August 15, 2016

2015 Annual Report

Summary of Occupational Disease Reports to the Michigan Department of Licensing and Regulatory Affairs

NOTE

The Michigan Health and Hospital Association, Michigan In-patient and Out-patient databases for calendar year 2015 were not available at the time of publication of the 2015 Annual Report (8-15-2016). This information will be updated when it becomes available, affecting Figures 4 & 5 (page 11) and Tables 9 & 10 (page 12).

Summary of Occupational Disease Reports to the Michigan Department of Licensing and Regulatory Affairs

August 15,2016

2015 ANNUAL REPORT SUMMARY OF OCCUPATIONAL DISEASE REPORTS TO THE MICHIGAN DEPARTMENT OF LICENSING and REGULATORY AFFAIRS

Occupational Disease Surveillance Program

TABLE OF CONTENTS

There are many ways to report occupational diseases to the state:

ONLINE:

www.oem.msu.edu

EMAIL:
ODReport@ht.msu.edu

FAX:

517.432.3606

TELEPHONE:

1.800.446.7805

MAIL:

LARA, MIOSHA
Technical Services Division
530 W Allegan St
PO BOX 30649
Lansing, MI 48909

Michigan State University Department of Medicine

West Fee Hall
909 Fee Road, Room 117
East Lansing, MI 48824
517.353.1846

Kenneth D. Rosenman, MD
Mary Jo Reilly, MS

Michigan Department of Licensing and Regulatory Affairs (LARA)

PO Box 30649
Lansing, MI 48909

517.284.7777

Barton G. Pickelman
Acting Director MIOSHA

There are many resources available to help employers, employees, healthcare professionals and others understand more about work-related diseases. Links to these resources can be found at: **www.oem.msu.edu**.

Acronyms

BLS Bureau of Labor Statistics

LARA MI Department of Licensing and Regulatory Affairs

MDHHS Michigan Department of Health and Human Services

MIOSHA Michigan Occupational Safety and Health Administration

MSU OEM Michigan State University Occupational and Environmental Medicine

NAICS North American Industrial Classification System

NIOSH National Institute for Occupational Safety and Health

OD Report Occupational Disease Report

WCA Workers' Compensation Agency

This report was funded by the National Institute for Occupational Safety & Health, under cooperative agreement U60-OH008466.

Background

This is the 24th annual report on occupational diseases in Michigan, and is based upon the reports submitted to the Michigan Department of Licensing and Regulatory Affairs (LARA) in calendar year 2015. Since 1978, physicians, hospitals, clinics, other health professionals and employers have been required by the Michigan Public Health Code (Article 368, Part 56, P.A. 1978, as amended) to report known or suspected cases of occupational diseases. LARA designates Michigan State University's College of Human Medicine, Occupational and Environmental Medicine Division (MSU OEM) as its bona fide

Part 56 of the Michigan Public Health Code requires reporting of all known or suspected occupational illnesses or work-aggravated health conditions to the Michigan Department of Licensing and Regulatory Affairs *within 10 days of discovery*.

In 2015, 839 (1.3%) of the 64,603 human exposure-related calls to the Michigan Poison Control Center were related to occupational exposures.

Background continued...

agent to compile and analyze the occupational disease reports.

A standard form is used to report individuals with a known or suspected work-related condition. It requests medical and demographic information on the affected employee as well as information about the facility at which the employee became ill. Figure 1 is a copy of the Known or Suspected Occupational Disease reporting form.

Reports received are reviewed by MSU OEM staff and computerized.

In some cases, additional follow-up is conducted. The reported patient may be contacted and interviewed by staff at MSU OEM to obtain more information about their illness. A Michigan Occupational Safety and Health Administration (MIOSHA) enforcement inspection may be initiated at the patient's workplace to assess current working conditions and determine if other employees are experiencing similar health issues.

Reports are analyzed on a yearly basis and the results are shared with health professionals and other stakeholders.

Figure 1. Occupational Disease Reporting Form

Michigan Department of Licensing and Regulatory Affairs — MIOSHA Technical Services Division

Known or Suspected Occupational Disease Report

(Information will be held confidential as prescribed in Public Act 368 of 1978.)

EMPLOYEE AFFECTED

Name (Last, First, Middle)	Age / Sex M F	Race: White Black Hispanic Other	
Street	City	State	Zip
Home Phone Number	Last Four Digits of Social Security Number (Optional)		

CURRENT EMPLOYER

Current Employer Name	Worksite County		
Worksite Address	City	State	Zip
Business Phone	If Known, Indicate Business Type (products manufactured or work done)		
Number of Employees: <25 25-100 100-500 >500			
Employee's Work Unit/Department	Dates of Employment From: Mo Day Year To: Mo Day Year		
Employee's Job Title or Description of Work			

ILLNESS INFORMATION

Nature of Illness or Health Condition (Examples: Headache, Nausea, Difficulty Breathing, Cough, etc.)		Date of Diagnosis Mo Day Year
Suspected Causative Agents (Chemicals, Physical Agents, Conditions)	Did Employee Die? Yes No	If Yes, Date of Death Mo Day Year
If Physician, Indicate Clinical Impression for Suspected Occupational Disease, or Diagnosis of Confirmed Occupational Disease		

ADDITIONAL COMMENTS

REPORT SUBMITTED BY

If Report Submitted by Non-Physician, Did Employee See a Physician? *If yes, record information below.* Yes No Don't Know			
Physician's Name	Phone		
Office Address	City	State	Zip
Name of Person Submitting Report — Physician Non-Physician			
Address	City	State	Zip
Signature	Phone		Date

The Michigan Department of Licensing Regulatory Affairs is an equal opportunity, affirmative action employer, service provider and buyer.

Return completed form to:

Michigan Department of Licensing and Regulatory Affairs (LARA)
Michigan Occupational Safety and Health Administration (MIOSHA)
Technical Services Division (TSD)
530 W. Allegan Street, P.O. Box 30649, Lansing, MI 48909-8149
Overnight Mail Address: 525 W. Allegan Street, Lansing, MI 48933

MIOSHA-MTSD-51 (04/16)

Authority: P.A. 368 of 1978
Completion: Required
Penalty: Misdemeanor

METHODS

An occupational disease (OD) report is initiated when a clinician knows or suspects that a patient's illness is work-related. Reports are submitted by or requested from a variety of sources, listed below. Additional reports are generated through annual review of the Michigan Health and Hospital Association inpatient database.

SOURCES TO IDENTIFY PATIENTS

- **Health Care Providers** Private practice, working for industry, NIOSH-certified "B" readers, audiologists, clinics
- **Employers**
- **Hospitals** for International Classification of Diseases—9th Revision (ICD-9)[1] 502, 501, 495, 496, 491, 492, and other select work-related conditions; ICD-10 was used beginning 10-1-2015
- **Workers' Compensation Agency**
- **Poison Control Center** data for work-related poisonings
- **Reports from Co-Workers or MIOSHA Field Staff** confirmed by a health care provider
- **Death Certificates** for ICD-10 Cause of Death (COD) or contributing COD J61, J62.8, J63, J64, J65, J67; if Underlying COD J45, J68
- **3rd Judicial Circuit State Court of Michigan** for asbestos-related disease
- **Mine Safety and Health Administration**
- **Michigan Cancer Registry** for mesothelioma
- **Clinical Laboratories** for blood lead analyses, and specific IgE allergy testing

OD reports are used to direct surveillance, intervention and prevention activities. The computerized OD report information includes: 1) employee name, age, sex, race, zip code and optional partial social security number; 2) employer name, worksite address, city, zip code, number of persons employed at the facility and an assigned North American Industry Classification System (NAICS) code; 3) details of the illness, diagnosis date, suspected causative agent(s), vital status, and assigned ICD-9 code (ICD-10 beginning 10-1-2015); and 4) information about the report submitter, including whether they are employed by the company, an outside medical department contracted by the company, or a private practice health professional.

More than one report on a given individual with different work-related diseases may be submitted to LARA within a given year and across multiple years. If several reports are submitted for acute illnesses for a single individual, all of the reports are included in our statistics. In contrast, if more than one report is submitted in a given year for a chronic disease in a single individual, only one of the submissions is included in our statistics. If multiple reports are submitted over several years on that individual's chronic disease, only the earliest report is included in our statistics (see list below for chronic diseases).

The 2014 Annual Report on Silicosis & Other Work-Related Lung Disease contains information on Asbestos-related lung disease that was formerly in the OD Annual Reports. The report can be found at: www.oem.msu.edu

CHRONIC OCCUPATIONAL DISEASES COUNTED ONLY ONCE

ICD-10	ICD-9	DESCRIPTION
A15.0	011	Pulmonary TB
A18.0	015	TB of Bones & Joints
D86	135	Sarcoidosis
B90	137	TB, Late Effects of
C00-D49	140-239	Cancer
E20-E35	250-259	Diseases of Other Endocrine Glands
E50-E64	260-269	Nutritional Deficiencies
E70-E88	270-279	Metabolic & Immunity Disorders except E86.0 [276], Dehydration
D50-D89	280-289	Diseases of the Blood & Blood Forming Agents
F01-F99	290-319	Mental Disorders except F43 [308 (Acute Reaction to Stress) & 309 (Adjustment Reaction)]
G00-G99	320-340	Select Diseases of the Nervous System & Sense Organs
H90-H91	388-389	Noise-Induced Hearing Loss, Tinnitus
I00-I99	390-409	Select Diseases of the Circulatory System
J40-J47, J60-J70	491-505 & 509	Select Diseases of the Respiratory System, Pleural Plaques w/no Parenchymal Abnormality on ILO form
J80-J84	515	Interstitial Lung Disease, Pulmonary Fibrosis
L94.9	517	Connective Tissue Lung Disease
K00-K95	520-579	Diseases of the Digestive System
N00-N99	580-629	Diseases of the Genitourinary System

RESULTS

A total of 7,472 occupational disease reports were submitted to LARA in calendar year 2015. Figure 2 shows the number of reports received each year since 1985.

Reporting Source

Company or contract medical departments submitted 55% of the reports (4,104 cases); non-company associated health care practitioners submitted 45% of the reports (3,368 cases). Figure 3 shows the trends by reporting source (company or non-company associated) since 1991.

Company Size

A little over half of the reports were submitted on individuals who worked in large companies (Table 1) with 54% of the 4,731 reports that listed company size coming from businesses with > 500 employees.

A greater proportion of reports for companies with 500 or fewer employees come from non-company health practitioners. About 76% of the 997 reports with known company size that were submitted by non-company practitioners involved companies with < 500 employees, while about 38% of the 3,734 reports with known company size submitted by company practitioners involved facilities with < 500 employees.

Non-Company Clinicians

One hundred fifty non-company-associated clinicians reported 349 incidents of occupational disease. Thirty labs were responsible for

Figure 2
OD Reports to LARA by Year Reported: 1985-2015

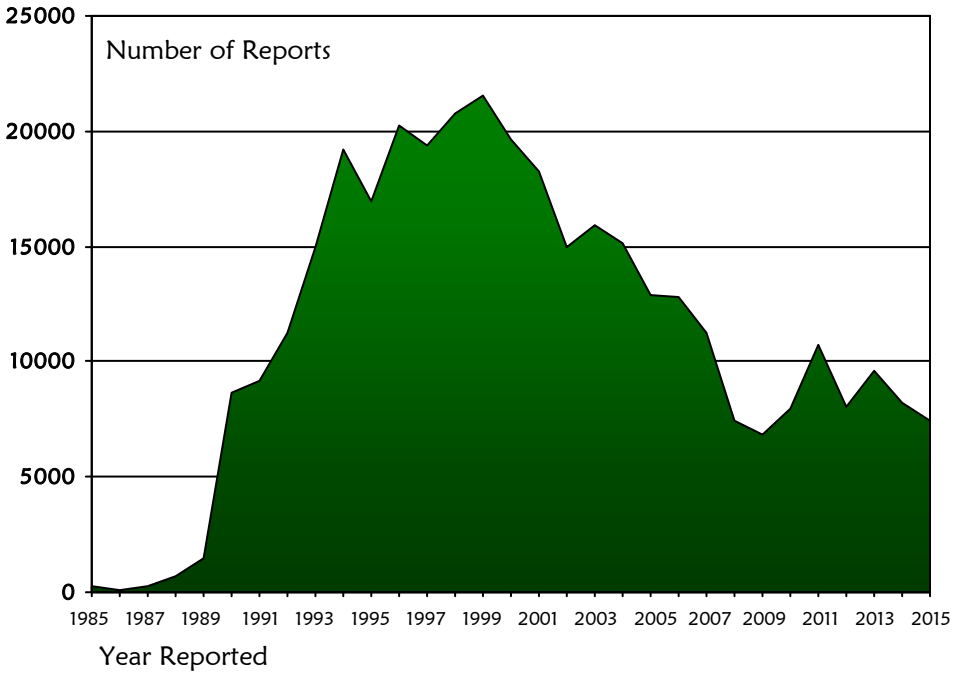
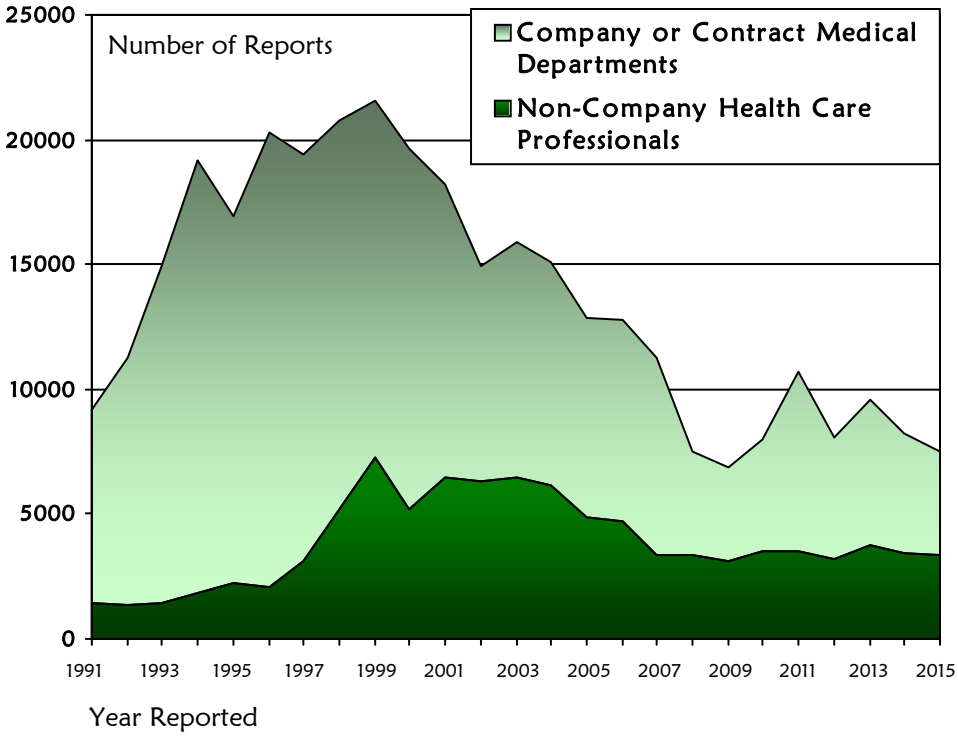


Figure 3
OD Reports by Year and Reporting Source: 1991-2015



RESULTS, continued...

identifying 1,802 reports of lead poisoning. In addition, the Michigan Poison Control Center reported 839 incidents of work-related poisonings, the 3rd Circuit Court of Michigan reported 251 asbestos-related claims, hospitals reported 115 patients with work-related conditions and two labs reported 11 latex allergies. One hundred thirty-seven (91%) of the clinicians reported only one patient each in calendar year 2015 (Table 2); one clinician reported 75 patients; this clinician is certified to interpret chest x-rays for dust-related lung disease ("B" reader). A "B" reader is a licensed physician who has passed a test on interpreting chest x-rays for pneumoconiosis and maintains certification by passing an additional test every four years. In 2015, there were six Michigan physicians who were listed as a "B" reader on the NIOSH "B" reader website.

Occupational Health Clinics

There are approximately 187 occupational health clinics in Michigan. From June 2005 to 2009, the number of such clinics reporting occupational disease cases to the State increased from 21 to 56. In 2010, the number of reporting clinics dropped to 44, in 2011 increased to 64, in 2012 decreased to 61, in 2013 increased to 66, in 2014 decreased to 46 and in 2015 decreased to 39. Biennial audits of a sample of non-reporting clinics began in 2009.

Demographics

Table 3 shows the age, gender and race distribution of the workers with occupational diseases reported in the year 2015. The mean age of reported patients was 46 ± 15 years (range, 16 to 104 years) with approximately two-thirds of the patients (63%) between the ages of 25 and 54 years. Seventy reports were submitted for patients age 19 or younger, and 95 reports were submitted for patients age 80 and older.

Sixty-nine percent of all reports submitted were for male workers. Ninety-five percent of the submitted reports (7,075 cases) did not indicate the worker's race. Of the 397 reports that did indicate race, 78% were Caucasian, 18% were African American and 3% were Hispanic.

Table 1
Company Size at Facilities with an OD Report in 2015: Non-Company v Company Clinicians

Number of Employees	REPORTING SOURCE					
	Non-Company Clinicians		Company Clinicians		Total Reports	
	#	%	#	%	#	%
< 25	161	16.1	321	8.6	482	10.2
25-100	269	27.0	441	11.8	710	15.0
100-500	325	32.6	639	17.1	964	20.4
> 500	242	24.3	2,333	62.5	2,575	54.4
Total	997[a]	100.0	3,734[b]	100.0	4,731	100.0

[a] The number of employees was missing on 2,371 reports.
[b] The number of employees was missing on 370 reports.

Table 2
OD Reports Submitted by Non-Company Clinicians in 2015

Number of Reports	Clinicians		Patients
	#	%	#
1	137	91.3	137
2-5	5	3.3	16
6-10	1	0.7	10
11-20	3	2.0	42
>20	4	2.7	144
Total[a]	150	100.0	349

[a] Includes reports only from individual clinicians.

RESULTS, continued...

Table 3
Demographic Characteristics of Occupational Disease Cases Reported in 2015

Demographic Characteristic		
Age	#	%
≤ 19	70	1.3
20-24	354	6.4
25-29	495	8.9
30-34	559	10.1
35-39	582	10.5
40-44	581	10.4
45-49	644	11.6
50-54	617	11.1
55-59	644	11.6
60-69	691	12.4
70-79	228	4.1
> 80	95	1.7
Total[a]	5,560	100.1[b]
Gender	#	%
Male	5,163	69.3
Female	2,291	30.7
Total[c]	7,454	100.0
Race	#	%
Caucasian	311	78.3
African American	73	18.4
Hispanic	13	3.3
Total[d]	397	100.0

[a]Age was unknown for 1,912 reports. Mean age 46 ±15 yrs.
[b]Percent does not add to 100 due to rounding.
[c]Gender was unknown for 18 reports.
[d]Race was unknown for 7,075 reports.

Younger Workers

Of the 47 workers *age 18 and younger*, seven were 16 years old, 15 were 17 years of age, and 25 were 18 years old. Eleven (23%) of the reported patients age 18 and younger were female and 36 (77%) were male. Place of employment was unknown for all of the 47 younger workers.

All of the younger workers were reported by private practice clinicians not associated with any company. Thirty-two were reported by the Poison Control Center, three were for respiratory symptoms, 12 were for an elevated blood lead level (serum lead levels were between five and 27 micrograms per deciliter). No work-related *fatal illnesses* for workers age 18 or younger were identified in 2015.

Older Workers

Of the 95 workers age eighty and older, 91 (96%) were between the ages of 80 and 89, and four (4%) were between 90 and 104 years of age. Seventy-nine were men and 16 were women. Twenty-nine of the older patients worked in or were retired from manufacturing, two worked in construction, and one worked in the health care industry. Industry or former industry was not indicated in 63 reports.

Private practice clinicians not associated with any company reported 93 of the 95 patients. Forty-nine of the older workers were reported for dust-related lung disease (including 11 with lung cancer, 20 with asbestosis, 15 with silicosis and three with pleural thickening), 42 for elevated blood lead levels (serum lead levels were between 5 and 19 micrograms per deciliter), and one each for other respiratory illness, elbow sprain, back sprain and dermatitis.

Illness Information

Table 4 shows the distribution of diagnoses or clinical impressions by reporting source. Diagnoses were grouped by major International Classification of Diseases categories (ICD-9th Revision). Overall, repetitive trauma conditions (sprains and strains) were the most frequently reported conditions, with 2,796 cases representing 37% of all OD reports submitted.

Toxic effects of substances (poisoning) were the second most frequently reported, with 1,826 (24%) cases. Symptoms, signs and ill-defined conditions were the third most frequently reported conditions with 839 (11%) cases, followed by diseases of the respiratory system which were the fourth most frequently reported conditions, with 601 (8%) cases. Nervous system and sense organ diseases were reported for 583 cases representing 8% of all reports submitted. There were 408 (6%) musculoskeletal disease reports, 185 (3%) reports of skin diseases, 85 (1%) burns to the eye, 64 (1%) reports of cancers, and 58 (1%) reports of mental disorders (stress-related illnesses). Less frequently reported conditions included diseases of the digestive system, infectious and parasitic diseases, and diseases of the blood and blood forming

RESULTS, continued...

Table 4
2015 OD Reports by Disease Type and Reporting Source

DISEASE TYPE	Non-Company #	Non-Company %	Company #	Company %	Total #	Total %
Infectious & Parasitic Diseases (ICD 001-139)	0	--	10	0.2	10	0.1
Neoplasms (ICD 140-239)	63	1.9	1	<0.1	64	0.9
Metabolic Disorders (ICD 270-279)	0	--	0	--	0	--
Blood and Blood Forming Organs (ICD 280-289)	0	--	0	--	0	--
Mental Disorders (ICD 290-319)	0	--	58	1.4	58	0.8
Nervous System & Sense Organs (ICD 320-389)	27	0.8	556	13.5	583	7.8
Circulatory System (ICD 390-459)	0	--	2	<0.1	2	<0.1
Respiratory System (ICD 460-519)	523	15.5	78	1.9	601	8.0
Digestive System (ICD 520-579)	0	--	14	0.3	14	0.2
Genitourinary System (ICD 580-629)	1	<0.1	0	--	1	<0.1
Skin & Subcutaneous Tissue (ICD 680-709)	39	1.2	146	3.6	185	2.5
Musculoskeletal System & Connective Tissue (ICD 710-739)	7	0.2	401	9.8	408	5.5
Symptoms, Signs & Ill-Defined Conditions (ICD 780-799)	686	20.4	153	3.7	839	11.2
Repetitive Trauma: Sprains & Strains (ICD 800-999 except ICD 940 & ICD 980-989)	142	4.2	2,654	64.7	2,796	37.4
Burn Confined to Eye (ICD 940)	72	2.1	13	0.3	85	1.1
Toxic Effects of Substances - Poisonings (ICD 980-989)	1,808	53.7	18	0.4	1,826	24.4
TOTAL	**3,368**	100.0	**4,104**	99.8[a]	**7,472**	99.9[a]

[a]Percent does not add to 100 due to rounding.

organs.

Reporting Source Differences

Company and non-company-affiliated providers differed markedly in the types of occupational diseases reported (Table 4). Sixty-five percent of reports from company health care providers were of repetitive trauma illnesses, while four percent of reports by non-company providers represented these diagnoses. Conversely, 54% of non-company reports were of toxic effects of substances (poisonings), compared to less than one percent of company submissions. The second, third and fourth most frequently reported diagnoses for company providers were nervous system and sense organs (14%), musculoskeletal diseases (10%), and symptoms, signs and ill-defined conditions (4%). Symptoms, signs and ill-defined conditions were the second most frequently reported diagnoses by non-company providers (20%). The third and fourth most frequently reported diagnoses for non-company providers were respiratory system (16%) and repetitive trauma conditions (4%).

Company and non-company practitioners differed by industries represented in their reports (Table 5). Company-affiliated providers and non-company-affiliated physicians reported high percentages of patients employed in manufacturing (66% and 43%, respectively), primarily automobile production. The second and third most frequently reported industries by company providers were healthcare and social assistance (5%) and retail trade (5%). The second and third industry types most frequently reported by non-company providers were construction (30%), and utilities (9%). Industry type was missing on 2,249 non-company and 77 company reports.

Gender Differences

Repetitive trauma was the most frequently reported diagnosis for women, with 51% of submissions (Table 6). The second, third and fourth most frequent diagnoses for women were signs, symptoms and ill-defined conditions (14%), poisonings (11%) and musculoskeletal diseases (8%). For men, repetitive trauma conditions were the most frequently reported diagnoses (32%), followed by poisonings (31%), symptoms, signs and ill-defined conditions (10%) and diseases of the nervous system and sense organs and respiratory diseases (9% each). Eighteen reports did not indicate gender.

RESULTS, continued...

Table 5
2015 OD Reports by Industry Type and Reporting Source

2007 North American Industry Classification System		Non - Company		Company		Total	
		#	%	#	%	#	%
11	Ag, Forestry Fishing & Hunting	1	0.1	6	0.1	7	0.1
21	Mining	2	0.2	9	0.2	11	0.2
22	Utilities	105	9.4	21	0.5	126	2.4
23	Construction	334	29.8	103	2.6	437	8.5
31-33	Manufacturing	483	43.2	2,666	66.2	3,149	61.2
42	Wholesale Trade	32	2.9	70	1.7	102	2.0
44-45	Retail Trade	10	0.9	200	5.0	210	4.1
48-49	Transportation & Warehousing	12	1.1	126	3.1	138	2.7
51	Information	1	0.1	18	0.4	19	0.4
52	Finance & Insurance	0	—	9	0.2	9	0.2
53	Real Estate & Rental & Leasing	0	—	35	0.9	35	0.7
54	Professional, Scientific & Tech Svcs	17	1.5	45	1.1	62	1.2
55	Mgt of Companies & Enterprises	0	—	0	—	0	—
56	Administrative & Support & Waste Mgt & Remediation Svcs	12	1.1	170	4.2	182	3.5
61	Educational Services	7	0.6	114	2.8	121	2.4
62	Health Care & Social Assistance	18	1.6	203	5.0	221	4.3
71	Arts, Entertainment & Recreation	16	1.4	6	0.1	22	0.4
72	Accommodation & Food Services	10	0.9	80	2.0	90	1.7
81	Other Services (excl Public Admin)	9	0.8	43	1.1	52	1.0
92	Public Administration	50	4.5	103	2.6	153	3.0
	Total[a]	1,119	100.1[b]	4,027	99.8[b]	5,146	100.0

[a]Industry was unknown for 2,249 non-company reports and 77 company reports.
[b]Percent does not add to 100 due to rounding.

Table 6
2015 OD Reports by Disease Type and Gender

DISEASE TYPE	Males		Females	
	#	%	#	%
Infectious & Parasitic Diseases (ICD 001-139)	0	—	10	0.4
Neoplasms (ICD 140-239)	64	1.2	0	—
Metabolic Disorders (ICD 270-279)	0	—	0	—
Blood and Blood Forming Organs (ICD 280-289)	0	—	0	—
Mental Disorders (ICD 290-319)	31	0.6	25	1.1
Nervous System & Sense Organs (ICD 320-389)	476	9.2	107	4.7
Circulatory System (ICD 390-459)	2	<0.1	0	—
Respiratory System (ICD 460-519)	476	9.2	125	5.5
Digestive System (ICD 520-579)	14	0.3	0	—
Genitourinary System (ICD 580-629)	0	—	1	<0.1
Skin & Subcutaneous Tissue (ICD 680-709)	127	2.5	58	2.5
Musculoskeletal System & Conn Tissue (ICD 710-739)	216	4.2	192	8.4
Symptoms, Signs & Ill-Defined Conditions (ICD 780-799)	493	9.5	330	14.4
Repetitive Trauma: Sprains & Strains (ICD 800-999 except ICD 940 & ICD 980-989)	1,634	31.6	1,162	50.7
Burn Confined to Eye (ICD 940)	52	1.0	33	1.4
Toxic Effects of Substances (ICD 980-989)	1,578	30.6	248	10.8
TOTAL[a]	**5,163**	99.9[b]	**2,291**	99.9[b]

[a]Gender was not listed for 18 individuals.
[b]Percent does not add to 100 due to rounding.

Fatalities

Fatalities related to occupational illnesses were reported for 53 workers (Table 7). None of the illness-related fatalities reported were from acute incidents. Non-company clinicians reported all of the 53 fatalities. The workers who died ranged in age from 43 to 90 years. Thirty-eight died from asbestos-related cancer, 14 from asbestosis, and one from another lung disease. Twenty-eight of the deceased workers had been employed in manufacturing and seven in utilities. Former occupation was not specified for 18 workers.

Michigan has a separate program to track acute traumatic fatalities, called MIFACE (Michigan Fatality Assessment and Control Evaluation). The MIFACE program identified an additional 140 traumatic work-related fatalities from injuries in 2015 that occurred in Michigan (provisional data). A separate report for the most recent work-related fatalities (2014 calendar year) can be found at: www.oem.msu.edu. There were three acute work-related injuries resulting in deaths among youths in the MIFACE Program in 2015.

MI Fatality Assessment & Control Evaluation

RESULTS, continued...

Comparison with Other Data Systems

No one reporting system captures the true burden of occupational disease. The following section looks at other reporting systems and the contribution each makes to the overall characterization of work-related illness in our state.

Published Aggregate Data in MI

Table 8 compares data from the OD reporting system with Workers' Compensation Agency claims and the BLS Annual Survey. These data illustrate the variation of reported disease categories by reporting source and suggest that the magnitude of occupational diseases among Michigan workers is greater than what currently gets reported.

The most quoted data source on occupational injuries and illnesses available in Michigan comes from the BLS Annual Survey of company injury and illness logs. In 2014, there were a total of 117,400 injuries and illnesses of which 59,700 were severe enough to cause loss of work days, job transfer or restriction. Of the 117,400 total, 6,000 were occupational illnesses and 111,400 were occupational injuries.

Data from Michigan's Workers' Compensation Agency (WCA) for 2015 showed 21,466 claims for occupational injuries and illnesses with seven or more consecutive days away from work; 13,997 of those claims are for illnesses (Table 8). Overall in 2015, about $526 million in compensation was paid by insurance companies and self-insured employers on 185,802 claims for both lost work time and medical-only costs. These claims include new claims filed in 2015, as well as previous claims for workers who continue to lose work time or incur medical costs due to their injury or illness. Sixty-nine percent of the total paid claims in 2015 were for medical procedures or care only and 31% for wage loss (http://www.michigan.gov/documents/wca/wca_2015_Annual_Report_519706_7.pdf).

Table 7
Demographic Characteristics of Reported Occupational Disease Fatalities in 2015

DEMOGRAPHIC CHARACTERISTIC		
Vital Status	**#**	**%**
Fatal	53	0.7
Non-Fatal	7,419	99.3
Total	**7,472**	**100.0**
Age	**#**	**%**
40 - 49	1	1.9
50 - 59	2	3.8
60 - 69	13	24.5
70 - 79	26	49.1
≥ 80	11	20.8
Total	**53**	**100.1[a]**
Disease Type	**#**	**%**
Neoplasm-lung	38	71.7
Asbestos-related	14	26.4
Other– lung	1	1.9
Total	**53**	**100.0**
Industry	**#**	**%**
Manufacturing	28	80.0
Utilities	7	20.0
Total	**35[b]**	**100.0**

[a]Percent does not add to 100 due to rounding.
[b]Industry was missing on 18 reports.

Other Sources-Hospital Discharge Data

The hospital discharge data described in this next section is not part of the 7,472 occupational disease reports described in the 2015 Annual Report. Hospital discharge data does not include identifiers; presumably some of the patients overlap with those in the 7,472 OD reports. However, especially for long latency, chronic diseases like asbestosis, it would be difficult to identify newly diagnosed patients. Therefore, the hospitalization data in this section should be considered as supplemental to the 7,472 OD reports submitted to the state in 2015. The most recent data available from the MHA is for calendar year 2014. The following section looks at hospital data where Workers' Compensation is the expected payer.

If the source of payment changed after the patient was treated and discharged from the hospital, such as might occur in a disputed workers' compensation case, it is likely that this change would not be captured in the MHA data reported in this section. Figure 4 shows the number of patients, as well as hospitalizations, with Workers' Compensation (WC) insurance designated as the primary payment source at discharge for the years 1992 through 2014; the numbers of hospitalizations from 1995 -2014 decreased compared to the years 1992-1994. In addition,

RESULTS, continued...

Table 8
Comparison of 2014 Bureau of Labor Statistics (BLS) Occupational Illness Survey Data and 2015 LARA Workers' Compensation Agency (WCA) Claims with 2008—2015 LARA Occupational Disease (OD) Reports

	Disease Category														
	Skin		Lung—Dust		Lung—Toxic		Poisoning		Physical Agents		Repeated Trauma		All Other		Total
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
BLS Survey															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2014	900	15.0	ND	--	700	11.7	NS	--	ND	--	ND	--	4,400	73.3	6,000
WCA Claims															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2015	38	0.3	1	<0.1	53	0.4	5	<0.1	36	0.3	10,749	80.2	2,515	18.8	13,397
LARA OD Reports															
Year	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#
2008	196	2.9	905	13.2	600	8.7	1,811	26.4	13	0.2	2,305	33.5	1,042	15.2	6,872
2009	258	4.1	321	5.1	372	5.9	1,782	28.1	176	2.8	1,892	29.8	1,544	24.3	6,345
2010	263	3.5	440	5.9	841	11.3	1,750	23.5	190	2.5	2,394	32.1	1,573	21.1	7,451
2011	499	4.9	459	4.5	634	6.3	1,716	17.0	237	2.3	3,974	39.3	2,589	25.6	10,108
2012	378	5.0	328	4.3	419	5.5	1,442	18.9	46	0.6	2,892	38.0	2,106	27.7	7,611
2013	347	4.0	274	3.2	439	5.1	2,192	25.5	45	0.5	3,263	37.9	2,041	23.7	8,601
2014	338	4.5	371	4.9	458	6.1	1,808	23.9	181	2.4	2,547	33.7	1,863	24.6	7,566
2015	185	2.8	340	5.1	261	3.9	1,826	27.6	99	1.5	2,307	34.9	1,598	24.2	6,616

ND = There was no data for this disease category. NS = Data too small to be displayed.

the percentage of hospitalizations with WC insurance designated as the primary payment source at discharge decreased beginning in 1993 (Figure 5). For both these parameters, there was a plateau in the decrease from 2004 to 2008. However, there was also a decrease in 2009-2014 in both these parameters. In 2009, 0.30% of the 1,305,935 Michigan hospitalizations designated WC insurance as the primary payment source at discharge; in 2014 0.23% of the 1,227,988 Michigan hospitalizations designated WC insurance as the primary payment source at discharge.

Table 9 shows the primary discharge diagnosis for hospitalizations from 2002 to 2014 where WC insurance was designated as the primary payment source at discharge. WC insurance covers a broad range of conditions, including mental illness, infections, heart disease and cancer. The most common two hospitalized conditions covered by WC insurance were injuries and poisoning accounting for 49%, and musculoskeletal diseases, accounting for 24% of all WC-related patient hospitalizations.

Table 10 lists the demographics of patients with WC insurance as the primary payment source at discharge. From 70-76% of the hospitalizations were for men, across all years from 2002 to 2014. Among hospitalizations for which race was known, approximately 85-90% were white, 7-11% were African American, <1% were Asian, and 2-5% were listed as "other."

Most hospitalizations involved workers between the ages of 40 and 59 years. Less than 1% involved workers under the age of 15. The percentage of workers 80 years or older has ranged over time from <1-4%. The percentage of hospitalizations of workers under the age of 20 has decreased slightly over time, from 3% in 1992 to 1% in 2014 (1992 data not shown).

RESULTS, continued...

Special Project—Use of Hospital Discharge Data to Evaluate Work-Related Severe and Minor Hospitalized Traumatic Injuries

The Council of State and Territorial Epidemiologists (CSTE), in an effort to provide a standardized way for states to monitor and evaluate trends in work-related injuries because "acute work-related trauma is a leading cause of death and disability for U.S. workers," developed a set of criteria to analyze state hospital discharge data. Details can be found on the CSTE website at www.cste.org, referencing Indicator #22: Work-Related Severe Traumatic Injury Hospitalizations.

Data from the Michigan Health and Hospital Association inpatient databases for calendar years 2006 through 2014 were analyzed. All inpatient hospitalizations for Michigan residents where the primary insurance was listed as workers' compensation, who were ages 16 years and older and whose primary discharge diagnosis was an injury with ICD-9 codes 800—959.9 were identified. Cases were then classified into one of two groups: severe and minor. Severe injuries were defined as having an Abbreviated Injury Scale (AIS) code of 3 or greater (http://www.aaam.org/about-ais.html). Annual crude rates of injury were calculated using the Bureau of Labor and Statistics (BLS) Geographic Profiles of Employment and Unemployment (www. bls.gov/gps).

There were a total of 11,439 inpatient hospitalized injuries with workers' compensation as the primary payer for workers age 16 years and older in Michigan from 2006-2014. Of those, 4,346 (38%) were classified as severe and 7,093 (62%) were classified as minor injuries. Figure 6 shows the annual crude rate of work-related inpatient hospitalizations for severe and minor injuries per 100,000 workers from 2006 through 2014. There was an overall decrease in the rate of minor injury hospitalizations, from a high of 19.69 minor injuries per 100,000 in 2006 to a low of 13.75 in 2014. The crude rate of severe work-related hospitalized injuries remained relatively unchanged throughout that same time period, from 2006 to 2014, with 10.77 severe injuries per 100,000 in 2006 and 10.50 in 2014. The overall decrease in work-related hospitalizations (Figures 4 and 5) is secondary to the decrease in minor injuries, while the more severe injury rates remain unchanged over time.

Tables 11 and 12 show the distribution and rate for severe (Table 11) and minor (Table 12) work-related hospitalized injuries, by race, gender, and age groups. For both severe and minor injury hospitalizations, black workers had lower rates than white workers, although neither difference was statistically significant. Rates for females were statistically significantly lower than males for both the severe and minor injury hospitalizations. Female workers were 71% and 64% less likely to be hospitalized for a severe or minor injury, respectively, compared to male workers. Overall for both severe and minor injuries, the rates of hospitalization increased with increasing age. Among the severe group, these increased rates were statistically significantly higher for the age categories 45 years and older, compared to the youngest hospitalized workers. Among the minor injury hospitalizations, the increased rates were statistically significantly higher across all age groups when compared to the youngest workers.

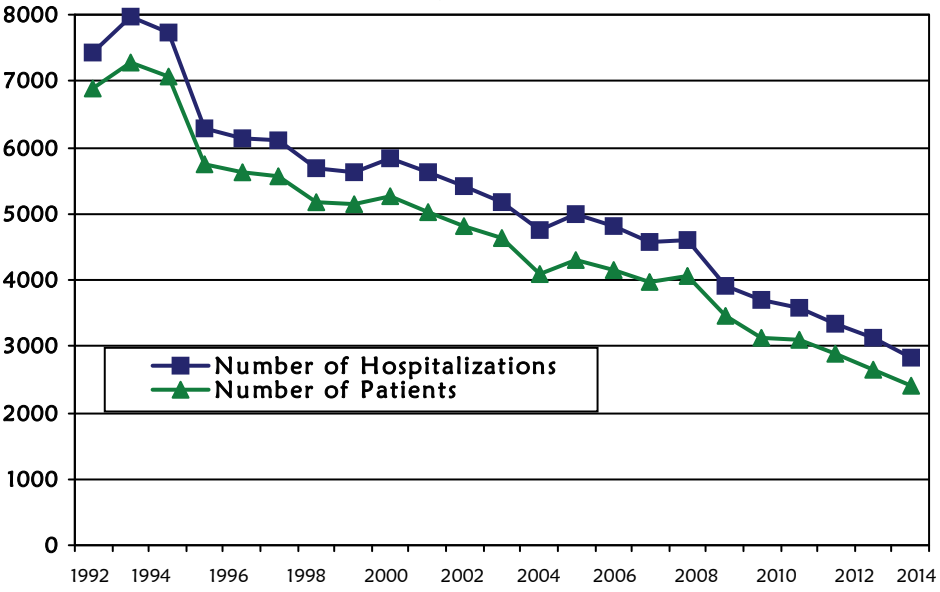
Figure 7 shows the distribution of the type of severe hospitalizations. Fractures accounted for 2,862 (66%) of all the severe injuries, followed by crushing or internal injuries with 1,011 (23%), intracranial injuries with 408 (9%), spinal cord injuries with 41 (1%) and open wounds accounting for 24 (1%) of the severe work-related hospitalized injuries from 2006-2014. Figure 8 shows the annual crude rate of work-related hospitalized injuries for severe and minor traumatic injuries per 100,000 workers by year and gender. Males had higher rates of hospitalization than females regardless of severity.

Figure 9 shows the annual crude rate of work-related hospitalized traumatic injuries by year and race. The crude rate for minor injuries among blacks showed a steep decrease beginning in 2011. Figures 10 and 11 show the annual crude rates of work-related hospitalizations severe (Figure 11) and minor (Figure 12) traumatic injuries by age.

For 2006 and 2014 we also evaluated

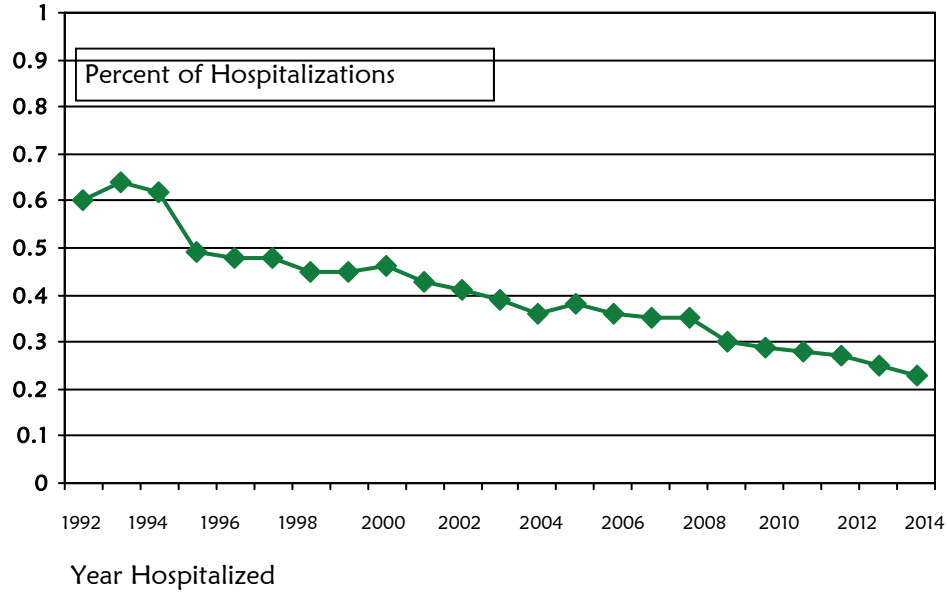
RESULTS, continued...

Figure 4
Hospitalizations and Patients with Workers' Compensation Designated as the Primary Payment Source at Discharge in Michigan: 1992-2014



The number of hospitalizations and patients with Workers' Compensation as the primary source of payment in Michigan has steadily declined over time.

Figure 5
Percent of Total Michigan Hospitalizations with Workers' Compensation Designated as the Primary Payment Source at Discharge in Michigan: 1992-2014



In calendar year 2014, there were 1,227,988 hospitalizations in Michigan. Of those, only 0.23% were paid for by Workers' Compensation. The percent of hospitalizations paid for by Workers' Compensation in Michigan has steadily declined over time.

RESULTS, continued...

Table 9 Primary Diagnosis of Hospitalizations in Michigan from 2002-2014, with Workers' Compensation Designated as Primary Payment Source at Discharge

	Year of Hospitalization												
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1º Discharge Diagnosis[a]	%	%	%	%	%	%	%	%	%	%	%	%	%
Infectious Diseases (001-139)	0.1	0.4	0.4	0.7	1.3	0.8	1.3	1.6	1.2	1.5	1.7	2.2	2.6
Neoplasms (140-239)	0.2	0.2	0.2	0.4	0.3	0.1	0.3	0.3	0.1	0.4	0.2	0.1	0.1
Endocrine Diseases (240-279)	0.4	0.3	0.4	0.2	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6
Blood Diseases (280-289)	<0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	<0.1	0.1	0.2	0.1	0.2
Mental Disorders (290-319)	0.9	0.7	0.8	0.6	0.9	1.0	0.9	0.9	0.8	1.0	0.6	1.0	0.9
Nervous System Diseases (320-389)	1.1	1.1	1.2	1.0	1.1	1.4	1.7	1.6	2.0	1.8	2.1	2.1	1.9
Circulatory Diseases (390-459)	2.1	2.6	2.9	4.0	3.8	4.6	4.1	4.7	4.8	4.7	3.9	3.1	4.0
Respiratory Diseases (460-519)	1.4	1.7	2.0	2.2	2.1	2.2	2.6	2.5	2.8	1.9	2.4	1.8	2.1
Digestive Diseases (520-579)	1.7	1.8	2.0	2.5	1.9	1.8	2.3	2.5	2.6	1.9	2.0	1.8	1.9
Genitourinary Diseases (580-629)	0.5	0.6	0.6	0.8	0.8	1.1	1.3	1.2	1.1	1.3	0.9	0.8	1.0
Pregnancy Complications (630-676)	0.5	0.4	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.3	0.1	0.3	0.4
Skin Diseases (680-709)	3.2	3.5	3.3	3.6	4.7	4.7	3.8	4.0	4.3	5.2	5.6	5.0	5.0
Musculoskeletal Diseases (710-739)	43.9	39.3	38.5	34.2	36.9	33.1	32.2	31.8	29.8	28.7	28.5	24.7	23.6
Congenital Anomalies (740-759)	0.2	0.2	0.3	0.1	0.4	0.3	0.2	0.3	0.3	0.3	0.2	0.2	0.1
Perinatal Complications (760-779)	--	--	--	--	--	<0.1	--	--	--	--	--	--	—
Symptoms & Signs (780-799)	1.2	1.7	1.5	1.8	2.3	1.7	1.9	1.4	1.8	1.6	1.4	1.3	1.4
Injury & Poisoning (800-999)	40.1	40.6	41.1	42.4	38.8	42.3	41.8	42.4	43.1	44.2	44.0	48.9	48.5
V Codes	2.2	4.7	4.6	5.5	4.1	3.9	4.6	3.8	4.3	4.6	5.3	5.9	5.8
Total[b]	**4809**	**5160**	**4760**	**4996**	**4825**	**4578**	**4611**	**3906**	**3688**	**3589**	**3333**	**3127**	**2823**

[a] International Classification of Diseases-9th Revision
[b]Totals vary due to missing information.

Table 10 Demographics of Hospitalizations in Michigan from 2002-2014, with Workers' Compensation Designated as Primary Payment Source at Discharge

	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Gender	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	%	%	%
Male	76	74	76	75	73	73	70	71	73	74	75	75	76
Female	24	26	24	25	27	27	30	29	27	26	25	25	24
Total[a] #	**4809**	**4635**	**4760**	**4996**	**4825**	**4578**	**4611**	**3906**	**3688**	**3589**	**3333**	**3127**	**2823**
Race	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	%	%	%
White	86	85	86	87	87	87	90	89	90	89	87	88	87
African Am	9	11	10	9	9	9	8	9	7	8	9	9	8
Asian	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1
Other	5	4	3	3	4	4	2	2	2	3	4	3	4
Total[a] #	**3123**	**3046**	**3172**	**3465**	**3261**	**3233**	**3255**	**2761**	**2671**	**2659**	**2557**	**2532**	**2286**
Age	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	%	%	%
< 15	<1	<1	<1	<1	<1	<1	--	--	<1	<1	<1	<1	<1
15-19	1	1	2	1	1	1	1	1	1	1	1	1	1
20-29	11	12	11	11	11	11	10	9	9	10	10	11	11
30-39	25	24	22	20	19	18	17	17	18	17	15	14	16
40-59	54	53	55	53	52	54	54	55	53	53	55	54	54
60-79	8	10	10	11	12	12	14	14	16	15	17	18	17
≥ 80	<1	<1	1	4	3	3	4	4	3	4	1	1	1
Total[a] #	**4792**	**4635**	**4760**	**4986**	**4825**	**4578**	**4602**	**3902**	**3688**	**3589**	**3333**	**3127**	**2823**
Avg Age	43	44	44	46	47	47	48	49	48	48	48	48	47
SD-Age	±12	±13	±12	±15	±15	±15	±15	±15	±14	±15	±13	±14	±14

[a]Totals vary due to missing information.

RESULTS, continued...

the E-codes used for cause of injury, for both severe and minor work-related hospitalizations. In 2006, E-codes were available for 68% of the severe and minor injuries. The most commonly reported causes for both severe and minor injuries, respectively, included: falls (46% and 40%), motor vehicle crashes (14% and 8%), machinery (14% and 15%), and struck by incidents (15% and 9%). In 2014, the use of E-codes was unchanged; accounting for 65% of severe and 63% of minor hospitalized injuries. The most commonly reported causes for severe and minor injuries, respectively, were: falls (50% and 45%), motor vehicle crashes (20% and 10%), machinery (13% and 15%), and struck by (9% and 7%).

Figure 6
Annual Crude Rate of Work-Related Inpatient Hospitalizations for Severe and Minor Traumatic Injuries per 100,000 persons age 16 years and older, Michigan, 2006-2014

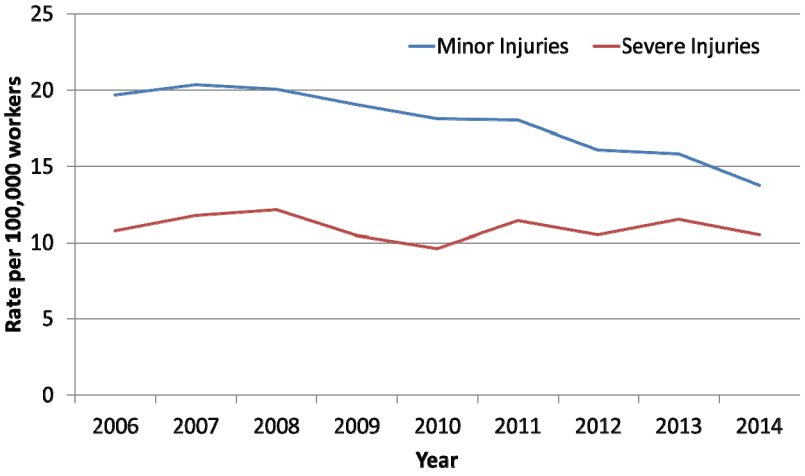


Table 11
Distribution and Rate of Work-Related Inpatient Hospitalizations for Severe Traumatic Injuries per 100,000 persons age 16 years and older, by Race, Sex and Age, Michigan, 2006-2014

	Number	Percent	Rate per 100,000 workers	RR (95% CI)
Race*				
White	2643	88.6	7.95	Reference
Black	242	8.1	5.62	0.71 (0.48,1.05)
Sex				
Male	3445	79.3	16.65	Reference
Female	901	20.7	4.78	0.29 (0.23,0.36)
Age (years)				
16-24	380	8.7	6.93	Reference
25-34	658	15.1	8.52	1.23 (0.84,1.80)
35-44	799	18.4	8.92	1.29 (0.89,1.86)
45-54	1102	25.4	11.31	1.63 (1.15,2.32)
55-64	991	22.8	16.58	2.39 (1.17,3.41)
65+	416	9.6	24.98	3.60 (2.37,5.47)

*Race was unknown for 1362 individuals and was not included in the calculation of percentages. Other races n=99 (included in the calculation of percentages).

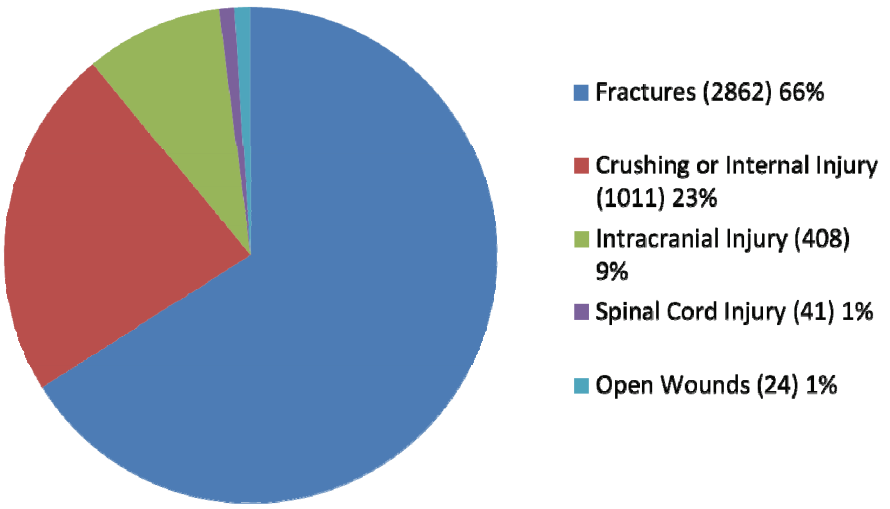
RESULTS, continued...

Table 12
Distribution and Rate of Work-Related Inpatient Hospitalizations for Minor Traumatic Injuries per 100,000 persons age 16 years and older, by Race, Sex and Age, Michigan, 2006-2014

	Number	Percent	Rate per 100,000 workers	RR (95% CI)
Race*				
White	4321	85.8	13.0	Reference
Black	522	10.4	12.13	0.93 (0.71,1.23)
Sex				
Male	5338	75.3	25.8	Reference
Female	1755	24.7	9.31	0.36 (0.31,0.42)
Age (years)				
16-24	636	9.0	11.6	Reference
25-34	1225	17.3	15.86	1.37 (1.03,1.82)
35-44	1534	21.6	17.13	1.48 (1.12,1.95)
45-54	1980	27.9	20.33	1.75 (1.34,2.29)
55-64	1373	19.4	22.97	1.98 (1.49,2.63)
65+	345	4.9	20.72	1.79 (1.21,2.65)

*Race was unknown for 2055 individuals and was not included in the calculation of percentages. Other races n=195 (included in the calculation of percentages).

Figure 7
Work-Related Inpatient Hospitalizations by Severe Traumatic Injury Type for persons age 16 years and older,



RESULTS, continued...

Figure 8
Annual Crude Rate of Work-Related Inpatient Hospitalizations for Severe and Minor Traumatic Injuries per 100,000 persons age 16 years and older, by Gender, Michigan, 2006-2014

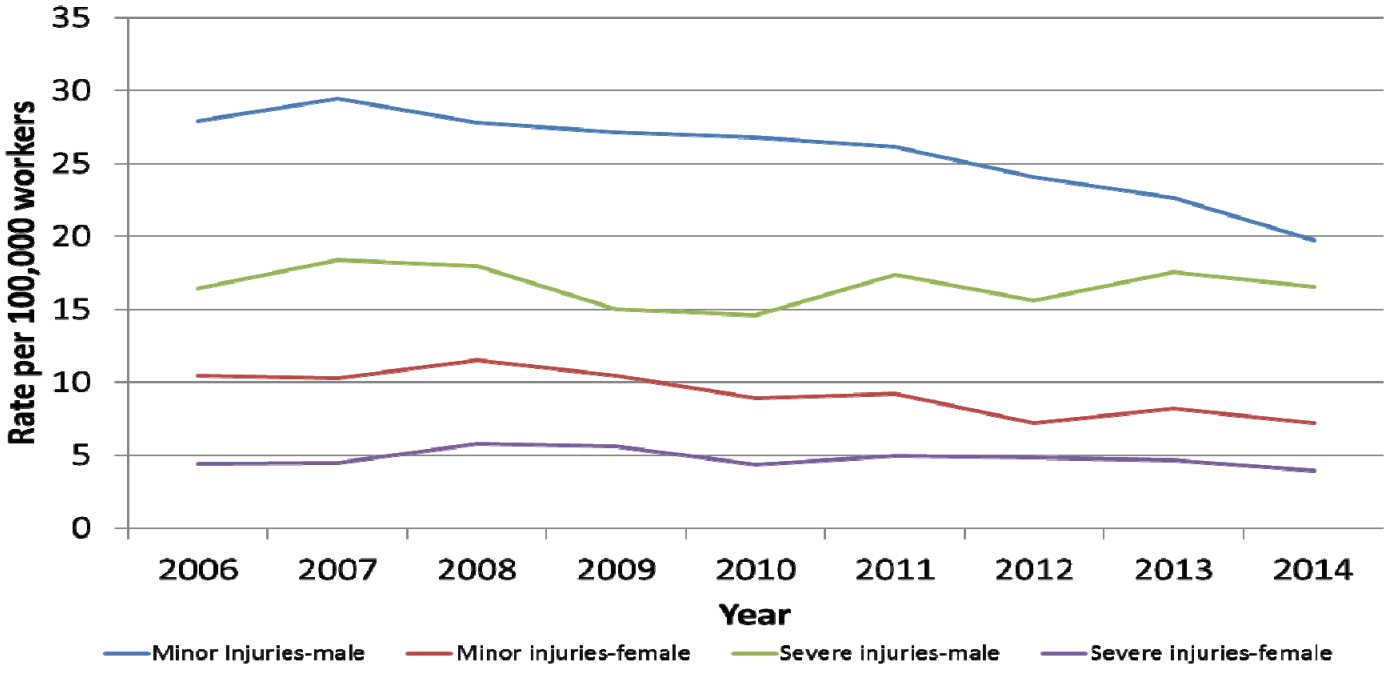
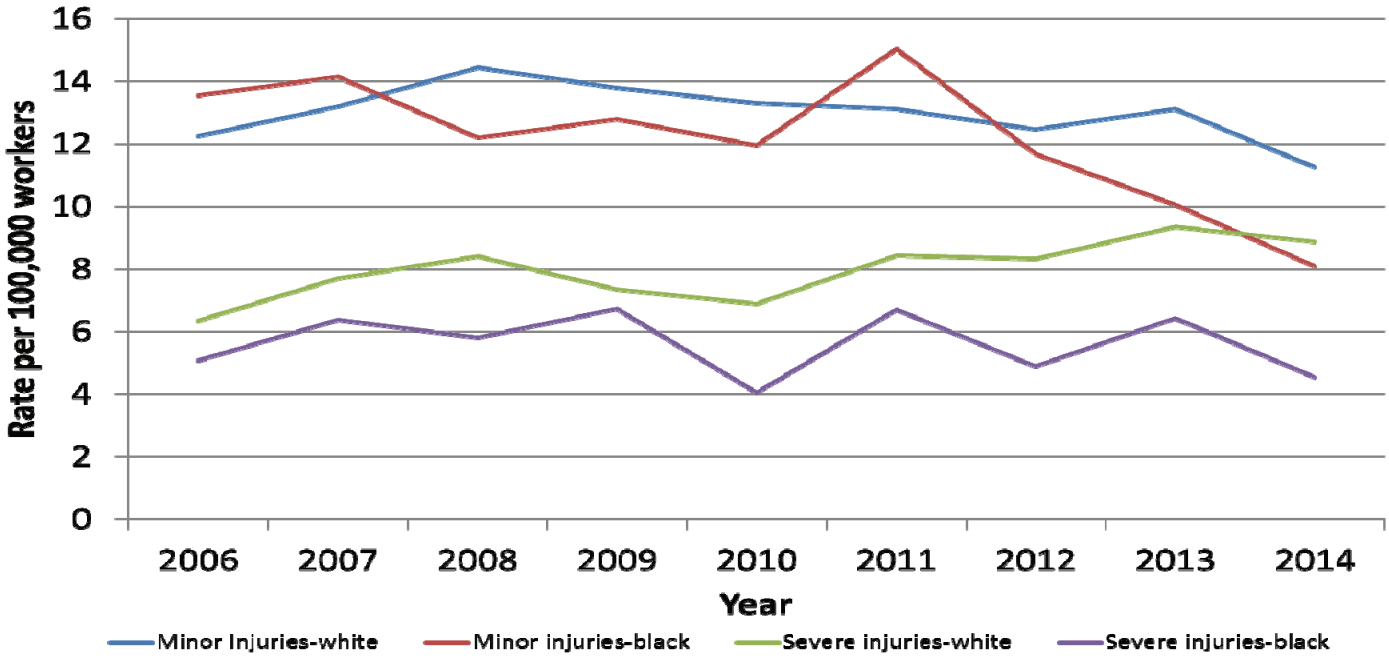


Figure 9
Annual Crude Rate of Work-Related Inpatient Hospitalizations for Severe and Minor Traumatic Injuries per 100,000 persons age 16 years and older, by Race, Michigan, 2006-2014



RESULTS, continued...

Figure 10
Annual Crude Rate of Work-Related Inpatient Hospitalizations for Severe Traumatic Injuries per 100,000 persons age 16 years and older, by Age Groups, Michigan, 2006-2014

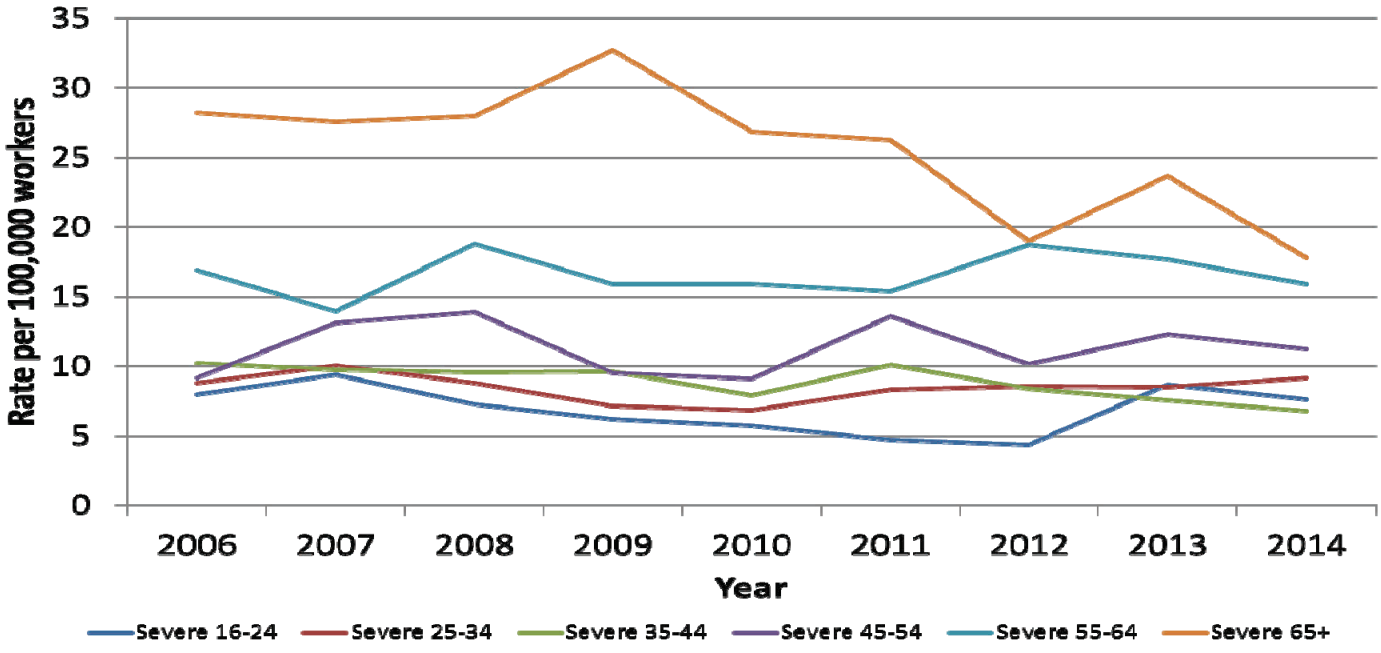
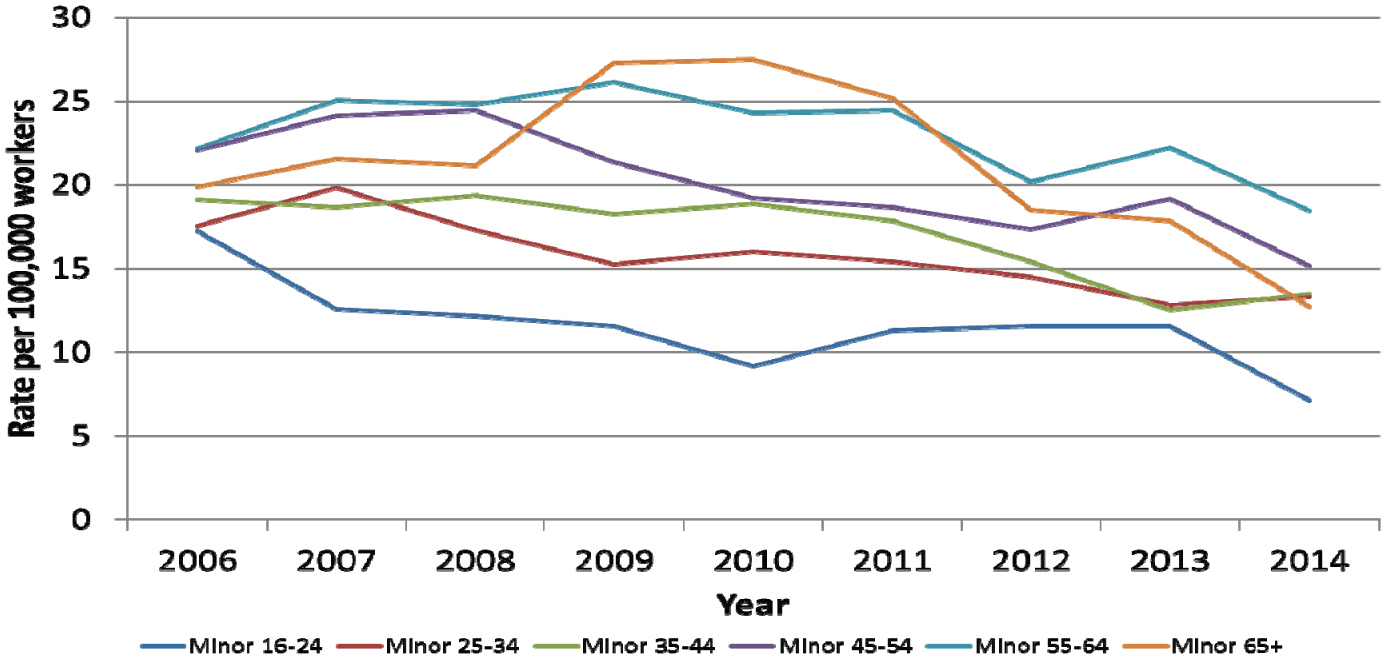


Figure 11
Annual Crude Rate of Work-Related Inpatient Hospitalizations for Minor Traumatic Injuries per 100,000 persons age 16 years and older, by Age Groups, Michigan, 2006-2014



RESULTS, continued...

Poison Control Center Data

In 2015, 839 calls to the Michigan Poison Control Center (PCC) were identified for individuals with work-related symptoms. Table 13 describes available demographic characteristics and disease categories of the individuals reported. There were more reports for males (61%). The individuals ranged in age from 16 to 75 years. Eighty-three percent of these individuals with known age were less than age 50. Of the 839 calls to the PCC in 2015, the top calls included: 229 (27%) for skin rash and burns, 135 (16%) for general symptoms, 105 (13%) for head and neck symptoms, and 104 (12%) for nausea and vomiting.

Table 13
Demographic Characteristics of 839 Individuals Reported by the Michigan Poison Control Center in 2015

Demographic Characteristics		
Age	#	%
15-19	46	6.2
20-29	279	37.7
30-39	169	22.8
40-49	121	16.4
50-59	97	13.1
60-69	27	3.6
≥ 70	1	0.1
Total	**740**[a]	99.9[b]
Gender	#	%
Male	498	60.5
Female	325	39.5
Total	**823**[c]	100.0
Disease Type	#	%
Skin Rash and Burns	229	27.3
General Symptoms	135	16.1
Head and Neck Symptoms	105	12.5
Nausea & Vomiting	104	12.4
Respiratory Symptoms	74	8.8
Cardiovascular Symptoms	20	2.4
Allergic Reaction	3	0.4
Lead Poisoning	1	0.1
Ill-defined	168	20.0
Total	**839**	100.0

[a]Age was unknown for 99 reports.
[b]Percent does not add to 100 due to rounding.
[c]Gender was missing on 16 reports.

Adult Blood Lead Epidemiology and Surveillance (ABLES)

In 2015, there were 14,308 adult Michigan residents reported by labs as having their blood tested for lead. Table 14 describes the demographic characteristics of the 1,802 individuals reported with a blood lead level of 5 ug/dL and above. Most individuals were males between the ages of 30 and 59. Construction and manufacturing were the most frequently reported industries of lead exposure. A comprehensive report on all blood lead levels in Michigan can be found at: www.oem.msu.edu, the 2014 Annual Report on Blood Lead Levels on Adults in Michigan.

Table 14
Demographic Characteristics of 1,802 Individuals Reported by Laboratories with Elevated Blood Lead in Michigan, 2015

	Blood Lead Level			
	>=5 & <10 *ug*/dL		>=10 *ug*/dL	
Age	#	%	#	%
16-19	10	0.9	5	0.7
20-29	129	11.8	100	14.1
30-39	232	21.2	201	28.3
40-49	231	21.1	159	22.4
50-59	231	21.1	146	20.6
60-69	147	13.4	73	10.3
≥ 70	113	10.3	25	3.5
Total	**1,093**	99.8[a]	**709**	99.9[a]
Gender	#	%	#	%
Male	897	82.1	666	93.9
Female	196	17.9	43	6.1
Total	**1,093**	100.0	**709**	100.0
Industry	#	%	#	%
Construction	148	43.8	167	41.6
Manufacturing	80	23.7	141	35.2
Utilities	46	13.6	36	9.0
Trade	18	5.3	20	5.0
Public Admin	24	7.1	8	2.0
Arts & Entertainment	4	1.2	11	2.7
Admin & Support	2	0.6	0	—
Transportation	5	1.5	5	1.2
Other Services	0	—	5	1.2
Prof & Scientific	11	3.3	5	1.2
Mining	0	—	0	—
Health Care	0	—	3	0.7
Real Estate	0	—	0	—
Total	**338**[b]	100.1[a]	**401**[b]	99.8[a]

[a] Percent does not add to 100 due to rounding.
[b] Industry was missing on 755 reports of blood lead levels <10 ug/dL and on 308 reports of blood leads >=10ug/dL.

DISCUSSION

There were 7,472 Occupational Disease Reports sent to LARA in calendar year 2015. These reports do not include occupational injuries. The most frequent types of occupational diseases reported to LARA were repetitive trauma illnesses (37%), toxic effects of substances (24%), signs and ill-defined conditions (11%) and respiratory diseases (8%). From 1988 through 1999, the number of reports sent to the State increased substantially. Figure 2 shows the number of occupational disease reports received each year since 1985. Since 1999, the number of reports had been decreasing, except for the increases in 2003, 2010, 2011 and 2013. There was a large decrease in the number of reports received in 2005, with over 2,200 fewer reports received than in 2004; in 2009 the total number of reports decreased by over 640 from 2008. In 2010, the number of reports increased to 7,952, an increase of over 1,000 reports since 2009, and in 2011 to 10,701, an increase of almost 4,000 reports, a decrease of 2,548 reports in 2012, an increase of 1,554 reports in 2013, a decrease of 1,395 reports in 2014, and a decrease of 756 reports in 2015.

The initial overall decline in the number of reports reflected fewer reports from company medical departments. The number of reports from non-company-affiliated practitioners remained relatively unchanged through 2004; however, from 2004 to 2009, there was a large decline of approximately 3,000 reports in the number of non-company-affiliated practitioner reports as compared to 2004 (Figure 3). The number of company-affiliated physicians or medical departments reporting decreased in 2015 to 100, compared to 190 in 2014, 210 in 2013, 179 in 2012, 188 in 2011, 185 in 2010, 194 in 2009, 449 in 2008, 426 in 2007, 396 in 2006, 374 in 2005, 373 in 2004 and 305 in 2003.

ICD-9 codes were used to classify the diagnosis or clinical impression recorded on the occupational disease reports submitted to LARA. Sprains and strains, except those involving the back, are considered by the federal and Michigan OSHA programs as illnesses secondary to cumulative trauma, and are therefore required to be reported even though in the ICD-9 coding system, sprains and strains are classified as injuries.

Many employers, physicians and other healthcare providers do not report patients with occupational diseases either because they are unaware of the reporting law or choose not to report for a different reason. Currently, reports are received from approximately 100 company-affiliated physicians reporting employees from 979 different companies; there were 150 non-company-affiliated physicians reporting patients to the state. There were 241,852 companies in the year 2015 and 30,607 licensed physicians in Michigan in the year 2015. Accordingly, reports are received from 0.4% of companies and 0.5% of physicians. Over the last several years, these percentages have remained largely unchanged. Efforts continue to remind employers of the requirement to report by routinely distributing reporting forms during MIOSHA inspections. In addition, all new physicians receive information on the requirement to report when they apply for medical licensure in Michigan.

The 7,472 occupational disease reports received this past year under-represent the actual incidence of occupational diseases in Michigan. Based on an MSU study matching multiple data bases in Michigan for the years 1999-2001, one could estimate that the BLS survey missed 50% of the total number of occupational illnesses in Michigan[2]. For 2014, the most recent year available, the BLS annual survey reported 6,000 illnesses; by extension one would expect 12,000 illnesses in 2014 instead of the approximately 8,200 reported in that year. Even these types of estimates are an underestimate because it assumes that all physicians recognize work-related illness in their patients and that all employers are informed when work-related conditions are diagnosed. These assumptions often go unmet, given the limited training that healthcare providers receive in diagnosing work-related conditions, and that many individuals never inform their employer when they are diagnosed with a work-related condition.

The type of illness and industry where occupational diseases occur as reported by non-company-affiliated healthcare practitioners differs from company-based healthcare practitioners (Tables 1, 4 and 5). The differences vary depending on the specialties of the non-company-affiliated physicians who submit reports. For example, in 2015 the non-company-affiliated health care practitioners were more likely to report patients with respiratory disease who work in small, non-manufacturing companies. A large percentage of the

DISCUSSION

year 2015 reports from non-company-affiliated health care practitioners were from physicians who are specialists in the radiographic interpretation of mineral and dust-related lung disease. However, regardless of the mix of non-company-affiliated specialists reporting, the data illustrates that relying on company-affiliated reports alone would cause occupational illness statistics to markedly undercount certain work-related conditions. Similarly, one cannot rely on Workers' Compensation data for a reliable count of work-related conditions. In a study covering the years 1992-1994, only 9.6% of the workers for whom an Occupational Disease Report was submitted had definitely filed a WC claim, although an additional 36% may have filed a claim for a total of 45.6%[3]. In that study, limits of the data did not allow for a more precise estimate of the claims filed, but the range underscores the point that a large number of workers do not file WC claims even though they are seen by a physician for their illness. This is an ongoing issue, as review of hospital discharge data for individuals with pneumoconioses shows only <1% - 8% paid by WC (2014 Annual Report: Tracking Silicosis and Other Work-Related Lung Diseases in Michigan, available at: www.oem.msu.edu).

Review of Table 8 shows a large difference in the distribution of occupational illnesses identified through the state's OD reporting system, compared to both the BLS Annual Survey of Employers and the state's WCA claims system. For example, poisoning represents approximately 28% (1,826) of the OD reports, while that category of diseases only accounts for approximately 2% (200 cases) of the BLS survey and <1% (5 cases) of WCA claims. Non-employer sources such as from the Poison Control Center, "B" Readers and laboratories provide additional occupational diseases not being reported by employers or practitioners.

Although it has been reassuring to see the drop in hospitalizations related to work (Figures 4 and 5), the new analyses that are summarized in this report show that the drop is due to a decrease in minor but not severe injuries (Figure 6). Increased effort to reduce these severe injuries may be assisted by the new requirements that were implemented in Michigan on 9-1-2015 for employers to report acute work-related hospitalizations (http://www.michigan.gov/lara/0,4601,7-154-10573_11472-370952—,00.html). In addition to tracking the overall incidence of occupational disease, a more comprehensive system allows us to identify areas of concern in our state, monitor trends, develop interventions designed to prevent additional occupational disease, and subsequently evaluate the effectiveness of these efforts.

REFERENCES

1. Public Health Services and Health Care Financing Administration. *International Classification of Diseases, 9th Revision, Clinical Modification.* Washington: Public Health Service, 1980.
2. Rosenman KD, Kalush A, Reilly MJ, Gardiner JC, Reeves M, Luo Z. *How Much Work-Related Injury and Illness is Missed by the Current National Surveillance System?* J Occup Environ Med 2006; 48:357-365.
3. Biddle J, Roberts K, Rosenman KD, Welch EM. *What Percentage of Workers With Work-Related Illnesses Receive Workers' Compensation Benefits?* J Occup Environ Med 1998; 40:325-331.