

Occupational Injuries Due to Violence

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Each year in the United States, an estimated 800 to 1,400 people are murdered at work, and an unknown number of non-fatal injuries due to workplace violence occur. Based on Ohio's workers' compensation claims from 1983 through 1985, police officers, gasoline service station employees, employees of the real estate industry, and hotel/motel employees were found to be at the highest risk for occupational violent crime (OVC) injury and death. Grocery store employees, specifically those working in convenience food stores, and employees of the real estate industry had the most reported rapes. Four previously unidentified industries at increased risk of employee victimization were described. Identification of industries and occupations at high risk for crime victimization provides the opportunity to focus preventive strategies to promote employee safety and security in the workplace.

The problem of violence in the United States has recently received increased attention from the public health community.¹⁻³ Despite the increased attention, workplace violent behavior has been relatively ignored. Each year in the United States, an estimated 800 to 1,400 people are murdered at work, and an unknown number of non-fatal occupational injuries occur due to violent crimes.^{4,5} Knowledge of high-risk occupations and industries and the personal characteristics of the victims offers the opportunity for focusing preventive efforts to reduce these injuries. Four sources of data are currently available to address this task of identification: workers' compensation claims (WCC), death certifi-

cates, Uniform Crime Data maintained by the Federal Bureau of Investigation (FBI), and the National Crime Survey performed by the Bureau of Crime Statistics. The FBI crime statistics and the National Crime Survey are useful for describing the demographics of violent crimes; however, they do not include information on the victim's industry or occupation.⁶ Death certificate reviews are a useful source for describing industries with increased risk of occupational fatalities,^{5,7} but they do not contain morbidity data. WCC were chosen for this study because of their inclusion of industry and occupation codes and their ability to identify injuries as well as deaths.

Methods

All Ohio workers are eligible for benefits from the Bureau of Workers' Compensation (BWC) with the exception of federal employees, railroad workers, people who are self-employed, and officers of family farm corporations. All the above workers, with the exception of federal and railroad employees, may opt for workers' compensation coverage through the BWC. The filing mechanism, degree of coverage of Ohio's workers by the BWC, and eligibility requirements have been presented elsewhere.⁸

A case of occupational violent crime (OVC) injury is defined as the intentional battery, rape, or homicide during the course of employment. We reviewed Ohio's computerized data set of all lost-time (involving one or more days away from work) workers' compensation claims for workplace injuries for the 3-year period 1983 through 1985. These claims were coded by trained nosologists employed by the Industrial Commission of Ohio's Division of Safety and Hygiene. WCC injuries which met the following criteria were selected for initial review: (1) involved a firearm, knife, or was not classified; and (2) resulted in a cut, puncture wound, multiple injuries, or was not stated. Information indicating the circumstances of the injury and, in particular, whether

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the injury occurred during the commission of a crime, is not computer-coded. As a result, each claim form meeting the above criteria was reviewed to determine the circumstances of the injury and to exclude unintentional injuries.

Seven hundred twenty-two filed claims satisfied the computerized selection criteria. Following a review of each claim, 259 intentional violent crime victims were identified. The remaining 463 injury claims were unintentional injuries or self-inflicted intentional injuries. Victimization rates were calculated by age and industry for the years 1983 to 1985. The numerator was the victims identified by Ohio's WCC. The denominator was the number of employees in a four-digit Standard Industrial Classification (SIC)⁹ or age stratum for Ohio during the study period, obtained from the Bureau of Labor Statistics (J Bush, US Dept of Commerce, Bureau of the Census, personal communication) and the State of Ohio Bureau of Employment Services' Labor Market Information Division (R Green, personal communication). No employment data by SIC are available by gender or age stratum. Only industries with four or more cases in 1983 through 1985 were included in the analysis.

A rate of OVC was calculated for each age stratum per year, and an average rate for the 3-year period was estimated. Similarly, a rate for OVC and for occupational homicide was determined for each SIC for each year, and an average rate for the 3-year period was estimated. A rate ratio (RR) for each age stratum and industry was determined in comparison with rates for all age strata and all industries for Ohio employees. Confidence limits (95%) were determined using the mean of a Poisson-distributed variable around the rate ratio.¹⁰

The sensitivity of WCC in identifying occupational homicides was determined by comparing claims with death certificates for Ohio for two of the three years (1983 to 1984) of this study. The death certificate review used the "injured at work" box to identify occupational deaths. Manual review of these death certificates identified the homicides, and only the victims who died in 1983 or 1984 were included. Tests of significance were estimated using McNemar's χ^2 test.

Results

For the 259 workers' compensation cases resulting from occupational violent crime, the claimants' ages ranged from 16 to 63 years with a mean of 31 years. The age group of 25 to 34-year-olds had the greatest risk (RR, 1.3; 95% CI, 1.0 to 1.6), and the 45 to 54-year age group had the lowest (RR, 0.5; 95% CI, 0.3 to 0.7) (Table 1). Rates by gender could not be determined due to lack of sex-specific age data for Ohio employees. Male victims were more common (75%). Fifty-five percent of attacks occurred between 7 PM and 7 AM. Firearms were the weapons most frequently used (73%) (Table 2), of which handguns represented 85%. There were 100 victims in 1983, 94 victims in 1984, and 65 victims in 1985. No monthly or seasonal trends in cases were observed.

TABLE 1
Workers' Compensation Claims for Violent Crime by Age of Victim: Ohio, 1983-1985

Age, yr*	No. (%)	Rate/ 10,000 Employees†	RR‡ (95% CI)§
16-19	17 (6.6)	6.0	1.0 (0.6-1.7)
20-24	44 (17.0)	7.2	1.2 (0.9-1.7)
25-34	95 (36.7)	7.4	1.3 (1.0-1.6)
35-44	52 (20.1)	5.3	0.9 (0.7-1.2)
45-54	19 (7.3)	2.7	0.5 (0.3-0.7)
55-64	20 (7.7)	4.0	0.7 (0.4-1.1)
65+	0 (0.0)	-	-
Unknown	12 (4.6)	-	-
Total	259 (100.0)	5.8	1.00

* Age strata used by US Dept of Commerce, Bureau of the Census, to collect civilian labor force data.

† Annual rate averaged over 3-year period.

‡ Rate ratio compared with rate of victimization for all Ohio employees.

§ 95% confidence interval.

TABLE 2
Type of Violent Crime by Age, Sex, Time, and Gun Usage: Ohio, 1983-1985

	No. (%)	Age (mean), yr	Sex (% Male)	Night	Gun
Battery and assault	192 (74)	30	84	51	72
Homicide	50 (19)	36	67	67	74
Rape	17 (7)	26	6	60	NA*
Totals	259 (100)	31	75	55	73

* NA, not available.

Of the 259 cases of victimization, 192 (74%) were battery and assaults, 50 (19%) were homicides, and 17 (7%) were rapes.

Nine industrial classifications had more than three victims during the study period (Table 3). Police officers and sheriffs had a rate ratio for combined occupational injury and death of 37.0 (95% CI 27.0 to 49.6) compared with all Ohio civilian employees. Police officers were followed in risk by gasoline service station employees (RR, 13.2; 95% CI, 8.3 to 19.9) and employees in the real estate industry (RR, 8.0; 95% CI, 2.6 to 18.6). Police officers had the greatest risk of homicide (RR, 22.9; 95% CI, 7.4 to 53.4), followed closely by hotel/motel employees (RR, 21.9; 95% CI, 8.8 to 45.1).

Convenience food stores had five rape victims, followed by the real estate industry with three. Hotel/motels, eating and drinking establishments, and private protective services each had one victim.

Police officers and those employed in private protective services had the lowest proportion of homicides to injuries (11% and 14%, respectively), whereas 50% of occupational violent crime injuries to hotel/motel employees resulted in death (Fig. 1).

We compared WCC with death certificates to determine the sensitivity of WCC in detecting occupational homicide. WCC detected 41 (61%) of the 67 occupational homicides identified by death certificates. Reviewing the death certificates of the victims not identified by WCC, the majority of missing deaths were among the self-employed (70%). Eating and drinking establishments accounted for 55% of the victimized self-employed.

TABLE 3
Rates of All Victims of Violence and Homicides By Industry: Ohio Workmen's Compensation Claims 1983-1985

Industry (SIC)*	All Victims of Violence			Homicides		
	No. (%)	Rate/ 10,000 Employee†	RR‡ (95% CI)§	No. (%)	Rate/ 10,000 Employee†	RR (95% CI)
Police officers and sheriffs (9221, 9223)	44 (17.0)	22.2	37.0 (27.0-49.6)	5 (10.0)	2.52	22.9 (7.4-53.4)
Gasoline service stations (5541)	22 (8.5)	7.9	13.2 (8.3-19.9)	5 (10.0)	1.77	16.1 (5.2-37.5)
Real estate (6531)	5 (1.9)	4.8	8.0 (2.6-18.6)	0 (0.0)	-	-
Hotels/motels (7011)	14 (5.4)	4.7	7.8 (4.3-13.1)	7 (14.0)	2.41	21.9 (8.8-45.1)
Private protection services (7393)	7 (2.7)	4.5	7.5 (3.0-15.4)	1 (2.0)	1.72	15.6 (0.4-86.9)
Local and suburban transit (4111)	6 (2.3)	3.8	6.3 (2.3-13.7)	1 (2.0)	0.63	5.7 (0.1-31.7)
Grocery stores (5411)	24 (9.3)	2.3	3.8 (2.4-5.7)	6 (12.0)	0.61	5.5 (2.0-12.0)
Eating and drinking establish- ments (5812, 5813)	32 (12.4)	1.2	2.0 (1.4-2.9)	5 (10.0)	0.20	1.8 (0.6-4.2)
Medical and surgical hospitals (8062)	7 (2.7)	0.4	0.7 (0.3-1.4)	2 (4.0)	0.13	1.2 (0.1-4.3)
Total (9 industries)	161 (62.2)			32 (64.0)		
Total (All industries)	259 (100.0)	0.6	1.0	50 (100.0)	0.13	1.0

* Standard Industrial Classification.

† Annual rate averaged over 3-year period.

‡ Rate ratio—compared with rate for all industries, computed using unrounded numbers.

§ 95% confidence interval.

% HOMICIDES/INJURIES

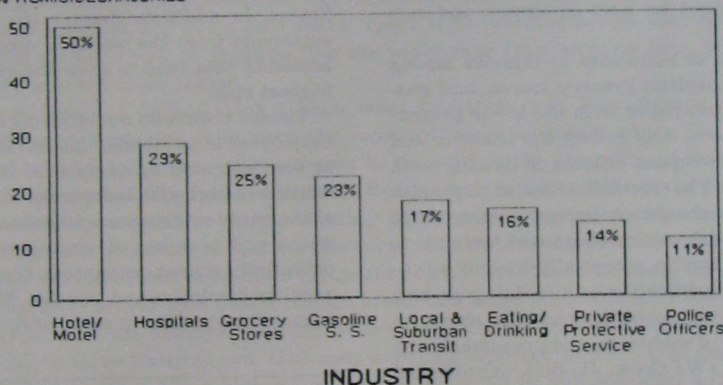


Fig. 1. Proportion of occupational violent crime homicides to occupational violent crime injuries by industry.

There is currently no other independent source for determining the number of occupational violent crime injuries against which to compare the sensitivity of WCC.

The WCC system identified three homicide victims not listed in Ohio's death certificates. Two of these victims were not Ohio residents.

Discussion

Previous studies have described police officers, grocery store employees, gasoline service station employees, employees of eating and drinking establishments, and taxicab drivers being at high risk for homicides.^{7,11} In the present study using workers' compensation claims, the same high-risk categories were identified

(with the exception of taxicab drivers, who had fewer than three injuries from criminal victimization during the study period 1983 through 1985). Thus, industries presenting the highest risk of workplace homicide, in general, also present the highest risk of non-fatal occupational injuries due to violence.

The inclusion of injury as a result of victimization in this study allowed for the identification of employees of additional industries and occupations at increased risk of victimization, including the hotel/motel industry, agents and managers of the real estate industry, the protective service industry, and local and suburban transit employees. The risks of OVC injury to those employed in the above industries have not been previously described.

All the industrial classifications identified in this study were in the service sector of the economy, and,

with the exception of police, private protective services, and real estate employees, all usually involve the direct exchange of cash for services or products. The association between handling substantial amounts of cash during the course of employment and occupational fatalities as a result of firearms has been reported.¹¹

Gasoline service stations and convenience food stores are recognized by law-enforcement agencies as having crime problems reflected in their high robbery rates, thus putting their employees at greater risk for injury during the commission of a crime. In response to this problem, a large convenience food store chain studied robbery deterrence strategies (WJ Crow, JL Bull, unpublished data). Changing certain features of the work environment and instructing employees on how to react in potential robbery situations reduced the number of robberies and, presumably, the number of injuries as well. The specific features of the work environment contributing to the reduction were installing exterior lighting and drop safe boxes with signs clearly stating their use, and making the cash register area more visible from the street. The study serves as a model for other high-risk industries. In addition to a potentially unsafe work environment, the economic impact of the negative public perception of convenience food stores as a result of frequent robberies has been described.¹² Actions to improve workplace security have the potential of providing a safe environment for both employees and customers.

The high proportion of homicides to injuries among employees of motels, hospital, grocery stores, and gasoline service stations, compared with the lower proportion among police officers, may reflect the training and experience of law enforcement officers in dealing with dangerous situations. The identification of high-risk employment situations should encourage employers to provide both a safer work environment and training to employees on how to handle potentially violent situations. Environmental modification and training on how to act prior to and during robberies has been shown to decrease the frequency of robberies, and presumably the risk of personal injury (WJ Crow, JL Bull, unpublished data). Most police departments offer programs on robbery deterrence and how to reduce the chance of personal injury in these situations.

The rates for occupational violent crimes determined by using workers' compensation claims are influenced by a number of biases. WCCs identified only 61% of occupational homicides during a 2-year period, a percentage similar to that found in Maryland (57%).⁷ Underreporting to workers' compensation systems is a well-recognized problem.¹³ The underreporting of occupational homicides to workers' compensation is probably due to either the victim's family being unaware of entitlement to compensation benefits or the lack of surviving dependents to claim such benefits. In addition to an underestimation of the number of cases of OVCs, different occupational groups (such as law enforcement officers) may be more aware of their entitlement to workers' compensation benefits, and may thus be more likely to file claims. For occupational rape, the stigmata associated with reporting and possible loss of employ-

ment probably result in significant underreporting of this condition. The lack of age, race, and gender information by SIC does not permit the adjustment of rates to reflect the different distributions in employment population by these three potential confounders. The influence on our rates of the more frequent occurrence of violent crime among young men cannot be ascertained here. Finally, using employment figures based on standard industrial classifications (SIC) assumes that all employees within a particular classification are equally at risk. For example, convenience food stores are in the same SIC as large supermarket chains; however, their employees may not be at the same risk. Of the 24 injuries in our study occurring in the grocery store industry, 90% occurred in convenience food stores.

Despite the underreporting to workers' compensation systems in general, the value of WCC as a surveillance tool for occupational lead poisoning and workplace sexual assault has been described.^{8,14} Given the variety of compensation coverages from state to state, it is difficult to predict the value of reviewing WCC in other states as a means of defining working populations at risk of violent crime injuries. However, given the ubiquitous nature of the service industries described in this study (convenience food stores, hotels, real estate agencies), it is likely that the results of this study could be generalized to other working populations across the United States. In addition, despite the absence of most self-employers from the workers' compensation system, the homicide data tend to show the same industries to be at highest risk.

Violent crimes do not occur by accident or at random. Employees in particular industries have different risks, as demonstrated by analysis of Ohio WCC data. Identification of high-risk industries, followed by modification of the work environment to reduce its attractiveness to felons and training of employees on how to react in potentially violent encounters, should help prevent these needless homicides and injuries. WCC could then be used to monitor the effectiveness of intervention programs.

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Penalty for Self-reliance

Once again I am lonely, a man turned 40 . . . It is not a bench mark birthday that makes me hear again so clearly the footfalls of the past; it is a place, a sprawling estate that was once a posh boarding school for boys . . . There was no succor at the Nyack Boys School. There, between a stone fence and the river, I was on my own for the first time. The lesson of boarding school was the lesson of separation, perhaps the fundamental lesson of manhood; through codes and rituals, men are taught to remove themselves and live a step apart. There is no reaching across that space—no handhold for wives or children, for the other men they want to love, for the mothers who left them behind.

Before Nyack, I do not think I knew what loneliness was. Now, having again walked the grounds and re-entered the rooms of the great estate where I spent a year of my boyhood, I can easily summon to the surface the deep ache of that first night in my room as I looked out between the mullions into the darkness at the car lights creeping across the bridge. Nothing dulled that ache, not puppets brought from home and held close in bed, not the nurse with the soft hands in the infirmary, not even the infrequent notes from my mother on her scented letterhead.

I must have sensed then that a certain break had taken place and that there was no way to close the distance between where I was and where I had been. Later, I was told, or more likely shown, that men were not supposed to want that distance closed. And by then I had already started on the road to independence and self-reliance, and in so doing insured forever the loneliness.

—From "About Men: The Road to Self-Reliance" by
Michael Norman in *The New York Times Magazine*,
Dec 13, 1987.