## Reference

1. The Registered Nurse Population: Findings from the 2004 National Sample of Registered Nurses. Health Resources and Services Administration, U.S. Department of Health and Human Services. http://bhpr.hrsa.gov/healthworkforce/rnsurvey04/2.htm

# Burden of Injury and Illness in Health Care as Documented by Surveillance Systems

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This section presents an overview illustrated by charts and tables that describe the national magnitude and trends of occupational injuries, illnesses, and fatalities in the HCSA sector,* as documented by various federal and state-based surveillance systems. The data focus on the three Health Care subsectors (i.e., ambulatory health care services, hospitals, and nursing and residential care facilities), although data for social assistance are also provided, where available. Data are presented for predominant health and safety hazards and issues including sprains and strains, overexertion/repetitive trauma, falls on same level, assaults and violent acts, sharps injuries (SIs), and infectious disease. Significantly elevated causes of death for each of the three Health Care subsectors and for the largest health care occupations are also provided.

## Bureau of Labor Statistics National Surveillance Systems Data

National statistics on occupational injuries, illnesses, and fatalities are compiled by the Bureau of Labor Statistics (BLS) in conjunction with participating state agencies. National estimates of the numbers and rates of illnesses and injuries are compiled from the annual Survey of Occupational Injuries and Illnesses (SOII), which is based solely on private industry employer's OSHA logs.[1] The SOII exclude self-employed persons, public sector workers, and workers employed on small farms, representing 22% of the U.S. workforce, and thus may underestimate the true prevalence of injuries, illnesses, and fatalities. Numbers of cases and incidence rates are reported by year with 2005 being the most recent year data are presented.

For each recordable case, employer's are required to complete OSHA Form 300 (Log of Work-Related Injuries and Illnesses), OSHA Form 301 (Injuries and Illnesses Incident Report), and OSHA Form 300A (Summary of Work-Related Injuries and Illnesses).[2] Collectively, these forms are used to develop a picture of the extent and severity of work-related incidents. In Form 300, employers must record information about every work-related death and about every significant work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. Employers must also classify the case as either an injury or one of the following types of illness: skin disorder, respiratory condition, poisoning, hearing loss, or all other illnesses. In Form 301, employers must record information about the employee (name, address, date of birth, gender, etc.), information about the treating health care professional, and information about the case (date and time of incident, job activity at time of incident, part of body affected, object or substance that harmed the employee, and date of death if employee died). In Form 301A, employers must provide yearly totals for the following: deaths, total cases with days away from work, total cases with job transfer or restriction, and total other recordable cases—total days away from work, total days of job transfer or restriction, injuries, or one of the five aforementioned illness categories. Establishment information including name, industry code, annual average number of employees, and total hours worked by all employees in the last year is also required.

* 2002 NAICS code 62 (see Chapter 1 for more information on NAICS codes for HCSA sector).

The circumstances of each case are classified based on the BLS Occupational Injury and Illness Classification Manual.[3] The survey uses four case characteristics to describe each incident that led to an injury or illness that led to one or more days away from work. These characteristics include the following:

- *Nature*: The physical characteristics of the disabling injury or illness, such as lacerations, fractures, or sprains/strains
- *Part of body affected*: Part of body directly linked to the nature of the reported injury or illness, such as back, finger, or eye
- *Event or exposure*: The manner in which the injury or illness was produced or inflicted by the source, such as falls, overexertion, or repetitive motion
- *Source*: The object, substance, exposure, or bodily motion that directly produced or inflicted the disabling condition, such as chemicals, vehicles, or machinery

In this section, numbers of cases and incidence rates are reported by year, with 2005 being the most recent year where data are presented. These estimates are provided for the HCSA sector as a whole, by three digit subsector and four digit industry (where available), with comparisons to all private industries and service-providing industries.

National statistics on fatal occupational injuries are from another BLS surveillance system called the Census of Fatal Occupational Injuries (CFOI). Unlike the SOII, the CFOI is considered a complete census that uses multiple data sources for tracking traumatic workplace fatalities resulting from intentional and unintentional injuries.[4]

## Total Nonfatal Occupational Injuries and Illnesses

Of the 4.2 million nonfatal occupational injuries and illnesses reported by private industry employers in 2005, the HCSA sector represents the second largest share of injuries and illnesses (668,000 or 15.9% of total recordable cases)[3] (Figure 2.2). In fact, three of the four HCSA subsectors—hospitals, nursing and residential care facilities, and ambulatory health care services—are ranked 1st, 2nd, and 12th, respectively, and are among the 14 industries with 100,000 or more injuries and illnesses in 2005 (Table 2.12). Hospitals have led this group for the past 3 years, ever since NAICS-based tabulations began in 2003.[5]

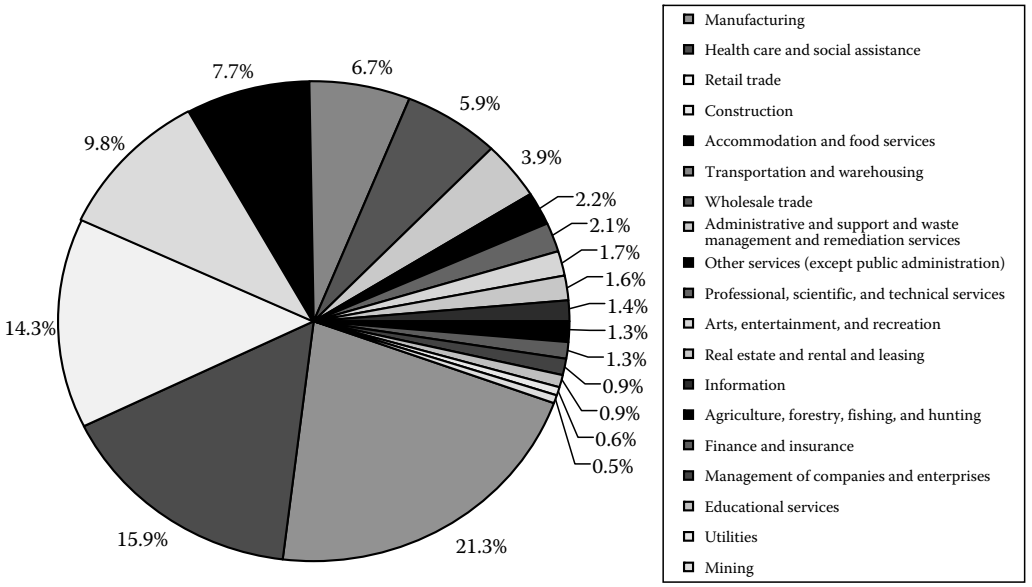



**FIGURE 2.2** Percent distribution of nonfatal occupational injuries and illnesses by industry sector, 2005.

**TABLE 2.12** Number of Cases and Incidence Rate of Nonfatal Occupational Injuries and Illnesses for Industries with 100,000 or More Cases, 2005

| 2002 NAICS Code[a] | Industry[b] | Total Cases (in Thousands) | Incidence Rate[c] |
|---|---|---|---|
| **622** | **Hospitals** | **281.51** | **8.1** |
| **623** | **Nursing and residential care facilities** | **209.1** | **9.1** |
| 452 | General merchandise stores | 147.2 | 6.7 |
| 336 | Transportation equipment manufacturing | 146.8 | 8.3 |
| 561 | Administrative and support services | 141.1 | 3.4 |
| 332 | Fabricated metal product manufacturing | 121.8 | 8.0 |
| 423 | Merchant wholesalers (durable goods) | 119.5 | 4.1 |
| 2382 | Building equipment contractors | 117.8 | 6.7 |
| 311 | Food manufacturing | 114.2 | 7.7 |
| 7221 | Full-service restaurants | 111.7 | 3.9 |
| 44511 | Supermarkets and other grocery (except convenience) stores | 110.7 | 6.5 |
| **621** | **Ambulatory health care services** | **110.6** | **2.8** |
| 424 | Merchant wholesalers (durable goods) | 110.0 | 5.7 |
| 7222 | Limited-service eating places | 103.3 | 4.1 |
| | Total (private industry[d]) | 4,214.2 | 4.6 |

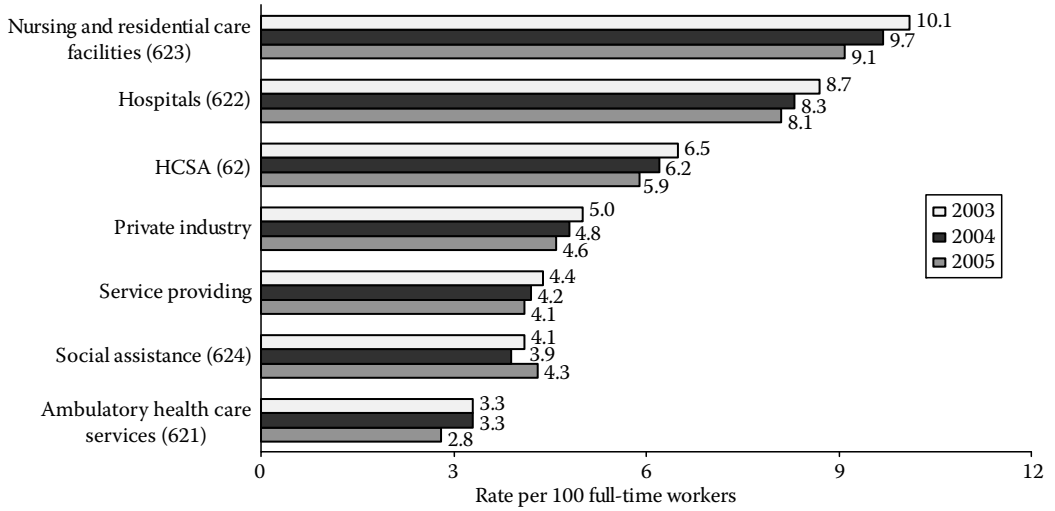
*Source:* From Bureau of Labor Statistics, http://www.bls.gov/news.release/osh.t04.htm
*Note:* Bold indicates health care industry.
[a] NAICS, U.S. Census Bureau, www.census.gov/epcd/www/naics.html
[b] Totals include data for industries not shown separately.
[c] The incidence rates represent the number of injuries and illnesses per 100 full-time workers.
[d] Excludes farms with fewer than 11 employees.

Occupational illnesses account for only 7% of all total reportable injury and illness cases in the HCSA sector and was not different from private industry as a whole. Compared to injuries, illnesses are often difficult to relate to the workplace and more likely to be underreported due to the fact that many work-related diseases are associated with long latency periods (e.g., cancers, chronic respiratory ailments, etc.). The issue of underreporting is discussed later in section.

Figure 2.3 compares incidence rates of nonfatal occupational injuries and illnesses for the HCSA sector and by subsector for 2003–2005 to those for private industry and to service-providing industries. In 2005, the incidence rate of injuries and illnesses in the HCSA sector was 5.9 cases per 100 full-time workers, nearly 1.3 and 1.4 times higher than in private and service-providing industries, respectively. Injury and illness incidence rates in the sector were driven by nursing and residential facilities and hospitals. These rates declined for all HCSA subsectors, as well as in private and service-providing industries, for each year since 2003 (when NAICS-based tabulations began), with the exception of the rate in the social assistance subsector that increased from 2004 to 2005.

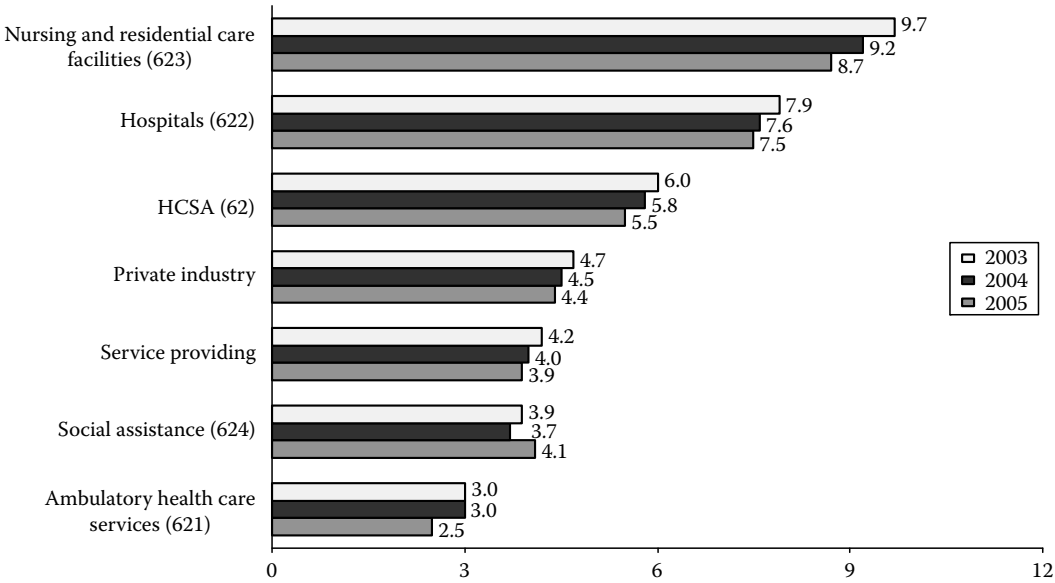
## Total Nonfatal Occupational Injuries

In 2005, the overall incidence rate of nonfatal occupational injuries for the HCSA sector was 5.5 cases per 100 full-time workers, compared to 4.4 and 3.9 cases per 100 full-time workers in the private and service-providing industries, respectively (Figure 2.4). The number of nonfatal injuries for this sector (624,000) accounted for 15.7% of the total number of injury cases in private industry.[6] Incidence rates declined for all HCSA subsectors, as well as in private and service-providing industries, for each year since 2003, with the exception of the rate in the social assistance subsector that increased from 2004 to




*Note:* NAICS codes in parentheses follow industry sector name.

**FIGURE 2.3** Incidence rates of nonfatal occupational injuries and illnesses, HCSA sector and private industry, 2003–2005. (From Bureau of Labor Statistics, Table 1, Incidence rates for nonfatal occupational injuries and illnesses by industry and case type: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1619.pdf, 2004 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1487.pdf, and 2003 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1355.pdf)




*Note:* NAICS codes in parentheses follow industry sector name.

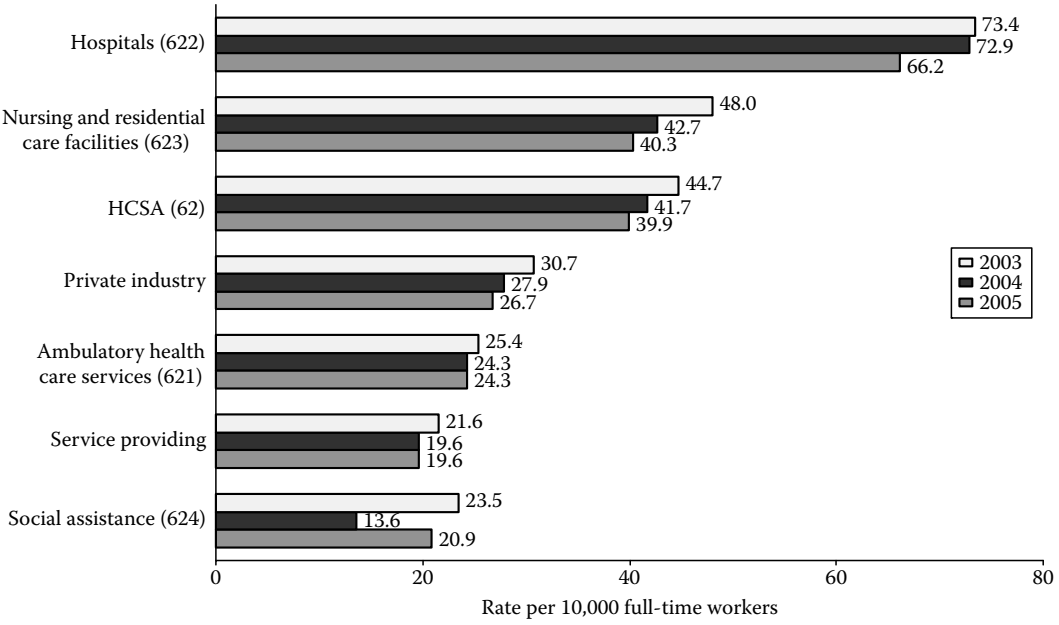
**FIGURE 2.4** Incidence rates of nonfatal occupational injuries, HCSA sector and private industry, 2003–2005. (From Bureau of Labor Statistics, Table SNR05, Incidence rate and number of nonfatal occupational injuries by industry, private industry, 2003–2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1611.pdf, 2004 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1479.pdf, and 2003 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1347.pdf)

2005. Nursing and residential care facilities had the highest incidence rate (8.7 cases per 100 full-time workers) with nearly 200,000 injury cases, followed by hospitals with an incidence rate of 7.5 and the highest number of injury cases (259,000) among the four subsectors (Figure 2.4).[6] These two subsectors accounted for nearly three-quarters of the total injury cases for the sector.

## Nonfatal Occupational Illnesses

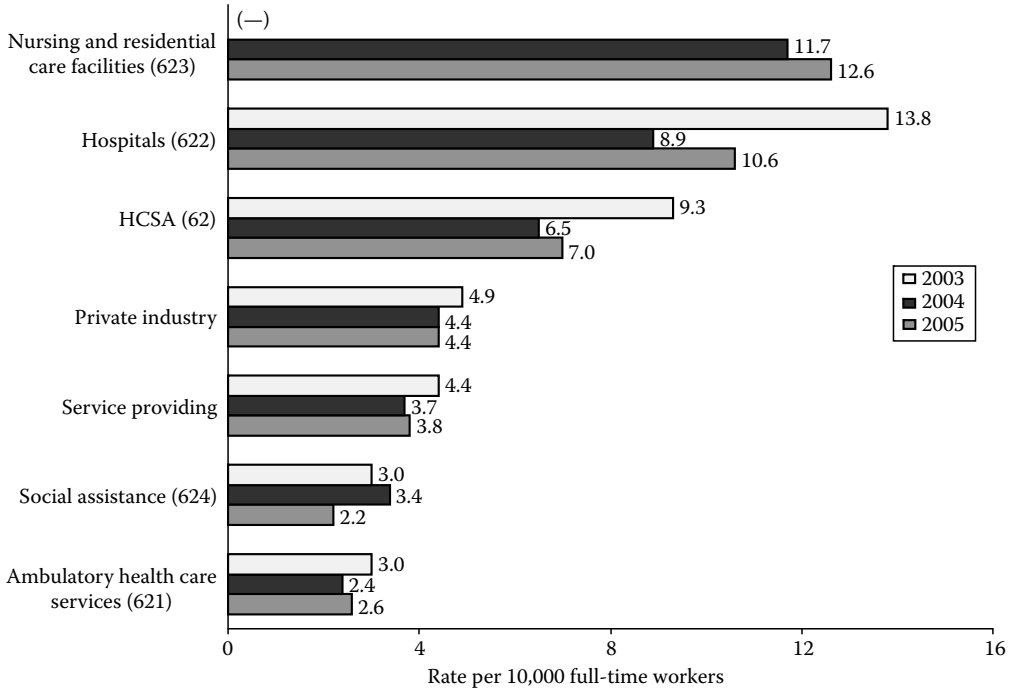
In 2005, the incidence of nonfatal occupational illnesses for the HCSA sector was 39.9 cases per 10,000 full-time workers, compared to 26.7 and 19.6 cases in the private and service-providing industries, respectively (Figure 2.5).[7] The number of nonfatal illnesses for this sector (45,000) accounted for almost 20% of the total number of illness cases in private industry.[8] Incidence rates declined for all HCSA subsectors, as well as in private and service-providing industries for each year since 2003, with the exception of social assistance and ambulatory health care services whose rates increased and remained unchanged from 2004 to 2005, respectively. In 2005, hospitals had the highest incidence rate (66.2 cases per 10,000 full-time workers) and number of reported cases (22,900) among the four subsectors. Nursing and residential care facilities accounted for the second highest incidence rate (40 cases per 10,000 full-time workers) and the third highest number of reported cases (9,200) behind ambulatory health care services. Hospitals accounted for over half of the 45,000 total illness cases for the sector.[8]

In 2005, nonfatal occupational skin diseases and disorders and respiratory conditions represented the most frequently reported illness categories in HCSA, with overall incidence rates of 7.0 and 5.2 cases, respectively, per 10,000 full-time workers (Figures 2.6 and 2.7). By comparison, incidence rates




*Note:* NAICS codes in parentheses follow industry sector name.

**FIGURE 2.5** Incidence rates of nonfatal occupational illnesses, HCSA sector and private industry, 2003–2005. (From Bureau of Labor Statistics, Table SNR08, Incidence rates of nonfatal occupational illness by industry and category of illness, private industry, 2003–2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1614.pdf, 2004 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1482.pdf, and 2003 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1350.pdf)




*Note:* NAICS codes in parentheses follow industry sector name.
(—) No publishable BLS data.

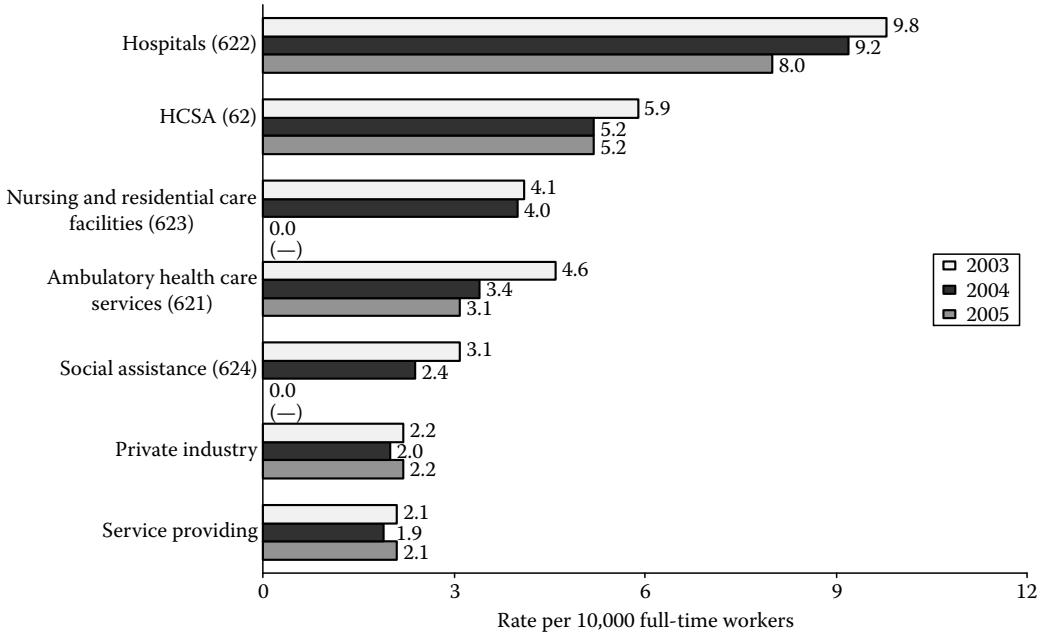
**FIGURE 2.6** Incidence rates of nonfatal occupational skin diseases or disorders, HCSA sector and private industry, 2003–2005. (From Bureau of Labor Statistics, Table SNR08, Incidence rates of nonfatal occupational illness by industry and category of illness, private industry, 2003–2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1614.pdf, 2004 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1482.pdf, and 2003 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1350.pdf)

in private industry were 4.4 and 2.2, respectively.[7] Eighty percent of the illness cases involving skin disorders and respiratory conditions were reported in nursing and residential care facilities and hospitals. Nursing and residential care facilities had the highest incidence rate (12.6) and second highest number of skin disease cases (2900) among the subsectors. Hospitals accounted for the second highest incidence rate (10.6) and the highest number of skin disease cases (3700). Hospitals had the highest incidence rate (8.0) and number of cases (2800) of nonfatal respiratory conditions.

The incidence rate of nonfatal occupational poisonings in the HCSA sector was 0.2 cases per 10,000 workers in 2005. The social assistance subsector had the highest incidence rate, four times higher than the HCSA sector average and the rate in 2004. The incidence rate for all other illnesses (primarily repetitive trauma cases) was 27.4 cases per 10,000 full-time workers, accounting for nearly 70% of the total illness cases in the sector (Figure 2.8).[8] Hospitals had an incidence rate of 47.3, nearly three times higher than in private industry, with over half of the "all other "illness cases for the sector.[8]

## Nonfatal Occupational Injuries and Illnesses Involving Days away from Work

Of the 4.2 million nonfatal occupational injuries and illnesses reported by private industry employers in 2005, 1.2 million (28%) involved one or more days away from work.[9] The HCSA sector accounted for 175,900 (14.2%) of these 1.2 million cases. Within HCSA, health care accounted for 154,940 (88%) of the



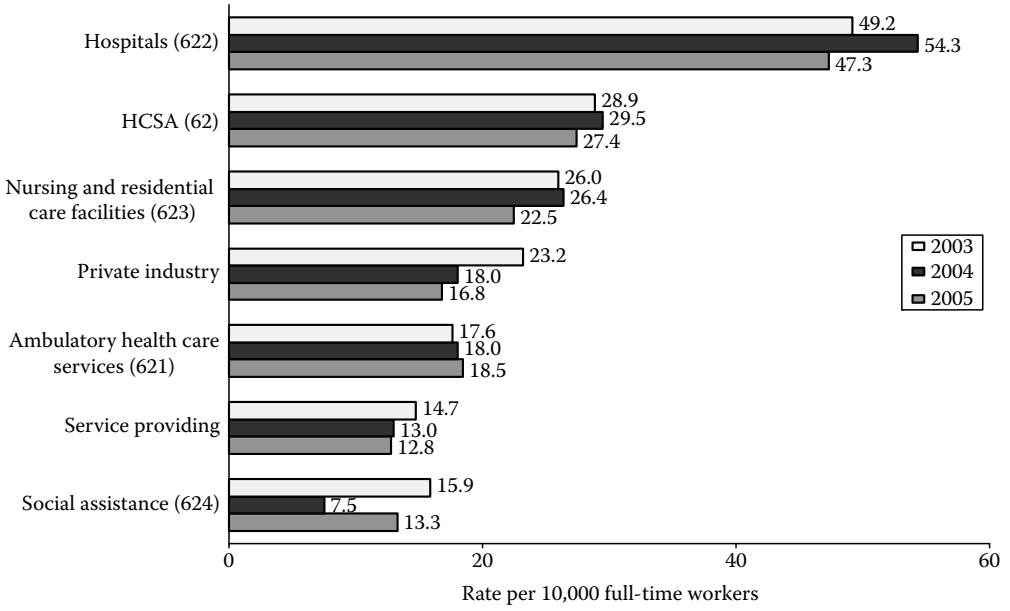

*Note:* NAICS codes in parentheses follow industry sector name.
(—) No publishable BLS data.

**FIGURE 2.7** Incidence rates of nonfatal occupational respiratory conditions, HCSA sector and private industry, 2003–2005. (From Bureau of Labor Statistics, Table SNR08, Incidence rates of nonfatal occupational illness by industry and category of illness, private industry, 2003–2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1614.pdf, 2004 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1482.pdf, and 2003 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1350.pdf)

175,900 cases, and social assistance the remainder (20,960 or 12%).[10] Nursing and residential care facilities (66,620 cases) and hospitals (62,930 cases) accounted for over 73% of the total number of injury and illness cases involving days away from work.

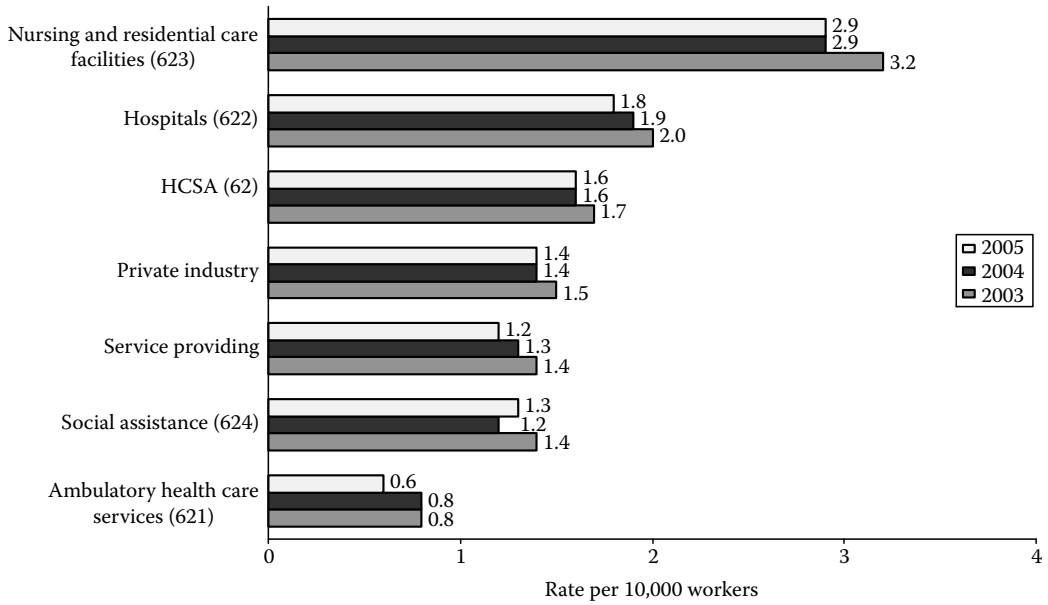
Figure 2.9 compares incidence rates of selected nonfatal occupational injuries and illnesses involving days away from work for the HCSA sector as a whole and by subsector for 2003–2005 to those for all private industry and to service-providing industries. In 2005, the incidence rate for the HCSA sector was 1.6 cases per 10,000 full-time workers, slightly higher than in private and service-providing industries. These data show that about one in four of the injury and illness cases involves days away from work. Nursing and residential care facilities and, to a lesser extent, hospitals were primary drivers for the increased incidence rates for the sector.

Cases involving days away from work are typically characterized by the nature of the injury or illness, the part of body affected, the source that caused the injury or illness, or the event that leads to exposure resulting in illness or injury. In 2005, sprains and strains (82.3 cases per 10,000 workers) were the most likely type of injury or illness in HCSA, nearly 1.5 times more likely to occur among workers in HCSA than in all private industry and about 5 times more likely than the next highest category of soreness and pain (Figure 2.10). The part of the body most affected was the trunk (66.8 cases per 10,000 workers), with an incidence rate nearly 1.5 times higher than in private industry, followed by lower extremities, upper extremities, and then multiple body parts (Figure 2.11). The health care patient (47.5 cases per 10,000 workers) was the most likely source of injury or illness for the health care worker, followed by floor/walkways/ground surfaces, and worker motion/position (Figure 2.12). Overexertion, falls on the same level, contact with object/equipment, and assaults/violent acts represent the top events or exposures leading to injury or illness in the sector (Figure 2.13).




*Note:* NAICS codes in parentheses follow industry sector name.

**FIGURE 2.8** Incidence rates of other nonfatal occupational illnesses, HCSA sector and private industry, 2003–2005. (From Bureau of Labor Statistics, Table SNR08, Incidence rates of nonfatal occupational illness by industry and category of illness, private industry, 2003–2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1614.pdf, 2004 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1482.pdf, and 2003 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1350.pdf)




*Note:* NAICS codes in parentheses follow industry sector name.

**FIGURE 2.9** Incidence rates of nonfatal occupational injury and illness cases involving days away from work, HCSA sector and private industry, 2003–2005. (From Bureau of Labor Statistics, Table R8, Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time workers by industry and selected events or exposure leading to injury and illness, 2003–2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1664.pdf, 2004 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1518.pdf, and 2003 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1386.pdf)

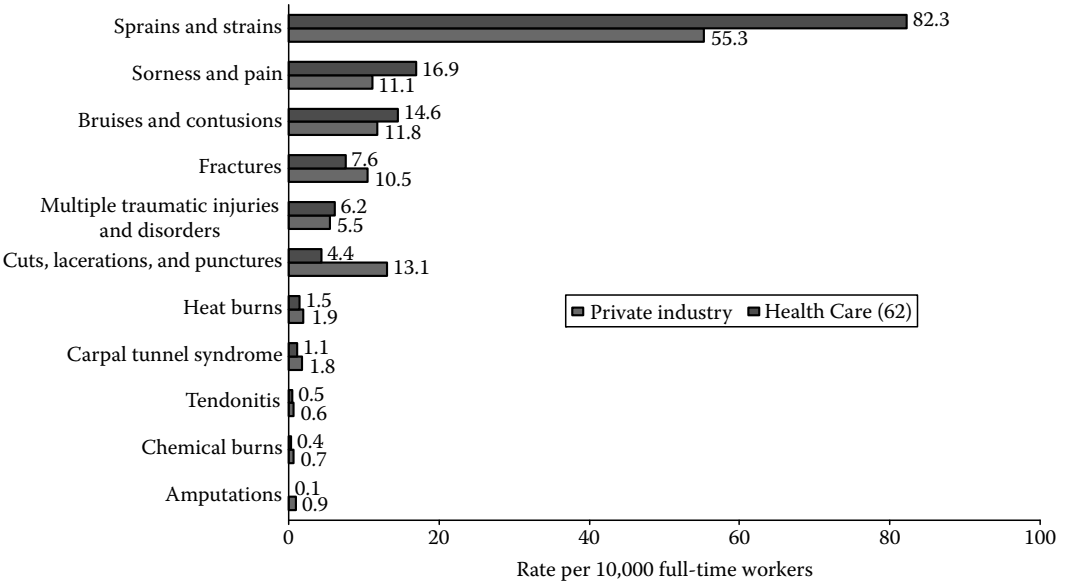
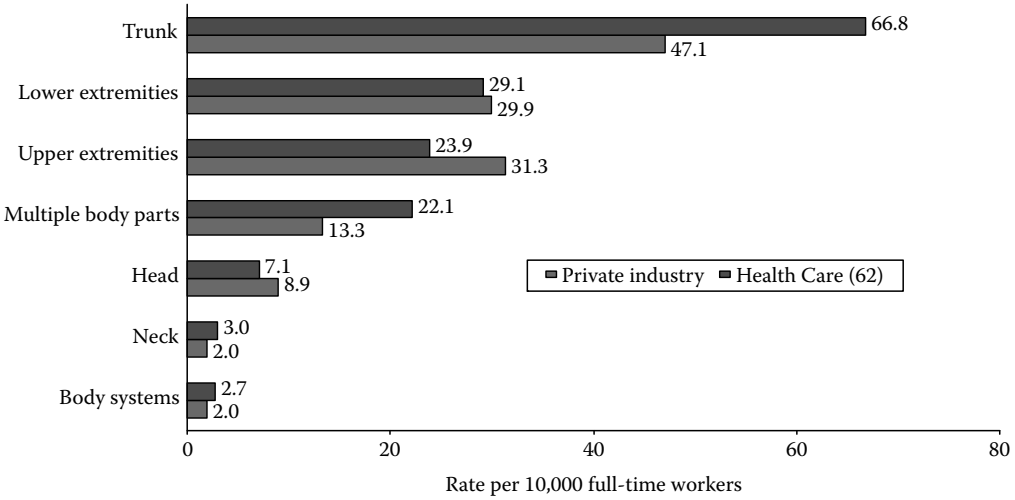
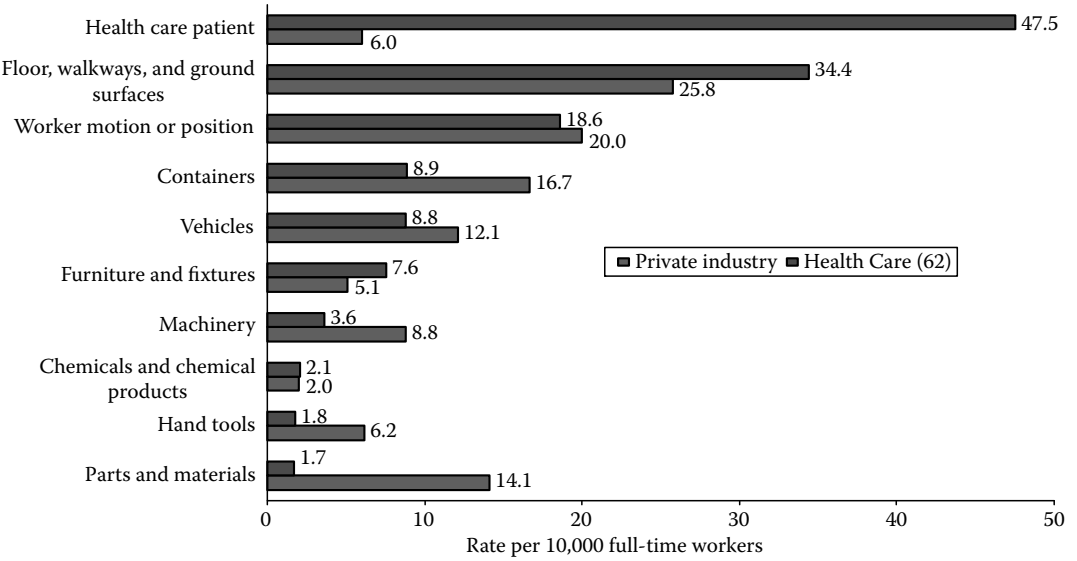



**FIGURE 2.10** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work by selected nature of injury or illness, HCSA sector (62)* and private industry, 2005. (* denotes NAICS codes in parentheses follow industry sector name.) (From Bureau of Labor Statistics, Table R5, Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time workers by selected natures of injury or illness, 2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1661.pdf)



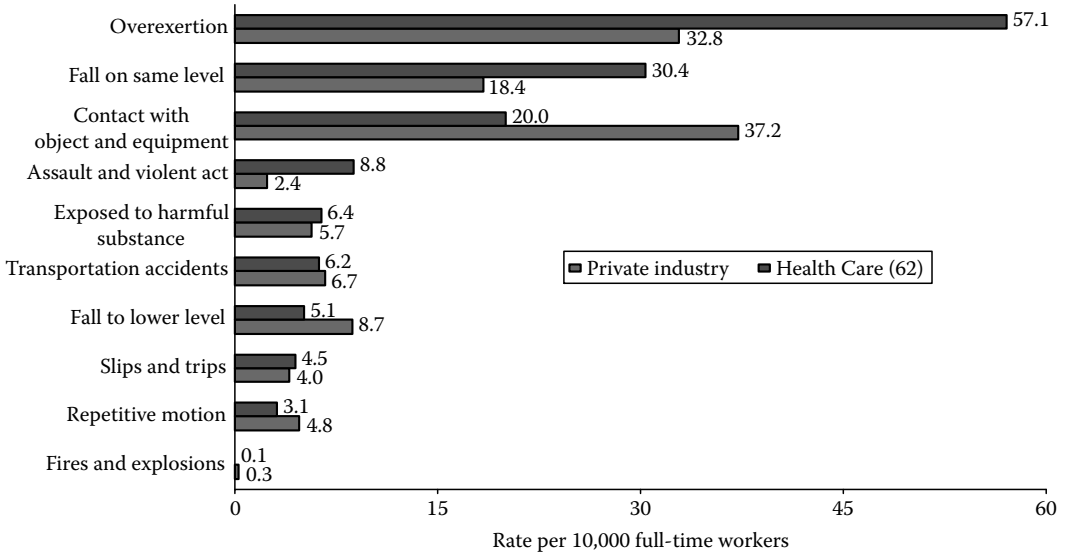

*Note:* NAICS code in parentheses follow industry sector name.

**FIGURE 2.11** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work by selected parts of body affected, HCSA sector and private industry, 2005. (From Bureau of Labor Statistics, Table R6, Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time workers by selected parts of body affected by injury or illness, 2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1662.pdf)




*Note:* NAICS code in parentheses follow industry sector name.

**FIGURE 2.12** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work by selected sources of injury or illness, HCSA sector and private industry, 2005. (From Bureau of Labor Statistics, Table R7, Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time workers by industry and selected sources of injury or illness, 2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1663.pdf)




*Note:* NAICS code in parentheses follow industry sector name.

**FIGURE 2.13** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work by selected events of exposures leading to injury or illness, HCSA sector and private industry, 2005. (From Bureau of Labor Statistics, Table R7, Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time workers by industry and selected events of exposures leading to injury or illness, 2005: 2005 data = http://www.bls.gov/iif/oshwc/osh/case/ostb1664.pdf)

The average incidence rate for assaults/violent acts in the HCSA sector (8.8 cases per 10,000 workers) was nearly four times higher than in all private industry.

In 2005, nursing and residential care facilities experienced the highest incidence rates (per 10,000 workers) for illnesses and injuries involving days away from work in the sector for

- Musculoskeletal disorders (MSDs) with an incidence rate of 131.4 cases, followed by other ambulatory health care services (89.0) and hospitals (82.7)[11]
- Overexertion including lifting with an incidence rate of 122.8, followed by other ambulatory health care services (90.2) and hospitals (71.9)[12]
- Falls on the same level with an incidence rate of 56.5, followed by social assistance (34.3) and hospitals (30.1)[12]
- Personal assaults and violent acts with an incidence rate of 20.1, followed by social assistance (9.7) and outpatient care centers (9.5)[12]

Incidence rates for MSDs, overexertion, falls on the same level, and personal assaults and violent acts in nursing and residential care facilities were 3.2, 3.7, 3.1, and 12.5 times higher in HCSA, respectively, than in private industry and 1.8–2.4 times higher than the sector average.[11,12]

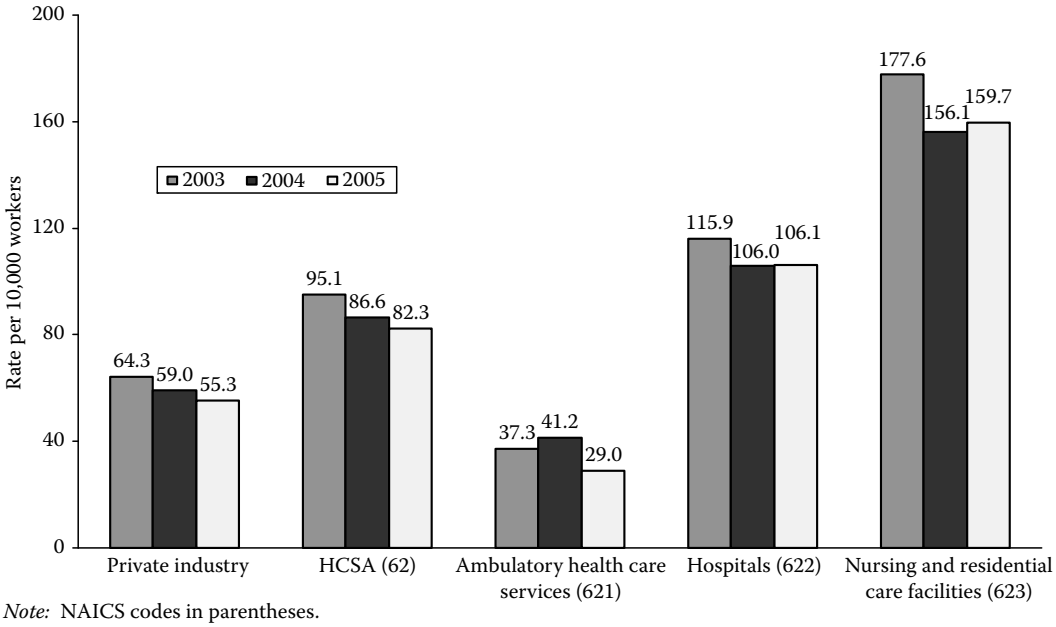
In 2005, home health care services experienced the highest incidence rates (per 10,000 workers) of any one industry in the sector for

- Falls to lower level with an incidence rate of 10.9 cases, followed by nursing and residential care facilities (7.7) and social assistance (7.3)[12]
- Transportation (highway) accidents with an incidence rate of 22.4, followed by other ambulatory health care services (20.9) and social assistance (11.9)[12]

## Major Injuries/Illnesses, Exposures, and Sources

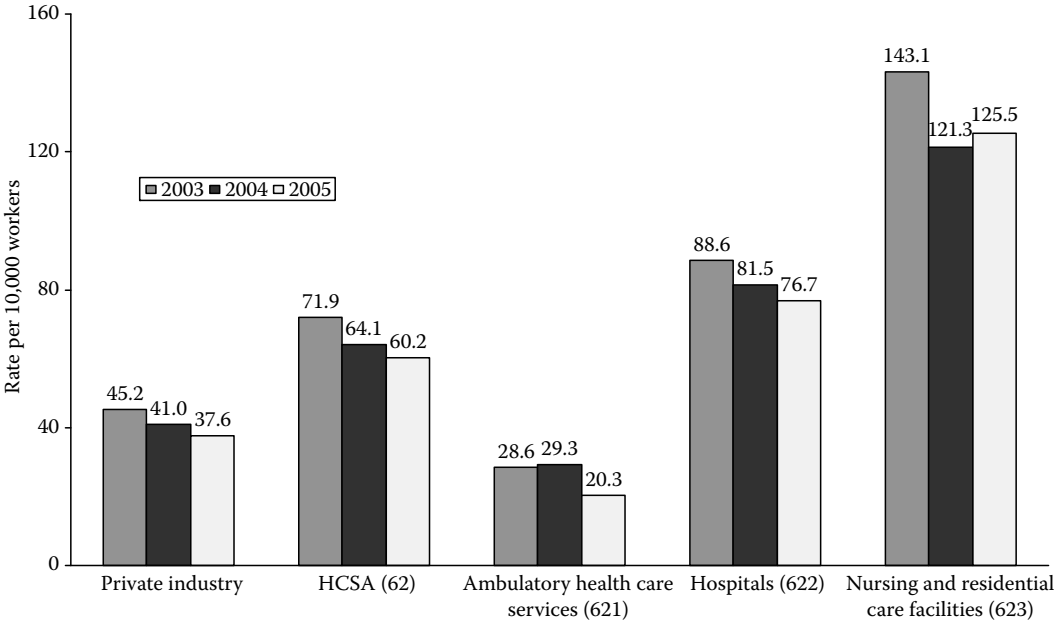
Figures 2.14 through 2.18 present incidence rates of predominant lost workday occupational injuries and illnesses in Health Care for 2003–2005, including sprains and strains; overexertion/repetitive motion injuries; back injuries; slips, trips, and falls; and assaults and violent acts. Overall, for each of these injuries, illnesses, and exposures, nursing and residential care facilities experienced the highest incidence rates, followed by hospitals and ambulatory health care services. With the exception of injuries due to assaults and violent acts, the incidence rates for injuries, illnesses, and exposures showed similar trends in magnitude across the Health Care subsectors when compared to private industry: about 2–4 times higher for nursing and residential care facilities, 1.2–2 times higher for hospitals, and less than half for ambulatory health care services (Figures 2.14 through 2.17). Incidence rates for injuries and illnesses involving assaults/violent acts were about 10 and 4 times higher in nursing and residential care facilities and hospitals than in private industry, respectively, and were no different than private industry for ambulatory health care services (Figure 2.18). Incidence rates for the 3 year period were somewhat lower in 2005 when compared to 2003 for these outcomes/exposures, with the exception of slips, trips, and falls in nursing and residential care facilities that increased about 7%.

Incidence rates characterized by selected sources of injury and illness are presented by Health Care subsector for 2003–2005, with comparison to private industry, in Figures 2.19 and 2.20. For each source (i.e., health care patient, worker motion or position, and floor and ground surfaces), nursing and residential care facilities experienced the highest incidence rates, followed by hospitals and ambulatory health care services. The incidence rates for injuries associated with worker motion or position in ambulatory health care services showed marked declines from 2003 to 2005 (Figure 2.21). The rates in hospitals, by comparison, were similar and in 2005 slightly exceeded that in nursing and residential care facilities. Incidence rates for two of the three source categories (worker motion or position and floor and ground surfaces) showed similar trends in magnitude across Health Care subsectors when compared to




*Note:* NAICS codes in parentheses.

**FIGURE 2.14** Incidence rates of nonfatal occupational sprains and strains involving days away from work, Health Care and private industry, 2003–2005.




*Note:* NAICS codes in parentheses follow industry sector name.

**FIGURE 2.15** Incidence rates of nonfatal occupational overexertion and repetitive motion injuries and illnesses involving days away from work, Health Care and private industry, 2003–2005.

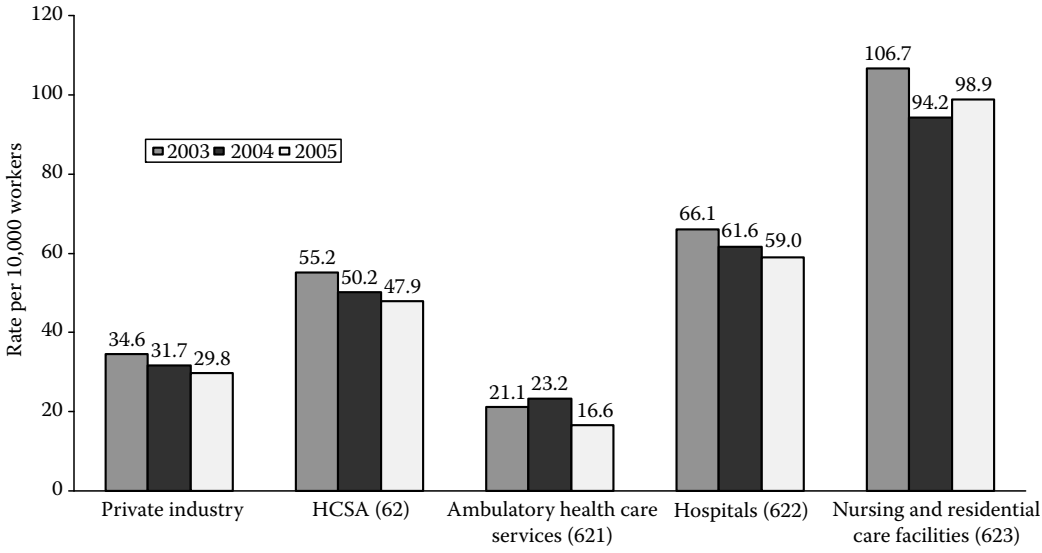



**FIGURE 2.16** Incidence rates of nonfatal occupational back injuries involving days away from work, Health Care and private industry, 2003–2005. (NAICS codes in parentheses follow industry sector name.)

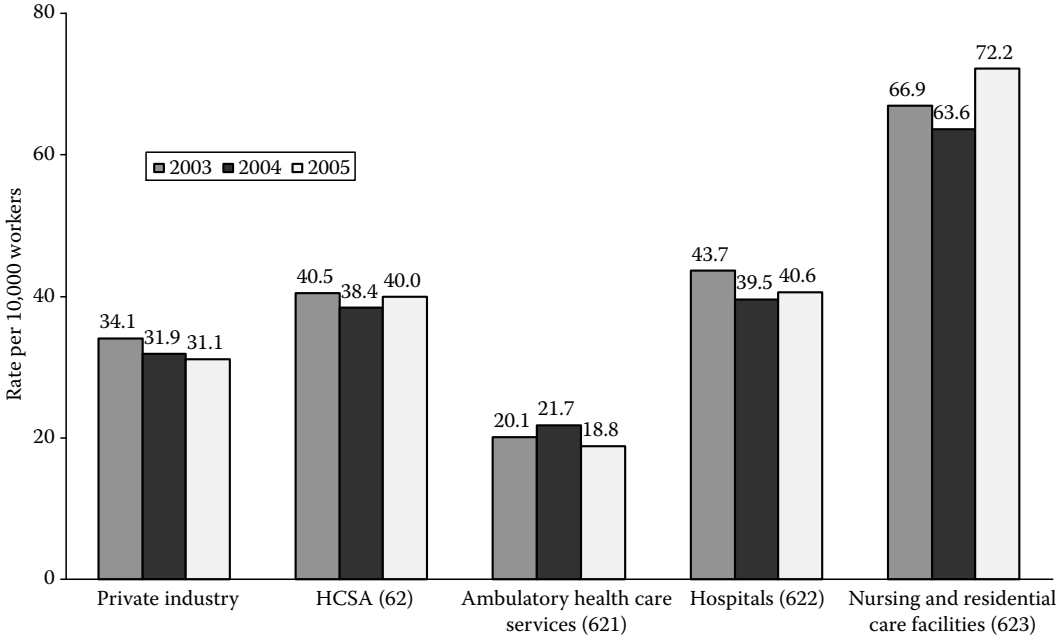



**FIGURE 2.17** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work due to slips, trips, and falls, Health Care and private industry, 2003–2005. (NAICS codes in parentheses follow industry sector name.)

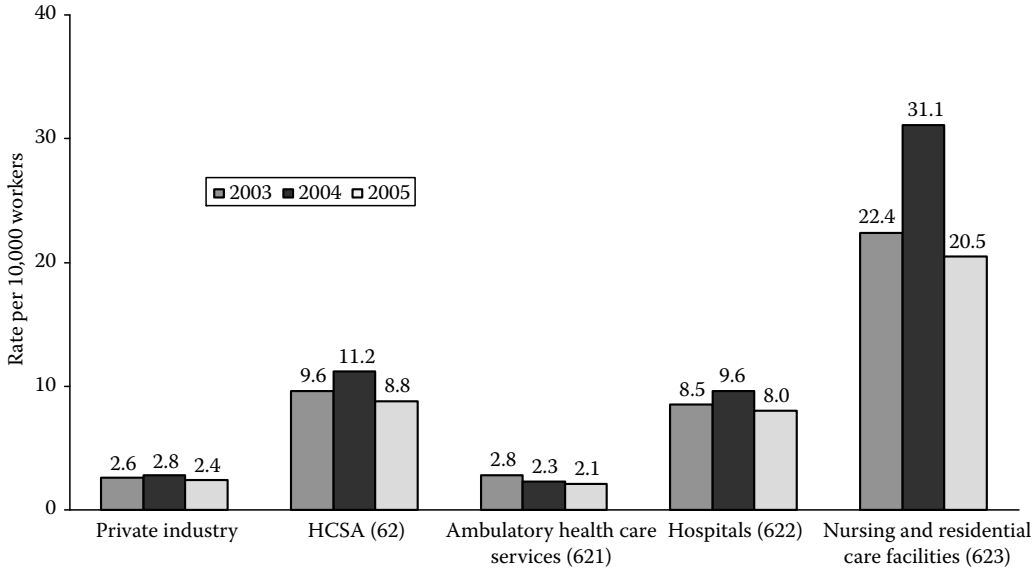



**FIGURE 2.18** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work due to assaults and violent acts, Health Care and private industry, 2003–2005. (NAICS codes in parentheses follow industry sector name.)

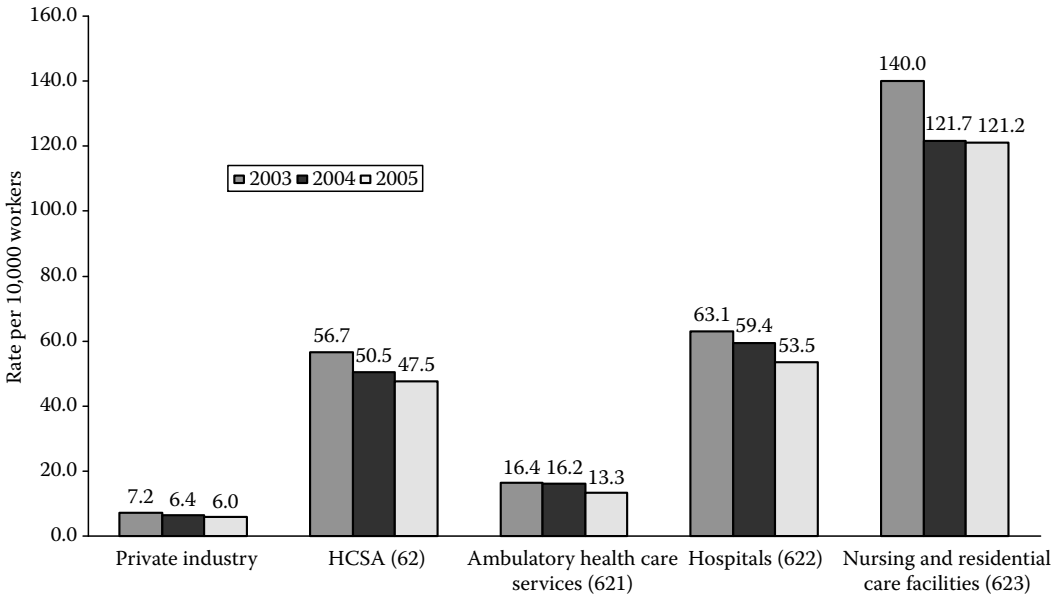



**FIGURE 2.19** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work, health care patient as source, Health Care and private industry, 2003–2005. (NAICS codes in parentheses follow industry sector name.)

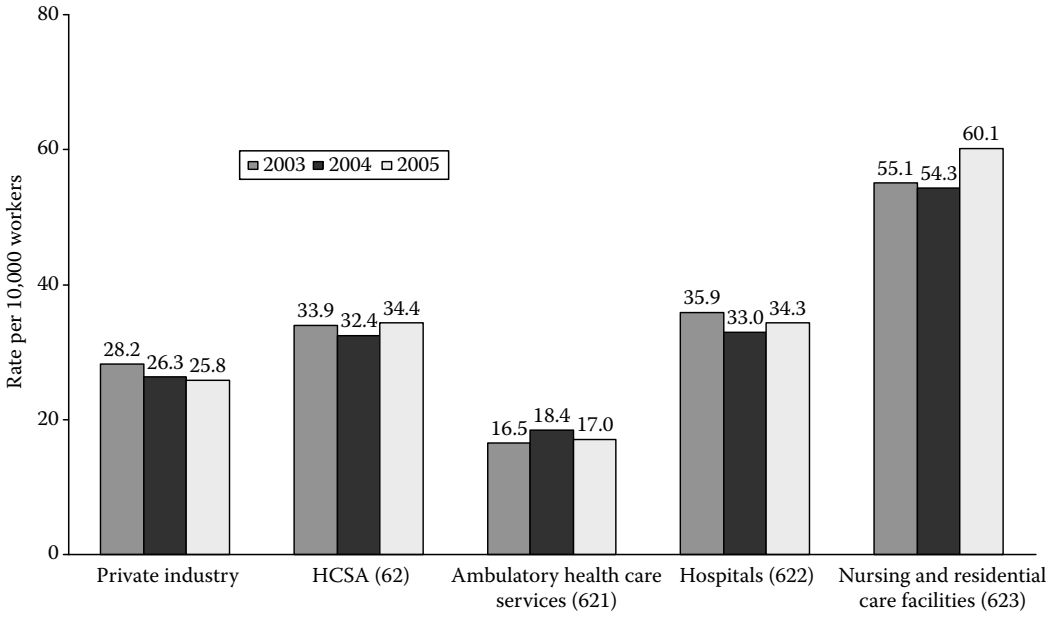



**FIGURE 2.20** Incidence rates of nonfatal occupational injuries involving days away from work, floor and ground surfaces as source, Health Care and private industry, 2003–2005. (NAICS codes in parentheses follow industry sector name.)

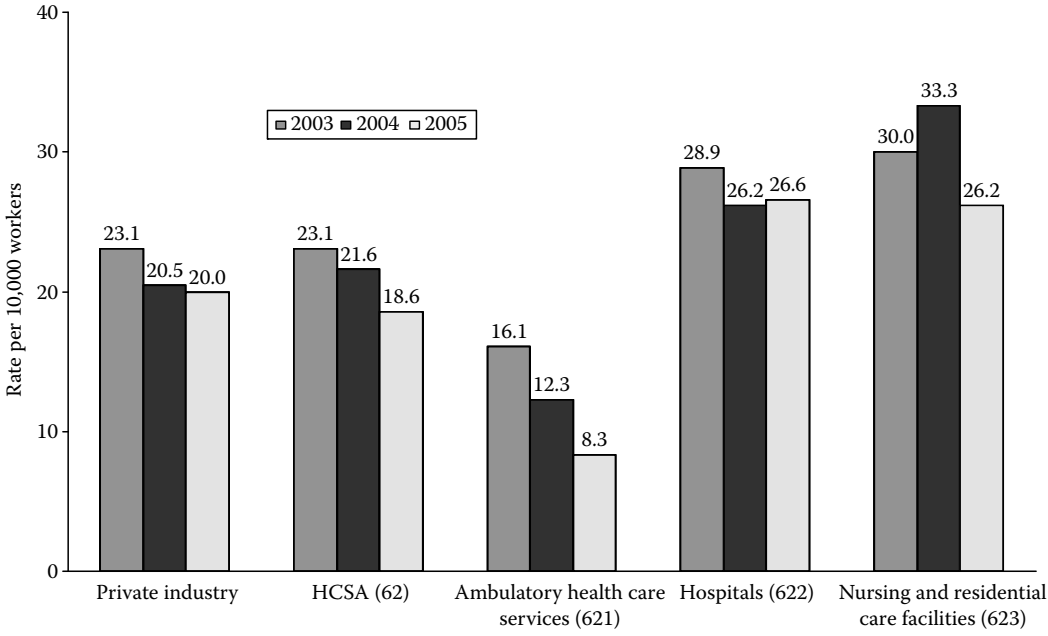



**FIGURE 2.21** Incidence rates of nonfatal occupational injuries and illnesses involving days away from work, worker motion or position as source, Health Care and private industry, 2003–2005. (NAICS codes in parentheses follow industry sector name.)

private industry: about 2–3 times higher for nursing and residential care facilities, 1.2–1.3 times higher for hospitals, and 40%–60% less for ambulatory health care services (Figures 2.20 and 2.21). Incidence rates involving injuries where the health care patient was the source were about 20, 9, and 2 times higher in nursing and residential care facilities, hospitals, and ambulatory health care services, respectively, than in private industry, a finding directly attributable to the fact that patients are unique to Health Care (Figure 2.19).

## Special Populations

This section provides data describing the distribution of nonfatal injuries and illnesses for selected special populations at risk within the HCSA sector (i.e., those workers who experience a disproportionate share of injury and disease due to sex, age, race, ethnicity, etc.).

The section focuses on women, young workers (16–19 year olds), minorities, and older workers (45 years and over). Reported figures are based on 2005 employment and injury and illness data.

### Industry Level Data

Table 2.13 displays the 2005 percent distribution of nonfatal injury and illness cases involving days away from work by the sex, race, and ethnic origin of worker in the HCSA sector and private industry. Women experienced 80.7% of the lost workday injury and illness cases in this sector compared to 31%

**TABLE 2.13** Percent Distribution of Nonfatal Injuries and Illnesses Involving Days away from Work by Industry, Sex, Race, and Ethnic Origin of Worker, 2005

| | | | Percent of Nonfatal Injury and Illness Cases Involving Days away from Work | | | |
|---|---|---|---|---|---|---|
| 2002 NAICS Code[a] | Industry | Total Cases | Women | Black or African American[b] | Hispanic or Latino[b] | Asian[b] |
| 621 | Ambulatory health care services[c] | 25,390 | 84.2 | 17.6 | 7.7 | 1.1 |
| 6211 | Physician offices | 5,420 | 91.0 | 10.5 | 14.5 | 0.5 |
| 6212 | Dental offices | 1,010 | 100 | — | — | — |
| 6213 | Offices of other health practitioners | 900 | 96.7 | 30.9 | 7.1 | — |
| 6214 | Outpatient care centers | 4,380 | 75.8 | 29.9 | 4.2 | 0.2 |
| 6216 | Home health care services | 9,660 | 95.3 | 20.1 | 5.7 | 1.0 |
| 6219 | Other ambulatory health care services | 3,180 | 45.6 | 7.1 | 8.4 | 0.8 |
| 622 | Hospitals | 62,930 | 77.1 | 17.1 | 10.3 | 4.2 |
| 623 | Nursing and residential care facilities | 66,620 | 84.5 | 29.3 | 9.2 | 1.9 |
| 624 | Social assistance | 20,960 | 75.6 | 16.5 | 9.0 | 0.8 |
| 62 | Health care and social assistance | 175,900 | 80.7 | 23.0 | 9.6 | 2.4 |
| | Total (private industry, 16 years and over) | 1,234,680 | 33.7 | 11.8 | 19.0 | 1.5 |

*Source:* From Bureau of Labor Statistics, Table R39, http://www.bls.gov/iif/oshwc/osh/case/ostb1695.txt and Table R38, http://www.bls.gov/iif/oshwc/osh/case/ostb1694.txt

*Notes:* Dash (—) indicates data are unavailable. Because of rounding and data exclusion of nonclassifiable responses, data may not sum to the totals.

[a] NAICS, U.S. Census Bureau, www.census.gov/epcd/www/naics.html

[b] Includes women and men.

[c] Excludes medical and diagnostic laboratories (NAICS 6215) where data is unavailable.

private industry. Available data by four-digit industry group reveal that women represented the minority of cases in only one industry, other ambulatory health care services. Overall, Blacks (both women and men) experienced 23% of the lost workday injury and illness cases, nearly twice that of their counterparts in private industry. Blacks accounted for over 29% of the cases in nursing and residential care facilities, and about 17% of the cases for each of the remaining three subsectors. Hispanics of both sexes experienced 9.6% of the lost workday injury and illness cases in the sector, about half of that of their counterparts in private industry. The distribution of cases among Hispanics across the four subsectors ranged from 7.7% to 10.3%, with the highest in hospitals. Asians of both sexes experienced 2.4% of the lost workday injury and illness cases in this sector, about 1.6 times that of their counterparts in private industry. The percent distribution of cases among Asians across the four subsectors ranged from 0.8% to 4.2%, with the highest percent of cases experienced in hospitals.

Table 2.14 displays the 2005 percent distribution of nonfatal injuries and illnesses involving days away from work, by age category of workers in the HCSA sector and private industry. In general, HCSA workers in the 16–19, 20–24, 25–34, and 35–44 age groups experienced lower percent of lost workday injury and illness cases than their counterparts in private industry. However, the reverse was true for workers aged 45 and over. When comparing the proportions of cases within each subsector to one another, workers in nursing and residential care facilities experienced the highest proportion of cases in the age groups of 16–19, 20–24, and 25–34. Workers in hospitals experienced the highest proportions in the age groups of 35–44, 45–54, and 55–54 and workers in social assistance experienced the highest proportions in the 65 and over age group.

**TABLE 2.14** Percent Distribution of Nonfatal Injuries and Illnesses Involving Days away from Work by Industry and Age of Worker, 2005

| 2002 NAICS Code[a] | Industry | Total Cases | Percent of Nonfatal Injury and Illness Cases Involving Days away from Work by Age Group | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 16–19 | 20–24 | 25–34 | 35–44 | 45–54 | 55–64 | 65 and Over |
| 621 | Ambulatory health care services[b] | 25,390 | 0.6 | 7.4 | 21.4 | 25.4 | 26.7 | 15.8 | 2.7 |
| 6211 | Physician offices | 5,420 | 1.1 | 3.2 | 15.6 | 30.0 | 36.5 | 11.6 | 1.9 |
| 6212 | Dental offices | 1,010 | — | 18.8 | 13.9 | 45.5 | 16.8 | — | — |
| 6213 | Offices of other health practitioners | 900 | — | — | 18.9 | 44.4 | 26.7 | 7.8 | — |
| 6214 | Outpatient care centers | 4,380 | 1.1 | 10.3 | 21.9 | 19.6 | 24.6 | 16.7 | 5.5 |
| 6216 | Home health care services | 9,660 | 0.3 | 5.8 | 17.2 | 23.1 | 29.0 | 21.7 | 2.9 |
| 6219 | Other ambulatory health care services | 3,180 | — | 12.9 | 47.8 | 18.9 | 10.7 | 8.5 | 1.2 |
| 622 | Hospitals | 62,930 | 0.8 | 6.5 | 18.8 | 26.7 | 29.0 | 16.4 | 1.7 |
| 623 | Nursing and residential care facilities | 66,620 | 3.4 | 12.1 | 25.1 | 24.8 | 22.5 | 10.1 | 2.0 |
| 624 | Social assistance | 20,960 | 1.7 | 9.8 | 20.7 | 21.5 | 27.0 | 14.8 | 4.4 |
| 62 | Health care and social assistance | 175,900 | 1.8 | 9.2 | 21.8 | 25.2 | 25.9 | 13.7 | 2.3 |
| | Total (private industry, 16 years and over) | 1,234,680 | 3.4 | 10.9 | 23.8 | 25.5 | 23.1 | 11.1 | 2.2 |

*Source:* From Bureau of Labor Statistics, Table R37, http://www.bls.gov/iif/oshwc/osh/case/ostb1693.txt

*Notes:* Dash (—) indicates data are unavailable. Because of rounding and data exclusion of nonclassifiable responses, data may not sum to the totals.

[a] NAICS, U.S. Census Bureau, www.census.gov/epcd/www/naics.html

[b] Excludes medical and diagnostic laboratories (NAICS 6215) where data is unavailable.

### Data by Selected Occupations

This section focuses on selected health care occupational groups, those which experienced the highest number of nonfatal injuries and illnesses involving days away from work in 2005. These include nursing aides, orderlies and attendants, registered nurses, licensed practical and vocational nurses, home health aides, personal and home care aides, and child care workers.

Tables 2.15 and 2.16 display the 2005 percent distribution of nonfatal injuries and illnesses involving days away from work by the sex, race, ethnic origin, and the age group of workers in these six occupations and private industry. Women in these occupations experienced most of the injury and illness burden, representing 84%–98% of the reported cases. With exception of registered nurses, Blacks in these occupations also experienced a disproportionately higher number of cases as compared to their counterparts in private industry. Registered nurses represented the only occupational group that experienced a disproportionately higher number of cases for Asian workers, as compared to private industry. The percents for Hispanics in each of the six occupations were less than their counterparts in private industry. When compared to private industry, there was a greater proportion of injury and illness cases in the older age groups for many of these occupations, with the exception of nursing aides, orderlies and attendants, and child care workers.

## Fatal Occupational Injuries

In 2005, HCSA accounted for 104 work-related fatalities.[13] Fifty-six (56%) of these fatalities involved transportation accidents (mostly highway accidents). Assaults and violent acts accounted for 21% of the fatal occupational injuries within the HCSA sector, with about an equal number of homicides and suicides.

**TABLE 2.15** Percent Distribution of Nonfatal Injuries and Illnesses Involving Days away from Work by Sex, Race, or Ethnic Origin of Worker for Occupations in HCSA Sector with Highest Number of Cases in 2005

| | | Percent Distribution of Nonfatal Injuries and Illnesses Involving Days away from Work | | | |
|---|---|---|---|---|---|
| Occupation | Lost Day Injury and Illness Cases | Women | Black or African American[a] | Hispanic or Latino[a] | Asian[a] |
| Nursing aides, orderlies, and attendants | 52,150 | 89 | 31.6 | 8.6 | 2.1 |
| Registered nurses | 20,100 | 92 | 7.8 | 3.5 | 6.6 |
| Licensed practical nurses and licensed vocational nurses | 7,190 | 93 | 17.1 | 3.7 | 1.4 |
| Home health aides | 7,110 | 98 | 23.4 | 11.4 | 1.0 |
| Personal and home care aides | 4,420 | 84 | 33.2 | 10.2 | — |
| Child care workers | 2,560 | 86 | 33.9 | 10.2 | — |
| Total (private industry, 16 years and older) | | 33.7 | 11.8 | 19.0 | 1.5 |

*Source:* From Bureau of Labor Statistics, Table R42, http://www.bls.gov/iif/oshwc/osh/case/ostb1698.txt and Table R43, http://www.bls.gov/iif/oshwc/osh/case/ostb1699.txt

*Notes:* Dash (—) indicates data are unavailable. Because of rounding and data exclusion of nonclassifiable responses, data may not sum to the totals.

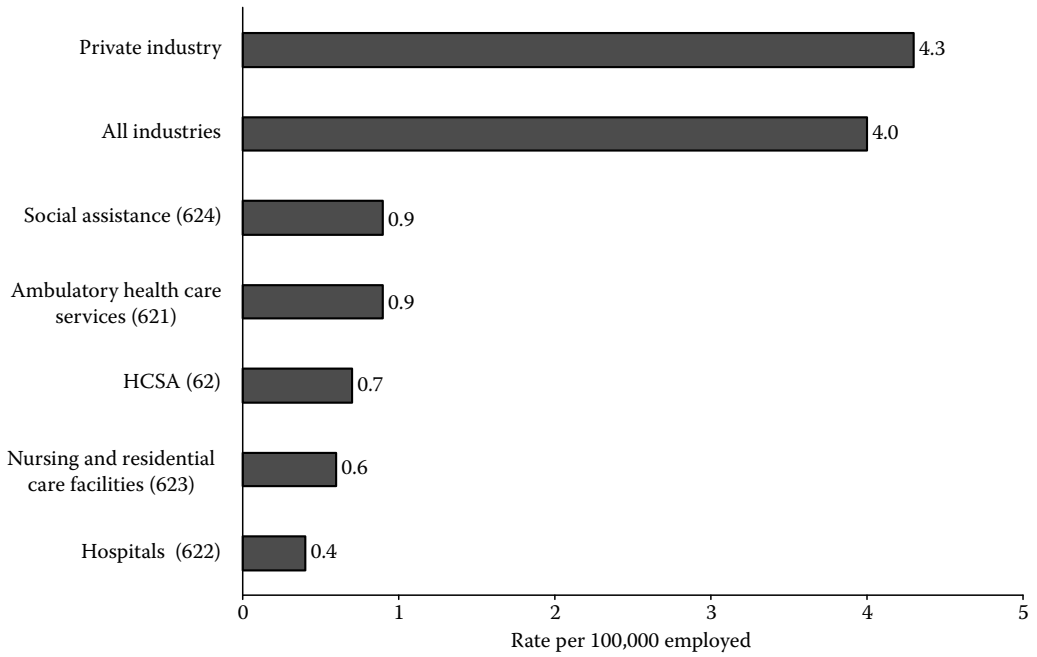
[a] Includes women and men.

**TABLE 2.16** Percent Distribution of Nonfatal Injuries and Illnesses Involving Days away from Work by Age for Occupations in HCSA Sector with Highest Number of Cases in 2005

| Occupation | Lost Day Nonfatal Injury and Illness Cases | Percent of Nonfatal Injury and Illness Cases Involving Days away from Work by Age Group | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 16–19 | 20–24 | 25–34 | 35–44 | 45–54 | 55–64 | 65 and Over |
| Nursing aides, orderlies, and attendants | 52,150 | 3.1 | 15.0 | 26.7 | 26.3 | 19.6 | 8.2 | 1.0 |
| Registered nurses | 20,100 | 0.6 | 2.2 | 0.7 | 26.6 | 34.8 | 17.2 | 2.6 |
| Licensed practical nurses and licensed vocational nurses | 7,190 | 0.3 | 2.8 | 21.3 | 27.9 | 30.5 | 15.8 | 1.1 |
| Home health aides | 7,110 | 0.4 | 8.0 | 18.5 | 20.3 | 30.8 | 19.2 | 2.7 |
| Personal and home care aides | 4,420 | 1.4 | 12.9 | 15.2 | 23.9 | 25.9 | 16.4 | 4.3 |
| Child care workers | 2,560 | 2.3 | 27.7 | 27.3 | 16.8 | 20.3 | 4.7 | 1.2 |
| Total (private industry, 16 years and older) | | 3.4 | 10.9 | 23.8 | 25.5 | 23.1 | 11.1 | 2.2 |

*Source:* From Bureau of Labor Statistics, Table R41, http://www.bls.gov/iif/oshwc/osh/case/ostb1697.txt

In 2005, the incidence rate of fatal work-related injuries in the HCSA sector was 0.7 per 100,000 workers in 2005, compared to an incidence rate of 4.3 in private industry (Figure 2.22). Among the four subsectors, hospitals accounted for the lowest incidence rate (0.4) and ambulatory care services and social assistance represented the highest rate (0.9).




*Note:* NAICS codes in parentheses follow industry sector name.

**FIGURE 2.22** Rate of fatal occupational injuries, HCSA sector and private industry, 2005. (From Bureau of Labor Statistics, Census of Fatal Occupational Injuries, Special tabulation—Number and rate of fatal occupational injuries by selected worker characteristics, 2003–2005, http://www.bls.gov/iif/)

## Other Key Facts[9,14]

- In 2005, strains and sprains were the leading nature of injury in every major industry sector. HCSA accounted for nearly one in five cases of all sprains and strains.
- In 2005, HCSA accounted for one in five cases of all falls on the same level. Two-thirds of these cases were reported by nursing and residential care facilities and hospitals.
- Nursing aides, orderlies, and attendants experienced the third highest number of days away from work in 2005 (52,150 cases) among all occupations and the highest among health care occupations, with the majority (89%) of the cases involving women. Injuries to these workers were attributable to health care patients 58% of the time and were due to overexertion for 54% of the cases. The median number of days away from work for this occupation was 5.
- Registered nurses accounted for the 11th highest number of injuries and illnesses involving days away from work in 2005 (20,100) among all occupations and the 2nd highest among health care occupations. The median number of lost workdays for this occupation was 6.
- In 2005, the combined number of injury and illness cases involving days away from work for nursing aides, orderlies, and attendants; and registered nurses (72,250 cases) accounted for over 40% of all injuries and illnesses involving days away from work in the HCSA sector.
- The HCSA sector accounted for nearly 20% ($n$ = 72,780) of all work-related MSDs involving days away from work in 2005, exceeding all industry sectors. Nursing aides, orderlies, and attendants had the highest number of MSD cases among health care occupations (28,920) and the second highest among all occupations. Registered nurses had the second highest number of cases among health care occupations (9,060) and the eighth highest number among all occupations. Home health aides and licensed practical and vocational nurses had the next highest number of MSD cases among health care occupations, ranking in the top 25 of all occupations.
- In 2005, two-thirds of personal assaults and violent acts occurred in the HCSA sector.

## Reported BLS Cases Underestimate Magnitude of Occupational Injuries and Illnesses

Studies have shown that the BLS SOII fails to capture a large proportion of job-related injuries and illnesses of private sector employers.[15–17] A recent study of injury and illness reporting in Michigan found that the SOII missed more than two-thirds of job-related injuries and illnesses,[15] while another study estimated that the SOII missed between 33% and 69% of all injuries and illnesses.[16] Additionally, major changes in OSHA recordkeeping rules in 1995 and 2002 have been shown to correspond directly to substantial declines in the number of SOII recordable injuries and illnesses.[18] For example, starting in 2002, MSDs were recorded in the "all other illnesses" illness category on OSHA Form 300 that, in effect, lumped MSDs in with all reported illnesses not categorized as skin disorders, respiratory ailments, poisonings, or hearing loss. The change has been perceived by many to obscure the magnitude of MSD cases in Health Care and other industries where MSDs represent a major problem.

Apart from regulatory changes, causes of underreporting of nonfatal injuries and illnesses are many and diverse.[17] Causes for underreporting by employers include the following: neglect for or lack of knowledge of recordkeeping requirements, negative impact of injury records on management bonuses, control increase of workers' compensation/insurance rates, avoid targeted OSHA inspections, or maintain eligibility for contracts requiring a good safety record. Likewise, workers may not report safety or health problems to their employers for many reasons, such as fear of disciplinary action, not wanting supervisor to think worker was careless, injury too minor to report, unable to afford lost work time, lack of awareness that problem is work related (particularly true for diseases with long latency periods), injury is considered part of the job (particularly true of health care workers), frustration with workers' compensation procedures, or negative impact on company goal of a perfect safety record (especially when reinforced by incentive programs that inadvertently result in peer pressure and are perceived to offer large rewards for hiding injuries). Despite these limitations,

the data from the SOII represent the only source of national data on the numbers and rates of occupational injuries and illnesses.

## Infectious Disease Data

### Sharps Injuries

Two surveillance systems have been developed to measure SIs among health care workers: the Exposure Prevention Information Network (EPINet) at the University of Virginia (http://www.healthsystem.virginia.edu/internet/epinet/about_epinet.cfm) and the CDC's National Surveillance System for Hospital Health Care Workers (NaSH) (http://www.cdc.gov/ncidod/dhqp/nash.html). Characteristics of these two systems and data derived from them are shown in Table 2.17. Data from EPINet and NASH, adjusted for underreporting, have been used to estimate that 384,325 percutaneous injuries are sustained annually by hospital-based health care personnel.[19] Since almost half of U.S. health care workers work outside of hospitals, as many as 600,000–800,000 SIs (Table 2.18) may occur annually among all health

**TABLE 2.17** SI Surveillance Data from Four Sources

| Characteristic | EPINet | NaSH | Massachusetts | California |
|---|---|---|---|---|
| Number of sites | 48 hospitals | 26 hospitals | 99 hospitals | 316 (of >3000 licensed acute care hospitals, home health care agencies, and skilled nursing facilities) |
| Most recent published data | 2003 | Summary report June 1995 to July 1999 | 2004 | 1998–1999 |
| Number of SIs per year reported | 1728 | 1380 (average) | 3279 | 976 (average) |
| Rate of SIs in most recent year available | 23.87 SIs per 100 occupied beds | | 18.3 per 100 licensed hospital beds | |
| Occupations associated with injuries | 37.9% nurses<br>22.1% physicians<br>9.0% surgery attendants<br>5.4% phlebotomist/ venipuncture/ IV team<br>2.4% clinical laboratory workers | 44% nurses<br>30% physicians<br>13% technicians | 39% nurses<br>33% physicians<br>20% technicians (includes surgical, phlebotomists, and clinical laboratories) | 49% nurses<br>9% physicians<br>10% technologists<br>9% aides, orderlies, and nursing assistants<br>8% phlebotomists needles per syringe<br>8% suture needles<br>7% butterfly needles |
| Devices associated with injuries | 32% disposable syringes<br>21% suture needles | 34% syringes<br>16% suture needles<br>13% butterfly needles | 31% hypodermic needles<br>22% suture needles (56% hollow bore needle: hypodermic, butterfly, vacuum tube, and others) | 32% disposable |
| Injuries with safety devices | 32% | 4.3 (195/4569) | 33% | |

*Sources:* From Perry, J., Parker, G., and Jagger, J., *Adv. Expo. Prev.*, 7, 42, 2005; National Surveillance System for Hospital Health Care Workers Summary Report for data collected from June 1995 through July 1999; Sharps Injuries among Hospital Workers in Massachusetts, 2004: Findings from the Massachusetts Sharps Injury Surveillance System, published April 2007; Cone, J., *Calif. Morbidity*, September 2000.

**TABLE 2.18** Frequency Estimates for the United States, 1998

| Health Outcome | Estimated Number |
|---|---|
| SIs | 600,000–800,000 |
| Occupationally acquired hepatitis B infection | 461 |
| Occupationally acquired acute hepatitis B | 132 |
| Occupationally acquired acute hepatitis C | 70 |
| Occupationally acquired HIV | 1 |

*Sources:* From CDC, *NIOSH Alert: Preventing Needlestick Injuries in Health Care Settings*, Department of Health and Human Services, CDC, Cincinnati, OH, DHHS (NIOSH) Publication No. 2000-108, 1999; Personal communication with Ian Williams, Division of Viral Hepatitis (DVH), CDC, February 1, 2002 and Annemarie Wasley, DVH, CDC, April 20, 2007; Do, A.N., Ciesielski, C.A., Metler, R.P., Hammett, T.A., Li, J., and Fleming, P.L., *Infect. Control Hosp. Epidemiol.*, 24, 86, 2003.



care workers, but little data are available about the occurrence of SIs in outpatient settings.[20] A few states, including Massachusetts and California, have also developed their own SI surveillance systems. Based on data from these surveillance systems, it is known that most reported SIs are associated with hypodermic syringes or other hollow-bore needles and most reported SIs occur in nursing, medical, or laboratory staff, but housekeepers and other health care workers are also at risk (Table 2.17).[21–24]

Although reported SIs among health care workers are a common occurrence, fortunately, they rarely lead to infection with bloodborne pathogens (Table 2.18).[20,25,26] Using mathematical modeling, the World Health Organization estimated the incidence of infections attributable to percutaneous injuries and concluded that 39% of HCV, 37% of HBV, and 4.4% of HIV infections acquired among health care workers worldwide in 2000 were attributable to occupational exposure via SIs. The occupational attributable fractions for the United States were estimated to be substantially lower: 8%, 1%, and 0.5% for HCV, HBV, and HIV, respectively. The probability of acquiring an infection depends on the prevalence of infection among the patient population, the probability of health care worker exposure, the probability of infection occurring after exposure, and the proportion of health care workers that are susceptible to infection.[27] Sepkowitz and Eisenberg estimated annual death rates for U.S. health care workers from occupational events to be 17–57 per 1 million workers. They attributed more than half of these deaths (between 80 and 260 total deaths in 2002) to infection; 75–250 deaths from HBV, and 5–10 deaths from HIV, HCV, and tuberculosis (TB) combined. Their estimates were based on reported rates of needlestick injuries, infection prevalence among patients, reported infections among health care workers, and the risk of dying from infections once acquired.[28]

### *HIV*

The average risk of HIV transmission after a percutaneous exposure from a known positive source is estimated to be 0.3%. Risk factors for transmission include exposure to a large quantity of blood from the source person (e.g., device visibly contaminated with patient's blood, procedure involving a needle being placed directly into a vein or artery, or deep injury), exposure to blood from a source person with terminal illness, hollow-bore needles, and, possibly, immunologic factors in the exposed worker.[29]

Data on HIV infection and AIDS among health care workers have been collected by the CDC through the HIV/AIDS Reporting System and the National Surveillance for Occupationally Acquired HIV Infection System.[30] Health care personnel with HIV/AIDS who are reported without any known risk for HIV infection are investigated by state and local health departments using the following case definitions. Documented cases of occupationally acquired HIV/AIDS are those in which HIV seroconversion is temporally related to an exposure to an HIV-positive source and in which the exposed worker has no nonoccupational risk factors for acquisition of HIV (e.g., male homosexual–bisexual contact or IV drug use). Possible cases of occupationally acquired HIV/AIDS are those in which a

**TABLE 2.19** Occupations of Health Care Workers with Documented and Possible Occupationally Acquired HIV Infection, 1981–2006

| Occupation | Documented | Possible |
|---|---|---|
| Nurse | 24 | 35 |
| Laboratory technician (clinical) | 16 | 17 |
| Physician (nonsurgical) | 6 | 12 |
| Laboratory technician (nonclinical) | 3 | — |
| Housekeeper/maintenance workers | 2 | 13 |
| Technician (surgical) | 2 | 2 |
| Embalmer/morgue technician | 1 | 2 |
| Health aide/attendant | 1 | 15 |
| Respiratory therapist | 1 | 2 |
| Technician (dialysis) | 1 | 3 |
| Dental worker (including dentist) | — | 6 |
| Emergency medical technician (paramedic) | — | 12 |
| Physician (surgical) | — | 6 |
| Other technician/therapist | — | 9 |
| Other health care occupation | — | 6 |
| Total | 57 | 140 |

*Source:* From Do, A.N., Ciesielski, C.A., Metler, R.P., Hammett, T.A., Li, J., and Fleming, P.L., *Infect. Control Hosp. Epidemiol.*, 24, 86, 2003.

*Note:* Dash (—) indicates no reported cases.

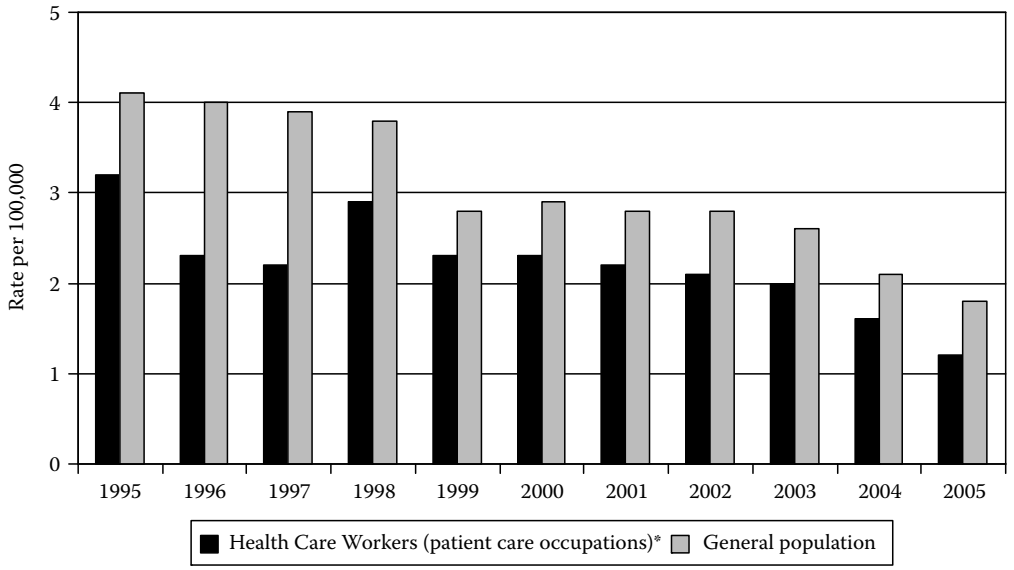


worker is found to be HIV positive, has no nonoccupational risk factors for HIV/AIDS, and has opportunities for occupational exposure to blood, body fluids, or HIV-positive laboratory material. More than 90% of health care personnel infected with HIV have reported nonoccupational risk factors for acquiring their infection.

Between 1981 and 2006, the CDC received reports of 57 documented cases and 140 possible cases of occupationally acquired HIV in U.S. health care workers (Table 2.19). Thirty-one (54%) of the implicated exposures occurred prior to 1991. Eight of the documented HIV cases occurred despite antiviral postexposure prophylaxis. No documented occupationally acquired cases of HIV infection have been reported since 1999, and the most recent possible case of occupationally acquired HIV was reported in 2000.

### *HBV*

CDC estimated an incidence of 17,000 HBV infections per year among health care workers in 1983, which declined to approximately 400 in 1995, after widespread immunization of health care workers, implementation of universal precautions, and adoption of the OSHA bloodborne pathogens standard. In 1983, the estimated incidence of HBV infections among health care workers was threefold higher than the incidence in the general U.S. population (386 per 100,000 vs. 122 per 100,000). By 1995, however, the estimated incidence of HBV infections among health care workers was more than fivefold lower than the incidence in the general U.S. population (9.1 per 100,000 vs. 50 per 100,000).[31] The CDC's Division of Viral Hepatitis estimates that 139 cases of acute HBV were occupationally acquired in 1995 (3.2 per 100,000 health care workers in patient care occupations), which declined to 87 in 2004 (1.6 per 100,000 workers) (Figure 2.23).[25,32]




* Patient care occupations include physicians, dentists, nurses, physicians' assistants, and health technologists and technicians.

**FIGURE 2.23** Incidence of acute hepatitis B among health care workers. (From personal communication with Ian Williams, Division of Viral Hepatitis (DVH), CDC, February 1, 2002 and Annemarie Wasley, DVH, CDC, April 20, 2007; CDC, *Morbidity Mortality Wkly Rep*, 56, 2007; Household Data Annual Averages, Current Population Survey, Bureau of Labor Statistics, U.S. Department of Labor, 1995–2005.)

### *HCV*

From 1999 through 2004, the percentage of patients with acute hepatitis C case who reported being health care workers averaged about 2% (range: 1%–4%). This increased to 7.2% in 2005. It is unknown what proportion of these cases was occupationally acquired.[33] It has been estimated that percutaneous exposure leads to 50–150 transmissions of HCV among health care workers annually, assuming that hospitalized patients have the same HCV seroprevalence as the rest of the U.S. population.[28] Seroprevalence studies of HCV in health care workers suggest minimally increased risk compared with the general population.[34]

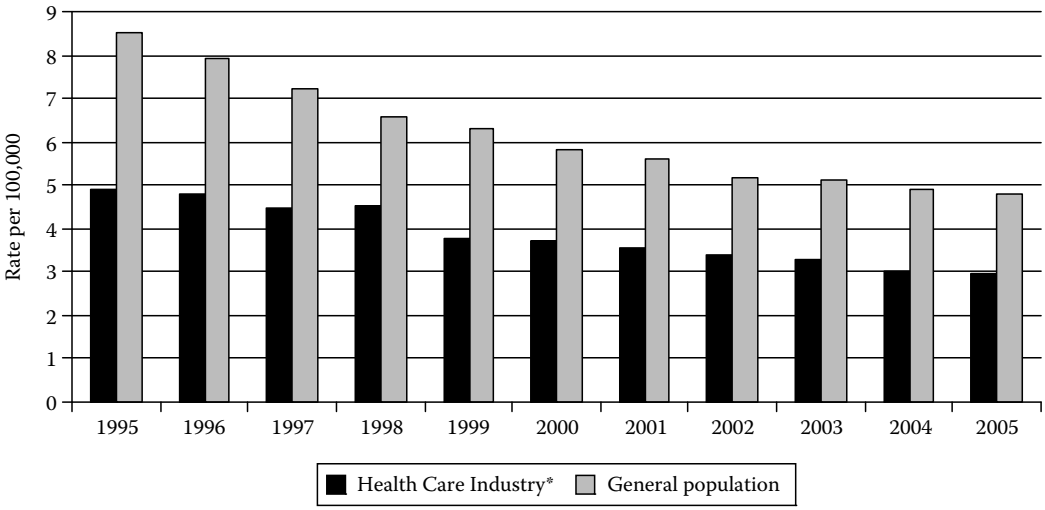
### *Tuberculosis*

The TB incidence in health care workers declined from 4.9 per 100,000 workers in the health care industry in 1994 to 3.0 in 2005 (Figure 2.24).[32,35,36] In 2005, 3.1% (420) of nationally reported TB cases for whom occupational information was available occurred among health care workers.[36]

The prevalence of TB among health care workers in 2006 (3.2 per 100,000 population) was higher than the prevalence of TB among health care workers in 2005 (3.1 per 100,000 population), and the prevalence has been slightly increasing since 2001. The risk of occupational acquisition of TB among health care personnel has increased due to the emergence of multidrug-resistant and extensively drug-resistant TB and the need to hospitalize patients not responding to traditional outpatient antibiotic regimens. Even though the incidence of TB is decreasing in the U.S. population, health care personnel remain at risk without careful adherence to engineering and administrative controls.[37,38]

### *Other*

A recent review found published case reports of occupationally acquired bloodborne infections for a total of 60 pathogens or species: 26 viruses, 18 bacteria/rickettsia, 13 parasites, and 3 yeasts.[39]




*Health care industry includes hospitals and nonhospital health services.

**FIGURE 2.24** Incidence of TB among health care workers. (From Online Tuberculosis Information System (OTIS), National Tuberculosis Surveillance System, United States, 1993–2004, U.S. Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), Division of TB Elimination, CDC WONDER Online Database, March 2006; CDC, Reported Tuberculosis in the United States, 2005, U.S. Department of Health and Human Services, CDC, Atlanta, GA, September 2006; Household Data Annual Averages, Current Population Survey, Bureau of Labor Statistics, U.S. Department of Labor, 1995–2005.)

## Disease and Cause-Specific Mortality Data

Death certificate data information from the NOMS (National Occupational Mortality Surveillance) system, with multiple cause of death, coded usual or lifetime occupation, and industry information, were used to assess whether any associations exist between cause-specific mortality and occupation and industry. For this surveillance system, 28 states have provided coded data for this surveillance system for the years 1984–1998 and multiple cause analysis was conducted. The measure of association used most often was the proportionate mortality ratio (PMR), defined as the ratio of the proportion of deaths due to a specific cause for a specified occupation or industry during a specified time period divided by the proportion of deaths due to that cause for all occupations or industries during the same period, multiplied by 100. A PMR is considered to be significantly elevated when its value is greater than 100 and the lower 95% confidence interval (CI) exceeds 100. A significantly elevated PMR suggests that more deaths than expected are associated with a given cause of death in a specified occupation or industry. PMRs should be interpreted as flags or indicators that describe gaps, trends, and elevated risks for serious, acute and chronic disease, and fatal injuries. The NOMS system is available on the Web as an interactive query system for access to precalculated PMRs by occupation or industry.[40]

NOMS data were analyzed to produce mortality estimates for each of the four HCSA industry subsectors and for 18 major health care occupations (Tables 2.20 and 2.21, respectively). PMRs for the top 10 causes of death (i.e., most highly and significantly elevated causes of death), excluding those associated with small numbers of deaths, are reported in Table 2.20. Three causes of death (AIDS, non-A and non-B viral hepatitis, and various cancers) were observed in all four subsectors. Drug-related deaths were observed in all three health care subsectors. The following causes of death were observed in two of the subsectors: viral hepatitis B (ambulatory health care services and hospitals), sarcoidosis (hospitals and social assistance), and malignant melanoma of the skin and polyarteritis nodosa and allied conditions (ambulatory health care services and social assistance). Of the top 10 causes of death in

**TABLE 2.20** Top 10 Significantly Elevated PMRs by HCSA Industry Subsector, 1984–1998

| 2002 NAICS Code[a] | CIC[b] | Industry | Cause of Death (ICD-9 Codes)[c] | PMR[d] | Number of Deaths | 95% CI LCL, UCL |
|---|---|---|---|---|---|---|
| 621 | 812, 820–822, 830, and 840 | Ambulatory health care services | Air and space transport accidents (840–845) | 380** | 97 | 308, 464 |
| | | | Other lung diseases due to external agents, excluding inhalation (506 and 5071–508) | 219** | 37 | 154, 302 |
| | | | Viral hepatitis B (0701 and 0703) | 186** | 69 | 144, 235 |
| | | | (AIDS) HIV infection (042–044) | 176** | 940 | 165, 187 |
| | | | Non-A and non-B viral hepatitis (0704–0709) | 159** | 103 | 130, 193 |
| | | | Myoneural disorders (358) | 155** | 53 | 116, 203 |
| | | | Polyarteritis nodosa and allied conditions (446) | 147** | 97 | 120, 180 |
| | | | Hodgkin's disease (201) | 145** | 127 | 121, 172 |
| | | | Drug-related deaths (292, 304, 3052–3059, 850–858, 9500–9505, 9620, and 9800–9805) | 143** | 760 | 134, 154 |
| | | | Malignant melanoma of skin (172) | 142** | 418 | 129, 156 |
| 622 | 831 | Hospitals | (AIDS) HIV infection (042–044) | 163** | 2875 | 158, 167 |
| | | | Sarcoidosis (135) | 149** | 269 | 132, 169 |
| | | | Viral hepatitis B (0701, 0703) | 145** | 155 | 123, 169 |
| | | | Non-A and non-B viral hepatitis (0704–0709) | 121** | 231 | 106, 137 |
| | | | Drug-related deaths (292, 304, 3052–3059, 850–858, 9500–9505, 9620, and 9800–9805) | 119** | 1760 | 114, 124 |
| | | | Cancer of small intestine, including duodenum (152) | 119** | 147 | 101, 140 |
| | | | Asthma (493) | 118** | 1575 | 113, 123 |
| | | | Disorders of the peripheral nervous system (350–357) | 118* | 249 | 104, 134 |
| | | | Diffuse diseases of connective tissue (710) | 115* | 927 | 108, 123 |
| | | | Acute myeloid leukemia | 114** | 681 | 105, 123 |
| 623 | 832 and 870 | Nursing and residential care facilities | Accidents caused by storms, floods, and earth eruption (908–909) | 209* | 10 | 100, 384 |
| | | | (AIDS) HIV infection (042–044) | 148** | 945 | 139, 158 |
| | | | Cancer of unspecified female genital organs (184) | 141** | 83 | 112, 175 |
| | | | Non-A and non-B viral hepatitis (0704–0709) | 135* | 74 | 106, 170 |

(*continued*)

**TABLE 2.20 (continued)** Top 10 Significantly Elevated PMRs by HCSA Industry Subsector, 1984–1998

| 2002 NAICS Code[a] | CIC[b] | Industry | Cause of Death (ICD-9 Codes)[c] | PMR[d] | Number of Deaths | 95% CI LCL, UCL |
|---|---|---|---|---|---|---|
| | | | Cancer of cervix uteri (180) | 123** | 440 | 111, 135 |
| | | | Diabetes mellitis (250) | 118** | 5700 | 115, 120 |
| | | | Drug-related deaths (292, 304, 3052–3059, 850–858, 9500–9505, 9620, and 9800–9805) | 113** | 550 | 103, 122 |
| | | | Endocrine, nutritional, metabolic, and immunity disorders (240–279) | 111** | 8080 | 109, 114 |
| | | | Motor vehicle traffic accidents (810–819) | 110** | 1352 | 105, 115 |
| | | | Cancer of pancreas (157) | 109* | 790 | 102, 117 |
| 624 | 871 | Social assistance | Non-A and non-B viral hepatitis (0704–0709) | 190** | 42 | 137, 257 |
| | | | (AIDS) HIV infection (042–044) | 186** | 514 | 170, 202 |
| | | | Neurotic and personality disorders (300–301) | 171* | 27 | 113, 249 |
| | | | Sarcoidosis (135) | 163** | 35 | 114, 227 |
| | | | Polyarteritis nodosa and allied conditions (446) | 153* | 30 | 103, 219 |
| | | | Malignant melanoma of skin (172) | 143** | 108 | 117, 172 |
| | | | Mental disorders associated with solvent exposures (296–297, 300–301, and 3483) | 136** | 85 | 109, 169 |
| | | | Lymphoid leukemia (204) | 127* | 78 | 100, 159 |
| | | | Cancer of bone, connective tissue, skin, and breast (170–175) | 122** | 1263 | 117, 172 |
| | | | Infectious and parasitic diseases (001–139) | 120** | 1716 | 115, 125 |

* = $p < 0.05$; ** = $p < 0.01$.

[a] NAICS, U.S. Census Bureau, www.census.gov/epcd/www/naics.html

[b] Census Industry Code, U.S. Census Bureau, http://www.census.gov/apsd/techdoc/cps/mar96/append_a.html

[c] Multiple cause PMR analysis was conducted using the ninth revision of the International Classification of Diseases (ICD-9) to code cause of death.

[d] PMR is defined as the ratio of the age-adjusted proportion of deaths from a specific cause of death for a particular occupation or industry during a specified time period compared to the proportion of that cause among all industries or occupations during the same period, multiplied by 100. To test for statistical significance, two-sided 95% CIs are calculated, based on the Poisson distribution for observed deaths, and using the normal approximation to the Poisson for large numbers. A statistically significantly elevated PMR must be interpreted as a flag that suggests elevated risk that should be further evaluated for confounding factors.

**TABLE 2.21** Top Three Significantly Elevated PMRs for Largest Occupations in HCSA Sector, 1984–1998

| Occupation | COC[a] | Total Employed (in Thousands) | Cause of Death (ICD-9 Codes)[b] | PMR[c] | Number of Deaths | 95% CI LCL, UCL |
|---|---|---|---|---|---|---|
| Registered nurses | 095 | 2,529 | Air and space transport accidents (840–845) | 211** | 28 | 140, 305 |
| | | | Viral hepatitis B (0701 and 0703) | 192** | 58 | 146, 248 |
| | | | (AIDS) HIV infection (042–044) | 180** | 587 | 166, 195 |
| Health aides (except nursing) | 447 | 1,906[d] | Myoneural disorders (358) | 245** | 8 | 106, 483 |
| | | | Hodgkin's disease (201) | 216** | 21 | 134, 330 |
| | | | (AIDS) HIV infection (042–044) | 154** | 139 | 130, 182 |
| Nursing aides, orderlies, and attendants | 446 | | (AIDS) HIV infection (042–044) | 172** | 1416 | 166, 178 |
| | | | Non-A and non-B viral hepatitis (0704–0709) | 171** | 120 | 142, 205 |
| | | | Viral hepatitis B (0701 and 0703) | 152** | 60 | 116, 196 |
| Child care workers | 406 and 468 | 1,401 | Systemic sclerosis (7101) | 154* | 27 | 102, 224 |
| | | | Lymphatic cancer and multiple myeloma (202–203) | 123** | 223 | 108, 140 |
| | | | Cancer of ovary and other uterine adnexa (183) | 120* | 207 | 104, 138 |
| Physicians | 084 | 863 | Air and space transport accidents (840–845) | 942** | 65 | 727, 1201 |
| | | | Viral hepatitis B (0701 and 0703) | 304** | 28 | 202, 439 |
| | | | Drug-related deaths (292, 304, 3052–3059, 850–858, 9500–9505, 9620, and 9800–9805) | 300** | 241 | 263, 340 |
| Personal service occupations, nec (includes personal and home care aides) | 469 | 703 | (AIDS) HIV infection (042–044) | 199** | 129 | 166, 236 |
| | | | Chronic myeloid leukemia (2051) | 171* | 20 | 105, 264 |
| | | | Cancer of urinary organs (188 and 1893–1899) | 144** | 73 | 113, 181 |
| Licensed practical nurses | 207 | 556 (includes licensed vocational nurses) | Sarcoidosis (135) | 161* | 34 | 112, 226 |
| | | | Drug-related deaths (292, 304, 3052–3059, 850–858, 9500–9505, 9620, and 9800–9805) | 146** | 226 | 127, 166 |
| | | | (AIDS) HIV infection (042–044) | 146** | 174 | 126, 170 |

(*continued*)

**TABLE 2.21 (continued)** Top Three Significantly Elevated PMRs for Largest Occupations in HCSA Sector, 1984–1998

| Occupation | COC[a] | Total Employed (in Thousands) | Cause of Death (ICD-9 Codes)[b] | PMR[c] | Number of Deaths | 95% CI LCL, UCL |
|---|---|---|---|---|---|---|
| Health diagnosing practitioners | 089 | 425 | Anterior horn cell disease including motor neurone disease (335) | 333** | 13 | 177, 569 |
| | | | Asthma (493) | 218* | 13 | 116, 373 |
| | | | Cancer of brain and nervous system (191–192) | 201** | 22 | 126, 305 |
| Clinical laboratory technologists and technicians | 203 | 321 | Viral hepatitis B (0701 and 0703) | 348** | 18 | 206, 550 |
| | | | Toxic encephalopathy (3483) | 192** | 24 | 123, 285 |
| | | | Sarcoidosis (135) | 191* | 15 | 107, 315 |
| Dental assistants | 445 | 274 | Hodgkin's disease (201) | 264** | 11 | 132, 472 |
| | | | (AIDS) HIV infection (042–044) | 163* | 28 | 109, 236 |
| | | | Alzheimer's disease (290, 3310, and 3311) | 155** | 125 | 129, 184 |
| Pharmacists | 096 | 245 | Drug-related deaths (292, 304, 3052–3059, 850–858, 9500–9505, 9620, and 9800–9805) | 242** | 90 | 194, 297 |
| | | | Cancer of ovary and other uterine adnexa (183) | 179** | 30 | 121, 255 |
| | | | Cancer of brain and nervous system (191–192) | 165** | 79 | 130, 205 |
| Physical therapists | 103 | 198 | (AIDS) HIV infection (042–044) | 200** | 35 | 140, 279 |
| | | | Cancer of bone, connective tissue, skin, and breast (170–175) | 179** | 26 | 117, 262 |
| | | | Non-Hodgkin's lymphomas (200, 2020–2022, 2028, and 2029) | 151** | 100 | 123, 184 |
| Dentists | 085 | 196 | Air and space transport accidents (840–845) | 643** | 15 | 360, 1060 |
| | | | Disorders of the peripheral nervous system (350–357) | 218** | 15 | 122, 359 |
| | | | Chronic myeloid leukemia (2051) | 213** | 17 | 124, 342 |
| Radiologic technicians | 206 | 182 | TB (010–018 and 137) | 307* | 12 | 159, 537 |
| | | | (AIDS) HIV infection (042–044) | 216** | 73 | 170, 272 |
| | | | Accidental poisonings (850–869 and 9292) | 168* | 25 | 109, 248 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Emergency medical technicians (EMTs), paramedics, and other technologists | 208 | 156 (EMTs alone) | (AIDS) HIV infection (042–044) | 168** | 199 | 146, 194 |
| | | | Infectious and parasitic diseases (001–139) | 124** | 514 | 113, 136 |
| | | | Alzheimer's disease (290, 3310, and 3311) | 124* | 99 | 101, 151 |
| Dental hygienists | 204 | 144 | Accidental falls (880–888 and 9293) | 174* | 19 | 105, 272 |
| | | | Cancer of ovary and other uterine adnexa (183) | 167* | 26 | 109, 244 |
| | | | Cancer neoplasm of breast (174 and 175) | 156** | 92 | 126, 191 |
| Speech therapists (speech language pathologists) | 104 | 114 | Mental disorders associated with solvent exposures (296–297, 300–301, and 3483) | 360* | 6 | 132, 783 |
| | | | | 279* | 6 | 102, 607 |
| | | | Multiple sclerosis and other demyelinating diseases of central nervous system (340–341) | | | |
| | | | Cancer of brain and nervous system (191–192) | 209* | 11 | 104, 373 |
| Health record technicians | 205 | 98 | (AIDS) HIV infection (042–044) | 213** | 27 | 140, 310 |
| | | | Lymphatic cancer and multiple myeloma (202–203) | 164* | 31 | 112, 233 |
| | | | Mental disorders related to substance abuse (291–292 and 303–305) | 148* | 33 | 102, 208 |

[a] Census Occupation Code (COC), U.S. Census Bureau, http://www.census.gov/hhes/www/ioindex/view.html

[b] Multiple cause PMR analysis was conducted using the ninth revision of the International Classification of Diseases (ICD-9) to code cause of death

[c] PMR is defined as the ratio of the age-adjusted proportion of deaths from a specific cause of death for a particular occupation or industry during a specified time period compared to the proportion of that cause among all industries or occupations during the same period, multiplied by 100. To test for statistical significance, two-sided 95% CIs are calculated, based on the Poisson distribution for observed deaths, and using the normal approximation to the Poisson for large numbers. A statistically significantly elevated PMR must be interpreted as a flag that suggests elevated risk that should be further evaluated for confounding factors.

[d] Separate employment figures for health aides (except nursing) and nursing aides, orderlies, and attendants are unavailable.

*$p < 0.05$; **$p < 0.01$.

ambulatory health care services, those unique to this subsector included air and space transport accidents, other lung diseases due to external agents, and myoneural disorders. Of the top 10 causes of death in hospitals, those unique to this subsector included asthma, disorders of the peripheral nervous system, and diffuse diseases of connective tissue and acute myeloid leukemia. Of the top 10 causes of death in nursing and residential care facilities, those unique to this subsector included accidents caused by nature; diabetes mellitus; endocrine, nutritional, metabolic, and immunity disorders; and motor vehicle traffic accidents. Of the top 10 causes of death in social assistance, those unique to this subsector included neurotic and personality disorders, mental disorders associated with solvent exposure, and infectious and parasitic diseases.

Table 2.21 presents the top 3 significantly elevated PMRs for each of the 18 largest HCSA occupations. Infectious diseases (AIDS, hepatitis, etc.) were among the top 3 significantly elevated PMRs for 11 of the 18 occupations, with AIDS being the most prevalent, accounting for thousands of deaths. Several cancers (small intestine, female genital organs, pancreas, bone, and Hodgkin's disease) were also among the top 3 significantly elevated PMRs for 11 of the 18 occupations. Other causes that were observed in more than one occupation included lymphatic cancer and multiple myeloma, drug-related deaths, air and space transport accidents, sarcoidosis, and mental disorders.

## Data Source Limitations

The ability to describe the distribution and determinants of occupational injury, disease, and mortality has improved since the passage of the Occupational Safety and Health Act. However, occupational safety and health surveillance data remain fragmented and have substantial gaps. This section is illustrative of the fragmented nature of occupational health statistics, though providing the reader with information representative of the current statistical and surveillance data sources. As noted recently by Rosenman and colleagues, no comprehensive occupational injury and illness (acute and chronic) surveillance system exists in the United States, either at the national or state levels.[15]

Each of the data sources used herein has limitations, particularly those that attempt to quantify reports of occupational injury and illness (i.e., disease caused by exposures at work). For example, the design of SOII, conducted annually by the U.S. BLS, excludes ~22% of the labor force (self-employed workers, public sector workers, and individuals employed on farms employing 10 or fewer workers). In 1987, the National Academy of Sciences reported on deficiencies in the BLS's occupational health and safety statistical programs.[41] Despite improvements to the SOII, recent studies have reported that the SOII substantially undercounts acute nonfatal injuries, and is generally believed to undercount both acute and chronic illnesses from chronic chemical and other exposures. Recordkeeping and regulatory changes have been suggested as explaining recent declines in the magnitude of occupational injuries and illnesses.[18]

Selected data on occupational mortality are presented in this section. The strengths and limitations of death certificate data have been discussed at length.[42,43] The fact that many individuals do not die as a direct result of their work-related disease prompts NIOSH to maintain surveillance for all causes of death, underlying and contributing. Certifying physicians typically do not list all of a decedent's diseases on the death certificate. As with any analysis based on death certificate data, there is undoubtedly some misclassification of cause of death, and death certificates rely on usual industry and occupation, which may not reflect lifetime exposure histories.

Data that depend, either directly or indirectly, on physician reporting or recording of occupational or work-relatedness can be influenced significantly by the physician's ability or willingness to suspect and evaluate a relationship between work and health. These, in turn, are influenced by evolving medical/scientific information, and by the legal, political, and social environment. Some factors may lead to increased diagnosis and recording/reporting (e.g., the Occupational Safety and Health Act of 1970), while other factors may reduce occupational disease recognition or reporting by physicians (e.g., long latency between a work exposure and disease development, or concern about involvement in litigation).

## Summary

The surveillance data described in this section provide information on the health status of workers in the HCSA sector. National surveillance systems show that this sector is particularly hazardous to workers in terms of nonfatal injuries and illnesses; the HCSA sector has the second largest share of all nonfatal injury and illness cases, as well as cases involving days away from work. Incidence rates for nonfatal injuries and illnesses in this sector are driven by nursing and residential care facilities and hospitals, with rates nearly double of those in all private industry. Predominant injuries and illnesses among health care workers include sprains and strains; injuries associated with slips, trips, and falls; overexertion/repetitive trauma injuries associated with patient lifting and assaults from patients; and SIs. Disease and cause-specific mortality data show significantly elevated causes of death in the sector for infectious disease, various cancers, and drugs. Limitations associated with the various reported data are also provided and underscore the importance of improved surveillance of acute and chronic illnesses and acute nonfatal injuries in this sector.

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