Workplace Health and Safety

The workplace, where most of us spend the bulk of our waking hours, can be a hazardous place. Despite improvements in workplace safety and health over the last several decades, more than 4.7 million workers sustained work-related injuries and illnesses in 2002 in the private sector alone. During the same year, an average of 15 workers died from work-related injuries each day. Work-related illness and injury take an enormous economic toll on the nation's employers, workers, their families, and society overall.

CDC conducts scientific research to identify, characterize, and evaluate workplace risk, designs engineering or other solutions to help prevent them, and communicates up-to-date information about work-related hazards and risks so research findings can be applied quickly and effectively. CDC also supports training and education programs for occupational safety and health professionals, as well as capacity building in the states.

The National Occupational Research Agenda was established through a multi-stakeholder, consensus-building process to provide a framework to target and foster occupational safety and health research. CDC conducts and sponsors research in priority areas, with a special focus on high-risk occupations—such as firefighting, construction, mining, and agriculture. Most importantly, we are committed to translating research results into practical applications that can be disseminated quickly to the workplace. For example, "Alerts" help employers and workers identify and respond to work-related health hazards, and "Workplace Solutions" provide practical advice on hazard control. Several publications—such as CDC's "Pocket Guide to Chemical Hazards"—are best-sellers among government documents. Research also guides CDC's efforts to strengthen worker health and safety in the area of emergency preparedness and response.

Through its efforts to target and foster research, develop effective partnerships, continuously monitor old and new hazards, and rapidly disseminate useful information, CDC has contributed to the nation's progress in reducing workplace injuries and illnesses. These efforts will help the agency anticipate and respond to new challenges as they emerge in the future.

COMMUNICATING WORKPLACE SAFETY AND HEALTH IN SPANISH

WHAT IS THE PUBLIC HEALTH ISSUE?

- Since 1992, work-related fatalities among Hispanic workers in the United States have increased by more than 50%.
- In 2000 alone, work-related fatalities among Hispanic workers increased by 12% in all U.S. industries and by more than 24% in the construction industry.
- Few resources are available to help Spanish-speaking workers and their employers learn about occupational safety and health.

WHAT HAS CDC ACCOMPLISHED?

Each year, CDC communicates key occupational research findings to the public and decision-makers. Targeted efforts to reduce illness and injury among Hispanic workers include translating this information into Spanish and communicating it in ways that are culturally and socially relevant to them.

Examples of Program in Action

- CDC conducts a Health Hazard Evaluation program to evaluate workplace hazards and recommend solutions when requested by employers, workers, or state or federal agencies. In 2003, the program increased its capacity to conduct evaluations and disseminate results and recommendations in Spanish. CDC is further exploring communication strategies to improve Hispanic workers' accessibility to the program.
- CDC implemented a Spanish-language answering system for its toll-free number and a system for responding to e-mail requests in Spanish. In 2003, during their first year in operation, about 900 Spanish-language requests for occupational safety and health were answered by these new systems.
- In 2003, over 12,000 visitors per month accessed Spanish-language occupational safety and health information through CDC's all-Spanish-language website, *NIOSH en Español*.

WHAT ARE THE NEXT STEPS?

- Supplement and enhance the occupational safety and health information provided on the *NIOSH en Español* website.
- CDC and the Occupational Safety and Health Administration will co-sponsor a Hispanic Summit on Occupational Safety and Health focusing on communication, training, and outreach.
- Continue to work with partners to explore best practices for communicating occupational safety and health information to Hispanic-owned small businesses and businesses with a large Hispanic workforce.

ENERGY EMPLOYEES OCCUPATIONAL ILLNESS COMPENSATION PROGRAM ACT OF 2000

WHAT IS THE PUBLIC HEALTH ISSUE?

- After 600,000 nuclear weapons workers were evaluated, it was discovered that more than 100,000 of them were exposed to radiation.
- An undetermined number of nuclear weapons workers has been exposed to beryllium.
- Silica exposure to workers conducting weapons testing in underground mines has resulted in silicosis.
- Members of this workforce also have been exposed to other hazardous chemicals.
- More than 300 Department of Energy (DOE) sites located in 30 states have independent and differing compensation programs. Nuclear weapons workers have limited and varying access to compensation for wage losses and medical expenses arising from work-related illness.

WHAT HAS CDC ACCOMPLISHED?

The *Energy Employees Occupational Illness Compensation Program Act of 2000* establishes a compensation program for DOE workers and contractors who become ill as a result of exposure to beryllium, silica, or radiation in the course of their work. The Department of Health and Human Services (HHS), through CDC, is responsible under the act for developing guidelines to determine if a worker's cancer was likely to have been caused by occupational exposure to radiation; establishing radiation-dose estimation methods; estimating radiation doses of individual cancer claimants; considering the addition of employee groups to a "Special Exposure Cohort;" and administering and staffing a federal Advisory Board on Radiation and Worker Health.

In May 2002, CDC developed final rules on dose reconstruction and probability of causation under the act, incorporating review by the public, scientific experts, and the independent Advisory Board. These regulations establish CDC methods to estimate radiation doses and enable the U.S. Department of Labor to evaluate cancer causation based on these dose estimates. In 2003, CDC initiated 5,000 dose reconstructions and completed more than 1,500 of them. CDC completed site profiles for many leading nuclear weapons sites, collecting and analyzing extensive information on radiation exposures and monitoring at the sites to facilitate the completion of a high volume of dose reconstructions in 2004. CDC also revised and obtained public comment on proposed procedures for adding groups of workers to the Special Exposure Cohort.

WHAT ARE THE NEXT STEPS?

CDC will expand its radiation dose reconstruction program to meet an unprecedented level of demand, develop final regulations for considering additions to the Special Exposure Cohort, and assist the Secretary of HHS and the Advisory Board in considering Special Exposure Cohort petitions.

HEALTH AND SAFETY OF YOUNG AND AGING WORKERS

WHAT IS THE PUBLIC HEALTH ISSUE?

- Because of their biologic, social, and economic characteristics, both young and aging workers pose unique and substantial risks for work-related injuries and illnesses.
- Each year, nearly 70 workers aged 18 years and older die as a result of work-related injuries, and an estimated 84,000 are treated in hospital emergency rooms.
- By 2010, an estimated 40% of the U.S. workforce will be 45 years and older. Older workers are at increased risk for fatal work injuries; require more time to return to work following an injury or illness; and are less likely to receive training as their jobs change.

WHAT HAS CDC ACCOMPLISHED?

CDC has broadened knowledge; initiated promising research and intervention efforts; and developed productive partnerships to address the health and safety needs of both young and aging workers.

Examples of Program in Action

- Through the childhood agricultural injury prevention initiative established in 1997, CDC collected and disseminated previously unavailable data on childhood agricultural injuries. CDC has funded 24 research projects to advance knowledge about causes and prevention of childhood agricultural injuries. CDC also funds the National Children's Center for Agricultural Safety and Health to translate scientific findings into layman's terms and facilitate prevention efforts across the country.
- CDC funded young worker safety and health demonstration projects and published a guide for communities on local efforts to better protect working youth. A guide on how to organize state-based teams is being prepared for distribution nationally.
- Participant of an inter-agency workgroup representing 26 federal organizations was established in 2003 to optimize the impact of federal resources in addressing young worker injuries and illnesses. As an example of this work, safety and health curricula developed through CDC demonstration projects are now used by the federal Job Corps program and some U.S. Occupational Safety and Health Administration training centers.
- CDC collaborated with the National Institute on Aging to fund occupational safety and health research on aging workers. CDC also supports a study by the Institute of Medicine to identify research gaps in our understanding of health and safety issues affecting older workers.
- CDC analyzed data and developed a chartbook documenting the safety and health needs of older workers. In addition, CDC is partnering with "Experience Works," an organization dedicated to serving the needs of aging workers.

WHAT ARE THE NEXT STEPS?

Substantial advances in knowledge about work-related injuries among young and aging workers have occurred. However, increased efforts are still needed to communicate information to stakeholders who can improve workers health and safety. Additional research is needed to better understand unique risks for workers and to identify effective prevention measures.

For additional information on this or other CDC programs, visit www.cdc.gov/program *January 2004*

HEALTH HAZARD EVALUATIONS

WHAT IS THE PUBLIC HEALTH ISSUE?

- More than 294,000 new cases of nonfatal occupational illnesses were reported in private industry in 2002.
- Some occupational diseases are caused by agents or working conditions in which there are no regulations or allowable exposure levels may not protect all workers.
- New occupational health problems have emerged and employees are not equipped with techniques for controlling and/or recognizing these hazards.

WHAT HAS CDC ACCOMPLISHED?

CDC's Health Hazard Evaluation (HHE) program is a congressionally mandated program that responds to requests for evaluations of workplace health hazards from employers; employees and their representatives; and government agencies. CDC conducts studies of workplaces in response to these requests to determine if workers are exposed to hazardous materials or harmful conditions. An HHE presents the opportunity to obtain information on occupational exposures where standards are lacking or do not protect all workers. Workplace exposures studied include chemicals, biological agents, work stress, noise, radiation, and ergonomic stressors. At no cost to the employer, CDC evaluates the workplace environment and the health of employees by reviewing records and/or conducting onsite testing. More than 12,000 HHEs have been completed since the inception of the program in 1971. Since 1999, CDC has been conducting follow-back surveys of HHE participants to assess their satisfaction with the process and to learn whether the recommendations provided led to workplace improvements.

Example of Program in Action

The HHE was an intricate source in defining a correlation between adverse health effects and occupational exposures. Follow-up activities were also performed to assist employers, employees, physicians, and others serving a critical role in reducing exposure and preventing disease. Examples of practices include an assessment and control of exposure to metalworking fluids, which have been associated with the development of hypersensitivity pneumonitis (a disabling lung disease); evaluation of exposure to ultraviolet light as a cause of skin and eye irritation; and recognition of the potential for overexposure to wood dust during furniture stripping and refinishing.

HHEs have been central to the public health response to terrorist attacks by providing state-of-the-art methods for assessing exposure, raising awareness of occupational health concerns among emergency responders, and developing strategies to improve preparedness for future events.

WHAT ARE THE NEXT STEPS?

Emerging occupational health hazards will continue to be a primary focus of the HHE program. CDC will work to inform employers and employees of the HHE program's availability as a unique resource to provide independent, science-based evaluations of a wide variety of occupational health hazards. Increasing efforts will be made to reach Spanish-speaking workers and their employers. Results from the follow-back surveys will be used for continuous improvements in the HHE program.

For additional information on this or other CDC programs, visit www.cdc.gov/program *January 2004*

HIGH-RISK INDUSTRIES (AGRICULTURE, CONSTRUCTION, HEALTHCARE, MINING)

WHAT IS THE PUBLIC HEALTH ISSUE?

- Mining, agriculture, and construction consistently lead the nation in occupational fatalities, with respective rates of 24, 23, and 12 fatalities per 100,000 workers compared with an average overall fatality rate of 4 per 100,000 in 2002. Nonfatal injury rates also are high for people working in these industries.
- Although people working in the healthcare sector have a lower risk for occupation-related fatalities than the above-mentioned industries, the nonfatal injury rate for healthcare workers is one of the highest in all sectors.

WHAT HAS CDC ACCOMPLISHED?

CDC has used industry-specific approaches and partnering to target research on the health of workers in these high-risk industries. The agriculture and construction industries have been targeted since 1990 and as a result are safer than they were a decade ago. CDC has 17 cooperative agreements, including 10 with regional centers for agricultural safety and health research. In addition, university-based researchers in 20 states address safety and health issues across various construction trades. An industry approach for mining began in 1996 with active projects now under way in 30 states. CDC's own intramural research, surveillance, and information dissemination activities also add an important dimension to improving conditions in these high-risk industries. For example, CDC is conducting a specific research program to prevent occupational illness and injury among nurses.

Examples of Program in Action

- CDC improved the safety of people working in the construction industry by identifying fatal falls during communication tower constructions as being an emerging hazard. CDC then worked closely with industry and government partners to identify safe practices.
- CDC sponsored studies to determine the use and effectiveness of Ultraviolet Germicidal Irradiation (UVGI). UVGI can be used to reduce exposure to biological agents that could potentially be released in a terrorism incident. In addition, when UVGI is used in indoor environments other than healthcare workplaces it has been shown to reduce the symptoms associated with indoor air quality.
- In the agriculture industry, CDC has supported research to prevent tractor rollovers, the leading cause of farm-related fatalities. This work has led to more effective educational efforts to increase farmers' use of tractor retrofit kits to protect against rollovers.
- CDC has taken a leadership role in conducting research and development studies at operating mine sites to assist the transfer of health and safety advancements in various areas. These include the development of new engineering designs and monitoring strategies for preventing and minimizing rock failures at underground and surface mines, improved training systems and approaches, and the expansion of the extramural mining program to address several high priority topics.

WHAT ARE THE NEXT STEPS?

Through surveillance, research, prevention, and control, CDC will continue to work to reduce fatality and injury rates in high-risk industries.

For additional information on this or other CDC programs, visit www.cdc.gov/program *January 2004*

MUSCULOSKELETAL DISORDERS IN WORKERS

WHAT IS THE PUBLIC HEALTH ISSUE?

- More than 520,000 lost workdays caused by musculoskeletal disorders (MSDs) are reported each year—more than one third of all the lost workdays resulting from occupational injuries and illnesses.
- Employers with leading safety and health programs in numerous industries report that the number of MSDs can be reduced with appropriate design and management of work environments, equipment, tasks, and tools.
- The challenge is to assist all employers in developing, evaluating, and adopting effective practices to protect employees.

WHAT HAS CDC ACCOMPLISHED?

CDC has provided widely requested guidance on preventing work-related MSDs. In addition, CDC continues to conduct and fund research addressing many aspects of the relationship between MSDs and both work-related and non-work-related factors, including physical and psychological stressors. CDC supports about 50 projects in these areas.

Example of Program in Action

Nursing aides, orderlies, and attendants at nursing homes experience the largest number of reported cases of work-related back pain. CDC is collaborating with BJC Health System, EZ Way Inc., and ArjoCentury Inc. to develop and evaluate the effectiveness of a best practices back injury prevention program for reducing the incidence, severity, and cost of back and other musculoskeletal injuries among nursing home personnel. Use of state-of-the-art lifting equipment has been demonstrated to completely eliminate the exposure to low-back stress associated with manually helping residents to stand and sit. Data from six nursing homes indicate that with the use of such equipment, there was a 61% reduction in injury rates and a 37% reduction in worker's compensation expenses related to patient lifting and transferring. Results of this evaluation will be published in 2004 and have been presented to several groups interested in approaches to back-injury prevention.

WHAT ARE THE NEXT STEPS?

CDC has issued the National Occupational Research Agenda for Musculoskeletal Disorders. It provides a blueprint for advancing research on MSDs by identifying high-priority research problems. The agenda was developed with extensive involvement of industry, labor, academia, and government experts. CDC will work with partners in the public and private sectors to implement this research agenda, while continuing to provide information and assistance to workplaces.

OCCUPATIONAL FATALITY INVESTIGATION AND PREVENTION

WHAT IS THE PUBLIC HEALTH ISSUE?

- In 2002, more than 5,500 workers were fatally injured at work, an average of 15 a day.
- The direct costs of occupational injuries and illnesses were estimated to be $45.8 billion in 2001 (2003 Liberty Mutual Workplace Safety Index). The indirect costs were estimated to be an additional $137.4 to $229 billion.
- Although data used to track work-related injury deaths are useful for identifying groups at high risk and the general causes of these events, more in-depth information is frequently required to understand the circumstances of and contributors to fatal injuries in order to develop effective preventive measures.

WHAT HAS CDC ACCOMPLISHED?

CDC operates the Fatality Assessment and Control Evaluation (FACE) program, which conducts in-depth investigations of work-related fatalities. Risk factors are identified and strategies to prevent similar deaths are developed and disseminated. FACE investigations are conducted by CDC staff in 6 states and by local investigators in 15 states funded by CDC through cooperative agreements. In 2003, 87 new investigations were conducted that focused on: deaths of youth less than 18 years of age, deaths in roadway construction work zones, deaths involving machinery, and deaths of Hispanic workers. State FACE programs target additional areas for investigation based on the region's pattern of work injury deaths.

In 1998, a program was developed to address firefighter line-of-duty deaths across the country. The results of these investigations were disseminated nationally throughout the fire service industry. Fire departments are using these results to improve work practices and procedures at fire scenes and to improve equipment to prevent injuries and deaths. In 2003, 43 new investigations were conducted in 22 states.

Example of Program in Action

In 2003, New York Governor George Pataki implemented a law prohibiting the use of live fires in firefighter drills. The law resulted from the 2001 death of a firefighter. CDC's investigation of this incident was cited in the justification for this new law.

WHAT ARE THE NEXT STEPS?

Fatality rates are decreasing in many industry sectors and occupational groups; however fatal injuries in the workplace still greatly affect the American workforce. FACE is a comprehensive worksite investigation providing strategies for more efficient worker injury prevention practices. FACE is now focusing on identifying risk factors and effective injury prevention strategies for high-risk occupational groups (e.g., adolescent workers, firefighters, Hispanic workers) and for persons working in unique hazardous environments (e.g., construction work zones).

OCCUPATIONAL SAFETY AND HEALTH INFORMATION

WHAT IS THE PUBLIC HEALTH ISSUE?

- In 2002, more than 4.7 million workers sustained work-related injuries and illnesses in the private sector; an average of 15 workers died from work-related injuries each day.
- The direct costs of occupational injuries and illnesses were estimated to be $45.8 billion in 2001 (2003 Liberty Mutual Workplace Safety Index). The indirect costs were estimated to be an additional $137.4 to $229 billion.
- Policy-related, technical, and educational materials are critical in assisting both individuals and decision-makers in taking appropriate actions to prevent and reduce work-related illnesses and injuries.

WHAT HAS CDC ACCOMPLISHED?

Each year, CDC translates occupational research findings into various media to be used by public health policymakers and practitioners, employers, and workers. This information provides a scientific basis for policy development and is used to identify previously unrecognized threats to worker health and safety and to develop related prevention strategies and workplace solutions. Educational materials provide targeted populations (e.g., workers, employers, health practitioners) with practical information about risks and prevention. Each year, CDC distributes over 1 million copies of occupational safety and health documents through its publications clearinghouse. Occupational safety and health information also is available in both English and Spanish on CDC's website.

Examples of Program in Action

- Published *Filtration and Air-Cleaning Systems to Protect Building Environments from Airborne Chemical, Biological, or Radiological Attacks,* which provides specific recommendations to protect building air environments from a terrorist release of chemical, biological, or radiological contaminants.
- Developed the online *NIOSH Hearing Protector Device Compendium*, which contains information on hearing protectors sold in the United States. This new database is searchable by product type, manufacturer, and Noise Reduction Rating.
- Created the *Respirator Fact Sheet: What You Should Know in Deciding Whether to Buy Escape Hoods, Gas Masks, or Other Respirators for Preparedness at Home and Work,* which provides basic information to assist employers, employees, and consumers who are considering purchasing escape hoods or other respirators.
- Published *Asphalt Fume Exposure During the Application of Hot Asphalt to Roofs*. Developed through a collaborative effort among NIOSH, the National Roofing Contractors Association, the Asphalt Roofing Manufacturers Association, the Asphalt Institute, and the United Union of Roofers, Waterproofers, and Allied Workers, the document identifies engineering controls and work practices that can reduce exposures to asphalt fumes.
- Published the *Work-Related Lung Disease Surveillance Report 2002*. The sixth in a series of documents on work-related respiratory diseases and associated exposures, the report includes information for 1997–1999, with new sections on malignant mesothelioma, lung cancer, other interstitial pulmonary disease, and smoking status by industry and occupation.

WHAT ARE THE NEXT STEPS?

- Continue to provide key information to individuals and decision-makers to help reduce work-related injuries and illnesses.
- Seek new and improved ways of reaching CDC stakeholders, such as expanding the use of Internet services to disseminate information.
- Regularly evaluate publications to assess their value and utility among primary users of this information.
- Improve communication practices for delivering occupational safety and health information to small businesses.

PREVENTING NEEDLESTICK INJURIES

WHAT IS THE PUBLIC HEALTH ISSUE?

- In the United States, 384,000 needlestick and other sharps injuries occur each year among hospital-based healthcare workers.
- Needlestick injuries carry the risk of exposure to infectious bloodborne diseases (e.g., HIV, hepatitis B virus, and hepatitis C virus). Even when a serious infection is not transmitted, the emotional impact of a needlestick injury can be severe and long-lasting.
- A substantial proportion of needlestick and other sharps injuries could be prevented by incorporating safer medical practices and programs in the workforce.
- Recent federal and state legislation mandates the use of safer medical devices.

WHAT HAS CDC ACCOMPLISHED?

CDC is responsible for conducting research and making recommendations for the prevention of work-related illness and injury. For needlestick and other sharps injuries, this is accomplished through a comprehensive research agenda including surveillance of blood exposures, developing recommendations for exposure management, disseminating strategies for reducing these exposures through the use of engineering and administrative controls, and conducting various training and education programs. CDC has undertaken research and distributed scientific information and recommendations to help prevent needlestick injuries among healthcare and public safety workers and has funded research to estimate the risk of exposure to blood for correctional healthcare workers, operating room personnel, and healthcare workers employed in non-hospital settings.

Example of Program in Action

CDC developed a website that contains information on needlestick prevention. In addition, CDC has partnered with hospitals, home healthcare agencies, nursing homes, and dental offices to work through the process of identifying, selecting, evaluating, and implementing safer medical devices. These healthcare facilities share their lessons learned on a website that is visited by more than 1,500 visitors each month.

WHAT ARE THE NEXT STEPS?

CDC will continue to monitor needlestick injuries and other blood exposures among healthcare workers and provide information on the management of occupational exposures, including updating recommendations for post-exposure prophylaxis. In addition, CDC is investigating the risks of blood exposure among healthcare workers, including those who work in home settings. CDC also is investigating the risks of blood exposure among community workers such as body piercers, tattoo artists, waste handlers, and police officers.

PREVENTING OVEREXPOSURE TO HAZARDOUS SUBSTANCES THROUGH RESPIRATOR CERTIFICATION

WHAT IS THE PUBLIC HEALTH ISSUE?

- When engineering and other controls do not reduce exposures below hazardous levels, workers must rely on personal protective equipment. Industries that often require workers to use such equipment include mining, firefighting and other emergency response, healthcare, and agriculture.
- People who respond to hazardous incidents or terrorist activities need assurance that the protective equipment they use will perform to specifications and meet minimum performance standards.
- According to a recent study conducted jointly with the Bureau of Labor Statistics, about 3.3 million workers use CDC-certified respirators.

WHAT HAS CDC ACCOMPLISHED?

CDC conducts a respirator certification program that ensures respiratory protective equipment will perform with established standards. The program assesses the ability of the equipment's design to meet regulatory performance and quality standards.

Since 1972, CDC has issued more than 8,200 respirator approvals. In 2003, CDC processed 399 certification applications for respirators produced by 90 manufacturers in 102 sites located in 18 countries. Forty-one product audits were completed; 11 respirator manufacturing sites were audited, including 2 foreign sites. Twenty-three reports of problems with CDC-approved respirators were received and 18 related investigations were completed; 7 of these investigations led to product recalls or field retrofit actions. Five new policies were developed and implemented to assess new and innovative respirator designs.

Examples of Program in Action

- In early 2002, CDC certified the first self-contained breathing apparatus (SCBA) for chemical, biological, radiological, or nuclear (CBRN) exposures, which is the type of respirator most likely to be used by first responders to potential terrorist incidents.
- In 2003, CDC provided criteria for testing and certifying CBRN air-purifying respirators used by emergency responders.
- CDC initiated a CBRN SCBA retrofit certification program that allows existing SCBA to be upgraded to CBRN performance requirements, using a CDC-approved retrofit kit. This will enable responders to obtain CBRN protection without purchasing new equipment. The first retrofit kit was approved in September 2003.
- CDC developed and implemented a CBRN research and development test program to increase respirator manufacturers' ability to conduct research and development. Manufacturers can test the effectiveness of their respirators against chemical warfare agents at a U.S. Army chemical test laboratory, before submitting them for CDC certification testing.
- CDC created a computer program that can be used to accurately predict when a respirator's cartridge filter will lose its ability to protect the wearer from toxic air contaminants.

WHAT ARE THE NEXT STEPS?

CDC is updating its existing quality assurance standard to promote improved respirator quality and reliability. CDC also is developing standards for certifying self-contained, closed-circuit escape breathing apparatus such as the self-contained self-rescuers that are used in the mining industry.

For additional information on this or other CDC programs, visit www.cdc.gov/program *January 2004*

PREVENTING WORK-RELATED INJURIES

WHAT IS THE PUBLIC HEALTH ISSUE?

- Fifteen U.S. workers die as a result of injuries at work, 200 are hospitalized, and 11,000 are treated in hospital emergency departments each year. Additional injuries are treated in physicians' offices, clinics, and at worksites.
- The direct costs of occupational injuries and illnesses were estimated to be $45.8 billion in 2001 (2003 Liberty Mutual Workplace Safety Index). The indirect costs were estimated to be an additional $137.4 to $229 billion.
- The leading causes of fatal occupational injuries are related to transportation, contact with objects and equipment (e.g., being struck by an object, striking against an object, being caught in equipment), and violence.
- Overexertion, contact with objects and equipment, and falls are the leading causes of nonfatal occupational injuries.
- Technological advances, the design and organization of work, and persistent hazards all create constant demands for new research and information to protect workers from injury.

WHAT HAS CDC ACCOMPLISHED?

CDC developed the nation's principal research program for the prevention of work-related injuries. CDC scientists, as well as researchers and professionals at universities and state agencies throughout the United States, engage in all aspects of injury prevention. For example,

- Injury surveillance is used to identify potential risk factors and monitor trends over time.
- Workplace protections have been improved because of various research initiatives (e.g., safety systems for machinery and protective equipment for workers).
- Intervention studies were created to evaluate the real-world effectiveness of protection strategies.
- Communication programs were developed to ensure that employers, managers, workers, and safety and health professionals have ready-access to the latest injury prevention information.
- The traumatic injury research program focuses on the leading causes of injury and death and on the highest risk industry sectors (i.e., agriculture, mining, construction). Since 1980, this program has helped reduce the rate of fatal occupational injuries nationwide by 46%.

Example of Program in Action

CDC developed and evaluated an injury prevention program for reducing the incidence, severity, and cost of back injuries, a persistent problem for nursing home workers. Research showed the program paid for itself in less than 3 years by reducing injury frequency by 57%, injury rates by 61%, and workers' compensation expenses by 37%.

WHAT ARE THE NEXT STEPS?

Although traumatic injury rates are decreasing in many industry sectors and occupational groups, workplace injury still takes a huge toll on the American workforce. Research is needed to address persistent hazards (e.g., falls in construction and tractor rollovers in agriculture) as well as emerging hazards (e.g., highway construction work zones).

PROTECTING THE SAFETY AND HEALTH OF IMMIGRANT WORKERS

WHAT IS THE PUBLIC HEALTH ISSUE?

- Foreign-born workers are more likely to be employed in the higher-risk and lower-wage sectors of the workforce, such as agriculture, construction, and service industries.
- There are about 17 million foreign-born workers in the United States.
- Latin America is the region of birth for over half of foreign-born workers.
- While the total number of occupational fatalities in the United States continues to decrease, the 840 fatal work injuries reported for Hispanic workers in 2002 accounted for the second highest annual total for that population since 1992.

WHAT HAS CDC ACCOMPLISHED?

CDC is working to address the health and safety needs of immigrant workers through targeted efforts to reduce illnesses, injuries, and fatalities in the most hazardous sectors of the immigrant workforce.

Examples of Program in Action

- To better understand issues faced by immigrant agricultural workers, CDC collaborated with the Department of Labor to collect data on hired crop farm workers, most of whom are foreign-born, through the National Agricultural Workers Survey (NAWS). NAWS is the only national study that has documented the living and working conditions of immigrant workers.
- In 2002, about 25% of fatal occupational injuries to foreign-born workers occurred to workers in construction trades. CDC is studying dry-wall work, the construction occupation that has the highest percentage of Hispanic workers, and has developed Spanish language survey and educational materials for preventing silicosis, a fatal disease affecting construction workers.
- In 2002, about 24% of fatal occupational injuries to foreign-born workers were due to homicides. CDC is evaluating the effectiveness of violence prevention strategies, such as panic buttons in taxi cabs, as well as various state-based approaches. CDC also is supporting studies on prevention of nonfatal injuries to immigrant workers, such as home healthcare aides and poultry workers.
- CDC has developed a Spanish-language website to better meet the needs of the growing Hispanic worker population, which is estimated to increase by more than one third over the next decade. The website, "NIOSH en Español," provides resources in Spanish, including translations of selected CDC publications and links to other useful Spanish-language materials on occupational safety and health.

WHAT ARE THE NEXT STEPS?

CDC will continue to improve data collection, research, and communication methods to better address the language, cultural, social, and political challenges immigrant workers face. Increased understanding of the experiences and concerns of immigrant workers will help better tailor education and intervention programs to meet the needs of this diverse population.

TRACKING WORK-RELATED INJURIES, ILLNESSES, AND HAZARDS

WHAT IS THE PUBLIC HEALTH ISSUE?

- In 2002, more than 4.7 million workers sustained work-related injuries and illnesses in the private sector, and an average of 15 workers died from work-related injuries each day.
- Ongoing surveillance activities in occupational safety and health form the foundation for prevention activities needed to reduce the incidence of work-related injuries and illnesses.

WHAT HAS CDC ACCOMPLISHED?

CDC plays a key role in tracking occupational hazards, diseases, and injuries. CDC supports scientists and public health agencies across the country to conduct research and develop state-based occupational disease and injury surveillance programs. In addition, CDC maintains national databases of occupational injuries and fatalities. With broad stakeholder involvement, CDC has developed a strategic plan to address surveillance needs for the 21st century.

Examples of Program in Action

- CDC provided support to New York City following the World Trade Center (WTC) attacks to track injuries to emergency response workers. Because high numbers of eye injuries were noted, CDC quickly developed and distributed recommendations for prevention. CDC continues to track injuries and illnesses sustained by emergency response and recovery workers at the WTC disaster site. This information will be helpful in disaster preparedness efforts to ensure that emergency response and recovery workers have equipment and training to protect their health and safety.
- CDC's Adult Blood Lead Epidemiology Surveillance (ABLES) program is an ongoing effort to identify and track blood lead levels among U.S. adults. In 2002, an ABLES report showed a decline in the rate of adults with blood lead levels above 25 micrograms per deciliter from a mean of 15.2 adults per 100,000 employed in 1994–1997 to a mean of 13.4 adults per 100,000 employed in 1998-2001 (*MMWR* 2002;13[51][SS11]:1-10).
- With CDC support, the California Department of Health Services (CDHS) worked with community organizations to collect occupational injury and illness data from immigrant workers. CDHS identified a high incidence of carpal tunnel syndrome (CTS) among immigrant women working for garment manufacturers. CDHS worked with employers to identify cost-effective changes for work stations to reduce CTS. This work provided insights into the undercounting of immigrants in surveillance systems and identified cost-effective prevention measures that could be adopted elsewhere.
- CDC's Sentinel Event Notification System for Occupational Risks (SENSOR) program involves ongoing case-based tracking linked actively with intervention activities for selected work-related health events. The New Jersey SENSOR project for silicosis identified highway repair as a high-risk exposure setting for construction workers. As a result, the New Jersey Silica Partnership was established; members include the state Departments of Health and Transportation, the Occupational Safety and Health Administration area office, CDC, industry, and labor associations. This partnership led to the inclusion of silica health and safety language in all state contracts for highway repair projects, the establishment of an education and respiratory protection training program for highway repair workers, and the development of a water spray to reduce silica dust generation.

WHAT ARE THE NEXT STEPS?

CDC has made strides in implementing its strategic surveillance plan, including taking steps to make occupational safety and health data more accessible and user-friendly. The plan will continue to guide future surveillance activities.

For additional information on this or other CDC programs, visit www.cdc.gov/program *January 2004*

WAR-RELATED INJURY PREVENTION

WHAT IS THE PUBLIC HEALTH ISSUE?

- In the 20th century, 72 million deaths (nearly half of which were civilians) occurred in 25 conflicts worldwide.
- From 1987 through 1997, 2 million children were killed and 4 to 5 million children were seriously injured during armed conflict.
- Each year in Afghanistan (one of the most heavily landmined countries in the world), 2,000 to 3,000 people are killed or injured by landmines and unexploded ordnance (UXO). About two people per 1,000 are permanently disabled.
- In recent years, frequency of rape and sexual violence has increased during and after conflicts. During the conflict in Bosnia, estimates of the number of women raped ranged from 10,000 to 25,000.

WHAT HAS CDC ACCOMPLISHED?

- CDC has provided support to the Landmine Survivors Network (LSN) for the past 4 years. LSN programs help people in war-affected countries to facilitate socioeconomic reintegration of landmine survivors and help survivors of traumatic limb-loss to recover from their injuries.
- CDC, the World Health Organization, and the Pan American Health Organization, have helped establish post conflict injury surveillance programs in Nicaragua, El Salvador, Honduras, Colombia, Sri Lanka, Ethiopia, and Mozambique. CDC established emergency room-based surveillance systems to track both fatal and nonfatal injuries to provide data so risk factors could be identified and injury intervention programs could be developed.
- CDC, in partnership with the United Nations Children's Fund (UNICEF), the Vietnam Veterans of America Foundation, the International Rescue Committee, and the Mine Clearance Planning Agency of Afghanistan, implemented the largest, nationwide war-related mortality, injury, disability, and mental health survey in Afghanistan. Data collected from more than 6,000 people have been used to establish national estimates of mortality, injury, disability, and mental health status.
- CDC organized a war-related injury and public health conference with the Sixth World Injury Conference. CDC sponsored 30 scholarship candidates from conflict settings to participate in this workshop about landmines, UXO, small arms, sexual violence, surveillance, and survey methodology.
- At the request of UNICEF, CDC organized and conducted an epidemiology training course to provide select mine-risk educators with the skills necessary to incorporate epidemiology and other public health practices into the development and evaluation of mine-risk education and other prevention programs.

WHAT ARE THE NEXT STEPS?

- CDC will help UNICEF evaluate several mine-risk education programs to determine their effectiveness in teaching people to identify and avoid landmine and UXO injuries.
- CDC will initiate efforts to measure the impact of sexual violence in the context of war through surveillance and surveys in conflict and post conflict settings; efforts are underway to develop a sexual violence survey in the Democratic Republic of Congo.
- CDC will continue to provide technical assistance to the United Nations and other nongovernmental organizations in their efforts to prevent war-related injuries.

For additional information on this or other CDC programs, visit www.cdc.gov/program *January 2004*

WORK-RELATED CANCERS

WHAT IS THE PUBLIC HEALTH ISSUE?

- Statistics show that more than 20, 000 cancer related deaths occur yearly in the United States due to occupational exposure to carcinogenic substances, chemicals, and sources of ionizing radiation.
- Millions of U.S. workers are exposed to substances that have been shown to be carcinogenic in animal studies.

WHAT HAS CDC ACCOMPLISHED?

CDC conducts and funds research and public health activities to prevent and reduce the incidence of work-associated cancers. Accomplishments include

- The publication of studies and risk assessments leading to widespread recognition of the hazards of arsenic, asbestos, benzene, beryllium, cadmium, chromium diesel fumes, ethylene oxide, nickel, radon, silica, sulfuric acid, and vinyl chloride.
- Establishing scientific basis and protection strategies, which are used in accordance with the U.S. occupational health standards to control workplace exposures.
- Developed the scientific basis for compensating U.S. uranium miners under the *Radiation Exposure Compensation Act*.
- Participated in the nomination and review process for adding to the National Toxicology Program's 11th Report on Carcinogens (2003) 14 substances or exposures occurring in the workplace that are classified as "known" or "reasonably anticipated" to be human carcinogens.

WHAT ARE THE NEXT STEPS?

- CDC research programs are focused on issues of current public health concern (e.g., occupational causes of breast cancer among women, the biological mechanisms underlying occupational cancer).
- In partnership with other agencies in the National Toxicology Program, CDC researchers will continue to evaluate the scientific evidence for identifying carcinogens and develop priorities for testing potential occupational carcinogens. Specifically, testing of complex mixtures or exposures in the workplace is a priority; abrasive blasting materials, welding fumes, and metal working fluids are being targeted for such testing.
- CDC will collaborate with the National Cancer Institute and other organizations to develop improved occupational cancer research methods by using advances in the field of genetics and integrating human, animal, and mechanistic cancer research findings.
- CDC will initiate a new National Exposures at Work Survey, which will provide data on current workplace exposures to potential carcinogens.

WORK-RELATED CARDIOVASCULAR DISEASES

WHAT IS THE PUBLIC HEALTH ISSUE?

- An estimated 59.7 million Americans have cardiovascular (heart) disease, which is the leading cause of death for both women and men in the United States.
- Cardiovascular disease rates vary substantially among occupational groups. Men have a 9-fold difference between high- and low-risk occupations, and women have a 5-fold difference.
- Prevalence of certain factors (e.g., job stress, shift work, persistently long work hours) may contribute to the development of heart disease. Environmental tobacco smoke also may contribute to heart disease, particularly in occupations with high exposure.
- More than 9 million Americans are exposed to high levels of noise at work, causing an elevated blood pressure for a short period of time. These individuals are at risk for developing chronically high blood pressure, which is one of the leading risk factors for cardiovascular diseases.

WHAT HAS CDC ACCOMPLISHED?

CDC has conducted preliminary research to evaluate the role of occupational factors in cardiovascular diseases and has inaugurated research and public health activities to improve employer protections for workers exposed to potential risk factors.

Examples of Program in Action

- Conducted a study of heart disease and job stress. The study found that increased job control, which can reduce job stress, was associated with lower incidence of ischemic heart disease.
- Performed a study of shift work and heart disease among blue-collar workers. The study found no relationship between non-rotating shift work and the risk of heart disease.
- Conducted an analysis of studies that examined the association between occupational exposure to environmental tobacco smoke and heart disease. These studies indicated an increased risk of heart disease of about 20% to 30% among exposed workers, resulting in 1,710 deaths annually among workers 35 to 69 years of age.

WHAT ARE THE NEXT STEPS?

CDC is conducting three studies to provide more definitive findings on the role of occupational factors in cardiovascular disease. CDC is conducting a 5-year prospective study of 20,000 men and women that will evaluate the relationship between job stress and both cardiovascular disease and hypertension while accounting for leading risk factors (e.g., smoking). CDC is also performing a 3-year prospective study of workers that will evaluate the relationship between noise and blood pressure. Finally, CDC is analyzing data from the third National Health and Nutrition Examination Survey and the O*NET system to examine relationships between specific occupational variables and symptoms of heart disease.

WORK-RELATED HEARING LOSS

WHAT IS THE PUBLIC HEALTH ISSUE?

- Millions of U.S. workers are exposed to potentially hazardous noise at work, and 9 million of them also are exposed to chemicals that can damage hearing.
- Of 28 million Americans with hearing impairment, half suffer from noise-induced hearing loss.
- Occupational hearing loss is irreversible, yet it is 100% preventable.
- Many employers lack resources and strategies to control damaging noise levels.
- The widespread reliance on personal hearing protection has not been effective in preventing occupational hearing loss.

WHAT HAS CDC ACCOMPLISHED?

CDC has conducted research and widely disseminated scientific guidance for the prevention of noise-induced hearing loss. CDC research and guidance has provided the scientific basis for U.S. national workplace standards to prevent noise-induced hearing loss among miners and employees of other industries.

Examples of Program in Action

- Recent CDC research identified that the laboratory rating method for personal hearing protection often overestimates the protection provided to workers. Based on those findings, the American National Standards Institute endorsed new test methods. As a result, ratings advertised on personal hearing protection will now reflect the level of protection the devices provide in real-world settings versus those in testing laboratories.
- CDC recently completed a cooperative research effort with the Nevada Mining Association to assess the effectiveness of engineering noise controls on operating mine equipment in several underground metal mines. The research study is the first of its kind. Findings are being used by industry and government to improve the working conditions of the mining workforce.
- Under a cooperative agreement, CDC is developing a computer-based system that will assist in tracking hearing conservation data among workers (e.g., noise exposure levels, use of hearing protection, medical histories). The completed electronic system will be usable in most occupational safety and health situations. Coalition partners for this initiative include automobile industry employers and workers, acoustic consultants, and computer software experts.

WHAT ARE THE NEXT STEPS?

CDC is working with the National Institutes of Health and other organizations to promote widespread use of improved protections against hearing loss. New efforts regarding noise control research will focus on workers at high risk in the construction and mining industries.

WORK-RELATED LUNG DISEASES

WHAT IS THE PUBLIC HEALTH ISSUE?

- From 1968 through 2000, pneumoconiosis (lung disease caused by inhalation of dusts) was an underlying or contributing cause of nearly 125,000 deaths in the United States, including over 2,860 deaths in 2000.
- Among adults, 20% to 30% of asthma is caused or aggravated by work exposures.
- An estimated 15% of chronic obstructive pulmonary disease (COPD)—the nation's fourth leading cause of death—is work-related.
- The estimated annual cost of COPD is $5 billion.

WHAT HAS CDC ACCOMPLISHED?

CDC conducts surveillance, research, and service aimed at preventing and eliminating occupational respiratory diseases. The prevention of COPD is an important public health issue in the United States. Drawing from a representative sample of the U.S. adult population, a CDC study estimated that nearly 20% of COPD among working adults is occupationally related and identified industries and occupations with a higher-than-expected prevalence of COPD. Increased risk for COPD was identified in the rubber, plastics, and leather manufacturing industries; the textile mill products manufacturing industry; the food products manufacturing industry; agriculture; and construction. COPD was substantially more prevalent in blue-collar industry sectors than in white-collar industry sectors. The study results also suggest an increased risk in other industries, such as utilities and office building services that have not previously been associated with a risk for COPD.

Example of Program in Action

CDC has initiated collaborative research studies with Tulane University and the University of California on the risk of COPD associated with dust exposures not otherwise regulated. The burden of COPD, particularly among the blue-collar industrial workforce, can be reduced or prevented through measures to reduce hazardous occupational exposures and through effective workplace pulmonary function screening for timely identification and treatment of COPD in its early stages. Reducing the burden of work-related COPD also would reduce significantly the overall burden of COPD in the U.S. adult population. COPD is included as a priority area under the National Occupational Research Agenda for research that will do the most to protect workers from job-related illnesses and injuries.

WHAT ARE THE NEXT STEPS?

CDC must continue to identify and promote control of workplace exposures that cause debilitating and deadly respiratory diseases. Epidemiologic research is needed to provide the scientific basis for preventing work-related COPD. CDC will evaluate the risks and potential preventive interventions for workers exposed to beryllium and for certain workers in the food processing industry (i.e., microwave popcorn production workers) who may be routinely exposed to substances causing bronchiolitis obliterans, a severe form of COPD. In addition, CDC recently began an aggressive program of research to prevent work-related asthma, including asthma related to nonindustrial building air quality.