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Under-recording of work-related injuries and illnesses: An OSHA priority[☆]

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ABSTRACT

Introduction: A 2009 Government Accounting Office (GAO) report, along with numerous published studies, documented that many workplace injuries are not recorded on employers' recordkeeping logs required by the Occupational Safety and Health Administration (OSHA) and consequently are under-reported to the Bureau of Labor Statistics (BLS), resulting in a substantial undercount of occupational injuries in the United States. **Methods:** OSHA conducted a Recordkeeping National Emphasis Program (NEP) from 2009 to 2012 to identify the extent and causes of unrecorded and incorrectly recorded occupational injuries and illnesses. **Results:** OSHA found recordkeeping violations in close to half of all facilities inspected. Employee interviews identified workers' fear of reprisal and employer disciplinary programs as the most important causes of under-reporting. Subsequent inspections in the poultry industry identified employer medical management policies that fostered both under-reporting and under-recording of workplace injuries and illnesses. **Conclusions:** OSHA corroborated previous research findings and identified onsite medical units as a potential new cause of both under-reporting and under-recording. Research is needed to better characterize and eliminate obstacles to the compilation of accurate occupational injury and illness data. **Practical applications:** Occupational health professionals who work with high hazard industries where low injury rates are being recorded may wish to scrutinize recordkeeping practices carefully. This work suggests that, although many high-risk establishments manage recordkeeping with integrity, the lower the reported injury rate, the greater the likelihood of under-recording and under-reporting of work-related injuries and illnesses.

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1. Introduction

The undercount of occupational injuries and illnesses in the United States has been well documented in multiple research studies over the last several decades (Leigh, Marcin, & Miller, 2004;

Rosenman et al., 2006; Spieler & Wagner, 2014). Recent estimates of the undercount range from 20% to as high as 70% (Wiatrowski, 2014). The lack of accurate data on workplace injuries and illnesses is of concern to occupational health and safety professionals, researchers, workers, unions, employers, public health advocates, and to government agencies, such as the Occupational Safety and Health Administration (OSHA). Policy-makers rely on data to promulgate effective occupational health and safety legislation. Researchers rely on data to understand root causes and evaluate interventions to prevent and control work-related injuries and illnesses. The lack of good data impedes efforts to improve the health and safety of the workers.

The government agency tasked with collecting and reporting on occupational injuries and illnesses is the Bureau of Labor Statistics (BLS) in the U.S. Department of Labor (DOL). BLS collects injury and illness information annually through the Survey of Occupational Injuries and Illnesses (SOII). BLS sends the SOII to a sample of over 175,000 employers throughout the country and across most industries. Employers complete the SOII using information directly from their OSHA recordkeeping logs (Ruser, 2008). Most employers, other than small employers with ten or fewer employees and some other exempted industry classes, are required under OSHA's Recordkeeping

[☆] Preamble

This "short communication" is based on a presentation by one of the authors at the 2015 NOIRS (National Occupational Injury Research Symposium). The presentation was part of a session entitled "Underreporting of Injuries/Illnesses: The Federal Perspective." Presenters were invited to submit a paper based on their NOIRS presentation for a special issue of the *Journal of Safety Research* dedicated to the conference. The purpose of our paper is to describe OSHA's inspection findings and efforts in regards to recordkeeping and under-reporting. Admittedly, our findings are subject to the many limitations inherent in OSHA enforcement procedures and staffing and to the limitations of the data collected under the Recordkeeping NEP. However, we hope to spark further definitive research on issues we have encountered, such as the significance of employer medical management practices on under-reporting and under-recording. Although there are limits to the generalizability of this work, we do think that safety and health professionals working with employers should be aware of the obstacles to accurate recordkeeping, particularly in high hazard industries with low rates, so that they can educate and guide employers to better/best practices. We hope that the information, case example and resources in the paper will provide this information.

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regulation (29 CFR 1904) to keep records of all work-related injuries and illnesses that meet certain criteria. The completeness of employers' recordkeeping logs directly affects the reliability of the BLS data. "Under-recording" is the term used to describe work-related injuries and illnesses meeting OSHA recordkeeping criteria that should have been recorded on the employer's recordkeeping log but were not. Under-recording also includes injuries and illnesses on the log that are incorrectly categorized as less severe than they actually are. For example, a recorded injury that does not list restricted work or days away from work or records fewer days away than actually occurred when the worker was restricted or off work due to the injury is considered an under-recording. If there is under-recording of injuries and illnesses, there is under-reporting to BLS. In this paper, "under-reporting" refers to two separate kinds of actions: employers that report inaccurate numbers and severity of workplace injury and illnesses to BLS and employees that do not report their work-related injury or illness to their employer. Researchers have identified several reasons for BLS's undercount of workplace injuries. In addition to poor employer recordkeeping practices and lack of understanding of the regulation, other causes include workers' reticence to report injuries for fear of losing their jobs, employers' incentive and disincentive programs that discourage workers from reporting injuries, and obstacles in both the OSHA recordkeeping regulation and SOII that affect the collection of complete data (Azaroff, Levenstein, & Wegman, 2002; Boden & Ozonoff, 2008; Leigh et al., 2004; Rosenman et al., 2006; Spieler & Wagner, 2014).

In response to these recordkeeping concerns, in 2008 Congress charged the Government Accountability Office (GAO) with evaluating DOL's processes to ensure accurate occupational injury and illness data. GAO evaluated OSHA's audits of employers' recordkeeping logs and interviewed OSHA staff, BLS staff, occupational health practitioners (OHPs), and other stakeholders. The GAO reported that delays in OSHA recordkeeping audits and insufficient worker interviews during the audits hindered OSHA recordkeeping investigations (GAO, 2009). Workers' fear of job loss and employers' incentive and disincentive programs were again identified as major deterrents to workers' reporting of injuries. More than one-third of OHPs interviewed by GAO described pressure from employers to under-treat workers to keep the injuries off the OSHA recordkeeping log. The GAO made several recommendations to OSHA, including more timely audits, targeting high hazard industries, requiring worker interviews during audits, and educating employers on recordkeeping requirements.

This short communication will describe OSHA's efforts to characterize and address under-recording of occupational injuries and illnesses, including the major factors affecting accurate recordkeeping identified during both OSHA's Recordkeeping NEP and OSHA's recent inspections in the poultry industry.

2. Methods

OSHA responded to the 2009 GAO report by embarking on a National Emphasis Program (NEP) on Recordkeeping, implemented in September of 2009 and ending in February of 2012 (OSHA, 2010a). OSHA selected industries from the list of industries that the Bureau of Labor Statistics (BLS) had identified as having the highest rate of injuries and illness involving days away from work, restricted work activity or job transfer (DART cases). OSHA then inspected establishments with injury rates initially below 2.0 events per 100 workers. OSHA expanded the targeting to establishments with medium injury rates, defined as greater than 4.2 but less than 8.0 injuries per 100 FTE (OSHA, 2010b). Each OSHA Area Office (over 70 in Federal OSHA) performed up to five inspections. OSHA also targeted certain high-rate industries and industries in which poor recordkeeping practices had been seen in past inspections, including nursing homes and meat packing/poultry processing. The compliance officers reviewed the employers' recordkeeping logs for the two years preceding the

inspection, reviewed available employee medical records, and performed extensive worker interviews. Employers were cited and fined for any recordkeeping violations found.

In the Fall of 2011, OSHA initiated an analysis of the data from 350 Federal inspections under the NEP (ERG, 2013). The analysis used data from both OSHA's Integrated Management Information System and the electronic inspection documentation completed by OSHA compliance officers. The objective of the analysis was to compile descriptive information and findings on recordkeeping accuracy and practices to aid OSHA in conducting more effective recordkeeping reviews and providing better guidance to employers. One of the industries identified with particularly high recordkeeping error rates was meat and poultry processing. OSHA prioritized this industry for further inspections, including special scrutiny regarding recordkeeping in follow-up investigations.

3. Results

OSHA's Recordkeeping NEP resulted in 576 inspections of 405 establishments under Federal jurisdiction and 171 establishments under State jurisdiction. Of the establishments inspected by Federal OSHA, 269 (66%) had recordkeeping violations, resulting in 809 violations and over half a million dollars in fines. Analysis of 350 Federal NEP inspections (ERG, 2013) focused on the two most important types of recordkeeping errors that affect injury and illness incidence rates: unrecorded cases (cases not found on the employer's log) and under-recorded cases (cases where days away or restricted work activity were not accurately recorded on the log). Almost half (47.14%) of the establishments inspected had unrecorded and/or under-recorded cases. Of the DART cases, 23% were either not recorded or inaccurately recorded as a case without days away or days of restricted work activity. OSHA inspectors conducted over 4800 employee interviews. Twenty percent of unrecorded or under-recorded cases were identified through these employee interviews. Workers identified employers' disciplinary and absentee programs as having the greatest negative effect on injury reporting.

More unrecorded and under-recorded cases were identified in establishments with low injury rates compared to those with medium injury rates. Although 47% of employers had some recordkeeping errors, very poor recordkeeping practices were found in a small number of establishments. Slightly over 50% of the unrecorded and under-recorded DART cases occurred in just 6.6% of the inspected establishments (ERG, 2013). Twelve establishments with particularly poor recordkeeping practices included three meat and poultry processing plants, three nursing homes, two iron foundries, an iron forge, a battery manufacturing plant, a dairy farm and a major airline. Meat and poultry had more than twice as many DART-related recordkeeping errors per inspection compared to other sectors, due at least in part to the very poor recordkeeping practices of some establishments.

3.1. Onsite medical units – a significant obstacle to accurate recordkeeping

During several recent OSHA inspections in the poultry industry, onsite medical units were identified as a new obstacle to accurate recordkeeping. OSHA's Medical Services and First Aid standard (29 CFR 1910.151) requires that employers ensure that employees have ready access to medical care for work-related injuries and illnesses. First Aid services are commonly provided in workplaces and may consist only of a box with first aid supplies and employees trained in first aid on every shift. Many employers rely on local health care services, such as clinics or emergency departments. Some employers, including poultry and meatpacking plants, retail warehouses and others, have onsite medical units called first aid stations or nursing stations. These units are frequently staffed by emergency medical

technicians (EMTs) or licensed practical nurses (LPNs) and often function in a medically ambiguous fashion.

In some poultry plants, OSHA found that the EMTs and LPNs staffing these onsite medical units had little to no nursing or medical supervision, functioned without appropriate, up-to-date protocols and provided care beyond their scopes of practice. In some cases, workers were seen multiple times without referral for a definitive evaluation, diagnosis and treatment. By preventing access to higher level medical care, these cases were kept off the employer's recordkeeping log. The following case illustrates the practices found in a poultry plant's onsite medical unit during an OSHA inspection.

Ms. S., a 40 year old Hispanic woman, had worked at the poultry plant for several years. She described symptoms of pain, numbness and tingling of both hands beginning one month after she started working on the debone line. She had no previous similar symptoms, no history of hand or wrist injuries or carpal tunnel syndrome, and no underlying medical problems. When her symptoms did not go away, she reported to her supervisor, who brought her to the onsite nursing station. The nursing station was staffed by LPNs, who reported to the plant's EMT-trained safety director. The LPNs were provided no higher level medical supervision by a physician, registered nurse or nurse practitioner. The LPNs treated Ms. S. with ice, muscle gel, Epsom salt soaks and non-steroidal anti-inflammatory medication (NSAIDs) for a ten-week period, seeing her a total of 94 times. Ms. S. asked to see a doctor several times but was not referred and continued to be sent back to her regular job on the debone line. No assessment of the relationship between her job and her symptoms was performed, and her injury was not placed on the OSHA 300 log.

After suffering worsening symptoms over two and one-half months and persistently requesting to see a doctor, Ms. S. was finally referred to the local physician. She was diagnosed with bilateral carpal tunnel syndrome and placed on work restrictions. Her clinical course included unsuccessful treatment with cortisone injections, permanent transfer off the debone line and plans for carpal tunnel release surgery. Carpal tunnel syndrome is a well-known injury suffered by poultry workers exposed to ergonomic hazards, such as those found on the debone line (Cartwright et al., 2012; Musolin, Ramsey, Wassell, Hard, & Mueller, 2014). Using several ergonomic assessment tools, including the Strain Index (Moore & Garg, 1995; Moore, Rucker, & Knox, 2001) and the Hand Activity Level (ACGIH, 2015), OSHA documented multiple, serious ergonomic hazards, including high repetition, strong force and awkward postures, on the debone line. It is likely that, if Ms. S. had been removed from the debone line and referred to a physician earlier, she would not have suffered severe bilateral carpal tunnel syndrome resulting in chronic disability and requiring surgery.

OSHA was able to identify Ms. S. because her case was placed on the company's recordkeeping log after she was referred to a physician. However, OSHA reviewed several years of nursing station records and found many workers from the debone line who were seen for musculoskeletal symptoms and never referred to a physician. Their injuries were never recorded on the recordkeeping log. Worker interviews revealed that some workers stopped going to the nursing station because the treatments were not helping. Some continued to have symptoms that were left untreated. Others went to their own doctors but did not report the injury to their employer for fear of reprisal. Some workers transferred to jobs that allowed their symptoms to resolve. The structure and policies of the onsite medical unit at this plant and the lack of supervision and training of the unit's staff created an environment that fostered under-reporting and under-recording of workplace injuries.

4. Limitations

The results described in this communication are not automatically generalizable to all industries. Industries selected for inspection under

the NEP were not a random sample. Pertinent data on size, location, administrative structures, and staffing were unavailable. In addition, no comparison group with "normal" injury rates and without record-keeping difficulties was included.

5. Discussion

The results of OSHA's Recordkeeping NEP and subsequent enforcement activities demonstrate continued obstacles to accurate occupational injury and illness counts. Many of the obstacles identified by OSHA inspectors were the same as those described by the 2009 GAO report and previous research, such as employer programs that discourage reporting, workers' fear of retaliation or job loss, and employers' misunderstanding of recordkeeping requirements. Medical management practices, such as those that occur in onsite medical units, represent a significant newly-identified cause of under-reporting and under-recording. The extent of injury and illness under-reporting and under-recording is difficult for OSHA to gauge. OSHA inspectors are unable to interview workers who are no longer on the employment roster, having quit or been terminated from employment. Absentee/disciplinary programs may lead to employees' termination for various infractions, including missing work for a doctor's appointment. Some plants inspected by OSHA have tremendously high turnover rates, sometimes over 100% per year. Research is needed to better understand the impact of employer medical management programs not only on recordkeeping but also on incidence and severity of work-related injuries and illnesses.

OSHA continues to prioritize its efforts to improve the collection of occupational injury and illness data. OSHA includes recordkeeping analyses in nearly all inspections, has published guidance for multiple stakeholders, and conducts outreach to improve employers' understanding of their responsibilities. OSHA's outreach on workers' rights makes clear that reporting an injury or illness is a right protected under the Whistleblower Protection statutes (*OSHA Workers*). OSHA's Temporary Worker Initiative has issued recordkeeping guidance to staffing agencies and host employers (*OSHA TWI Bulletin No. 1*). OSHA's revised reporting requirements for severe injuries and fatalities (*OSHA, 2014*) and new rule requiring electronic submission of injury and illness information (*OSHA, 2016*) represent regulatory efforts that may improve occupational injury and illness counts.

The consequences of inaccurate occupational injury and illness data are far-reaching. Employers are encouraged to use the 300 logs, along with first aid logs, workers compensation records and other data, to assess trends and find cases whose further scrutiny may identify workplace hazards. Without accurate data, employers cannot use the logs as a primary prevention tool. Employees suffer when injuries and illnesses are not prevented or are not diagnosed and treated early. Flawed information hampers injury prevention and control research. Policy-makers cannot make informed regulatory and guidance decisions. The economic and social burdens of work-related injuries and illnesses, and particularly those resulting in chronic disability, are borne primarily by the workers and their families (Leigh, 2011; Michaels, 2015). Finally, the poor medical care practices in onsite medical units affect the health care practitioners themselves not only by encouraging poor practice habits but also by threatening licenses when these practices violate state medical and nursing laws. Employers may also be at risk of medical malpractice given their appropriation of medical decision-making.

6. Conclusions

OSHA's Recordkeeping NEP corroborates the findings of other researchers regarding the causes of the undercount of occupational injuries and illnesses in the U.S., particularly the under-reporting by employees due to employers' disciplinary programs and employees' fear of reprisal. OSHA inspections in the poultry industry identified the structure and functioning of onsite medical units as a potential significant new cause of under-reporting and under-recording. Research

to improve data on occupational injuries and illnesses should further explore obstacles to under-recording and under-reporting, focusing on effective solutions. Lack of accurate data is a disservice to workers, employers, occupational health professionals, researchers and all those who seek to prevent workplace injuries and illnesses.

7. Practical applications

Occupational health professionals, including safety professionals, industrial hygienists, occupational health nurses and occupational medicine physicians, should be aware of obstacles to accurate occupational injury and illness recordkeeping. Professionals who consult with or work in high hazard industries should be particularly alert to recordkeeping errors in establishments recording low injury rates. OSHA's Recordkeeping website ([OSHA Recordkeeping](#)) has many resources to help employers and professionals understand the rule and accurately record occupational injuries and illnesses. OSHA's Safety and Health Program Management Guidelines ([OSHA, 2015](#)) is also a good resource for safety and health best practices, including the use of the OSHA 300 log to identify workplace hazards. Medical surveillance and management of worker injuries are an important component of successful ergonomic programs. NIOSH's publication "Elements of Ergonomics Programs" ([Cohen, Gjessing, Fine, Bernard, & McGlothlin, 1997](#)) describes methods to incorporate good medical management programs into an employer's ergonomics program and prevent work-related musculoskeletal disorders. Professionals involved in the development and operation of onsite medical units should understand their state's nursing and medical regulations and ensure that the unit's staffing, supervision, policies, and procedures are appropriate to the care being provided. Physicians and nurses should be alert to pressures to under-treat and aware of worker rights resources ([OSHA Workers](#)) for their patients. As one forward-thinking employer tells its healthcare providers: "Treat the patient, not the 300 log."

8. Next Steps

OSHA is continuing to evaluate onsite clinic and nursing station practices in a variety of industries. OSHA has encountered good programs that could be the basis of "best practices". OSHA's Office of Occupational Medicine and Nursing is engaging with healthcare professional organizations and other agencies and stakeholders to identify current best practices. We hope this will be the basis of future guidance either from OSHA, NIOSH or other appropriate agencies or organizations.

Disclaimer

Any opinions or recommendations expressed in this paper do not necessarily reflect official views or policy of OSHA. This paper is not a standard or regulation, and it neither creates new legal obligations nor alters existing obligations created by OSHA standards or the Occupational Safety and Health Act (OSH Act).

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References

29 CFR 1904 Recording and reporting of occupational injuries and illnesses. Occupational Safety and Health Standards, http://www.osha.gov/pls/oshaweb/owasrch.search_form?p_doc_type=STANDARDS&p_toc_level=1&p_keyvalue=1904. Accessed on 8 February 2016.

29 CFR 1910.151 Medical services and first aid standard. Occupational Safety and Health Standards, http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9806. Accessed on 8 February 2016.

ACGIH (2015). 2015 TLVs and BEIs. *Hand activity level section* (pp. 179–181). Cincinnati, OH: American Conference of Governmental Industrial Hygienists.

Azaroff, L. S., Levenstein, C., & Wegman, D. H. (2002). Occupational injury and illness surveillance: Conceptual filters explain underreporting. *American Journal of Public Health, 92*, 1421–1429.

Boden, L. I., & Ozonoff, A. (2008). Capture–recapture estimates of nonfatal workplace injuries and illnesses. *Annals of Epidemiology, 18*, 500–506.

Cartwright, M. S., Walker, F. O., Blocker, J. N., Schulz, M. R., Arcury, T. A., Grzywacz, J. G., ... Quandt, S. A. (2012). The prevalence of carpal tunnel syndrome in Latino poultry-processing workers and other Latino manual workers. *Journal of Occupational and Environmental Medicine, 54*, 198–201.

Cohen, A. L., Gjessing, C. C., Fine, L. J., Bernard, B. P., & McGlothlin, J. D. (1997, March). *Elements of ergonomics programs—a primer based on workplace evaluations of musculoskeletal disorders*. National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, U.S. Department of Health and Human Services (<http://www.cdc.gov/niosh/docs/97-117/pdfs/97-117.pdf>).

ERG (2013). Analysis of OSHA's National Emphasis Program on Injury and Illness Recordkeeping (RK NEP). Prepared by ERG, Lexington, MA. Prepared for office of statistical analysis, occupational safety and health administration, November 1, 2013. OSHA Docket ID OSHA-2013-0023-1835. <http://www.regulations.gov/#1home> (Accessed on 8 March 2016)

Government Accountability Office (GAO) (2009, October). *Report to congressional requesters: Workplace safety and health – enhancing OSHA's records audit process could improve the accuracy of worker injury and illness data*. GAO-10-10 (<http://www.gao.gov/new.items/d1010.pdf>).

Leigh, J. P. (2011). Economic burden of occupational injury and illness in the United States. *Milbank Quarterly, 89*, 728–772.

Leigh, J. P., Marcin, J. P., & Miller, T. R. (2004). An estimate of the U.S. Government's undercount of nonfatal occupational injuries. *Journal of Occupational and Environmental Medicine, 46*, 10–18.

Michaels, D. (2015, June). Adding inequality to injury: The costs of failing to protect workers on the job. *Occupational safety and health administration*. U.S. Department of Labor (<http://www.dol.gov/oshaweb/oshaweb/20150304-inequality.pdf>). Accessed on 8 February 2016).

Moore, J. S., & Garg, A. (1995). The strain index: A proposed method to analyze jobs for risk of distal upper extremity disorders. *American Industrial Hygiene Association Journal, 56*, 443–458.

Moore, J. S., Rucker, N. P., & Knox, K. (2001). Validity of generic risk factors and the strain index for predicting nontraumatic distal upper extremity morbidity. *American Industrial Hygiene Association Journal, 62*(2), 229–235.

Musolin, K., Ramsey, J. G., Wassell, J. T., Hard, D. L., & Mueller, C. (2014, March). Evaluation of musculoskeletal disorders and traumatic injuries among employees at a poultry processing plant. *Health hazard evaluation, report no. 2012-0125-3204*. National Institute for Occupational Safety and Health (<http://www.cdc.gov/niosh/hhe/reports/pdfs/2012-0125-3204.pdf>).

OSHA (2010a). *Injury and Illness Recordkeeping National Emphasis Program (RK NEP), directive number 10-02 (CPL 02), occupational safety and health administration*. U.S. Department of Labor (February 19, 2010). http://www.osha.gov/OshDoc/Directive_pdf/CPL_02_10-02.pdf. Accessed 04 March 2016).

OSHA (2010b). *Injury and Illness Recordkeeping National Emphasis Program (RK NEP), directive number 10-07 (CPL 02), occupational safety and health administration*. U.S. Department of Labor (September 28, 2010). http://www.osha.gov/OshDoc/Directive_pdf/CPL_02_10-07.pdf. Accessed on 04 March 2016).

OSHA (2014). *Occupational Injury and Illness Recording and Reporting Requirements – NAICS update and reporting revisions. 29 CFR Part 1904, occupational safety and health administration, U.S. Department of Labor. Federal Register, volume 79, no. 181, September 18, 2014.* (http://www.osha.gov/FedReg_oshaweb/FED20140918.pdf). OSHA's webpage on reporting a fatality or severe injury: <http://www.osha.gov/report.html>. Accessed on 17 February 2016).

OSHA (2015). *OSHA safety and health program management guidelines*. (November 2015 Draft for Public Comment: http://www.osha.gov/shpmguidelines/SHPM_guidelines.pdf and webpage: <http://www.osha.gov/shpmguidelines/index.html>). Accessed on 11 July 2016).

OSHA (2016). Final rule to improve tracking of workplace injuries and illnesses webpage. <http://www.osha.gov/recordkeeping/finalrule/index.html> (Accessed on 11 July 2016)

OSHA Recordkeeping webpage. OSHA injury and illness recordkeeping and reporting requirements. <http://www.osha.gov/recordkeeping/index.html>. Accessed on 11 July 2016.

OSHA TWI Bulletin No. 1. Injury and illness recordkeeping requirements. OSHA Temporary worker initiative. Occupational safety and health administration, U.S. Department of Labor. http://www.osha.gov/temp_workers/OSHA_TWI_Bulletin.pdf. Accessed on 17 February 2016.

OSHA Workers webpage. <http://www.osha.gov/workers/index.html>. Accessed on 17 February 2016.

Rosenman, K. D., Kalush, A., Reilly, M. J., Gardiner, J. C., Reeves, M., & Luo, Z. (2006). How much work-related injury and illness is missed by the current national surveillance system? *Journal of Occupational and Environmental Medicine, 48*, 357–365.

Ruser, R. W. (2008). Examining evidence on whether BLS undercounts workplace injuries and illnesses. U.S. Bureau of Labor Statistics. *Monthly Labor Review, 20–32* (August 2008).

Spieler, E. A., & Wagner, G. R. (2014). Counting matters: implications of undercounting in the BLS survey of occupational injuries and illnesses. *American Journal of Industrial Medicine, 57*, 1077–1084.

Wiatrowski, W. J. (2014). Examining the completeness of occupational injury and illness data: an update on current research. U.S. Bureau of Labor Statistics. *Monthly Labor Review, 1–14* (June 2014).

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