

School Nurses: A Resource for Young Worker Safety

Doloris N. Higgins, RN, MS, COHN-S; Jeanette Tierney, RN, BSN, COHN-S; Meredith Lins, RN, BSN; and Lawrence Hanrahan, PhD

ABSTRACT: On average, 67 youths under age 18 die at work in the United States each year, and many more suffer work-related injuries. In 1998, an estimated 77,000 young workers suffered work injuries that required treatment in hospital emergency rooms. It is estimated that only one third of work-related injuries are seen in emergency departments; therefore, the National Institute for Occupational Safety and Health (NIOSH) estimates that nearly 230,000 youths suffer work-related injuries each year. Through NIOSH's Fatality Assessment and Control Evaluation (FACE) program, NIOSH investigators identified poor knowledge of child labor laws, lack of safety training and supervision, inappropriate job assignment, and lack of employer compliance with labor laws as factors contributing to young worker deaths. School nurses serve as a resource to other professionals, parents, employers, and students and can help foster safer working conditions for youth by providing these groups with young worker safety information.

KEY WORDS: child labor, occupational fatalities, prevention, school nurses, young workers

INTRODUCTION

On average, 67 youths under age 18 die at work in the United States each year. In 1998, an estimated 77,000 young workers suffered work injuries that required treatment in hospital emergency rooms. Because only about one third of work-related injuries are seen in emergency departments, the National Institute for Occupational Safety and Health (NIOSH) estimates that nearly 230,000 youths suffer work-related injuries each year. Lack of safety information may be partly to blame. An expert panel's review of issues related to working youth published in a report, *Protecting Youth at Work*, concluded that "not only are children and adolescents not receiving health and safety informa-

tion, but adults involved with children—parents, teachers, health-care providers, staff members of community organizations—often lack the information necessary to promote the health and safety of youngsters in the workplace" (National Research Council, 1998, p. 185).

School nurses can help fill this information gap. They are viewed as reliable sources of health information and play a key role in student health and achievement despite their small numbers and far-ranging responsibilities (Black, 2003). Frequently, school nurses serve as members of school health and safety committees and provide leadership to colleagues about safety and health issues. Their involvement in community groups, such as the Parent Teacher Association, health fairs, and other educational programs, provides opportunities for channeling valuable young worker safety information and resources to parents, employers, students, and other professionals. School nurses can provide young worker safety information to those responsible for issuing work permits and can request that young worker safety information be passed on to students, their parents, and to prospective employers as part of the permit-issuing process.

Doloris N. Higgins, RN, MS, COHN-S, is a safety and occupational health specialist with the Division of Safety Research, National Institute for Occupational Safety and Health.

Jeanette Tierney, RN, BSN, COHN-S, is the director of Wisconsin Fatality Assessment and Control Evaluation (WI FACE), Wisconsin Department of Health and Family Services, Madison, WI.

Meredith Lins, RN, BSN, is an investigator with Wisconsin FACE, Wisconsin Department of Health and Family Services, Madison, WI.

Lawrence Hanrahan, PhD, is a Senior Epidemiologist, Wisconsin Department of Health and Family Services, Madison, WI.

OVERVIEW OF PROBLEM

Fatal Injuries at Work

According to the U.S. Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI), 603 workers under age 18 suffered fatal occupational injuries between 1992 and 2000, an average of 67 per year. The CFOI is based on data compiled from various state and federal administrative sources, such as death certificates, worker's compensation reports, Occupational Safety and Health Administration (OSHA) reports, and medical examiner's reports. Of these fatally-injured young workers, 362 were ages 16 or 17, 119 were ages 14 or 15, and 122 were under 14. More than 30% of all fatal injuries to young workers occurred in family businesses (NIOSH 2003a).

Approximately three fourths of these deaths were concentrated in three industry divisions: agriculture/forestry/fishing (43%), retail trade, such as restaurants and retail stores (18%), and construction (14%). The remaining young-worker deaths occurred in the service industry division, including nursing homes, amusement parks, and swimming pools (11%), the manufacturing division (6%), and within the other major industry divisions, such as transportation; communications, electric, gas, and sanitary services; and wholesale trade (8% overall, with deaths occurring in small numbers within each division).

The most common events leading to young worker deaths were transportation incidents (45%), contacts with objects and equipment (19%), assaults and violent acts (17%), and exposure to harmful substances and environments (10%). Seven percent of the events leading to death were falls; an additional 2% occurred in other circumstances (NIOSH 2003a).

Nonfatal Injuries at Work

There are two primary sources of information about nonfatal injuries to young workers. One is the National Electronic Injury Surveillance System (NEISS) which is based on hospital emergency room data, and the other is the Survey of Occupational Injuries and Illnesses (SOII) which is an annual survey of employers conducted by the BLS. Using NEISS, NIOSH estimated that 77,000 young workers under age 18 required treatment in hospital emergency departments for work-related injuries during 1998 (Jackson, 2001). It is estimated that only one third of work-related injuries are seen in emergency departments (CDC, 2001a); therefore NIOSH estimates that nearly 230,000 youths suffer work-related injuries each year (NIOSH, 2003a).

According to BLS data collected through SOII (a sample survey sent to private sector employers, excluding self-employed individuals, government employees, and farm owners with fewer than 11 employees), youths age 17 and under experienced 10,946 lost worktime injuries in 1997. The majority of these lost

worktime injuries occurred in retail trade (7,658 injuries). The remainder occurred in services (1,906 injuries), manufacturing (454 injuries), wholesale trade (288 injuries), construction (233 injuries), and other industries (407 injuries), according to the U.S. Department of Labor (USDOL, 2000). Lost worktime injury data helps highlight industries where youths experience more severe injuries. It should be noted, however, that these statistics do not represent lost worktime injuries for youth working in agriculture, because the sample does not include farm owners with fewer than 11 employees.

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The FACE Program Investigates Young Worker Deaths

The Fatality Assessment and Control Evaluation (FACE) Program is located in the Division of Safety Research, a Division of the National Institute for Occupational Safety and Health (NIOSH). The FACE program's goal is to prevent occupational fatalities across the nation by identifying industries and workers at high risk for fatal injury, investigating work situations where fatalities occur, and formulating prevention strategies and disseminating them to those who can intervene in the workplace (Higgins, Casini, Bost, & Rautianinen, 2001). The FACE program has two components: A NIOSH-based component established in 1982 and a state-based component established in 1989. Investigations are conducted by NIOSH staff and staff in the 15 states that receive NIOSH funding. FACE investigators travel to the worksite where the fatality occurred and collect in-depth information not ordinarily available to national surveillance data sources such as the Bureau of Labor Statistics. This in-depth information allows FACE investigators to identify factors contributing to fatal injuries and develop effective injury prevention measures.

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Targets for on-site investigation are determined by NIOSH and state-based programs after reviewing surveillance and scientific literature. Past targets have included confined space incidents, electrocutions, falls from elevations, and logging deaths. Along with

young worker deaths, the FACE program targets for on-site investigation include machine-related deaths, street and highway construction work zone deaths, and deaths of Hispanic workers, regardless of cause.

Although youth deaths were investigated as part of earlier targets, NIOSH began to target young workers as a priority population for investigation in 1999. FACE investigators use standardized procedures to collect information about factors associated with the host (the youth who died), the agent (the mode of energy exchange: for example, electrical energy resulting in an electrocution), and the environment (the physical and social aspects of the workplace) during the pre-event, event, and postevent phases of the incident. Information is obtained from multiple sources that may include interviews with employers, workers, and other investigators; examination of the fatality site and related equipment; and review of records such as U.S. Department of Labor (USDOL) and state Occupational Safety and Health Administration (OSHA) reports, USDOL Wage and Hour Division reports, state child labor reports, police and medical examiner reports, and employer safety procedures and training records. Participation in the FACE program is voluntary. Investigations are not conducted on all youth work-related fatalities due to resource limitations and inability to gain access into worksites. Therefore circumstances identified are not necessarily representative of all youth cases across the country.

The youth worker population included for investigation in the FACE program was defined as any worker under age 18 who suffered a traumatic fatal occupational injury at work. From May 1986 through December 2003, 75 fatality investigations were completed by the FACE program. These youth deaths were grouped by external cause of injury (E-Code) according to the International Classification of Diseases, Ninth Revision (World Health Organization, 1977). Table 1 illustrates the cause of death for investigated fatalities

Table 1. Young Worker FACE Investigations in Agriculture, Forestry, and Fishing (1986–2003)

E-Coded Cause of Death	Fatalities Investigated
Agricultural machinery (E919.0)	9
Machinery, other than agricultural (E919.1–E919.9)	4
Motor vehicle traffic accident without collision on highway (E816)	3
Mechanical suffocation (E913)	2
Other noncollision motor vehicle traffic accident (E818)	1
Lightning (E907)	1
Struck by falling object (E916)	1
Accidental poisoning (E860–E869)	1
Animal-drawn vehicle (E827)	1
Accident to watercraft causing submersion (E830)	1
Total	24

Note. FACE = Fatality Assessment and Control Evaluation.

where young workers were working in agriculture, forestry, or fishing industries; Table 2 illustrates the cause of death for fatalities where young workers were working in other industry groups.

Case Reports

The following case reports provide examples of the risks young workers may encounter:

Eleven-Year-Old Youth Killed in Tractor Rollover on Family Farm

In 2002, an 11-year-old youth died after he was pinned under the tractor he was driving. The victim was working by himself in a hayfield moving large round bales of hay into a row so they could be loaded later. When he didn't return to the farm at the expected time, his older brother went to the field and found the victim pinned under the overturned tractor. The brother went to the neighbor's farm about one mile away and called for emergency medical services (EMS). He also contacted his parents. EMS personnel responded within 10 minutes after they received the emergency call. While traveling to the scene, EMS personnel requested assistance from a medical flight service. The medical flight service responded, and the attending physician pronounced the youth dead at the scene (Wisconsin Department of Health and Family Services, 2002).

Fourteen-Year-Old Laborer Dies After Falling Through a Skylight

In 2001, a 14-year-old youth was working on a Saturday for a roofing contractor and died after falling through a 56-inch by 24-inch curb-mounted skylight to a concrete floor approximately 12 feet below. The

Table 2. Young Worker FACE Investigations in All Other Industry Groups, Excluding Agriculture, Forestry, and Fishing (1986–2003)

E-Coded Cause of Death	Fatalities Investigated
Machinery (E919.1–E919.9)	19
Falls from elevation (E880–E888)	11
Electric current (E925)	6
Struck by falling object (E916)	5
Other motor vehicle/nontraffic collision with moving object (E822)	2
Accidental poisoning (E860–E869)	2
Motor vehicle traffic accident (collision with another vehicle; E813)	2
Accident caused by firearm missile (E922)	1
Unspecified accidental drowning (E910)	1
Noncollision motor vehicle traffic accident while boarding/alighting (E817)	1
Motor vehicle traffic accident—loss of control without collision on the highway (E816)	1
Total	51

Note. FACE = Fatality Assessment and Control Evaluation.

victim and his 16-year-old brother had been hired on the day of the incident along with several other day laborers to pull up and remove built-up roofing material from the flat roof of a one-story wholesale florist shop. The victim had received no safety training and had been working for approximately 15 minutes pulling up roofing material by hand when he fell backwards onto a skylight lens which broke under his weight. The skylight did not have a protective screen/cover or guarding around it, nor were there any warnings affixed to the skylight lens to warn against sitting or stepping on it (NIOSH, 2002).

Nonfatal Traumatic Injury Investigation

Although nonfatal injuries that occur outside of work are not normally investigated by the FACE program, a high school in Massachusetts requested an investigation by the Massachusetts FACE program.

Fifteen-Year-Old Student Amputates Fingers While Operating an Unguarded Table Saw in Woodworking Class

In 2003, a 15-year-old student amputated one finger (both joints) and amputated a portion of another finger and thumb on her left hand while operating an unguarded table saw in a woodworking class. The student was making a lengthwise cut (ripping) when she reached around to the back side of the unguarded saw blade to grab the piece of wood that was being cut. Her fingers and thumb came in contact with the rotating saw blade, resulting in serious injuries. The student was brought to the hallway, and the school nurse was called for assistance. In addition, a call was placed to the local police department for emergency medical help. The injured student was transported to a local hospital where she underwent surgery for her injuries (Massachusetts Department of Public Health, 2003).

COMMON CONTRIBUTORS TO YOUNG WORKER DEATHS

The 75 FACE investigations of young worker deaths were analyzed to identify factors that contributed to each fatal incident. The following list illustrates factors common to many of these incidents:

- Failure of employers and workers, including youths, to recognize hazardous work situations.
- Absence of comprehensive safety programs that include meaningful training on workplace hazards and standardized safe operating procedures.
- Employer failure to comply with applicable OSHA standards.
- Failure to provide equipment with appropriate safety features, such as guards around moving parts and rollover protective structures and seat belts.

- Unavailable personal protective equipment or inappropriate use of safety gear.
- Lack of appropriate supervision.
- Employer failure to understand and comply with child labor laws.
- Inexperience of young workers.
- Youths learning unsafe behaviors by watching co-workers.
- Failure of parents and school personnel working with work permit systems or school-related job training programs to recognize work prohibited by child labor laws.
- Inappropriate tasks being performed by family members in a family-owned business.

PREVENTION RECOMMENDATIONS

The following types of prevention strategies are typically found in FACE recommendations from youth fatality case reports:

- Employers should develop, implement, and enforce a comprehensive injury prevention program that defines the process to be used for identifying and correcting safety and health problems in their businesses and indicates that appropriate safety training, supervision, personal protective equipment, and safe equipment and tools will be provided to all employees.
- Employers should comply with all applicable occupational safety and health regulations.
- Employers should become knowledgeable about and should comply with applicable child labor laws.
- Government agencies, school officials, and health and safety organizations should continue their efforts to inform the public about child labor laws.
- Parents should discuss employment decisions with their children and inquire about the training and the supervision their children are receiving, the types of work to which they are being assigned, and the equipment they are asked to operate. Parents should contact appropriate agencies, such as DOL, OSHA, or DOL Employment Standards Administration (ESA) Wage and Hour Division, whenever they have questions or concerns about the type of work their children are performing. Parents who hire their own children should take care not to assign their children to work for which they have not been trained or that is hazardous.

TYPES OF WORK TOO HAZARDOUS FOR YOUNG WORKERS

To help prevent young workers from being exposed to hazardous working conditions, the Fair Labor Standards Act (FLSA) establishes a minimum age of 18

Table 3. Hazardous Occupation Orders for Nonagricultural Work (HOs) and for Agricultural Work (HO/As) Under the U.S. Fair Labor Standards Act (FLSA)

Nonagricultural Work ^a	Agricultural Work ^b
HO 1. Manufacturing or storing explosives	HO/A 1. Operating tractors with horsepower greater than 20 power take-off
HO 2. Driving a motor vehicle and being an outside helper on a motor vehicle	HO/A 2. Operating corn pickers, cotton pickers, grain combines, hay mowers, forage harvesters, hay balers, potato diggers, mobile pea viners, feed grinders, crop dryers, forage blower, auger conveyors, nongravity-type self-unloading wagons or trailers, power post-hole diggers, power post drivers, nonwalking-type rotary tillers
HO 3. Coal mining	HO/A 3. Operating trenchers or earth-moving equipment, forklifts, potato combines, power-driven saws
HO 4. Logging and sawmilling	HO/A 4. Handling breeding animals, sows with suckling pigs, cows with newborn calves
HO 5. Power-driven woodworking machines ^c	HO/A 5. Felling, bucking, skidding, loading, unloading timbers with a butt diameter >6 inches
HO 6. Exposure to radioactive substances and to ionizing radiation	HO/A 6. Using ladders or scaffolds >20 feet high
HO 7. Power-driven hoisting equipment, including forklifts	HO/A 7. Driving a bus, truck, or car while transporting passengers or riding as a passenger or helper on a tractor
HO 8. Power-driven metal-forming, punching, and shearing machines ^c	HO/A 8. Working inside fruit, forage, or grain storage units, silos or manure pits
HO 9. Mining, other than coal mining	HO/A 9. Handling/applying agricultural chemicals classified as Category I or II toxicity
HO 10. Meat packing or processing (including power-driven meat-slicing machines) ^c	HO/A 10. Handling or using a blasting agent
HO 11. Power-driven bakery machines	HO/A 11. Transporting, transferring, moving, or applying anhydrous ammonia
HO 12. Power-driven paper-products machines ^c	
HO 13. Manufacturing brick, tile, and related products	
HO 14. Power-driven circular saws, band saws, and guillotine shears ^c	
HO 15. Wrecking, demolition, and ship-breaking operations	
HO 16. Roofing operations ^c	
HO 17. Excavation operations ^c	

Note. Adapted by *Child labor requirements in nonagricultural occupations under the Fair Labor Standards Act* (WH Publication No. 1330), by U.S. Department of Labor, 2001, Washington, DC: Author; and *Child labor requirements in agriculture under the Fair Labor Standards Act* (WH Publication No. 1295), by U.S. Department of Labor, 1990, Washington, DC: Author.

^a Seventeen hazardous nonagricultural jobs are prohibited under the FLSA. Generally, youths under age 18 cannot do work involving these activities. Additional restrictions are in place for youths under 16 years of age.

^b Children working on their parents' farms are exempt from the prohibitions of the FLSA. For other children under age 16 working in agriculture, 11 hazardous occupations/tasks are prohibited.

^c Limited exemptions are provided for apprentices and student-learners under specified standards.

years for those nonagricultural occupations that the Secretary of Labor finds and declares to be particularly hazardous for 16- and 17-year-old minors or to be detrimental to their health or well-being [Hazardous Orders (HOs)]. There are currently 17 HOs (Table 3) which include a partial or total ban on the occupations or industries they cover. The FLSA also sets standards for child labor in agriculture. These standards

Labor Requirement in Agriculture Under the Fair Labor Standards Act (Child Labor Bulletin No. 102) (USDOL, 2001); and *Child Labor Requirements in Nonagricultural Occupations Under the Fair Labor Standards Act (Child Labor Bulletin 101)* (USDOL, 1990). Bookmarks that are available from USDOL Wage and Hour Division offices and from the World Wide Web (<http://www.youthrules.dol.gov/posters.htm>) summarize this information in English and Spanish. All states have their own child labor laws. These laws may be more protective than federal laws. The law offering the greatest protection is followed. For example, if a state child labor law is less protective than federal law, or if no applicable state law exists, federal child labor laws apply (if the business meets coverage requirements under federal laws).

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differ for those in nonfarm jobs. Work banned by the 11 Hazardous Orders/Agriculture (HO/As) only cover workers under age 16. Youth working on farms owned or operated by their parents are exempt from these laws regardless of age (Table 3). In addition to the HOs, there are additional minimum ages and hours restrictions in both nonagricultural and agricultural occupations. This information is summarized in *Child*

LOCATING INFORMATION ABOUT YOUNG WORKER SAFETY

NIOSH has published additional documents that can be used by school nurses. An Alert, *Preventing Deaths, Injuries, and Illnesses of Young Workers*, describes work hazards, labor laws, safety resources, and safety recommendations designed to help promote safety for young workers (NIOSH, 2003a). This document has a

tear-out sheet that summarizes safety information useful for young workers, employers, schools, and parents. Nurses can distribute the entire Alert or just the tear-out sheet for students, colleagues, and parents at meetings and health fairs, or post the tear-out sheet on school and community bulletin boards where students, colleagues, parents, and business owners may see and read it.

Another NIOSH document, *Promoting Safe Work for Young Workers: A Community-Based Approach* (NIOSH, 1999), provides a summary of three community-based young worker safety projects. The activities and lessons learned from these projects are summarized in the NIOSH document and serve as a guide for those interested in undertaking community-based prevention efforts.

Additionally, NIOSH produced a CD-ROM, *NIOSH Safety Checklist for Schools and other Safety Databases*, that is available by calling 1-800-356-4674 (NIOSH, 2003b). School nurses can bring this CD-ROM to the attention of school health and safety committees on which they serve. Among the items provided on the CD are safety checklists. These checklists can be used by schools to evaluate the safety of, for example, saws used in the school's wood working shop. A variety of school settings, such as mechanics and metals shops, can be used as a surrogate for a work environment. School personnel can demonstrate to students how to perform a safety inspection under supervision and demonstrate how hazards are corrected. This process helps students identify hazards and reinforces the concept that students and workers have a right to be protected from hazards where they work.

Another document, *School Health Guidelines to Prevent Unintentional Injuries*, indicates that "schools have a responsibility to prevent injuries from occurring on school property and at school-sponsored events" and that "schools can teach students the skills needed to promote safety and prevent unintentional injuries, violence, and suicide while at home, at work, at play, in the community and throughout their lives." School efforts to promote safety can be part of a "coordinated school health program" (CDC, 2001b, p. 11).

WEB-BASED RESOURCES

National Institute for Occupational Safety and Health (NIOSH): <http://www.cdc.gov/niosh>

NIOSH is part of the Centers for Disease Control and Prevention (CDC) and is the only Federal institute responsible for conducting research and making recommendations for preventing work-related illness and injuries. The Institute develops and disseminates information about methods for preventing disease and disability. For information about research focused on young worker safety and health: <http://www.cdc.gov/niosh/topics/youth>

For information about the NIOSH FACE program

and FACE reports: <http://www.cdc.gov/niosh/face/faceweb.html>

Department of Labor, Employment Standards Administration, Wage and Hour Division: <http://www.dol.gov>

This office enforces the FLSA for employment in the private sector and in state and local government. It establishes and enforces national standards for minimum wage, overtime pay, child labor, and record keeping. This office also conducts workplace investigations and gathers data on wages, hours, and other employment conditions and practice, to determine compliance with FLSA, and to assess penalties if violations are found.

- Information on youth issues: <http://www.dol.gov/dol/topic/youthlabor/index.htm>
- Information on hazardous jobs: <http://www.dol.gov/dol/topic/youthlabor/hazardousjobs.htm>
- Easy-to-read FACT sheet pertaining to Federal child labor laws in nonfarm jobs: <http://www.dol.gov/esa/regs/compliance/whd/whdfs43.htm>
- Easy-to-read FACT sheet pertaining to Federal child labor laws for farm jobs: <http://www.dol.gov/esa/regs/compliance/whd/whdfs40.htm>
- Information directed to parents of working youth: <http://www.dol.gov/dol/topic/youthlabor/Parentsofyoung.htm> or <http://www.youthrules.dol.gov>

U.S. Department of Labor, Occupational Safety and Health Administration (OSHA): <http://www.osha.gov/>

OSHA develops and enforces Federal regulations and standards that apply to workers regardless of age.

- Information regarding youth workers: <http://www.osha.gov/SLTC/teenworkers/index.html>
- Information about OSHA consultation programs available to employers who wish to identify hazards and improve their safety and health management programs: <http://www.osha.gov/dcsp/smallbusiness/consult.html>

U.S. Department of Labor 18(b) State Plan States: <http://www.osha.gov/fso/osp/index.html>

Many states have taken the responsibility for state-wide occupational safety and health standards enforcement. These states agree to enforce safety and health standards that meet or exceed OSHA regulations. OSHA approves and monitors state plans.

State Agency Contacts for Child Labor: State child labor laws may be more restrictive than federal laws and vary from state to state. Links to state labor offices are available at <http://www.youthrules.dol.gov/states.htm>

DISCUSSION

School nurses can help promote safety for young workers by acting as an information resource and thus help reduce the information gap identified by the National Research Council's expert panel. Sharing information about safe employment of youths is a necessary complement to rigorous enforcement of both child labor laws and health and safety laws. School nurses are encouraged to share the information and resources provided in this article with other professionals, parents, employers, and students as a starting point to help foster safer working conditions for youth. Many of the publications referenced in this article are available at no cost on the World Wide Web or can be obtained from the government agencies that published them.

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