

Injured Workers' Underreporting in the Health Care Industry: An Analysis Using Quantitative, Qualitative, and Observational Data

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Underreporting of occupational injuries was examined in four health care facilities using quantitative, qualitative, and observational data. Occupational Safety and Health Administration logs accounted for only one-third of the workers' compensation records; 45 percent of injured workers followed by survey had workers' compensation claims. Workers reported 63 percent of serious occupational injuries. Underreporting is explained by time pressure and workers' doubts about eligibility, reputation, income loss, and career prospects. Though aware of underreporting, managers subtly believe in workers' moral hazard behaviors.

Introduction

AS OF 2007, officially reported non-fatal workplace injuries and illnesses occurred at a rate of 4.2 cases per hundred full-time equivalent workers in U.S. private industries (Bureau of Labor Statistics, 2008). Despite these incidents' high cost—\$160 billion dollars in 2005 (U.S. Census Bureau 2008)—the public policy interest in the problem seems to have diminished during the last few years. This is partly because the U.S. Bureau of Labor

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Statistics (BLS) data have shown a continuous decline in occupational injury rates since the early 1990s.

Several studies have argued that the official statistics regarding occupational injuries are flawed because of systematic underreporting. Labor economists have mainly been silent on this topic despite implications that underreporting would lead to biased estimates in the empirical research assessing the cost of injuries and models of compensating wage differentials and workers' turnover.

This paper addresses this topic by first describing the sequence of theoretical conflicting incentives and factors, including individuals' time preferences, that affect workers' decisions to report and to seek compensation. The study then tests empirically both the magnitude of underreporting and the factors related to both occupational injuries and underreporting. It exploits the rare opportunity of analyzing information of different types: quantitative administrative and survey records, as well as qualitative and observational data. We studied this topic in the context of the health care sector, a very important component of the U.S. economy and labor market.¹ The health care sector has one of the highest injury and illness incidence rates, 5.6 percent in 2007 (BLS 2008). Given its continuous growth, this sector is likely to be responsible for an increasing share of the total costs of occupational injuries and illness in the United States. Already in 1993, the health services industry accounted for 8.1 percent of the total cost of non-fatal injuries resulting in work loss (Waehrer, Leigh, and Miller 2005). In addition, injuries have implications for employee turnover, absenteeism (Dale-Olsen 2006; Viscusi and Moore 1991), and effort, and for employers' willingness to substitute capital for labor. As such, occupational injuries negatively affect the main output of this industry, i.e., patients' safety and well-being. Given that the available national statistics on occupational injuries are derived from individual firms' reports, it is essential to understand to what extent underreporting may be an issue and thus lead to an underestimation of the magnitude of these problems.

Evidence on Reporting

In the United States, records of occupational injuries and illnesses are collected through two different types of administrative records: logs required by the Occupational Safety and Health Administration (OSHA) and workers'

¹ As of 2006 health care expenditures represented 16 percent of gross domestic product (GDP). Health care and social assistance represented almost 11 percent of all non-farm employment in the United States. Employment in these sectors is predicted to grow by 27 percent between 2006 and 2016, against an average employment growth of 11 percent for all industry sectors (BLS 2007).

compensation data. The OSHA 300 Logs (200 Logs prior to 2002) represent the federal government's responsibility to monitor workers' safety and health. Most firms with at least ten employees are required to keep logs of all their work-related injuries and illnesses with the exception of very minor injuries that only require first aid and do not entail medical treatment, loss of consciousness, work restriction, or transfer to other jobs. OSHA may review these forms during possible worksite inspections, and the BLS samples these logs to produce an annual survey containing estimates of workplace injuries and illnesses.

Workers' compensation data, on the other hand, describe very different state systems designed to compensate workers for the economic losses they may incur because of medical expenses and earnings losses caused by an on-the-job injury or illness.

Several studies have discussed the shortcomings of each of these two systems as official sources of information about the extent of occupational injuries and illnesses in the United States (Azaroff, Levenstein, and Wegman 2002; Ruser 2008). Leigh, Marcin, and Miller (2004) estimated that the annual U.S. BLS estimates, based on firms' OSHA logs, miss between 33 percent and 69 percent of all injuries.

At the same time, research based on surveys of employees has described underreporting of occupational injuries and illness of more than 60 percent across different industrial sectors and jobs (Pransky et al. 1999; Scherzer, Rugulies, and Krause 2005). In studies specific to the health care sector, e.g., Weddle (1996) found that 39 percent of hospital service workers had not reported one or more injuries despite the fact that 64 percent of these unreported injuries required medical care and 44 percent resulted in lost work time. Hospital service workers were also found to be less likely to report if they were older and had longer tenure (Sarri, Eng, and Runyan 1991; Weddle 1996), and doctors were much less likely to report incidents than were midwives (Burke and Madan 1997). Indeed, Makary et al. (2007) found that surgeons did not report over 50 percent of their needlestick injuries, saying that "lack of time" was the main reason for their underreporting.

It is expected that only a fraction of occupational injuries or illnesses will result in compensation claims. In fact, only workers who incur medical expenses or whose spell out of work will exceed the "waiting period" will qualify for benefits. Still, studies have found rates of "under-claiming" for eligible employees ranging from 30 percent to 75 percent (Biddle and Roberts 2004; Biddle et al. 1998; Morse et al. 2003; Rosenman et al. 2000; Shannon and Lowe 2002). Severity of the injury (Alamgir et al. 2006), general health status, unionization, and industrial sector have all been found to be important determinants of claiming behavior. Economic analysis (Butler 1994) has also

shown that an increase in workers' compensation benefits and a decline in waiting period have a large effect on the frequency of insurance claims, and that this effect is much smaller when measured according to the frequency of OSHA log data. At the same time, changes in state workers' compensation laws affect the frequency of reporting injuries to the BLS. New laws introducing stricter requirements to provide objective evidence of work-related disability have been found to be responsible for 6.8–9.4 percent of the overall decline in work-related injuries reported by the BLS during the 1990s (Boden and Ruser 2003).

Theoretical Framework

Economic analysis has looked at occupational risk as a factor affecting employment choices and compensation. However, we know little about workers' behavior after injuries actually happen. Indeed, workers have the right to report occupational injuries, and as far as compensation claims, the workers' compensation system is an entitlement program: a program serving all qualified individuals regardless of possible firms' or states' budget constraints. The high rates of underreporting and under-filing found in the existing literature and the litigious nature of the workers' compensation system (Card and McCall 2006), however, raise doubts about the extent to which workers may indeed feel entitled to act after an occupational incident. It is in fact possible that employees may perceive the outcomes of reporting or filing as uncertain and potentially risky. Heckman and Smith (2004) suggest that, especially in the case of voluntary social programs, it is important to study the determinants of participation by decomposing the process into five stages: eligibility, awareness, application, acceptance, and enrollment. This approach permits a better understanding of how personal choices, program features, and parties' conflicting interests determine different outcomes in the use of such programs.

After an injury or illness, some workers may doubt that their injuries are *eligible* to be reported and then compensated. This can happen, e.g., when incidents result in health problems that are difficult to diagnose, that do not result in immediate medical treatment (as in the case of back injuries or “emotional” injuries), or that are no longer eligible because of new stricter regulations (Boden and Ruser 2003). But the perceived ineligibility could also result from the same assumptions that underlie the theory of compensating wage differentials, i.e., that workers have knowledge of the risk associated with their occupations. If they perceive risk as an integral attribute of their job they may feel precluded from the right to report.

Employees may also lack *awareness* of their right to report and to be compensated for medical expenses and income losses. Employers may neglect to educate workers about these policies, or the information may be provided at a time when workers still overestimate their ability to avoid risk (e.g., during orientation), and may therefore disregard the relevant information (Seabury et al. 2005).

Workers, however, may most likely experience conflicting incentives at the time of deciding whether actually to *report* the injury and consequently to start a potential *application* process for workers' compensation benefits.² Workers may benefit from reporting if employers subsequently take action to reduce job-related risks or if an early report can increase the legitimacy of potential future claims. If the injury produced medical expenses or income loss, the worker will also receive compensation benefits. The perceived value of these benefits will increase with the income replacement rate and with the level of uncertainty workers may attribute to their flow of future earnings. It is interesting, however, that the literature regarding moral hazard related to workers' compensation seems to imply a tendency on the part of employees to exploit the system but has been silent on the nature of the costs associated with reporting injuries or pursuing a claim.

The opportunity costs of reporting could be quite high and diverse in nature. First, injured workers may risk a "reputation loss." This may include a drop in self-respect, a stigma similar to what has already been observed with participation in other government programs (Moffitt 1983). Having been involved in a report of an injury may also be perceived as a "scar" that could jeopardize current or future jobs.³ It could be interpreted by the employer as a signal of low productivity, of a confrontational character, or of financial need. Employees may be concerned that the injury claim will negatively affect their relationships with clients and with co-workers (who could resent the additional workload or negatively judge the ability and character of the injured worker).

Second, significant "transaction costs" (Currie 2004) may be associated both with learning about the rules governing reporting and with actually acting on the decision to do so. For example, the process may be difficult for workers who have limited literacy, who are unfamiliar with human resources personnel,

² In Massachusetts, a workers' compensation claim must be filed by the employer. The employer has the right to choose the healthcare provider for the first visit, and the provider will bill the insurer directly after the claim is opened. A worker needs to personally file a claim only if the employer fails to contact the insurance company (Massachusetts Department of Industrial Accidents, 2007).

³ OSHA will investigate cases where workers claim to suffer retaliation because of their reporting of hazards. The process, however, is complex, and the burden of proof falls on the worker (Varelas 2008). In a more general context, Lewin and Peterson (1999) found evidence that employers exercise retribution (in terms of performance ratings, promotion rates, involuntary separations) against grievance filers and their supervisors. The authors noticed, however, that their data could not permit ruling out completely the explanation that such outcomes were due to individual workers' performance.

or who are simply working under tight time constraints and feel they cannot “afford” to interrupt their tasks.

Finally, filing a claim could complicate and limit the choice of medical care. It may require arguing with the physician who needs to assess the work-relatedness of the injury; dealing with claims representatives who could make the process burdensome; and taking time off from professional duties, which may affect workers' morale and produce income losses (Strunin and Boden 2004).

The comparison of all these costs and benefits will lead to different decisions because of individual characteristics and preferences. Individuals may differ in their time preferences and in their higher or lower discounting of future well-being. Reporting could have immediate negative consequences with only future benefits (temporal mismatch).⁴ Then workers who attach greater weight to current well-being may decide not to report an injury. They may fear immediate retribution or inconvenience, thereby discounting the gravity of compromising their long-term health and, consequently, long-term employment. Similarly, while the cost associated with interrupting an important job assignment to report an incident is immediately understood, the benefits of avoiding future health complications may be too uncertain (saliency mismatch). Here is where more experienced workers may have an advantage because of their ability to better understand the gravity of an injury. Finally, the fear of compromising a job may completely overshadow the benefits of avoiding future health risks or of being compensated for medical expenses and income losses (scale mismatch). This may be particularly true for low income workers.

Given these differences in workers' preferences, however, the propensity to report or to pursue benefits will be largely affected by firms' policies and practices toward reporting. Firms indeed may have several incentives to discourage reporting by workers or the recording of reported injuries. Understanding changing legal requirements and maintaining OSHA logs can be administratively burdensome, especially for smaller companies (Leigh et al. 2004). Higher injury rates reported in OSHA logs also increase the firm's probability of becoming a target for OSHA inspections.⁵ Contractors could be penalized in bidding if they have high reported injury rates. In addition, high rates of injuries may be reflected in firms' experience ratings and may thus increase the cost of workers' compensation insurance and of workers' compensation

⁴ Prelec (1991) introduces these concepts of mismatches. See also Seabury et al. (2005).

⁵ Ruser and Smith (1988) found, however, an underreporting of only 5–14 percent among high hazard plants potentially subjected to the OSHA records check procedures after 1981. Their finding, however, refers to the additional underreporting caused by increased inspection risk and does not represent overall underreporting.

claims for self-insured firms and may theoretically increase costs because of compensating wage differentials. The relationship between the insurance industry and state regulations clearly affects firms' willingness to acknowledge (*accept*) reports of injuries (Boden and Ruser 2003) and to commence benefits (*enroll*) in the workers' compensation system.

Sometimes managers may not be aware of the incentives to underreport that they infuse into a work environment. For example, some safety programs reward managers not on the basis of their implementation of new and safer production techniques, but on the basis of a decline in the number of reported occupational injuries or illness (Pransky et al. 1999). At the same time, it is also true that different incentives could lead firms to facilitate the reporting process: when workers believe themselves to be employed by a company with transparent and employee-friendly policies, they may show greater effort and therefore increased productivity (Ichniowski 1986), as well as stronger attachment and thus lower firm adjustment costs. The tighter the labor market, the more relevant these consequences will be.

Because of all the different and conflicting interests involved, the study of reporting requires information about both the work environment and individual preferences that is unlikely to be included in administrative data. At the same time it requires analyses that can validate workers' survey data. This represents a great opportunity to show how different data collection methodologies can lead to a deeper understanding of labor market problems.

The Data

The data analyzed in this study were collected for a study funded by the U.S. National Institute for Occupational Safety and Health under the name "Promoting Healthy and Safe Employment (PHASE) in Healthcare."⁶ The project studied two acute-care, non-profit, community hospitals, and two long-term care facilities (nursing homes) in northeastern Massachusetts (one for-profit and one non-profit). None of the facilities were unionized, but two unions representing health care workers provided participants for some focus groups. The resulting data were of different types, quantitative and qualitative, ranging from administrative payroll records to focus groups transcripts.

⁶ The National Institute of Health request for application had a stated purpose to "...foster multidisciplinary research..." through "...integration of qualitative and quantitative research methodologies ..." (Slatin et al., 2004). Nine health care facilities had originally committed to participate in the study, but five withdrew for a range of different reasons including concerns about the effect that the survey questions might have on employees' demands; financial difficulties; staffing shortages; and the fact that healthcare worker unions were participating in the study.

Administrative Data. Workforce rosters and OSHA logs were requested from the participating health care facilities, and workers' compensation data (both medical and indemnity cases) were requested from the insurance companies of these facilities. Some facilities provided only some of the data and for different time periods (ranging from 1997 to 2004).

Survey Data. Permission to survey employees was given by only one of the hospitals (Hospital two) and by both nursing homes. A three-step approach was used to collect survey data. Workers were first mailed an *Epidemiological Baseline Questionnaire* to collect information mainly on current and recent health endpoints under study, as well as on indicators of socioeconomic position and characteristics of the work environment. A total of 1144 surveys were distributed to hospital employees, and 307 surveys were distributed to employees of the two nursing homes; 480 employees responded. Respondents were mainly female (85 percent) and white people (90 percent); 25 percent of them were nurses; and workers in nursing homes were more frequently minorities and of lower socioeconomic status⁷ (Table 1). Overall the response rate was about 34 percent, a result that was probably largely due to respondents' working conditions. In fact, in a major deviation from the original research plans, employers were unwilling to allow the workers to fill out surveys during their work time. Surveys had to be mailed to workers' home addresses, and health care workers are known to experience substantial time pressures and difficulty juggling home and work responsibilities. In fact, PHASE researchers found survey response to be associated with higher socioeconomic status and with less job strain (Cifuentes et al., 2008). This result was further confirmed by the comparison of our survey data with the data from the hospital workforce rosters (d'Errico et al. 2007).

Those employees who completed the first survey and volunteered to be followed up with were asked to complete an *Outcomes Baseline Questionnaire* and a *Follow-up Questionnaire*. These were administered with a 12-month gap to capture the longer-term economic and health outcomes of the health problems that individuals had originally reported, accounting for new events that may have occurred in workers' lives. The response rates for these two outcomes surveys were much higher than for the original survey: 72 percent ($n = 236$ out of 327 mailed surveys) and 70 percent ($n = 237$ out of 335 mailed surveys), respectively.

⁷ Workers' socioeconomic positions were assigned on the basis of department-specific job title, utilizing job average hourly wage, educational requirements, and level of supervisory and decision-making responsibility (from written job descriptions and researchers' own knowledge of the healthcare institutions); six categories were defined (d'Errico et al. 2007).

TABLE 1
 SURVEY DATA: WEIGHTED^a SUMMARY STATISTICS FOR SELECTED VARIABLES

	All (1)	Hospital 2 (2)	Nursing homes (3)	p-Value ^b (4)
Part A: Mean (SE)				
<i>Demographic</i>				
Age	45 (0.57)	45 (0.62)	45 (1.4)	0.85
Female	0.85 (0.01)	0.85 (0.02)	0.83 (0.04)	0.52
Non-white ethnicity	0.10 (0.01)	0.06 (0.01)	0.29 (0.05)	<0.001
Home owner	0.79 (0.02)	0.83 (0.02)	0.65 (0.05)	<0.001
<i>Class of workers</i>				
Semiskilled	0.06 (0.01)	0.04 (0.01)	0.18 (0.04)	0.001
Skilled	0.26 (0.02)	0.26 (0.02)	0.31 (0.05)	0.27
Semiprofessional	0.22 (0.02)	0.22 (0.02)	0.21 (0.04)	0.93
Registered nurses	0.25 (0.02)	0.29 (0.03)	0.12 (0.03)	<0.001
Professional	0.15 (0.01)	0.15 (0.01)	0.13 (0.03)	0.59
Administrative	0.04 (0.01)	0.04 (0.01)	0.03 (0.02)	0.58
<i>Job attributes</i>				
Hourly wage	22.5 (0.50)	23.4 (0.56)	18.6 (0.83)	<0.001
Hold second job	0.27 (0.02)	0.29 (0.02)	0.19 (0.04)	0.02
Hours	33 (0.66)	32 (0.76)	35 (1.18)	0.04
Works overtime	0.17 (0.02)	0.20 (0.02)	0.07 (0.02)	<0.001
Part B: Percentages				
Total number of respondents	100% (n = 480)	100% (n = 376)	100% (n = 104)	
At least one injury at work	13.5% (n = 59 ^c)	13.7% (n = 46 ^c)	12.5% (n = 13 ^c)	0.74
Total number of injuries at work	100% (n = 79 ^c)	100% (n = 64 ^c)	100% (n = 15 ^c)	
Reported injury	63% (n = 49)	59% (n = 36)	87% (n = 13)	0.02
Objective injury ^d	28% (n = 22)	29% (n = 18)	27% (n = 4)	0.88
Subjective injury	45% (n = 36)	46% (n = 30)	40% (n = 6)	0.67
Other injury	26% (n = 21)	25% (n = 16)	33% (n = 5)	0.57

NOTES: ^aIn the survey data *female white hospital* nurses were assigned a weight of two because only half of them had been mailed the survey. All other surveyed individuals were assigned a weight of one.

^bTwo sample *t*-test for differences between values in column 2 and 3.

^cThe total number of workers with serious injuries on the job (fifty-nine) differs from the total number of injuries with reporting status (seventy-nine) because fourteen individuals (24 percent of fifty-nine) reported more than one serious injury.

^dWe define "objective injuries" as abrasions, bruises, cuts, burns, dislocation, fractures, and bites; "subjective injuries" as epicondylitis, strain, sprain, disc herniation; "other injuries" as multiple injuries and those for which no description was provided.

Observational Data. The research team included ergonomists who observed workers on site during both day and afternoon work shifts. They used a validated tool (Buchholz et al. 1996) to estimate the percentage of the observation time that employees were exposed to known postural and physical stressors within pre-defined time intervals.⁸ They also recorded task-specific information on repetition, monotony, responsibility for safety, and other

⁸ To reduce a potential Hawthorne effect (Leonard 2008), workers were observed for extended periods of time (multiple hours). Also, workers were observed while performing physical tasks under great time pressure, and PHASE researchers believe that this very quickly reduced the risk of any initial self-consciousness.

measures of work organization and workload, such as frequency of overtime and absenteeism.

Qualitative Data. Qualitative data used in this project included documents and records (10 years of written hospital and nursing home policies, newsletters, media reports, and other documents), fifty-four interviews with health care managers, and focus groups with 197 health care workers (eighty-one hospital workers, fifty-four nursing home workers, and sixty-two unionized health care workers employed at non-participating facilities). Interviews focused on a variety of topics ranging from financial and organizational issues to diversity and safety in the workplace.

Results

Aggregate BLS data have indicated a continuous decline in injury rates in the health care sector since the mid 1990s, but in 2007 hospitals and nursing homes were still leading the list of the fourteen industries having at least 100,000 injuries and illnesses, with incidence rates of 7.7 and 9.7 percent, respectively (almost double the 4.2 percent incidence rate for all private industries) (Bureau of Labor Statistics 2008).

How Much and What is Reported? Bureau of Labor Statistics are based on individual firms' reports. We now turn to the administrative data provided by the facilities to assess how their occupational injury data compare with

TABLE 2
ADMINISTRATIVE DATA: PERCENTAGES OF REPORTED OCCUPATIONAL INJURIES AND ILLNESSES FOR TWO MASSACHUSETTS HOSPITALS: AVERAGE YEARLY RATES OVER THE PERIOD 1999–2002

	Hospital 1 ^a (fte = 1226; n = 1720)			Hospital 2 ^b (fte = 990; n = 1354)		
	(1) OSHA logs (%; obs = 318)	(2) Workers' compensation first report of injury (%; obs = 822)	(3) <i>p</i> -Value ^c	(4) OSHA logs (%; obs = 233)	(5) Workers' compensation first report of injury (%; obs = 716)	(6) <i>p</i> -Value ^c
Percent of full-time employees (fte)	9	24	<0.001	6	19	<0.001
Percent of employees on payroll (n)	6	17	<0.001	4.6	14	<0.001

NOTES: ^aRecords averaged over the period January 1999–September 2001.

^bRecords averaged over the period January 1999–September 2002.

^cTwo sample *t*-tests for differences in values between columns 1 and 2 and columns 4 and 5.

national statistics. Table 2 presents the percentages of occupational injuries for the two hospitals that provided administrative data: with yearly average rates of 9 and 6 percent for the two facilities, their OSHA data mirror closely the national incidence rates of 8.8 percent and the Massachusetts incidence rate of 9 percent as reported by the BLS for 2001. Table 2, however, shows a surprising result: rates of workers' compensation first reports of injuries (both medical and indemnity claims) are almost three times what we found in the OSHA logs. This finding is unexpected because we would anticipate that only a subset of the overall injuries recorded by OSHA would be filed as possible workers' compensation claims. To further assess this discrepancy in the administrative data, we turn to our baseline survey data. We find that 13.7 percent of hospital workers who responded had a serious occupational injury (Table 1, part B, column 2), a value quite close to the 14 percent that we calculated in the same hospital by using workers' compensation data (Table 2, column 5).

This first piece of evidence leads us to the hypothesis that OSHA logs considerably underrepresent the frequency of occupational injuries and illnesses and therefore the riskiness of the health care sector. The result is confirmed by the fact that our baseline surveyed employees said that they reported only 63 percent of their serious occupational injuries (Table 1, part B, column 1).

To gain insights about which injuries may lead to undercounting in the OSHA records, we look at the distribution of injury characteristics between

TABLE 3
ADMINISTRATIVE DATA: SELECTED INJURY CHARACTERISTICS IN TWO MASSACHUSETTS HOSPITALS
OVER THE PERIOD 1999–2002

	Percent of OSHA logs (<i>n</i> = 551) (1)	Percent of workers' compensation first report of injury (<i>n</i> = 1538) (2)	<i>p</i> -Value ^a (3)
Body parts			
Hand/wrist	14.0	29.9	<0.001
Arm/shoulder/neck	7.4	8.1	0.60
Back	13.6	11.6	0.21
Hip/lower extremities	7.8	11.6	0.01
Other	57.1	38.9	<0.001
Type of incident			
Struck by/against	39.5	32.3	0.002
Overexertion	18.8	18.6	0.92
Slip, trip, fall	2.9	15.6	<0.001
Exposure/contamination	9.8	15.2	0.001
Assault	1.2	7.3	<0.001
Other	27.5	10.8	<0.001

NOTES: ^aTwo sample *t*-tests for differences between values in columns 1 and 2.

the two types of administrative records (Table 3). The different distribution of the types of injuries in the OSHA data and the workers' compensation data suggest that certain types of incidents (e.g., falls and assaults) may be disproportionately undercounted on the OSHA logs. They may, however, still be important signals of the level of risk associated with certain jobs, but a risk that is not captured by official statistics. Or it could be that in health care, we are dealing with a working population that is more aware of the long-term consequences of injuries and exposures and is therefore more proactive in filing for compensation. To further assess this possible explanation, we turn again to our survey and observational data.

What Predicts Reporting? In our survey data (Table 1, part B, columns 2 and 3), a higher proportion of injuries was reported in the nursing homes (87

TABLE 4
 SURVEY DATA: LOGIT ESTIMATES OF THE DETERMINANTS OF REPORTING A
 SERIOUS INJURY AT WORK (N = 79)

	(1)	(2)	(3)	(4)
Demographic				
Female	0.56 (0.70)			-1.33 (1.01)
Age	0.02 (0.17)			1.18 (0.64)*
Age squared	-0.01 (0.01)			-0.01 (0.01)*
Home owner	0.11 (0.88)			-0.43 (1.6)
Hold second job	-0.22 (0.82)			-2.03 (1.39)
Objective injury	0.25 (0.69)			0.42 (1.10)
Hospital		-2.13 (1.13)*		-2.01 (1.41)
Class of workers				
Semiskilled		Reference category		Reference category
Skilled		-0.35 (1.17)		6.36 (4.8)
Semiprofessional		-0.11 (1.11)		1.08 (2.16)
Registered nurses		1.24 (0.93)		4.16 (2.52)
Professional		1.55 (1.24)		2.48 (2.99)
Administrative		-0.96 (1.27)		-3.09 (2.67)
Tenure				
Tenure < 1 year		Reference category		Reference category
1 ≤ Tenure < 5 years		-0.76 (1.39)		1.28 (2.13)
Tenure ≥ 5 years		-2.07 (1.24)*		-3.65 (1.8)**
Job attributes				
Hours			-0.68 (0.31)**	-1.73 (0.67)**
Hours squared			0.01 (0.01)**	0.02 (0.00)**
Time pressure ^a			-1.64 (0.77)**	-4.72 (3.04)
Supervisor support			-0.79 (0.77)	-3.88 (2.18)*
Constant	-0.61 (3.3)	3.15 (1.7)	16.11 (7.4)	14.09 (9.90)

NOTES: **0.025 significance level; *0.10 significance level. Standard errors are in parentheses and estimated with the Huber/White estimator of variance.

^aWorkers replied that they had "not enough time to get their job done."

percent) than in the hospital (59 percent). Table 4 presents Logit multivariate estimates of the determinants of reporting a serious injury. Here, the unit of analysis is the single injury and not the individual worker, because 24 percent of all injured workers replied that they had experienced more than one serious injury on the job. Estimations are conducted with robust standard errors corrected for potential heteroskedasticity and correlation of the error terms across injuries pertaining to the same individual. Although these results have to be interpreted with caution because they are based on a very small number of observations ($n = 79$), they provide interesting insights. The specification of column 1 aims at capturing the opportunity cost of reporting (higher age may indicate more serious health consequences; home ownership and a second job may capture different financial needs), but the specification does not seem to capture the determinants of reporting. When we test the role of workers' status on the job, we find again that only hospital workers and employees with longer tenure were less likely to report (Table 4, column 2). As we start controlling for hours and amount of time pressure (Table 4, column 3), we find, however, that these work environment characteristics are the strongest predictors of underreporting. And the supervisor's role (a measure that captures both individual support but also the supervisor's ability for "getting the job done") seems to be important, as well as the time pressure employees may be working under (Table 4, columns 3 and 4).

Mergers in the health care industry have increased nurses' effort (Currie, Farisi, and Macleod 2005). Previous research (d'Errico et al. 2007; Gillen et al. 2007; Trinkoff et al. 2005, Videman et al. 2005) has highlighted the importance of physical effort and working conditions as determinants of workplace injuries.⁹ Our estimations based on survey data show an environment where long hours and time pressure are also the key determinants of underreporting. To better assess the value of these findings, we turn to a different type of data, collected by ergonomists who did site visits to observe employees' movements and level of activity. Table 5 presents records from these 251 observations and presents a clear picture in which 68 percent of observed individuals take only formal breaks; understaffing and working under deadlines were observed in more than 20 percent of the observed work shifts; and high time pressure was reported by individuals on almost 30 percent of all observed shifts.

Our initial conclusion is that administrative data suggest a first cause of underreporting: firms and workers may consider some incidents not eligible to

⁹ We conducted additional multivariate analysis with our survey data and also found that effort (hours and physical job demands) and a violence-prone work environment were the main determinants of serious injuries.

TABLE 5
OBSERVATIONAL DATA FROM SITE VISITS

	Hospitals 1 and 2 (%; n = 179)	Nursing homes 1 and 2 (%; n = 72)	All observations (%; n = 251)
Recorder observed			
Understaffing (%)	23	26	24
Only formal breaks (e.g., for meals) (%)	70	63	68
High time pressure (always or often) (%)	24	42	29
Workers report			
To be working under deadlines (%)	19	28	22
Deadlines happen often (%)	18	28	21

NOTES: *n* represents the total number of observations collected by ergonomists who watched employees' movements and activity during the day. Numbers may not add because of missing values.

be reported or may act only on workers' compensation claims. At the same time, survey and observational data suggest workplaces where both the occurrence of an injury and its reporting are affected more by the very demanding working conditions than by difficulty in understanding the process or the financial risk associated with it. The low response rate of our survey makes it essential, however, to further validate our results with different types of data. We therefore turn to the qualitative data that were collected from employees and managers.

Workers' Knowledge and Experience with Reporting and Workers' Compensation. Surveyed workers were asked specifically about their knowledge of injury reporting procedures and of the workers' compensation system. Workers also discussed these topics during focus groups and interviews. These two sources of quantitative and qualitative information provide very consistent findings.

Our first result rejects the hypothesis that workers are *not aware or lack information* about their rights after an injury: the large majority of surveyed workers knew about the existence of reporting polices (96 percent) and were familiar with the workers' compensation system (81 percent). Underreporting was widespread; however, only 45 percent of workers with work-related health problems thought that incidents were usually reported. Similarly, only 45 percent of workers who had experienced injuries on the job had them filed for workers' compensation.¹⁰

¹⁰ The survey did not distinguish between claims filed by employers and those pursued by employees (see footnote 2). However, an employer's filing typically occurs only after the employee notifies a supervisor or other management representative of the injury.

One of the biggest obstacles in reporting injuries and filing claims is tied to employees' perception of which incidents are *eligible* to be reported. One hospital administrator claimed that his facility was encouraging all types of reporting, regardless of the degree of severity of the injury. But the main reason for not reporting a health problem (in 40 percent of cases) or for not pursuing compensation after an injury (in 54 percent of cases) was the worker's belief that the injury "was not serious enough." There was also a belief (34 percent) that "injuries happen to most people with this occupation" and as such do not merit being reported (O'Sullivan et al. 2008). The high level of risk associated with the job seemed to be perceived almost with pride:

It's a job expectation... What did you expect...? It was going to be easy? (Nurse)

[Nurses underreport.] They are basically caregivers, and they continue to try to take care of others, and they put themselves last. (Nurse)

We also learned more clearly which benefits and costs may determine the decision to actually *report or to have a claim filed*. Surveyed workers told us that they mainly reported injuries to their supervisors (77 percent of cases). And although in many cases (46 percent) attention was given after reporting an incident, in several instances there were no benefits associated with reporting: the reaction was simply to advise the worker to be more careful in the future (13 percent), or no action was taken at all (34 percent). Only in 10 percent of cases was safety upgraded or time off given. Focus group participants supported these findings, giving examples both of strong support from supervisors and of situations where workers felt they were blamed for the injury:

They [nursing supervisors] are up there before we know it helping us out. (Nurse)

The nurse manager ...verbally attacked nurses that wrote [reports] saying they were trying to cause trouble. (Nurse)

The focus group results reinforced our econometric findings that *time pressure* is one of the main obstacles to report. They described the lengthy bureaucratic procedures involved in the reporting and filing process and the fact that because it is very demanding of workers' time, it just may not be feasible in an environment characterized by understaffing. Indeed, our review of the facilities' documentation and policies validates workers' perceptions that reporting can be a laborious and time-consuming activity requiring several lengthy steps.

Employees were also very concerned about the consequences that reporting injuries or pursuing workers' compensation claims could have on their *reputation*. On the one hand, co-workers resented being asked to work harder and faster to cover for a colleague who has either taken time off or has been assigned to light duty:

We are not very nice to the injured nurses...Because that person was on light duty...nobody was going to get a break. So there is some resentment from other workers. (Nurse)

When I came back the first day after being hurt I was greeted with, "so how much did you sue for?" I kind of was stunned... and said "I don't know where this rumor started, but I'm not the type that would sue. I want a job in nursing"... and the first couple of weeks have been really difficult because nobody actually talks to me... (Nursing home employee)

On the other hand, almost one-third of our surveyed employees were concerned that applying for workers' compensation could lead to discrimination, missed promotions, or job loss. Some workers voiced the fear of losing the opportunity to earn extra income by working overtime.

Workers also described their resistance to applying for workers' compensation benefits as due to the inadequacy of income replacement, delayed payments, and the fear of losing fringe benefits such as health insurance for the entire family. The ones who had filed for workers' compensation discussed the difficulties of navigating the system and of obtaining medical care:

I had a workman's comp case at a hospital that I worked at before... I've never been treated so horribly in my life... I felt like I was applying for welfare... And then after the third injury in a year, I was fired. And they knew it was their fault. So now I would never, ever file another workman's comp case. (Nurse)

I'm a ping pong ball. My primary care physician will not see me because it's a work related matter. I have to go to the specialist and the specialist just discharged me because the neurologist was reporting on the case.... (Nursing home employee)

One of the more interesting qualitative findings, however, concerned the costs that time off entails for workers in terms of their own *perceptions of themselves*.¹¹ A discussion of the nature of nursing prompted general agreement among all focus group participants:

¹¹ Similarly, Heyes's study (2005) shows how the status of nursing as a "vocation" contributes to the compression of nurses' wages.

[after the problem] I continued to work...I didn't want to lose my identity as a nurse...The identity of what you do and who you are is very, very tied up into nursing...They need me at two in the morning. That's how important I am, type of thing. So, it is, you know, sort of a big push to continue to work. (Nurse)

Once you get injured, people start to think you are a careless worker, you are not careful; you are too risky to be working in a nursing home. ... You get that in your mind and that's when it inhibits you from coming forth and saying that you hurt yourself. (Nursing home employee)

In the theoretical framework section of this paper, we discussed how individuals' decisions may be affected by their ability to fully assess costs and benefits, as these may occur at different times, they may be more or less easy to understand and imagine, and they can be quite different in scale. Analysis of the focus groups highlights some individual attributes potentially related to the different weight that workers attach to benefits and costs.

For example, our statistical analysis found some evidence of the importance of being able to calculate future costs: older workers were more likely to report, but longer tenure workers were less likely to do so. The qualitative data presented a more complex picture: union nurses told us that young or male workers are more likely to report injuries than their counterparts because their generation or gender has a culture of not putting up with unpleasant experiences. However, we also heard that younger nurses report less frequently because they do not appreciate the potential health and safety consequences as more experienced nurses do. Finally, for some workers the immediate cost of reporting may overshadow by far any potential future benefits: conversations we had with workers suggested a fear of reporting among immigrant workers who were concerned about losing their work permits.

The Managers' Views. It is interesting to note that when managers were interviewed, they described the existence of reporting policies, but when talking about underreporting they confirmed it and gave very similar explanations for it as the ones provided by workers, i.e., injuries as part of the job, time constraints, and the key role of supervisors:

...A nurse told me: 'we don't even write half of the time we get struck'...I'm not saying that's right but I think they accept it because it just goes along with the territory. (Hospital director of security)

Managers also stressed the importance of developing a safe work environment although, interestingly enough, only 59 percent of workers stated that

they received health and safety training during the previous year, and those who did attended for an average of only 3 hours.

One of the most interesting findings, however, was the discussion of the workers' compensation system. It highlighted factors that affect the likelihood of being *accepted* and *enrolled* in the system. Despite the fact that the majority of our surveyed workers with work-related problems (92 percent) and of our surveyed injured workers (55 percent) had not filed for workers' compensation, some managers gave examples of fraud by some claimants and of their "dishonest" attitudes:

...there are people who just aren't going to report something because, you know, it's a chronic condition. And those people are stoic throughout their life, and they are not the kind of people that are going to become a burden on the facility or a burden on the workman's compensation system, but there are also people who will, you know what I mean, scratch their finger on the Scotch tape holder and fill out and send in a report. (Nursing home administrator)

The belief in moral hazard behaviors can be pervasive; e.g., managers indicated the need to carefully screen new hires to avoid employing those individuals:

....who are looking to use the system....and know where they can do that. They know that certain companies don't have those things [drug testing, pre-employment physical, etc.] in place and they will try to go there to have their [health problem] alleged as work-related injury. (Nursing home administrator)

Interviews showed, however, how firms' behaviors and attitudes toward injuries are also the result of wider market forces:

[Facilities] are much more focused on getting their hands wrapped around workers, comp, controlling costs, [and this is because] insurance carriers are being much more choosy, they are in the driver's seat. They can pick and choose their customers because there are so few carriers available now. Several companies have closed. Several large companies remain, and they are being much more picky about who they are taking on as a risk....The customers have to abide by their rules and regulations. (Nursing home administrator)

The two long-term care facilities felt pressure to control injury costs because of the increasing market power of workers' compensation insurance companies. The hospitals, however, saw workers' compensation premiums as a fixed cost about which they were generally unconcerned as long as the cost remained relatively constant from year to year. Facility accreditation pressures were the primary driver for employee health and safety measures.

Conclusions

In this study, we have analyzed the problem of underreporting of occupational injuries and illnesses in the health care sector, a sector that is steadily growing in size and importance in the U.S. economy. It is important to study underreporting because if official statistics underestimate the number of injuries and illnesses, then much higher estimates of their cost are needed, as well as a renewed urgency to infuse the labor market with safety and health incentives. Our ability to properly test those economic theories that examine the role of occupational risk in models of compensating wage differentials or of labor mobility may also be affected. Underreporting could possibly imply large biases in empirical results, if, e.g., some workers face systematic incentives to underreport or if some of the known factors that contribute to an injury (e.g., time pressure) deter workers from reporting.

Our results show substantial underreporting, and they are drawn from and tested with data of very different types: in the facilities that we studied, OSHA logs accounted for only one-third of the corresponding workers' compensation records. To assess this discrepancy in the administrative records, we turned to survey data. Surveyed workers reported only 63 percent of injuries they considered to be serious occupational injuries, and, among those injured workers who could be followed over time, only 45 percent had a workers' compensation claim.

From qualitative data and from survey data we found that lack of awareness of or knowledge about reporting processes and workers' compensation systems does not explain underreporting. Instead, workers tend to underestimate the legitimacy of reporting incidents when injuries are not serious or are of a type they consider inevitable on their jobs, a finding further proven by the systematic underreporting of certain types of incidents, such as assaults, in the OSHA data. But even when reporting seems to be the right thing to do, additional factors affect the costs of reporting: time pressure, concerns about reputation and career, and fears of the income loss and psychological distress associated with time off work (when workers define their identity through their profession). Indeed, observational data show a work environment characterized by time pressure.

Managers are aware of underreporting and perceive the potential long-term advantages of using reporting as a tool for developing a safe work environment. However, despite the rich evidence of a tremendous amount of employee self-restraint in reporting and in applying for workers' compensation, managers still show a subtle belief in workers' moral hazard behaviors. In addition, they see injuries as an inevitable feature of their industry, which

leaves them to focus primarily on monitoring claims and controlling their costs.

Our study is a rare example of how different types of data (administrative, survey, observational, and qualitative data) can lead to a deeper understanding of a problem. However, the generalizability of our findings is clearly limited. First, we have studied a very unique sector, an industry characterized by a very tight labor market where time pressure is a known problem. In addition, workers in this industry are likely to be quite knowledgeable about the consequences of health problems. They may also be highly motivated in their jobs. Finally, our results are based on only a few facilities and a small number of surveyed employees. Clearly our findings need to be tested with further research.

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