

Commentary

OSHA, Well Past Its Infancy, but Still Learning How to Count Injuries and Illnesses

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Although it has been almost 50 years since the passage of the Occupational Safety and Health (OSH) Act in 1970, concerns continue about the adequacy of the nation's occupational injury and illness surveillance system. Tracking of injuries and illnesses is a basic premise of prevention. Identification of industries and work groups with increased risk, determining which injuries and illnesses have the highest incidences, measuring trends over time, monitoring the effect of program activity, and ensuring that occupational injuries and illnesses receive their fair share of attention and resources depend on the ability to accurately and consistently measure the number and rate of injuries and illnesses. The importance of developing a tracking system for occupational injuries and illnesses was recognized in the original Occupational Safety and Health (OSH) Act of 1970, Pub. L. 91-596, 84 Stat 1590. The U.S. Secretary of Labor was authorized in Section 24 of the OSH Act to do the following: "(a) In order to further the purposes of this Act, the Secretary, in consultation with the Secretary of Health and Human Services, shall develop and maintain an effective program of collection, compilation, and analysis of occupational safety and health statistics. Such program may cover all employments whether or not subject to any other provisions of this Act but shall not cover employments excluded by section 4 of the Act." The employments excluded in Section 4 were workers covered by other federal agencies such as railroad and maritime workers and federal and state workers. The Secretary of Labor elected to delegate responsibility to collect, compile, and analyze occupational

safety and health statistics to the Bureau of Labor Statistics (BLS) in the Department of Labor. Despite the authority in the OSH Act to cover all workers, BLS elected to base their data collection program on an employer-based survey and supplementary workers' compensation data. The survey excludes the self-employed, workers on farms with 10 or fewer employees, private household workers, and Federal government workers (prior to 2008 all governmental workers were excluded). In the 1990's, BLS dropped the supplementary workers' compensation data, because it could only be obtained from a limited number of states. The BLS employer survey selects employers stratified by industries from the 44 states participating in the survey and sufficient employers from non-participating states to produce national estimates. State estimates are only provided for the participating states. Each case reported by an employer is weighted according to the stratified selection so as to allow extrapolation from the individual cases reported to a national estimate. Individual cases and weighting are maintained as confidential information.

Because of criticisms of the program during the 1970's and 1980's, a Panel on Occupational Safety and Health Statistics was convened by the National Research Council and issued a report in 1987 titled "Counting Injuries and Illnesses in the Workplace: Proposals for a Better System [NRC, 1987]." There were six major conclusions of that report: (i) the BLS system was inadequate in providing OSHA with data to conduct an effective program to prevent workplace injuries and illnesses; (ii) OSHA has neither used the data provided to it nor recognized the need for data to manage its program; (iii) no modification of the BLS survey would enable it to measure the rate of occupational illnesses; (iv) no adequate evaluation of the BLS survey for occupational injuries had been conducted; (v) BLS collects only a small proportion of the data employers are required by OSHA to record on occupational injuries and illnesses; (vi) the number of occupational fatalities is unknown with estimates ranging from 3,740 to 11,700. This last conclusion

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that the employer-based system was unable to provide a reliable estimate on the number of acute traumatic fatalities was particularly embarrassing and, in 1992, the Census for Fatal Occupational Injuries (CFOI) was initiated by BLS to conduct a census of acute traumatic fatalities rather than rely on the employer survey. This new system, which was not dependent on an employer survey but rather used multiple data sources, including death certificates, police reports, and newspaper clippings, had the immediate effect of doubling the number of acute traumatic fatalities identified in the United States. Estimates of the number of non-fatal traumatic injuries continued to be obtained from the employer survey. The changes that BLS made in response to the NRC report on non-fatal injuries were to increase the amount of data collected on cases with days away from work, job transfer, or restricted work injuries but not to expand the sources of data as was done with acute traumatic fatalities.

Subsequent to the changes in the 1990s, there has been an increasing number of studies showing that the employer-based surveillance system estimate of non-fatal occupational injuries markedly underestimated the true burden of occupational injuries [Leigh et al., 2004; Rosenman et al., 2006; Boden and Ozonoff, 2008]. That the BLS employer based surveillance system underestimates the number of non-fatal traumatic injuries should not come as a surprise given the inability of the employer-based survey to obtain an accurate estimate for the much more easily identifiable acute traumatic deaths. Figure 1 shows the differences between the BLS employer-based survey and Michigan’s multi-data source surveillance for four work-related injuries; amputations, burns, crushing injuries, and skull fractures [Kica and Rosenman, 2014; Largo and Rosenman, 2015; <http://www.oem.msu.edu/AnnualReports.aspx>]. Michigan’s multi-data source surveillance system uses hospital discharge records, emergency department records and workers’ compensation data as sources for all four injury types. In addition, the state’s poison control center has been used as one of the sources to identify work-related burns. Depending on the condition, the BLS employer survey only identified 36.9–47.8% of the injuries identified in Michigan’s multi-data sources

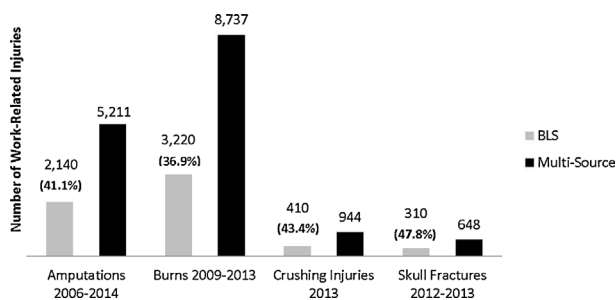


FIGURE 1. Comparison of multi-source data surveillance in Michigan versus the Bureau of Labor Statistics Employer Based Survey for work-related amputations, burns, crushing injuries, and skull fractures.

surveillance system. These low percentages of cases identified are consistent with what was found for acute traumatic fatalities when such fatalities were identified from the BLS employer survey prior to the current CFOI system.

The Health and Safety Executive (HSE) of the United Kingdom also collects data on occupational injuries and illnesses from an employer-based survey. However, the HSE also conducts a worker-based survey and, unlike the way BLS presents it data, the HSE does not present the employer-based results in isolation. Rather the official HSE statistics combine data from both the employer- and worker-based surveys to provide a more comprehensive picture of occupational injuries and illnesses (Fig. 2). As in the United States, the number of occupational injuries and illnesses identified in the United Kingdom employer-based survey is appreciably less than the total estimate 198,000 of 611,000 (32.4%) [HSE, 2015].

Given the limited changes made to the approach to counting non-fatal injuries in response to the 1987 NRC review and studies highlighting the incompleteness of the BLS data, concern about underreporting in the BLS employer-based survey led to congressional hearings and, in 2009, appropriations to fund research to determine the cause for the underestimate. The three publications in this issue of AJIM from the National Institute for Occupational Safety and Health (NIOSH) are some of the studies funded from this appropriation [Bhandari et al., 2016; Marsh et al., 2016; Tonozzi et al., 2016]. AJIM has previously published studies conducted in California, Massachusetts, and Washington, which were also funded by BLS from the same appropriation [Boden, 2014; Davis et al., 2014; Joe et al., 2014; Wuellner and Bonauto, 2014].

There can be multiple reasons why a surveillance system based on employer reporting can be incomplete. One of the many “filters” that have been described that could contribute to underreporting is that employees do not report their injury to the supervisor and their employer never becomes aware of the injury or illness [Azaroff et al., 2002]. The three papers reported in this issue of AJIM

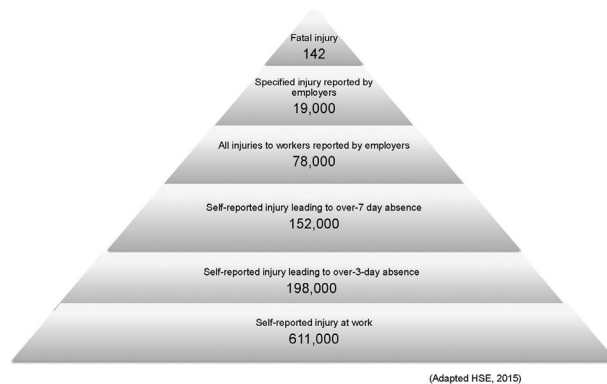


FIGURE 2. Injury severity triangle, United Kingdom work-related injuries 2014/15.

address whether employers with employees with a serious enough work-related injury to go to an emergency department are aware of their employee's injury. The sample of injured workers was obtained from a national sample of approximately 67 of the 5,000 emergency departments (EDs) in the United States, the National Electronic Injury Surveillance System (NEISS). Follow back interviews were conducted in 2012 and 2013 of injured workers identified as being treated in this national sample of emergency departments. One of the three publications presents the results in the sample of workers who requested doing the interview in English and the second among individuals who requested doing the interview in Spanish. The third publication discusses the difficulties faced in doing these two follow back surveys, which were only able to interview 20% and 25%, respectively, of the injured workers. The goal of the NIOSH studies was to "to assess whether workers treated in EDs reported their injury or illness to their employer and their reasons for reporting or not reporting."

The most obvious example of why an employee might not inform their supervisor of a work-related condition would be a retiree who developed a chronic disease such as mesothelioma or silicosis years after they retired and used Medicare to pay for their health care. Reasons why a current employee may not report their injury to their employer include the employee does not believe the injury is serious enough, negative incentives from the employer when an employee does report an injury (e.g., increased scrutiny, penalization for being "accident prone"), positive incentives not to report injury (e.g., rewards for most injury free days), unfamiliarity with how to report, and the generally easier process of obtaining treatment using one's regular insurance and seeking care from one's personal physician.

NIOSH has previously reported that an estimated 3.6 million work-related injuries and illnesses were treated in hospital emergency departments in 1998 based on the emergency surveillance system [Jackson, 2001]. Combined with National Health Interview Survey (NHIS) Occupational Supplement data that showed that only 34% of occupational injuries were treated in the emergency department, the total estimate of work-related injuries and illnesses in 1998 based on the emergency data surveillance system was 10.5 million [Jackson, 2001]. This compared to the BLS estimate of 5.9 million work-related injuries and illnesses for the same year, the BLS estimate being only 56% of the estimate based on emergency room and NHIS data.

The authors of these three new NIOSH studies concluded "that ED medical record data may not be appropriate for assessing underreporting issues because workers treated in the ED for a work-related injury or illness are likely to have reported to their employer." Although the authors were unable to address the original objective of their studies, these NIOSH studies have provided important

information on the BLS underreporting issue; the substantial difference between the BLS and ED estimates previously reported by NIOSH is not due to the lack of awareness of the injury or illness by the employer since only 3–4%, respectively in the two surveys, of the work-related injuries treated in the emergency department were not known by the injured worker's employer. This is an important finding and suggests efforts to improve surveillance at least for injuries serious enough to involve an emergency department visit should not focus on employer awareness of the injury. Strengths of the NIOSH work were the selection of the workers to be interviewed from a nationally representative sample and that one of the two surveys were specifically for the potentially vulnerable group of workers who indicated a preference to do the survey in Spanish. However, the conclusion that employers were aware of injuries among their employees who had emergency department treatment needs to be understood with the caveat that the NIOSH surveys had a very poor response rate of only 20–25% and that the high percentage of respondents that reported their employers were aware may not be generalizable to all workers treated in the emergency department and certainly not generalizable to the other approximately 65% of work-related injuries and illnesses not treated in the emergency department. Additional caveats in interpreting the generalizability of the results were that volunteer workers, day laborers, and workers under 20 or over 64 years old were excluded from the NIOSH surveys.

A separate issue related to the BLS employer-based survey is that, because of BLS confidentiality policies, the data cannot be used to target individuals companies with high injury rates, nor can individual injuries be used as sentinel cases to initiate follow-up activity. The data can be used to target industries with higher risk, given the caveat that certain industries such as agriculture may have more underreporting than other industries [Leigh et al., 2014] and, therefore, have inaccurately low injuries rates in the BLS statistics. The use of individual cases to initiate OSHA compliance inspections has been shown to be effective for elevated blood lead levels, amputations, burns, and skull fractures [Rosenman et al., 2001; Kica and Rosenman, 2014; Largo and Rosenman, 2015]. See Table I for a summary of OSHA follow back inspections of work-related amputations from Michigan's multi-data sources surveillance system. Eighty-eight percent of the companies inspected due to a work-related amputation were cited for violations directly related to the amputation hazard, and 61% of the companies had not corrected the hazards leading to the amputation even though the inspection took place 3–6 months after the amputation had occurred. On a national level, OSHA has partially addressed the need to have data on individual companies by promulgating regulations in 2014 requiring employers to report directly to OSHA all overnight hospitalizations for treatment of non-motor vehicle work-related incidents and

TABLE I. Michigan OSHA Amputation Inspections, Michigan 2006–2012

Total inspections	Companies with violations	Violations			Penalties		
		Total	Average	Median	Total	Median	Max
172	160 (93%)	1,566	44	7	\$652,755	\$800	\$134,310

Adapted from Largo and Rosenman, OEM 2015.

all amputations and eye enucleations that occur within 24 hr of the work-related incident (https://www.osha.gov/pls/oshaweb/owadis.show_document?p_table=STANDARDS&p_id=12783). Just this year OSHA adopted regulations that will require all companies with 250 or more employees and companies with 20–249 employees from certain industries to electronically submit their OSHA log of injuries and illnesses (<https://s3.amazonaws.com/public-inspection.federalregister.gov/2016-10443.pdf>). Although these two new regulations will allow OSHA to use injury and illness data to target individual companies and conduct sentinel case follow-up, neither incorporate multiple data sources, so underreporting can be expected. Based on the NIOSH surveys, one would expect employers to be aware of injuries that are severe enough to be covered by these new regulations and any underreporting that occurs would be expected to be from employer non-compliance.

There appears to be a general consensus that the current BLS employer-based survey neither adequately estimates non-fatal occupational injuries nor occupational illnesses and “a more coordinated, cost-effective set of approaches for occupational safety and health surveillance is needed in the United States” [NAS, 2016]. A new National of Academies of Sciences, Engineering and Medicine Committee titled “Developing a Smarter National Surveillance System for Occupational Safety and Health in the 21st Century” was convened this year and is expected to issue a report by the end of 2017 [NAS, 2016]. The papers from NIOSH contribute to the knowledge about occupational injury surveillance by finding that the underreporting identified in the BLS employer survey is not secondary to underreporting by workers to their employers, whether or not Spanish is their preferred language, among workers with severe enough injuries to use the emergency department for treatment. This conclusion is limited by a poor response rate and the fact that volunteer workers, day laborers, and young and old workers were excluded from the NIOSH studies.

AUTHORS' CONTRIBUTIONS

Dr. Rosenman conceived this manuscript, interpreted the data, wrote and revised the manuscript, and is accountable for

ensuring all questions related to the accuracy or integrity of the work.

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The author declares no conflicts of interest.

DISCLOSURE BY AJIM EDITOR OF RECORD

Steven Markowitz declares that he has no competing or conflicts of interest in the review and publication decision regarding this article.

DISCLAIMER

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