

Evaluation of the Louisiana Early Event Detection System for Timely Capture of Work-related Amputations

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On January 1, 2015, the Occupational Safety and Health Administration (OSHA) began enforcing its updated Recordkeeping Rule regarding severe injury reporting, which requires employers to report all work-related inpatient hospitalizations, amputations, and losses of an eye within 24 hours of occurrence. Previously, employers were only required to report inpatient hospitalizations of three or more employees for a single event. The rule was updated to improve access to information about workplace safety and health and allow OSHA to utilize these types of injuries as sentinel events to trigger investigations into specific workplaces. Investigations frequently uncover other safety issues at the work site which, when corrected, prevent further worker injury.

In 2015, United States employers reported 2,723 work-related amputations to OSHA; Louisiana employers reported 55 of these. Because accurate capture of cases relies on employer reporting, there are concerns about under-reporting. The Bureau of Labor Statistics collects work-related injury and illness data from 230,000 private industry, state, and local government establishments each year for the Survey of Occupational Injuries and Illnesses (SOII). Though not administered by OSHA, the SOII uses OSHA's recordkeeping guidelines to make data collection convenient. In addition, the SOII encompasses industries not regulated by OSHA, such as railroad and mining.

In 2015, SOII captured 220 work-related amputations with days away from work in Louisiana, 3.8 times the number of work-related amputations reported by employers to OSHA that year. The large difference in the number of cases reported to OSHA versus the SOII adds to concerns that employers are under-reporting severe work-related injuries to OSHA. While the difference may be at least partially explained by the difference in the scope of employers included in the SOII versus those regulated by OSHA, a likely contributing factor is employer knowledge that SOII data is for statistical purposes only and cannot be used for any regulatory purpose. There are concerns that, for a variety of reasons, the SOII also undercounts injuries and illnesses; therefore, the actual number of work-related amputations that occurred in Louisiana in 2015 may be higher than 220.

The Louisiana Department of Health (LDH), Occupational Health and Injury Surveillance Program (Occ. Health Program), supports OSHA's efforts to protect worker safety and health. The

Occ. Health Program currently tracks work-related injuries using the Louisiana Hospital Inpatient Discharge Database (LAHIDD) and emergency department (ED) databases; however, there are issues with these data sources. They do not directly capture work-relatedness. In occupational health, work-related cases are commonly captured by selecting records that have workers' compensation as a payer or a work-related external cause of injury ICD code in one of the diagnostic fields; however, it is generally accepted that this method will undercount cases. Additionally, LAHIDD and ED data are retrospective; data is typically not received until a year or more after occurrence. Consequently, LAHIDD and ED records cannot be used for OSHA case referral because work site investigations must be completed within six months of the injury occurrence.

A pilot project was carried out to evaluate the usefulness of the Louisiana Early Event Detection System (LEEDS) in identifying work-related amputations in a timely enough manner to make case referral to OSHA feasible. LEEDS is a near real-time reporting syndromic surveillance system that receives data from 70 emergency departments in the state. A syndrome is assigned to each LEEDS record based on the text contents of the chief complaint, admit reason, and discharge diagnosis fields. The Occ. Health Program receives a subset of LEEDS data biweekly from LDH's Infectious Disease Epidemiology Program, containing potentially work-related syndromes; amputation is one of these syndromes.

While evaluation of the LEEDS data was the primary goal of this project, LAHIDD (2000-2014) and ED (2010-2012) data was summarized to provide a snapshot of the scope of work-related amputations in the state. The site of amputation for most inpatient hospitalizations (n=682) was finger/thumb (62.0%), followed by lower limb (18.3%), and toe amputations (13.0%). Upper limb amputations and multiple site amputations each comprised less than 5% of work-related amputation hospitalizations. The amputation site for nearly all ED visits (n=515) was finger/thumb (92%), followed by lower limb amputations (3.3%); all other sites each comprised less than 3% of work-related ED amputation visits.

Table 1 displays the distribution of work-related amputation hospitalizations and ED visits stratified by sex, age, and race as well as crude rates and rate ratios with 95% confidence intervals (CI).

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Table 1. Distribution, Crude Rates and Ratios of Work-Related Amputation Hospitalizations and ED Visits by Sex, Age, and Race - Louisiana, 2000-2014

	LAHIDD, 2000-2014			ED, 2010-2012		
	Count	Rate *	Rate Ratio (95% CI)	Count	Rate *	Rate Ratio (95% CI)
Louisiana	682	2.36	---	515	8.96	---
Sex						
Male	633	4.16	11.62 (8.69, 15.88)	467	15.34	8.64 (6.41, 11.89)
Female	49	0.36	Reference	48	1.78	Reference
Age Group (Years)						
16-24	86	4.21	2.39 (1.47, 4.05)	95	12.89	2.45 (1.42, 4.56)
25-34	149	2.35	1.33 (0.84, 2.21)	115	8.98	1.71 (0.99, 3.15)
35-44	165	2.42	1.37 (0.87, 2.28)	114	8.79	1.67 (0.97, 3.09)
45-54	167	2.53	1.43 (0.91, 2.38)	123	9.55	1.82 (1.06, 3.35)
55-64	94	2.48	1.41 (0.87, 2.38)	53	6.18	1.18 (0.65, 2.25)
65+	21	1.76	Reference	15	5.25	Reference
Race[^]						
White	362	1.77	Reference	317	7.86	Reference
Black	157	2.01	2.01 (0.93, 1.37)	110	7.08	0.90 (0.72, 1.12)
Other	79	11.89	6.71 (5.19, 5.58)	49	30.49	3.88 (2.81, 5.26)

Within each stratification, a reference group is identified. Rate ratios compare the rate of each sub-strata to the reference group. Bold rate ratio indicates statistical significance; *Rates are per 100,000 Louisiana workers; ^ Does not include cases where race was unknown (n=34). For rate calculation, Louisiana's employed population was obtained using the National Institute of Occupational Safety and Health Work-related Injury Statistics and Resource Data System's Employed Labor Force application, which utilizes data from the BLS Current Population Survey.

Approximately 1.5 months of LEEDS data (9/17/17-11/1/17) was queried for the syndromic keyword 'AMPUTATE' and limited to patients aged 16 to 80 years. This resulted in 78 potentially work-related amputation records. Of the 78 records, 32 were excluded because the amputation was due to a medical condition, such as diabetes mellitus or osteomyelitis, or because there was more than one record captured in LEEDS for the same patient on the same day. The medical records for the remaining 46 cases were requested from the treating facility so that physician notes and payer information could be reviewed. OSHA requires employer information in order to open an investigation; therefore, an attempt was made to identify employer information in the medical record. Thirty-three (71.7%) of the requested medical records were received.

Table 2 shows the final determination of work-relatedness for the LEEDS data set (n=46) stratified by sex, age group, race, and body part. Eleven work-related amputation cases were identified from LEEDS data (n=1) or by physician's note and/or workers'

compensation as payer in the medical record (n=10).

Table 2. Amputations by Work-Relatedness, Age, Sex, Race, and Body Part, LEEDS, 9/17/2017-11/01/2017

	Total	Work-Related	Not Work-Related	Undetermined*
Louisiana	46	11	11	24
Sex				
Male	43	11	10	22
Female	3	0	1	2
Age Group (Years)				
16-24	7	3	2	2
25-34	9	1	2	6
35-44	10	4	1	5
45-54	7	2	4	1
55-64	7	1	1	5
65+	6	0	1	5
Race				
White	25	4	8	13
Black	6	2	0	4
Other	2	1	1	0
Unknown	13	4	2	7
Body Part				
Finger/Thumb	42	10	10	22
Upper Limb	1	0	0	1
Toe	3	1	1	1
Lower Limb	0	0	0	0

* Undetermined includes medical records that were not received as well as those for which work-relatedness was still unclear after medical record review.

Only two work-related records contained employer name; however, contact was made with the area director of OSHA to see if it was possible to link any of the cases identified in LEEDS with cases reported to OSHA. The following information was provided to OSHA for this purpose: patient age and sex, triage date, treating facility, site of injury, and employer name (if available). None of the work-related amputation cases identified in LEEDS could be linked to cases reported to OSHA, providing further support to the concern about employer under-reporting of worker injuries to OSHA.

Although this finding validates the Occ. Health Program's endeavor to make timely identification of work-related injuries using LEEDS data, a decision was made not to pursue use of LEEDS data for this purpose. Only one case could be identified using LEEDS data alone, requiring medical record request and review of nearly 50 records for a period spanning only 1.5 months. The resources required to maintain an effort of requesting, obtaining, and reviewing such a volume of medical records are not available at this time.

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