Occupational Injury in North Carolina

Dawn N. Castillo, Sheila Higgins

In 2008, 161 North Carolina workers died from work-related injuries, 3,324 were hospitalized, and 119,000 reported work-related injuries. Workers' compensation costs in the state exceeded $1.3 billion in 2007. Concerted efforts by the private and public sectors will be needed to reach goals to reduce the incidence of occupational injuries.

There are similarities and differences between injuries that occur in the workplace and those that occur in other settings. Similarities include injury causes, such as falls and motor-vehicle crashes, although some injury causes are more common in work settings than in other settings, such as being caught in moving parts of equipment. The strategies for controlling injuries in the workplace often are similar to those in other settings, and the workplace provides an additional avenue for prevention efforts. For example, employer practices of providing defensive-driving training to employees whose duties include driving, as well as policies mandating seat-belt use for work-related driving, complement state licensure, laws, and enforcement activities. Similar to injuries in other settings, there are socioeconomic disparities between populations with and populations without an increased risk for occupational injuries. Minority, low-wage, and immigrant workers tend to work in the riskiest workplace environments. The primary difference between injuries that occur in occupational settings and those that occur in other settings is in the control and responsibility for the health of the individuals. The work environment and processes are largely controlled by employers, and there are legal obligations for employers to provide their employees with a safe working environment.

Similar to injuries in other settings, occupational injuries result in large costs to injured individuals, their families, and society. In 2007, workers' compensation costs in North Carolina exceeded $1.3 billion [1]. These economic costs do not include the pain, suffering, and lost potential of the injured workers, their families, and employers.

Occupational injuries are an important public-health problem. Goals to reduce occupational injuries by 2020 have been set nationally and in North Carolina (Table 1) [2, 3]. Reaching these goals will require concerted and complementary efforts by the private and public sectors, including labor departments and public-health agencies, trade and labor organizations, the research community, employers, and workers.

North Carolina Labor Force

There were approximately 4.25 million people employed in North Carolina in 2008 [4]. The education, health, trade, and manufacturing industries accounted for nearly 50% of the workforce. The state's labor force is growing faster than the national average and is transitioning from traditional, labor-intensive industries to knowledge-based or service-related industries. Workers aged 55 years or older are the nation's and state's fastest-growing worker segment, accounting for 18% of the state's labor force in 2008. These transitions will affect the future frequency and types of occupational injuries in the state.

Table 1.
Proposed 2020 Goals to Reduce Occupational Injuries

Scope, goal(s)
National[a]
Reduce the rate of injuries and illnesses due to overexertion or repetitive motion that lead to days away from work
Reduce deaths from work-related homicides
Reduce deaths from work-related injuries (includes specific subobjectives for mining, construction, transportation and warehousing, and agriculture, forestry, fishing, and hunting)
Reduce nonfatal work-related injuries (includes subobjectives for injuries reported to employers, injuries treated in emergency departments, and injuries to adolescent workers 15-19 years of age)
Reduce work-related assaults
North Carolina[b]
Reduce the mortality rate from work-related injuries

[a]Goals are adapted from [2].
[b]Goal is from [3].

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Occupational Injuries in North Carolina

The Council of State and Territorial Epidemiologists (CSTE) [5] has identified occupational-health indicators that can be used by states to assess the occupational-health status of their workers and to help identify prevention priorities. A subset of indicators focused on injury is presented here, and some comparisons are made to national statistics. All data were calculated using methods specified for the CSTE indicators [5].

Nonfatal injuries and illnesses reported by employers. Analysis of employer-reported data collected by the Bureau of Labor Statistics (BLS) revealed that in 2008 there were an estimated 119,000 nonfatal work-related injuries and illnesses (hereafter referred to as "injuries") in North Carolina. National data suggest that approximately 95% of cases are injuries rather than illnesses [6]. The injury rate is decreasing in the state and the nation, and North Carolina rates have consistently remained lower than the overall national rates. Between 2003 and 2008, North Carolina rates decreased 15%, from 4,000 to 3,400 per 100,000 full-time-equivalent workers.

The industries in North Carolina with the largest burden and highest risk for injuries are shown in Table 2. The BLS summarizes data on the public sector separate from data on private-sector industries. For the past several years, the injury rate for the public sector (state and local government) was high in comparison with the rate for the state's private sector. This mirrors national trends.

The BLS collects data on events that contribute to injuries and on the demographic characteristics of injured workers, only for those cases serious enough to result in days away from work. In North Carolina during 2008, the events or exposures most responsible for injuries resulting in days away from work were contact with objects and equipment; bodily reaction and exertion, mostly overexertion, such as in lifting; and falls, most of which were on the same level as that on which the worker was standing or working (Figure 1). These events accounted for 76% of the reported injuries. These are also the most common events nationally.

In the state and the nation during 2008, 64% of injuries that led to days away from work involved injuries to men. A total of 73% of injuries in North Carolina that were associated with missed work involved people aged 25-54 years; the pattern for the United States was similar. In North Carolina, when race and ethnicity were reported, whites accounted for 50% of injuries resulting in missed workdays; blacks, 17%; Hispanics, 9%; and other groups, 1%. Race or ethnicity was unreported in 23% of injuries leading to days away from work.

The data described above are believed to be conservative. The BLS survey is based on a sample and excludes self-employed people, farms with fewer than 11 employees, and federal-government employees. Additionally, research suggests that many cases are undercounted, as a result of disincentives for reporting [10].

Work-related hospitalizations. In 2008, there were 3,324 North Carolina hospitalizations with workers' compensation identified as the expected payer. Work-related hospital-discharge rates decreased 23%, from 101 to 78 hospital discharges per 100,000 employed persons, between 2003 and 2008. US rates show a similar trend, and North Carolina was below the national rate as of 2006.

Workers 25-54 years of age accounted for 66% of work-related hospitalizations; males accounted for 73%. The 5 diagnoses with the highest percentages of work-related injuries (31% combined) were related to musculoskeletal disorders. The leading cause of work-related injuries was falls.

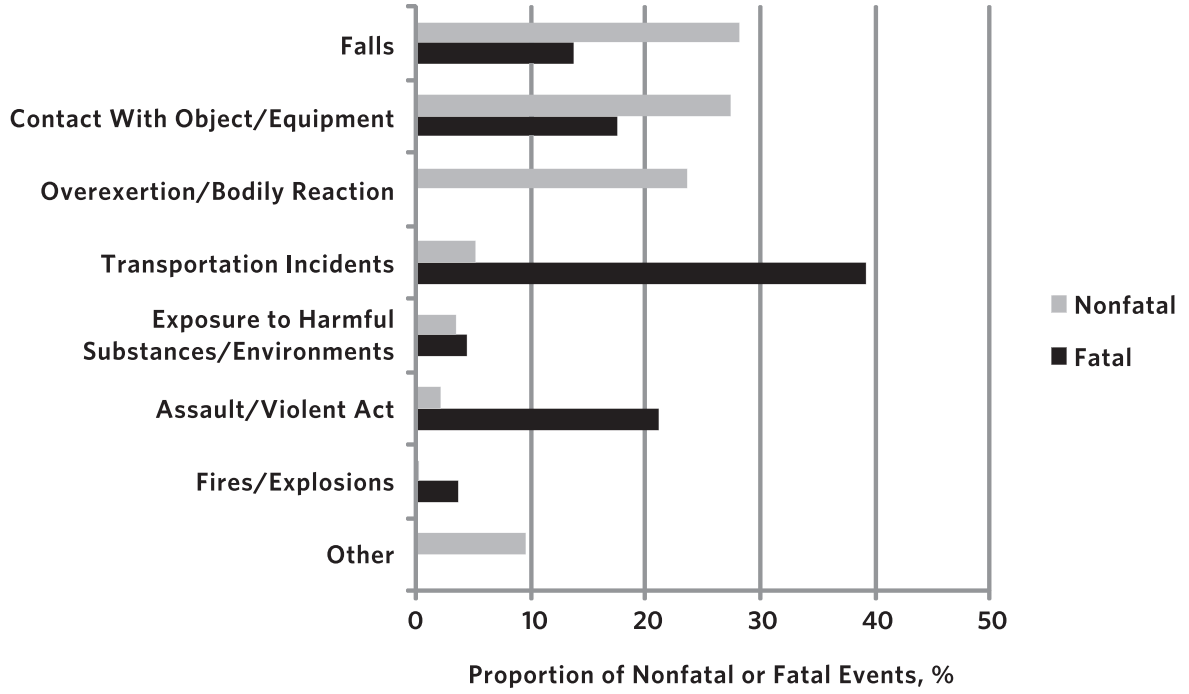
Hospital-discharge data do not include industry and occu-

Table 2.
North Carolina Industries With the Largest Absolute Burden of and Risk for Nonfatal and Fatal Occupational Injuries, 2008

Injury type	Value
Nonfatal	
Absolute burden, no. of events, by industry	
Manufacturing	21,900
Education and health services	18,400
Retail trade	13,700
Risk, events per 100,000 FTE employees, by industry	
Transporting and warehousing	4,900
Education and health services	4,600
Agriculture, forestry, fishing, and hunting	4,500
Fatal	
Absolute burden, no. of events, by industry	
Construction	33
Agriculture, forestry, fishing, and hunting	21
Transportation and warehousing	18
Risk, events per 100,000 employees, by industry	
Agriculture, forestry, fishing, and hunting	40.7
Transportation and warehousing	12.1
Construction	8.5

Note. Values were calculated using methods and data sources identified in [5]. Data for fatal injuries are from [7]. Data for nonfatal injuries are from [8]. Denominator data used to calculate fatality rates are from [9]. FTE, full-time equivalent.

Figure 1.
Distribution of Events Leading to Nonfatal and Fatal Injuries in North Carolina, 2008



pation codes, and race and ethnicity data were not available for 2008. Recent North Carolina legislation requires hospitals to record race and ethnicity data as of 2010.

Estimates of work-related hospitalizations, when calculated on the basis of expected payment by workers' compensation insurance, are believed to be conservative. In a recent analysis that used survey data from 10 states, workers' compensation insurance paid the hospitalization costs of a median of 61% of self-reported occupational injuries [11]. Although this study was not restricted to persons who were hospitalized because of work-related injuries, it suggests that relying on workers' compensation as the expected payer is likely to undercount work-related hospitalizations.

Fatal work-related injuries. In 2008, North Carolina had 161 work-related fatalities. The rate of work-related fatalities is decreasing in the state and the nation. From 2003 through 2008 in North Carolina, there was a 17% decrease, from 4.6 to 3.8 deaths per 100,000 employed persons. In 2008, the North Carolina fatality rate was higher than the US rate of 3.6 deaths per 100,000 employed persons.

The North Carolina industries with the largest burden and highest risk for death due to work-related injury in 2008 are shown in Table 2. A separate analysis revealed that 25 government workers (at federal, state, and local levels) in North Carolina died from work-related injury in 2008, corresponding to a rate of 14.8 deaths per 100,000 employed persons (data not shown), which is more than 3 times the average rate for all North Carolina workers.

In 2008, transportation incidents accounted for the majority (39%) of fatal work-related injuries in North Carolina (Figure 1). National patterns were similar. However, one issue has emerged recently in North Carolina that bears monitoring. A published analysis of data for the period of 1992-2006 suggested that North Carolina had the highest rate of any state for heat-related deaths among crop workers [12].

In 2008, North Carolina workers 25-54 years of age accounted for 63% of fatalities; men accounted for 90% of fatalities. Whites accounted for 60% of work-related fatalities, blacks for 25%, and Hispanics for 12%; race or ethnicity was unreported in 2% of cases. Age and sex profiles in the United States during 2008 were similar to those in North Carolina.

Improving Data for Action

The North Carolina Division of Public Health recently received funding through a 5-year cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH) to build state capacity for occupational-health surveillance. North Carolina was 1 of 14 states to receive this capacity-building award. The goal of the North Carolina grant is to conduct trend analysis of secondary data sets and to link findings with prevention activities. An advisory board is being established to share information and expertise, to promote effective partnerships, and to support actions that address problems identified through surveillance. Plans include compiling all 19 CSTE occupational-health indicators and evaluating additional indicators

important to North Carolina (eg, farm injury, heat-related injury, and injury to public employees). Plans also include using additional data sources, such as workers' compensation, and conducting more in-depth analysis to describe at-risk industry and worker subgroups.

The data on occupational injuries that are currently available in North Carolina and the United States are useful for getting a sense of the size of the occupational-injury problem, for focusing research and prevention efforts, and for monitoring trends. However, important questions remain about the actual size of the problem, whether decreasing trends reported in some data systems are real, and whether specific types of worker populations or types of injuries are systematically missed in existing systems. It is important to answer these questions to understand the true burden of occupational injuries and to ensure that limited prevention resources are targeted to the most important problems [10, 13].

Additionally, there are a number of improvements that could be made to occupational-injury data [13, 14]. These include expanding public-health data systems that can be used in occupational-injury prevention by ensuring that variables on work relatedness, industry, and occupation are included in existing and developing data systems, such as electronic health records, hospitalization data, migrant-health community-clinic data, and state and national health surveys [15]. In addition, methods and guidance should be developed for combining and linking data from multiple data sets to better describe the overall occupational-injury problem [13].

Prevention

The Occupational Safety and Health Administration (OSHA) establishes and enforces regulations to keep workers safe from recognized safety and health hazards. North Carolina is 1 of 27 states and territories that have been approved by OSHA to administer their own occupational safety and health program. The North Carolina OSHA has set strategic goals to reduce fatal work-related injuries by 5% and nonfatal injuries and illnesses by 15% by fiscal year 2013. The North Carolina OSHA's strategic plan to reach these goals includes focused efforts in construction, logging, and arboriculture (a subindustry of forestry), certain manufacturing subindustries (ie, food, sawmills, and veneer, manufactured-home, and other wood products), long-term care (a subindustry of health services), and certain health hazards. In addition to regulatory enforcement, state and federal OSHA programs provide consultative services to businesses, develop strategic partnerships and alliances, develop and provide worker-safety training, and develop informational documents on preventing work-related injuries. There are also federal and state agencies and laws specific to mining and work by youths younger than 18 years of age.

NIOSH is the federal agency responsible for researching occupational safety and health. NIOSH conducts its own research, makes science-based recommendations for safety regulations, and has a wealth of informational materials on occupational safety. NIOSH also funds extramural research and provides support for training occupational-safety researchers and professionals.

North Carolina academic institutions, including the University of North Carolina, Duke University, and East Carolina University, are actively involved in occupational-safety research and prevention. These academic programs conduct research to advance knowledge about the prevention of occupational injuries in the state and the nation and to train occupational-safety and -health professionals and researchers.

Labor, trade organizations, and nonprofit organizations, including the North Carolina Occupational Safety and Health Project [16], are also involved in occupational safety. They advocate for worker safety, develop informational materials and guidance for their constituents, and partner with federal and state agencies on research and prevention efforts.

Conclusion

Although there have been declines in the numbers and rates of occupational injuries in North Carolina, there is much that remains to be done to improve the safety of the state's workers. More needs to be done to ensure that recognized injury-prevention measures are used in workplaces, that knowledge on occupational injuries and prevention is advanced, and that employers and others in the state are positioned to respond to emerging issues associated with a changing workforce. NCM

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REFERENCES

1. Sungupta I, Reno V, Burton JF Jr. *Workers Compensation: Benefits, Coverage and Cost, 2007.* Prepared on behalf of the National Academy of Social Insurance (NASI). Washington, DC: NASI; 2009. http://www.nasi.org/sites/default/files/research/Workers_Comp_Report_2007.pdf. Accessed October 21, 2010.
2. US Department of Health and Human Services (DHHS). *Healthy People 2020.* Washington, DC: DHHS; 2011. http://www.healthypeople.gov/2020/default.aspx. Accessed February 14, 2011.
3. North Carolina Institute of Medicine (NCIOM). *Healthy North Carolina 2020: A Better State of Health.* Morrisville, NC: NCIOM; 2011. http://publichealth.nc.gov/hnc2020/docs/HNC2020web.pdf. Accessed February 14, 2011.

4. Division of Policy, Research, and Strategic Planning, North Carolina Department of Commerce (NCDC). *2009 North Carolina Economic Index: A Summary of North Carolina's Economic Strengths, Challenges, and Opportunities.* Raleigh, NC: NCDC; 2009. http://www.nccommerce.com/NR/rdonlyres/83DDA45A-0180-4A50-9BAA-ADA34894371E/0/20090331_economicindex.pdf. 2009. Accessed October 21, 2010.
5. Council of State and Territorial Epidemiologists (CSTE). Occupational health indicators: a guide for tracking occupational health conditions and their determinants CSTE Web site. http://www.cste.org/dnn/Portals/0/OHIndicatordocument41310.pdf. Updated May 2010. Accessed February 14, 2011.
6. Bureau of Labor Statistics (BLS). Workplace injuries and illnesses—2008 [news release]. USDL-09-1302. Washington, DC: BLS; 2009. http://www.bls.gov/iif/oshwc/osh/os/osnr0032.txt. Accessed January 13, 2011.
7. US Department of Labor, Bureau of Labor Statistics (BLS). Census of Fatal Occupational Injuries (CFOI)—current and revised data. http://www.bls.gov/iif/oshcfoi1.htm. Accessed February 16, 2011.
8. US Department of Labor, Bureau of Labor Statistics (BLS). Industry injury and illness data—2008. http://www.bls.gov/iif/oshsum.htm. Accessed February 16, 2011.
9. US Department of Labor, Bureau of Labor Statistics (BLS). Labor force statistics from the Current Population Survey. http://www.bls.gov/cps/. Accessed February 16, 2011.
10. *Hidden Tragedy: Underreporting of Workplace Injuries and Illnesses.* A Majority Staff Report by the Committee on Education and Labor, US House of Representatives. Washington, DC: Government Printing Office; 2008.
11. Bonauto DK, Fan JZ, Largo TW, et al. Proportion of workers who were work-injured and payment by workers' compensation systems—10 states, 2007. *MMWR Morb Mortal Wkly Rep.* 2010;59(29):897-900.
12. Luginbuhl RC, Jackson LL, Castillo DN, Loringer KA. Heat-related deaths among crop workers—United States, 1992-2006. *MMWR Morb Mortal Wkly Rep.* 2008;57(24):649-653.
13. Council of State and Territorial Epidemiologists (CSTE). Counting work-related injuries and illnesses: taking steps to close the gap. CSTE Web site. http://www.cste.org/dnn/ProgramsandActivities/OccupationalHealth/tabid/331/Agg1332_SelectTab/4/Default.aspx. Accessed October 21, 2010.
14. *Tracking Occupational Injuries, Illnesses, and Hazards: The NIOSH Surveillance Strategic Plan.* Washington, DC: National Institute for Occupational Safety and Health; 2001.
15. Nicholson VJ, Bunn TL, Costich JF. Disparities in work-related injuries associated with worker compensation coverage status. *Am J Ind Med.* 2008;51(6):393-398.
16. http://ncosh-project.org. North Carolina Occupational Safety and Health Web site. Accessed October 21, 2010.