat processing plant working near a room that was being sanitized. Either the door was opened, or some product leaked through the seal. The workers developed symptoms of nausea and respiratory distress. They went outside and called EMS. She was taken to an emergency department and decontaminated there. She had a headache, chest pain, cough, nausea, vomiting, and throat and eye irritation. (Event MI03799)

MI04225 – A floor leader in her 40s was one of about five workers working near a room that was being sanitized. Either the door was opened, or some product leaked through the seal. The workers developed symptoms of nausea and respiratory distress. They went outside and called EMS. She was taken to an emergency department and decontaminated there. She had a headache, chest pain, cough, and throat and eye irritation. (Event MI03799)

MI04226 – A floor leader in her 30s was one of about five workers for a meat processing plant working near a room that was being sanitized. Either the door was opened, or some product leaked through the seal. The workers developed symptoms of nausea and respiratory distress. They went outside and called EMS. She was taken to an emergency department and decontaminated there. She had a headache, cough, nausea, vomiting, and throat and eye irritation. (Event MI03799)

MI04227 – A worker in her 40s was one of about five people for a meat processing plant working near a room that was being sanitized. Either the door was opened, or some product leaked through the seal. The workers developed symptoms of nausea and respiratory distress. They went outside and called EMS. She was taken to an emergency department and decontaminated there. She had a headache, nausea, high blood pressure, tachycardia, cough, difficulty breathing, and throat and eye irritation. (Event MI03799)

MI04254 – A fast food worker in his 20s got some disinfectant (signal word: Danger) on his fingers and in his mouth. He had a burning sensation in his mouth and throat and under his fingernails. He went to an emergency department.

MI04338 – A fast food worker in her 30s washed walls with bleach. She became dizzy, had difficulty breathing and developed laryngitis. Four days later she still had laryngitis and went to an emergency department.

MI04340 – A fast food worker in her teens was emptying the trash and dropped a clean trash bag in a puddle of disinfectant (signal word: Danger) and other chemicals from the dishwasher. When she picked up the bag, some splashed in her eye. She initially had blurry vision and photophobia which resolved when she rinsed her eye at work. She also had eye pain which did not resolve so she called poison control and went to an emergency department where her eye was rinsed with two liters of saline and her symptoms resolved.

MI04369– A restaurant worker in his 20s mixed bleach with an ammonia disinfectant (signal word: Danger) to clean. He developed dyspnea, tachypnea, throat irritation, dizziness, and confusion. He was taken by EMS to an emergency department.

MI04489 – A restaurant server in her 40s needed to soak quart size water bottles in sanitizer in the sink at the end of the day. She reached up to a shelf overhead for the sanitizer. The lid on it did not fit tightly and when she squeezed the sides of the container some splashed out over her hand and in her eye. She developed eye pain, difficulty seeing, tearing, and her eye was red. She went to an emergency department.

MI04522 – A food processing worker in her 50s mixed some bleach and another cleaner/disinfectant. She inhaled fumes for about 35 minutes. She developed a cough, tearing, congestion, pain on deep breathing, and high blood pressure. She went to an emergency department.

MI04523 – A fruit packing worker in his 20s was pouring out a disinfectant at work and inhaled the fumes. He developed shortness of breath, a cough, wheezing, hoarseness, and pain with deep breathing. He was taken by ambulance to an emergency department.

MI04524 – A scanner at a frozen fruit processing plant in her 20s inhaled chlorine fumes while taking stickers off pallets of blueberries and scanning them to show they'd been processed. The chlorine used to clean lines had been turned up too much. She developed a cough, difficulty breathing, sore throat, eye irritation and a headache. She went to an urgent care center.

MI04525 – A worker at a blueberry farm was exposed to bleach and ammonia. He developed a cough and vomited. He called poison control.

MI04532 – A worker in his 40s was exposed to a disinfectant being sprayed on blueberries for two days. He developed chest tightness and wheezing and went to an urgent care clinic.

MI04537 – A worker at a food processing plant in her 20s was splashed with a mix of disinfectant (signal word: Danger) and cleaner in her eye. Her eye was red and tearing and she called Poison control.

MI04544 – A meat clerk at a grocery store in her 30s was getting ready to clean a sausage maker. She put sanitizer directly on a wet rag rather than diluting it in the sink. The sanitizer splashed onto her eye. Her eye became irritated and her lid was swollen. She called poison control and went to an occupational health clinic.

MI04557 – A fast food crew member in his 20s was cleaning the dishwasher at work. He was leaning in to correctly put a part back in a line and disinfectant (signal word: Danger) sprayed him in

the face. Some got in his left eye. It became red and painful and his eye teared. He called poison control and went to an emergency department

Healthcare

MI04015 – A hospital nurse-in-training in her 20s was exposed to a disinfectant (signal word: Caution) when she pulled a sanitary wipe out of the container and some liquid on it splashed in her left eye. She developed eye pain and conjunctival injection and was seen in the emergency department. PPE was not required.

MI04022 – A veterinary clinic worker in his 60s cleaned the floor with a disinfectant (signal word: Warning) using his bare hands. His skin became red and irritated and he called poison control.

MI04188 – A nursing home worker was mopping and some disinfectant (signal word: Danger) splashed in her eye. She rinsed it for ten minutes but it was painful, so she called 911 and was taken by EMS to an emergency department.

MI04216 – A hospital worker was pulling out a germicidal disposable wipe (signal Word: Caution) and liquid splashed into her right eye. It became red and irritated. She called poison control.

Mi04309 – A hospital ambulatory care associate in her 50s was cleaning scopes with a disinfectant and an enzymatic cleaner. The liquid in the basin was too deep and some got into her gloves and on her arms above her gloves. Her skin became discolored and itchy and she went to an occupational health clinic. They now use longer gloves.

MI04344 – A surgical aide in her 30s was organizing a linen closet in a surgical center and she was exposed to disinfectant fumes from a leaking bag of discarded disinfectant and equipment. She was in the closet for about an hour. She developed a headache, nausea, photophobia, and was dizzy. She went to an occupational health clinic and was sent to an emergency department. The surgical center eliminated the hazard and no longer uses that disinfectant.

MI04372 – A hospital cleaning trainee in his 20s stacked a tub of rags on other tubs and some disinfectant (signal word: Danger) splashed into his eye. He went to the emergency department.

MI04432 – A nurse assistant at a surgical center in her 20s was getting ready to disinfect (signal word: Caution) a bed. She set a bottle down that had been previously opened and it splashed in her eye behind her eyeglasses. Her eye was irritated and tearing. She went to an emergency department.

MI04453 – A maintenance technician in his 40s at a hospital fitness club was chlorinating a pool. He was in a hurry and was not wearing a mask as he usually did. A solenoid didn't open and chlorine was backed up. He took off a screen and vapor sprayed back in his face. He developed chest tightness, cough, sore throat, shortness of breath, and vomited three times. He went to an emergency department.

MI04459 – An endoscopy center technician in her 50s was exposed to a disinfectant when a coworker left the cap off the bottle and did not dispose of the cleaning water. She developed a cough, increased salivation, throat irritation with possible throat swelling, a headache, and breathing issues. She went to an occupational health clinic.

MI04548 – A direct care worker at an adult foster care home in her 30s mixed bleach, water and a few capfuls of detergent to clean a bathroom. She developed a cough and burning eyes and called poison control.

MI04562 – A hospital employee in her 40s had disinfectant (signal word: Danger) splash in her eye. It became red and painful. She went to the emergency department.

Pool-related

MI03893 – A lifeguard in his 20s was exposed to pool chlorine vapors at the water park where he worked. He thought management was using too much pool chlorine. He developed a cough and shortness of breath and called poison control.

MI04288 – A teenaged worker at a public swimming pool was lifting liquid pool chlorine when it fell and splashed on his stomach and genital area. His skin became red and irritated. He called poison control.

MI04375 – A worker in his 40s was in an environment where pool sanitizer (signal word: Danger) was being used for a couple of hours. He developed eye and throat irritation, a cough, and difficulty breathing. He called poison control.

MI04506 – A firefighter in his 50s was moving a hose into an industrial facility that was on fire. He inhaled a plume of smoke containing swimming pool cleaner and became dizzy, had nausea, throat and chest irritation m and a cough. He immediately moved to fresh air. He received O2 in an ambulance which was there, and was taken to an emergency department.

MI04510 – A discount store cashier in his 20s was unloading items off truck. Some pool chlorine spilled in the truck. It was hot, so there was a fan blowing, that was blowing directly over the spill and he inhaled some of the fumes. He developed a cough, eye irritation, dizziness, and had a bad taste in his mouth. He went to an emergency department.

MI04520 – A worker in his 30s was working with pool algaecide and spilled it on his chest and groin. He took off his shirt, but not his pants. He showered about 4 hours later and woke at 4 am the next morning with irritation and a rash on his scrotum. He went to an emergency department.

Salon/spa

MI04316 – A hair stylist in her 20s was changing the comb soaking liquid and dropped the bottle. Some splashed into her face, eyes, and mouth. She developed red eyes and blurry vision and went to an emergency department.

MI04339 – A hair stylist in a hair and nail salon in her 20s was cleaning pedicure chairs with bleach, disinfectant (signal word: Danger), and acetone. She developed shortness of breath, chest pain, nausea, vomiting, a headache and dizziness. She went to an emergency department.

MI04491 – A spa esthetician in her 50s picked up a glass container with disinfectant (signal word: Danger) in it. The container slipped and disinfectant splashed in her eye, which became red and irritated. She went to an urgent care center.

Miscellaneous/unknown

MI04017 – A self-employed worker in his 40s used a disinfectant (signal word: Danger) to remove mold from a private house. He was not wearing eye protection and some disinfectant got in his eye. His eye was red and painful, and he lost some vision. He went to an emergency department and followed up with an ophthalmologist.

MI04021 – A Formulation Operator Specialist for a pharmaceutical company in his 60s was preparing a tank of disinfectant (signal word: Danger) with a coworker. The coworker added concentrate into the tank and handed the empty graduated cylinder down to him from the ladder. A drop went into his eye. He was wearing safety glasses but should have been wearing goggles or a face shield. He flushed his eye immediately for 15 min. They now wear the correct PPE.

MI04171 – A worker in his 20s got a disinfectant splashed in his eye. It became irritated and he could not see well. He called poison control.

MI04315 – A maintenance worker in his 20s was cleaning an ice machine and disinfectant (signal word: Danger) splashed in his eye. When he got home 4 hours later, he took off his contact lenses out and his eyes started to burn and his vision became blurry. He went to an urgent care center and then to an emergency department.

MI04318 – A wrapper operator at a paper mill in his 40s was cleaning an overflow pit and there were pinholes in a sodium hypochlorite line. His forehead burned; he was woozy; his lips tingled; he had a sore throat; and he was nauseated. He went to an emergency department.

MI04361 – An oil chemical company worker in his 50s mixed a disinfectant (signal word: Danger) with another chemical. He coughed up blood and had a sore throat. He went to an emergency department.

MI04364 – A maintenance worker for a community theater company in his 40s tried to unplug a sewer drain with an acid drain opener. This caused the raw sewage to back up on the floor. He tried to clean the sewage with bleach, and fumes were created. He had trouble breathing, and his eyes, nose, throat, and lungs burned. He went out for fresh air and then to an emergency department.

MI04377 – A child protective services investigator in her 40s kept an aerosol can of disinfectant (signal word: Caution) in a drawer at work, where she also kept food and dishes. At some point she noticed a smell, but did not figure out where it came from. After eating three English muffins and experiencing symptoms each time, she discovered the bottom of her drawer was wet. Although the food was not wet, she thinks it must have absorbed some of the disinfectant from the air in the drawer. She became nauseous, her gums were burning, tingly and swollen, her tongue was swollen, and she had a metallic taste in her mouth. She called poison control and the manufacturer and spoke to her doctor at her next visit. She reported, when interviewed two months later, that she continues to have flare-ups where her mouth becomes very painful.

MI04399 – A health department administrative assistant in her 50s was working when an office cleaner took her trash can into the hall to empty it. She went to retrieve it and was sprayed in the face and mouth with disinfectant (signal word: Danger) that the cleaner was using. She developed altered taste and burning and blisters on her tongue and inside her mouth. She went to an urgent care center.

MI04389 – An asbestos remover in his 50s was doing mold remediation, spraying bleach and a disinfectant (signal word: Caution) on trusses walls and joists in an attic. He was wearing a respirator, facemask and Tyvek suit. When he finished, he shut the attic door but continued working in the house. He believes he was exposed because the bleach and disinfectant contaminated the indoor air in the house. He developed a cough, difficulty breathing and lung pain, and his eyes were painful and tearing. He called poison control.

MI04423 – A production worker in her 50s was on an assembly line all day that prepared bottles of a disinfectant (signal word: Danger) for shipping. She was wearing gloves and did not notice any spill or leak, but somehow got disinfectant on her hand. That evening her hand started blistering. By morning it was red, burning, blistering, swollen and there were red streaks up her arm. She went to an emergency department and was admitted overnight. She lost three months of work as her hand and arm remained painful.

MI04450 – A worker in his 20s had a coworker throw a cleaner at him. He developed red, blistering painful second degree burns on his face and shoulders. He went to an emergency department.

MI04464 – A worker in his 50s had a disinfectant (signal word Danger) splash in his eye. He rinsed it at work. It was red and burning so he went to an emergency department.

MI04471 – A farm worker in his 20s was splashed with disinfectant in his eye. It became red and irritated. He called poison control.

MI04531 – A driver in his 50s for a porta-john rental company got a cleaning solution in his eye when he was taking the disinfectant that had been put in an unmarked jug out of his truck before daylight. There was no eye wash kit in his truck. His eye was painful and he went to an emergency department where he was diagnosed with a corneal burn.

MI04559 – A male worker in his 20s was splashed in the eye with a disinfectant (signal word: Danger) while cleaning. His eye became red and irritated and he called poison control.

MI04561 – A worker in her 20s had been exposed to a new disinfectant (signal word: Danger) at work for the previous month. The fumes caused a burning sensation and asthma exacerbation. She called poison control.

Other/Mixture

MI04403 – A city golf course superintendent in his 40s poured a fungicide into a tank. His eye itched and he unthinkingly lifted his goggles to rub his eye. He realized what he did and although he didn't think he had any of the fungicide on his glove, he went into the clubhouse to rinse his eye for about five minutes just to be sure. Later that day it became red and started tearing. He went to an urgent care center.

MI04425 – A dairy farm worker in his 20s was attempting to syphon a fungicide through a hose when he ingested a small amount. He fainted and was taken to an emergency department by ambulance. He initially had an elevated blood pressure. He developed throat irritation, nausea, vomiting, and a cough. He was not a certified or registered applicator nor was he under the direct supervision of a certified applicator. He had not received any pesticide safety training that season.

MI04527 – A farmworker in his 20s was working on an organic farm and walking down the road between hutches when the farm next door sprayed a mixture of pesticides that blew in his face. He had waved at the sprayer, who waved back, but then continued to spray. He developed a burning feeling in his lungs, itchy throat, and high blood pressure. He also felt disoriented. He went to an urgent care center. He continued to have difficulty breathing for several days. The owner of the organic farm reported the incident to MDARD. MDARD investigated and issued a warning letter to the applicator service for causing drift, not providing customer information and not having a written drift plan.

Mi04554 – A worker at a furniture rental center in his 20s was exposed to a deodorizer/disinfectant/mildewcide/insecticide (signal word: Warning) while using it at work to spray furniture. He developed a burning sensation in his throat and lungs and went to an emergency department.