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Characterizing Emergency Department Patients Who Reported Work-Related Injuries and Illnesses

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Background *Per a Congressional directive and funding, this study describes worker and workplace characteristics of emergency department (ED) patients who reported their injury/illness to their employer. The study also responds to Congress's request to enumerate injured/ill self-employed workers and workers with chronic conditions.*
Methods *We conducted a follow-back study on injured/ill workers, including self-employed, identified from a national ED surveillance system from June 2012 through December 2013.*
Results *An estimated 3,357,000 (95%CI: 2,516,000–4,199,000) workers treated in EDs reported their injury/illness to their employer or were self-employed. Of those, 202,000 (95%CI: 133,000–272,000) had a chronic condition. Of all reporters, excluding self-employed, 77% indicated they received instructions as to whom to report.*
Conclusion *The study did not identify underreporting issues and revealed that medical records data may not be appropriate for assessing underreporting. Additional research is needed to examine workplace characteristics that encourage injury and illness reporting.*
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KEY WORDS: employee reporting; employment characteristics; follow-back study; non-fatal occupational injury and illness reporting; telephone interviews

INTRODUCTION

Occupational injury and illness surveillance is the systematic collection, analysis, and interpretation of work-related injury and illness data used to improve workplace safety and health [CDC/NIOSH, 1998]. Existing occupational injury and illness surveillance efforts rely heavily on workers reporting their injuries and illnesses to their employer or health care professional. Consequently, the ability and willingness of workers to report a work-related injury or illness is critical. Timely and reliable reporting can increase the accuracy of occupational injury and illness surveillance and enable allocation of limited resources for targeted prevention and control in the areas of greatest need.

A single, comprehensive data source for non-fatal occupational injuries and illnesses does not exist. The two primary sources of national non-fatal occupational injury surveillance data are: (i) the Bureau of Labor Statistics (BLS) annual Survey of Occupational Injuries and Illnesses (SOII) and (ii) the National Institute for Occupational Safety and Health (NIOSH) Occupational Supplement to the National Electronic Injury Surveillance System (NEISS-Work). Both sources are constrained by their methodologies and data sources, limiting the portion of non-fatal occupational injuries and illnesses that they capture.

The only national employer-based surveillance system for non-fatal occupational injuries and illnesses is the BLS SOII. Approximately 250,000 United States (U.S.) private industry establishments and state and local government

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organizations are required to report workplace injuries and illnesses based on information captured in their Occupational Safety and Health Administration (OSHA) logs [Wiatrowski, 2014a]. In 2012, approximately 3.8 million non-fatal occupational injuries and illnesses were reported [BLS, 2015].

With its large sample size, high response rate, and standardized data collection, SOII is an extensive data source, but not exhaustive. It captures injuries and illnesses that require days away from work, restricted work activity or job transfer, medical treatment beyond first aid, or diagnosis of a significant injury or illness by a licensed health professional [BLS, 2012a]. Because OSHA recordkeeping guidelines do not apply to all employers, SOII does not include private household workers, self-employed individuals, farm employers with fewer than 11 employees, and employees of the federal government and United States Postal Service. The likelihood of a case being captured in SOII has been associated with the type of injury or illness [Wiatrowski, 2014b], the duration from injury or illness onset to reporting, ability to determine work-relatedness [Nestoriak and Pierce, 2009], and compliance with OSHA recordkeeping guidelines [Wuellner and Bonauto, 2014].

The second source of national data, NEISS-Work, captures non-fatal occupational injuries and illnesses treated in hospital emergency departments (EDs) regardless of employer type, industry, or employer size. NEISS-Work is collected by NIOSH using data from a national sample of U.S. hospital EDs and focuses on patients and healthcare providers as the source of work-related injury and illness reporting. In 2012, an estimated 2.8 million (95% confidence interval [CI]: 2,208,000–3,392,000) non-fatal occupational injuries and illnesses were treated in EDs; approximately 140,000 (95%CI: 94,000–186,000) of these injuries and illnesses resulted in hospitalization [CDC/NIOSH, 2015].

Hospital ED surveillance captures workers considered out-of-scope by SOII such as the self-employed, but there are limitations. For example, the proportion of injuries and illnesses captured by NEISS-Work is limited to injuries and illnesses treated in an ED. Consequently, NEISS-Work estimates are likely biased towards certain types of injuries and illnesses because some types receive treatment more frequently in medical venues other than EDs [CDC/NCHS, 2014]. NEISS-Work is also limited because workers may not identify their injury or illness as work-related to ED staff, or ED staff may omit details of the work-relatedness of injury or illness circumstances in medical documentation. The absence of such information in ED records hinders the ability of medical records abstractors to consistently identify injuries and illnesses as work-related [Jackson, 2001]. However, ED surveillance systems have been shown to capture less severe cases. Data from the 2010 Nationwide Emergency Department Sample show that of the 22 million injury-related ED visits in the U.S., 90% were of mild severity [Villaveces et al., 2013].

One of the biggest challenges for surveillance systems relying on employer reporting, such as SOII, is the potential disincentives for both the employers and employees to report injuries occurring at their workplace [Azaroff et al., 2002]. Concerns of underreporting in SOII [U.S. House of Representatives, 2008] led to a mandate from Congress that directed OSHA, NIOSH, and BLS to conduct studies to assess the quality and completeness of non-fatal occupational injury and illness surveillance [U.S. House of Representatives, 2009].

NIOSH's response to this mandate was to assess NEISS-Work for potential underreporting. NEISS-Work data lack specific information on workers treated in the ED for work-related injuries and illnesses, such as whether the workers reported their injury or illness to their employer, their reasons for reporting, and characteristics of their employment and workplace environment. However, NEISS-Work affords the opportunity to conduct follow-back studies of injured or ill workers to gather specific information missing from its routine surveillance data [Hartley et al., 2012]. NIOSH has successfully conducted several NEISS-Work follow-back studies in the past [Castillo and Rodriguez, 1997; Chen and Jenkins, 2007a,b; Hartley et al., 2012].

Given the directive from Congress, NIOSH collaborated with the U.S. Consumer Product Safety Commission (CPSC) to conduct follow-back study interviews of injured or ill workers identified from a sample of NEISS-Work cases to assess whether workers treated in EDs reported their injury or illness to their employer and their reasons for reporting or not reporting. In addition to assessing underreporting, Congress directed NIOSH to study two populations that are generally not captured in other systems: (i) self-employed and (ii) workers with work-related chronic injuries or illnesses [U.S. House of Representatives, 2009]. As our results suggest, the survey failed to contact, engage, and identify enough eligible respondents who did not report their injuries or illnesses to their employers or to someone for whom they were performing work to produce stable, reliable estimates [Marsh et al., 2016]. This necessitated a revision of the initial study objectives that had included describing the differences between the respondents who did and did not report their injuries and illnesses. Therefore, the focus of this paper is to describe the socio-demographic and employment characteristics of workers who reported their injuries or illnesses to their employer. We also describe workplace environment characteristics, including provision of instructions to workers on reporting injuries and illnesses at their workplace, and availability of paid time-off.

METHODS

The following is a condensed description of the methodology used for this NEISS-Work follow-back study.

A more detailed description is provided in a companion manuscript [Marsh et al., 2016].

NIOSH collects NEISS-Work data in collaboration with the CPSC[1] to estimate the number of non-fatal work-related injuries and illnesses treated in U.S. EDs. NEISS-Work is a clustered sample of visits from a stratified probability-based sample of approximately 67 U.S. hospital EDs [Jackson, 2001]. A work-related case is identified by medical chart review and is eligible for NEISS-Work if an injury or illness was incurred by a civilian non-institutionalized worker while working for pay or compensation, working on a farm, or working as a volunteer for an organized group. Each work-related injury or illness is only counted once, regardless of the number of patient ED visits required. For the purposes of NEISS-Work, an injury typically involves a single, instantaneous event such as a cut, fracture, or sprain. Illnesses must have a causal link with work. They include various conditions such as asthma, dermatitis, and repetitive motion disorders. While these definitions and examples are provided to the hospital coder to aid case identification, hospital coders are not responsible for assigning codes designating whether the patient was treated for an injury or an illness. These are assigned later in the process by trained CPSC staff and were used only for the purpose of identifying illness cases during the sampling process.

For this follow-back study, the NEISS-Work data were used for potential respondent identification via weekly sampling of cases treated in EDs from June 2012 through December 2013. Samples were drawn by CPSC and reviewed by NIOSH to confirm eligibility of potential respondents. In addition to the NEISS-Work eligibility criteria described above, follow-back criteria included: workers 20–64 years of age; fluent in English or Spanish; treated in an ED for an injury/illness/exposure/pain that was considered work-related; and working for pay, working for a family business, working on a farm or ranch, or self-employed at the time of the injury or illness. Age was restricted to 20 years and older to ensure that no worker in any state was a minor for whom a parental or guardian consent would have been required. The age range was chosen to minimize the influence of working students (those <20) and semi-retired (those >64). Workers <20 and >64 only accounted for a small proportion ($\sim 7\%$) of workers treated in EDs [CDC, 2016]. The study excluded volunteers and day laborers because their unique work situations and their small populations made it unlikely that sufficient data could be collected to meet reporting requirements established for statistical stability and confidentiality. Additional reasons for excluding day laborers included the fact that they generally could not be pre-identified for sampling purposes and would likely not have viable contact information. In addition, this particular group needed special consideration because of their unique reporting requirements, or lack thereof; their highly variable, unpredictable employment arrangements [Gonzalez, 2007]; and language and cultural issues. In order to minimize recall bias, cases whose ED visit was more than 30 days prior to the sampling date were also excluded. Self-employed and farm or ranch workers were sampled with certainty because they were of particular interest for this study. Patients with illnesses were also sampled at a higher rate because they were an additional special interest subpopulation.

Pilot testing and cognitive testing of the questionnaire were completed prior to conducting the interviews. The telephone interview questionnaire consisted of open-ended and multiple choice questions covering items such as demographics, injury and illness characteristics, employment and workplace characteristics, reporting of injury or illness at the workplace and the ED, medical coverage and return to work, and history of chronic conditions. The questionnaire began with questions to confirm respondent eligibility, including an assessment of whether or not the injury or illness was work-related. Later, the respondent was asked questions to assess if the worker was self-employed or a contingent worker, defined as a temporary, on-call, or contract worker. Several sections in the questionnaire were limited to designated subpopulations. For example, self-employed were not asked the same reporting questions as other workers because they generally do not have reporting requirements. Respondents were only asked questions about chronic health problems if they identified a work-related health problem that had persisted for at least 3 months. The English survey was translated to Spanish. Due to resource constraints, the Spanish survey did not undergo formal cognitive testing that may have identified discrepancies in interpreting questions resulting from the Spanish translation and modifications. Consequently, the English and Spanish results are being presented separately. Results presented here reflect respondents who completed the questionnaire in English. The results from respondents who completed the survey in Spanish are reported by Tonozzi et al. [2016].

Recruitment of respondents for this study was a multi-step process approved by the NIOSH Institutional Review Board. After receiving the contact information for sampled cases from participating hospitals, trained and experienced interviewers conducted the survey in English or Spanish using a Computer Assisted Telephone Interview (CATI) system after receiving verbal consent from the participants. Responses were only keyed via the CATI system; they were not electronically recorded. For narrative responses, interviewers often paraphrased answers as the respondents were talking. The interview took approximately 30 min to complete, and no incentives were offered for participation.

[1] NIOSH collects the occupational injury data through collaboration with the CPSC. However, there are no implied or expressed endorsements by the CPSC of the results presented herein.

The number of days between the incident and the interview ranged from 32 to 210, with 60 days being the median. The overall weighted patient interview response rate was 20%, using the American Association for Public Opinion Research (AAPOR) standard method of estimating the minimum response rate [AAPOR, 2011].

Several steps were taken to finalize the interview data prior to analysis. Standardized codes were assigned to narrative data including: industry codes that were applied per the 2002 Bureau of the Census Industry codes [BOC, 2002]; occupation codes that were applied per the 2010 Bureau of the Census Occupation codes [BOC, 2010]; and source and event codes that were applied based on the BLS Occupational Injury and Illness Classification System (OIICS) version 2.01 [BLS, 2012b]. In addition to these standardized codes, narratives summarizing reasons that respondents reported their injury or illness to their employer were assigned codes based on a qualitative content analysis. Two NIOSH researchers independently assigned all narrative responses to these code categories and adjudicated all discrepant category assignments [Marsh et al., 2016].

Statistical Analysis

Each NEISS-Work case was assigned a statistical weight based on the inverse probability of selection. A response propensity analysis indicated that worker status categories (paid private or government employee, all others/unknown) and age groups (20–30, 31–40, 41–50, and 51–64) were correlated with interview response rates. Thus, two weight adjustments were performed on the finalized follow-back data based on these variables. A non-response weight adjustment reduced non-response bias related to the inability to contact the potential respondent, refusal to participate by the patient, or refusal of the hospital to provide contact information for sampled patients. A post-stratification weight adjustment accounted for cases not eligible for sampling due to an old treatment date or having been selected for a previous study [Marsh et al., 2016]. Proportion estimates were derived by summing the adjusted weights for the cases of interest and dividing the subgroup estimates by the total estimate. Variances were estimated using Taylor series linearization and provided the basis for the calculation of 95% confidence intervals (CI). Following NEISS-Work reporting guidelines established to ensure data confidentiality and reliability, weighted estimates, and proportions were rounded and estimates not meeting reporting guidelines were suppressed. In addition, estimates with a coefficient of variation $>30\%$ were not reported. Analyses were conducted using SAS version 9.3 [SAS Institute, 2011]

The results for reporters and self-employed are presented in four groups which are not mutually exclusive. We define reporters as workers who reported their work-related injury or illness to their employer or indicated that their employer found out about their work-related injury or illness some other way. The first group combines reporters and self-employed workers. This group represents the overall population of interest, thus demographic and injury and illness characteristics for this group are presented as background. The second group consists of reporters and self-employed with chronic work-related conditions. The third group is reporters, excluding self-employed workers. Included within this group are workers who identified themselves as contingent (i.e., temporary, on-call, or contract). Where appropriate, data for contingent workers were analyzed separately because certain questions (e.g., union membership and job security) were not applicable to these special work situations. The fourth group is self-employed workers only. Distinct reporting questions were asked of this group because self-employed workers and their clients are generally not subject to OSHA record-keeping guidelines and their workplace characteristics can be quite different. We have presented overall estimates for primary groups of interest. For more detailed subgroups, rounded weighted percentages are presented due to the decreasing reliability of worker estimates that correspond to these smaller subsets. Because of statistical and confidentiality reporting guidelines, many results for the self-employed, contingent workers, and workers with chronic conditions were not reportable. Thus, results that are reportable for these groups have been presented in the text only and not in tabular format. Additionally, injuries and illnesses are referred to as injuries throughout the results section because over 90% of the cases in the sample are injuries, and because we cannot report weighted percentages for illnesses separately as these estimates do not adhere to NEISS-Work statistical reporting guidelines.

RESULTS

There were 2,236 interviews completed in English. Of these, 2,021 were reporters (1,969 reported their work-related injury to their employer and 52 indicated that their employer found out some other way) and 117 were self-employed workers and thus, were not necessarily required to report their injury. There were 26 respondents who did not report their injury and 72 respondents who were unsure about whom to report to and thus were not asked whether they reported their injury to their employer. This analysis is limited to the 2,138 (or 96% of the completed interviews) that were identified as reporters or self-employed.

Reporters and Self-Employed Workers

The national estimate of injuries treated in hospital EDs among reporters and the self-employed from

June 2012 through December 2013 was 3,357,000 (95%CI: 2,516,000–4,199,000). More specifically, 3,190,000 (95% CI: 2,368,000–4,012,000) were reporters and 167,000 (95%CI: 106,000–228,000) were self-employed.

Most of the reporter and self-employed participants in our study were males (62%) and White (65%). Participants were distributed relatively equally among 10-year age groups (Table I). Eleven percent (95%CI: 5–16%) were Hispanic, Latino, or of Spanish origin (data not shown). Approximately, 33% (95%CI: 29–36%) of the participants reported having a family income of $30,000 or less, and about 67% (95%CI: 63–71%) of the workers had completed high school or some college (Table I). Of the self-employed alone, most were males (93%; 95%CI: 87%–100%) and 50–64 years old (33%; 95%CI: 21–44%). Other characteristics of self-employed workers were similar to the combined data described above.

TABLE I. Estimated Percentages[a] of Reporters[b] and Self-Employed by Demographic Characteristics for Emergency Department-Treated Injuries and Illnesses From June 1, 2012 Through December 31, 2013

	Weighted % (n = 3,357,000)	95%CI
Gender		
Male	62	57–67
Female	38	33–43
Age group (years)		
20–29	29	27–31
30–39	24	22–27
40–49	24	22–26
50–64	23	20–25
Race		
White	65	52–78
Black	19	9–30
Others	14	9–20
Family income		
≤$15,000	10	7–12
$15,001–30,000	23	21–24
$30,001–50,000	18	16–20
$50,001–75,000	15	13–17
$75,001–100,000	8	7–10
>$100,000	8	6–10
Highest level of education		
<High school	8	6–10
High school	38	32–43
Some college	29	25–34
Undergraduate	16	12–19
Graduate	4	2–6

[a]Percentages may not add to 100% because refused/do not know responses, and non-reportable categories are not shown in the table.

[b]Reporters are workers who reported their injury or illness to their employer or indicated that their employer found out about their injury or illness some other way.

The most common injuries among reporters and self-employed were sprains or strains (22%), lacerations (16%), and contusions or abrasions (13%) (Table II). A quarter of the injuries affected the hand (including finger) and another 21% affected the back or neck. A third (34%) of the injury events involved contact with objects and equipment, followed by overexertion and bodily reaction (22%). Most of the participants (97%; 95%CI: 95–98%) were treated and released from the ED.

A large majority (86%; 95%CI: 84–88%) of the injured reporters and self-employed had already returned to work by the time of their interview (2,896,000; 95%CI: 2,140,000–3,653,000). Of these, most felt well enough to return to work the same day or within 1–3 days of their injury (Table II). Of the reporters (excluding self-employed) who had not returned to work, 69% (95%CI: 59–78%) were still recovering and 15% (95%CI: 10–21%) were fired or let go. Other reasons for workers not returning to work (e.g., the person quit) did not meet NEISS-Work reporting requirements.

Reporters and Self-Employed Workers With Chronic Conditions

Respondents were first asked if their ED visit in question was related to a chronic condition and then later asked whether they had any other chronic conditions that were unrelated to the ED visit in question but related to their current or previous job. An estimated 202,000 workers (95%CI: 133,000–272,000) reported having a chronic condition. Of these, 36% (95%CI: 26–46%) were related to the ED visit and 64% (95%CI: 54–74%) were unrelated to the ED visit but related to their current or previous job. In 83% (95%CI: 75–90%) of these cases, the respondents indicated that the diagnosis had been confirmed by a healthcare provider. Forty-seven percent (95%CI: 37–56%) reported a chronic back, neck, or spine problem; 15% (95%CI: 8–22%) reported carpal tunnel syndrome or tendonitis. However, the categories for this variable were not mutually exclusive as some respondents identified more than one chronic condition. When reporting the effect that their chronic condition had on normal work activities based on a four-point scale, about 20% (95%CI: 13–27%) of respondents reported that their condition had quite a lot of effect; 54% (95%CI: 45–63%) responded that their condition somewhat affected their normal work activities; and 13% (95%CI: 7–20%) responded that their condition had very little effect. Percentages were similar for the effect that chronic conditions had on normal activities at home. While most of the demographic characteristics of respondents with

TABLE II. Estimated Percentages[a] of Reporters[b] and Self-Employed by Injury/Illness Characteristics for Emergency Department-Treated Injuries and Illnesses From June 1, 2012 Through December 31, 2013

	Weighted % (n = 3,357,000)	95%CI
Injury diagnosis		
Sprain or strain	22	17–27
Laceration	16	13–18
Contusion or abrasion	13	11–15
Fracture, crushing, or dislocation	8	7–10
Puncture	3	2–4
Internal organ injury	3	2–4
Burn	3	2–4
Foreign body	2	1–2
Dermatitis	1	1–2
Body part affected		
Hand or finger	25	21–28
Back or neck	21	18–23
Leg, excluding foot	15	13–17
Arm, excluding hand	15	13–17
Head	6	5–8
Face	5	4–5
Foot or toe	4	3–5
Eye	4	3–6
Injury event		
Contact with objects and equipment	34	29–39
Overexertion and bodily reaction	22	20–25
Falls, slips, trips	19	16–22
Exposure to harmful substances or environments	15	11–20
Violence and other injuries by persons or animals	4	3–6
Transportation incidents	4	3–5
	Weighted % (n = 2,896,000)	**95%CI**
Calendar days passed before felt well enough to work[c]		
0, felt well same day	33	28–39
1–3 days	30	26–33
4–10 days	12	10–15
11 or more days	17	14–19
Still not feeling well	8	5–11

[a]Percentages may not add to 100% because refused/do not know responses, and non-reportable categories are not shown in the table.
[b]Reporters are workers who reported their injury or illness to their employer or indicated that their employer found out about their injury or illness some other way.
[c]These results are limited to the 86% of the injured/ill reporters and self-employed who had already returned to work by the time of their interview.

chronic conditions were similar to all reporters and self-employed, a larger percentage (51%; 95%CI: 38–64%) of those reporting a chronic condition had an annual family income of $30,000 or less.

Reporters, Excluding Self-Employed Workers

Table III presents employment characteristics of the estimated 3,190,000 (95%CI: 2,368,000–4,012,000) reporters. Most reporters (70%) worked for a private company. The most common industries among reporters were services (29%) and health and social services (22%). By occupation, the largest percentage of all reporters worked in a service-related job (29%). Forty percent (95%CI: 35–44%) of all reporters had worked for their employer for a year or less, with 21% having worked for their employer for <7 months.

Of the reporters, an estimated 254,000 (95%CI: 183,000–324,000) were identified as contingent workers (i.e., temporary, on-call, or contract). Among contingent reporters only, 75% (95%CI: 66–85%) worked for a private company. Most contingent workers were employed in services (32%; 95%CI: 23–40%) and construction (21%; 95%CI: 14–28%). The most common occupations among contingent reporters were service-related jobs (25%; 95%CI: 15–34%), transportation and material moving (20%; 95%CI: 11–29%), and construction and extraction (18%; 95%CI: 11–24%). Compared to all reporters, a higher percentage of contingent workers who reported (59%; 95%CI: 49–69%) had worked for their employer for a year or less.

Union membership and job security questions were only asked of workers who were not contingent and not self-employed (2,937,000; 95%CI: 2,156,000–3,717,000). Of reporters, 21% (95%CI: 15–27%) were labor union members. Seventy-four percent (95%CI: 69–79%) of the union members indicated that their union encouraged them to report their injury to their employer. When respondents were asked to rate how secure they felt in their job the day before they were injured, most reporters indicated that they either felt very secure (68%) or somewhat secure (21%) (Table IV).

Questions about injury reporting instructions and the availability of paid time-off were asked of all workers, except the self-employed. Respondents were asked whether they received instructions from their employer regarding whom to tell if they were injured. Most (77%; 95%CI: 72–82%) indicated that they were given such instructions. Of reporters who had returned to work or who were still recovering (96%; 95%CI: 94–97%), 65% (95%CI: 59–71%) reported that they took time-off due to their injury or illness. Sixty-four percent (95%CI: 61–68%) of those who had returned to work or who were still recovering indicated that they had paid time-off available.

All respondents were asked about who they expected would pay their ED bill. Most (65%) reporters expected workers' compensation to cover a majority of the medical payment while 14% expected to use health insurance (either their own or that of their spouse/partner) (Table IV). For contingent workers, 48% (95%CI: 38–58%) expected workers' compensation to cover their medical payment

TABLE III. Estimated Percentages[a] of Reporters[b] by Employment Characteristics for Emergency Department-Treated Injuries and Illnesses From June 1, 2012 Through December 31, 2013

	Weighted % (n = 3,190,000)	95%CI
Employment type		
Private company	70	65–75
Government	14	10–18
Farm, not family owned	1	0.6–2
Family owned farm or business	1	0.4–2
Industry[c]		
Services	29	24–34
Health and social services	22	18–26
Trade	16	12–20
Manufacturing	14	10–19
Construction	10	8–12
Transportation, warehouse, and utilities	7	5–10
Agriculture/forestry/fishing	1	0.4–2
Occupation[d]		
Service	29	24–34
Professional and related	15	12–18
Transportation and material moving	12	10–14
Production	12	8–15
Construction and extraction	9	7–12
Installation, maintenance, and repair	6	5–8
Office and administrative support	6	5–7
Sales and related	6	3–8
Management, business, and financial	3	2–4
Farming, fishing, and forestry	1	0.3–1
Length of time with employer		
<7 months	21	17–24
7–11 months	7	5–9
1 year	12	11–13
2–5 years	26	23–29
6–10 years	16	14–18
11–20 years	12	10–14
21 or more years	6	5–7

[a]Percentages may not add to 100% because refused/do not know responses, and non-reportable categories are not shown in the table.
[b]Reporters are workers who reported their injury or illness to their employer or indicated that their employer found out about their injury or illness some other way. This excludes self-employed.
[c]Based on 2002 Bureau of the Census Industry codes [BOC, 2002].
[d]Based on 2010 Bureau of the Census Occupation codes [BOC, 2010].

TABLE IV. Estimated Percentages[a] of Reporters[b] by Select Characteristics for Emergency Department-Treated Injuries and Illnesses From June 1, 2012 Through December 31, 2013

	Weighted % (n = 3,190,000)	95%CI
Level of job security the day before injury/illness[c]		
Very secure	68	66–71
Somewhat secure	21	19–23
Neither secure nor insecure	6	5–7
Somewhat insecure	3	2–4
Very insecure	1	0.7–2
Expected payer		
Workers' compensation	65	59–71
Health insurance	14	10–17
Employer directly	10	8–11
Out of pocket	5	3–7
Another source	2	1–4

[a]Percentages may not add to 100% because refused/do not know responses, and non-reportable categories are not shown in the table.
[b]Reporters are workers who reported their injury or illness to their employer or indicated that their employer found out about their injury or illness some other way. This excludes self-employed.
[c]Excludes workers who were identified as contingent (i.e., those who self-identified as either temporary, on-call, or contract).

and 19% (95%CI: 11–27%) were relying on health insurance.

Based on a qualitative analysis of the responses from all reporters (excluding self-employed), a majority indicated that they reported their work-related injury to their employer because they were following policies, procedures, and instructions. Other reasons given for reporting an injury included needing medical attention; experiencing pain, discomfort, or bleeding; needing to leave work/take time-off; incident witnessed or heard by another at work; and needing to document the injury.

Self-Employed Workers

Of the self-employed, 42% (95%CI: 28–56%) were employed in the construction industry. Another 23% (95% CI: 9–37%) worked in the agriculture, forestry, and fishing industry and 22%[2] (95%I: 8–36%) worked in services. The largest percentage (29%; 95%CI: 23–37%) had been self-employed for 6–20 years while another 24% (95%CI: 15–33%) had been self-employed for more than 20 years. Twenty percent (95%CI: 11–29%) had been self-employed for 1 year or less and 25% (95%CI: 12–37%) had been self-employed for 2–5 years. Most of the self-employed (90%; 95%CI: 82–97%) worked an average of 34 hrs or more per week, and most (90%; 95%CI: 84–96%) were not covered by workers' compensation.

Self-employed workers do not have the same reporting requirements as other workers. As a proxy to reporting an injury to an employer, self-employed workers were asked whether they were conducting work for a client and whether they

[2] Data are statistically unreliable with a coefficient of variation of 31%.

reported to that client. Of the self-employed workers, 56% (95%CI: 45–66%) were working for a client, and of those, 82% (95%CI: 70–94%) were working at the clients' location when the injury occurred. Almost half of the self-employed who were working at their clients' location (50%; 95%CI: 34–64%) told their client about their injury.

DISCUSSION

NIOSH conducted this study in response to a Congressional directive to assess underreporting and reasons that workers did not report their injury or illness to their employer. However, study results revealed that nearly all of the respondents reported their injury or illness to their employer. It is not clear whether persons being treated in the ED generally report their workplace injuries and illnesses or whether this high proportion of reporters is an artifact of the respondent sample, which includes cases previously indicated to be work-related based on medical record review. Since most of the respondents reported their work injuries or illnesses to their employer, our study was not able to confirm the disincentives for reporting workplace injuries and illnesses as evidenced from previous research [U.S. House of Representatives, 2008]. While the results of this paper could possibly be used to identify some select approaches to improve occupational injury and illness reporting in the workplace, the most significant impact of this study is the finding that ED surveillance data, such as those collected through NEISS-Work, are limited in their utility to investigate underreporting issues.

Employment and Workplace Characteristics

Over three quarters of the reporters indicated that they were provided instructions as to whom to report if they were injured or became ill at work. While OSHA recordkeeping rules do not apply to all employers, our data suggested that many employers appeared to have followed the OSHA rule that states the employer "must inform each employee of how he or she is to report an injury or illness" to their employer [OSHA, 2001]. Although we were not able to assess how many of the respondents worked for employers who were required to report, this finding supports the fact that employers communicating reporting guidelines to workers is a critical factor in accurate surveillance of injuries and illnesses. However, our study could not determine if the reporting of injuries and illnesses led to the next crucial surveillance step of recording the injury or illness on an OSHA log and reporting in SOII, if required. We were also unable to determine if employers abided by OSHA regulations by refraining from employee discipline as a result of reporting [OSHA, 1970], another key component to ensure accurate reporting. Although self-employed workers are not required to report to their clients based on OSHA regulations, we did not assess what, if anything, clients of self-employed workers did with the information when these workers reported their injuries or illnesses.

Qualitative findings from our study suggested that a primary reason for workers reporting an injury or illness to their employer was that they were following policies, procedures, and instructions, or were being responsible and accountable. This supports the need for employers to have policies and procedures in place that clearly define the mechanism for reporting injuries and illnesses. Workers generating a reporting culture, by willingly reporting their errors and near misses, is identified by Reason [1997] as a key subcomponent in a positive safety culture. To insure the effectiveness of this reporting culture, the employer must create an environment where people are encouraged to provide safety information, but are also aware of the distinction between acceptable and unacceptable behavior [Reason, 1997]. Probst and Estrada [2010] found that the reporting of worker safety incidents was more complete when supervisors enforced safety policies and organizations maintained positive safety climates.

Our study results indicate that most workers had paid time-off available. Azaroff et al. [2002] suggested that workers who do not have paid sick time may not be able to afford missing work. In addition, losing work time due to injury or illness may increase the workers' risk of job loss and decrease their opportunity for overtime and promotions. Consequently, they may be averse to reporting their workplace injuries or illnesses. Employers who provide their employees with paid sick time may be removing a possible barrier to reporting workplace injury or illness.

A fifth of the workers in our study were members of a labor union, yet nearly three quarters of the union members indicated that their labor union encouraged them to report occupational injuries and illnesses to their employers. Azaroff et al. [2002] suggested that unions may provide support to their members who report workplace health problems to their employers. Other research has indicated union workers are more likely to file for workers' compensation claims [Hirsch et al., 1997; Morse et al., 2003], which also requires that they inform their employer of their injury or illness. Furthermore, union members are more likely to have sick leave benefits which would enable them to take paid time-off from work should they become injured or ill [Azaroff et al., 2002]. For these reasons, unions may serve as a positive support for those employees who are injured or become ill at work.

Almost 90% of our study participants indicated that they felt secure in their job. Job security contributes to job satisfaction, and provides motivation to comply with safety policies, thereby encouraging workers to report workplace injuries or illnesses [Probst and Brubaker,

2001]. Conversely, Probst et al. [2013] theorized that employees who are insecure about their jobs and identify that workplace safety is desirable may be motivated to project themselves as "safe" by not reporting injuries or illnesses.

Self-Employed Workers and Chronic Conditions

As directed by Congress, this study attempted and was able to capture self-employed workers through an ED-based surveillance system. Less than 5% of the injured or ill workers in our study were self-employed, although the Current Population Survey estimates approximately 10% of U.S. workers are self-employed [Hipple, 2010]. Therefore, while this study was able to capture self-employed workers through the ED-based surveillance system, there may be an underestimation of non-fatal work-related injuries and illnesses among self-employed due to difficulty in capturing and identifying them within the NEISS-Work data. Nelson et al. [1999] reported that the self-employed are less likely to be covered by health insurance than compared to persons employed for wages and, consequently, are more likely to perceive cost as a barrier to seeking medical care. Thus, the self-employed may be less likely to seek medical care, which leads to data capture in a medical records based system such as NEISS-Work. Furthermore, the data from our study showed that trying to capture work-related injuries and illnesses to the self-employed cannot be done by tracking worksite reporting as only a small proportion in our study indicated that they reported to their client.

As per the Congressional directive, we also attempted to capture individuals with work-related chronic conditions. Our results indicated a very small proportion of study respondents reported having a work-related chronic condition. There are several problems in capturing chronic conditions through ED surveillance. The long latency periods of chronic illnesses make it difficult to diagnose and ascertain work-relatedness [Azaroff et al., 2002]. In addition, some diseases are difficult for employers and healthcare workers to identify as work-related [Spieler and Wagner, 2014]. However, chronic conditions are associated with elevated risk for work-related injuries [Smith et al., 2012]. For these reasons, ED-based surveillance systems that generally capture acute incidents are not the best means to capture this information.

Strengths and Limitations

Our study has several strengths. First, it has a strong methodology, using a stratified probability sample of hospitals, and a complex sample design to obtain nationally representative samples of occupational injury and illness cases treated in U.S. hospital EDs. Second, ED data are employee-oriented, and not based on whether a workers' compensation claim for an injury or illness was submitted and accepted. Third, we were able to include all worker types except volunteers and day laborers, and all industries and occupations, including groups such as the self-employed which are not captured through other data sources like SOII. Fourth, given the limitations of existing surveillance sources, follow-back studies can be an important tool to address information gaps and gather detailed information not otherwise available through routine data sources [Hartley et al., 2012]. As such, this is the first follow-back study investigating reporting issues directly from workers injured or ill at work at a national level. Fifth, although data on injury or illness severity were not collected, a majority of the injuries and illnesses were treated and released. Therefore, the study was able to capture less severe injuries which are likely not captured elsewhere. Finally, the study results suggest possible ways that employers can support and encourage their employees in reporting workplace injuries and illnesses.

In addition to its strengths, this study had several limitations. First, the study population contains workers with injuries and illnesses treated only in EDs. Thus, the population surveyed is not representative of all occupational injuries and illnesses requiring medical treatment. Second, workers who report at an ED may be more likely to report their injury or illness to their employer, especially if they need to leave work to seek immediate medical attention, a factor that was not assessed in our study. Therefore, ED or other hospital settings may not be the appropriate venue for collecting information on under-reporting behavior. Third, almost two-thirds of the workers in our study had workers' compensation as their expected payer and another 10% of workers had their medical expenses paid by their employer directly. Thus, by virtue of using this payment mechanism, the employees did not have an option of not reporting their injury or illness. Fourth, this study also had a very low response rate which could have resulted from several reasons such as difficulty in administering the questionnaire over the phone, complexity of the survey, and lack of incentives for participation. We recognize that this limited population of respondents could have biased the study results. However, we had no way of assessing why those we did not interview chose not to respond. Fifth, estimates may have been affected by a certain amount of recall bias as the range of days between the incident and the interview was 32–210 days. Lastly, there were limitations with the qualitative data. Narrative information was not collected verbatim and the information was frequently paraphrased. This made qualitative analyses difficult and limited the extent of detail that could be provided when reporting results.

CONCLUSIONS

We aimed to describe reporting behaviors of English-speaking patients who were seen at an ED for a work-related injury, illness, or exposure. Because the results of the survey indicated that almost all of the respondents reported their injury or illness to their employer, we were not able to examine specific reasons for workers not reporting. Based on this finding, we concluded that ED medical records 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. This study also confirmed that NEISS-Work data are geared towards capturing acute incidents, and therefore, other data sources may be better suited for surveillance of work-related chronic conditions. Continued research efforts are needed to examine workplace characteristics that encourage injury or illness reporting and should target specific industries or occupations. This information would improve the current understanding of workplace reporting.

AUTHORS' CONTRIBUTIONS

Ruchi Bhandari was involved in interpretation of results, writing the manuscript, and addressing editorial changes. Suzanne Marsh and Audrey Reichard were involved in all aspects of the study including designing study and analysis, interpreting results, writing the manuscript, and addressing editorial changes. Theresa Tonozzi was involved in reviewing and editing the manuscript. All authors gave final approval of the final version and agree to be accountable for all aspects of the published work.

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DISCLAIMER

The findings and conclusions of this report are those of the authors and do not necessarily represent the official views of the National Institute for Occupational Safety and Health.

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