FEATURE ARTICLE
Information Update

Preventing Young Worker Fatalities

The Fatality Assessment and Control Evaluation (FACE) Program

by Doloris N. Higgins, MS, BSN, COHN-S, Jeanette Tierney, BSN, COHN-S, and Lawrence Hanrahan, PhD

Abstract

During the period between 1992 through 1998, the Bureau of Labor Statistics identified an average of 67 work related deaths of individuals younger than 18 each year. This article describes the Fatality Assessment and Control Evaluation (FACE) program and summarizes indepth data collected on 59 young worker fatalities in 26 states. These investigations were conducted between May 1986 and February 2002. Young workers ranged in age from 9 to 17 years, with a mean age of 15.3 years: 21 were working in the agriculture, forestry, and fishing industry; 12 in construction; 10 in manufacturing; 8 in services; and 8 in the retail industry. The majority worked as laborers. Ninety-three percent were young men. Each investigation resulted in the formulation and dissemination of strategies to help prevent future similar occurrences. As an example of state FACE activities, the article describes the Wisconsin FACE program's efforts to foster collaboration between regulatory agencies, researchers, educators, and occupational safety and health professionals, and to integrate efforts aimed at improving safety for young workers.

The U.S. Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) compiles data from various state and federal administrative sources, such as death certificates, workers' compensation reports, Occupational Safety and Health Administration reports, and medical examiner's reports. Data have been collected from all 50 states since 1992 on all work related traumatic injury deaths without age limitations. During the period 1992 through 1998, CFOI identified an average of 67 work related deaths of youths under age 18 each year. Approximately 89% of these deaths were young men; 29% of those dying at work during the 6 year period were younger than age 15. Thirty percent of the deaths occurred while the young adults were working in a family business (U.S. Department of Labor [DOL], 2000).

Approximately three fourths of these deaths were concentrated in three industries: agriculture, forestry, and fishing (43%); retail trade (19%); and construction (14%). The most common cause of death in agriculture was from farm machinery. Homicide was the most common cause of death in retail trade industries. The three most common events or exposures associated with young adult deaths in construction were falls to a lower level; electrocution; and being struck by objects, particularly falling objects (DOL, 2000). Forty percent of all fatal injuries to working young adults were related to transportation. As defined by BLS, these incidents involve motor vehicles as well as industrial vehicles, such as tractors and forklifts, in which at least one vehicle is in operation (Windau, 1999).

Surveillance data sources such as CFOI are useful for setting research and prevention priorities as they identify common causes of death as well as the industries and occupations where young worker deaths are occurring. However, to develop effective prevention measures, more indepth information is required to understand the circumstances and contributors to fatal injuries among young workers. This article describes methods used in the Fatality Assessment and Control Evaluation (FACE) program to collect indepth information related to young worker deaths and to illustrate how case information is used to prevent future young worker fatalities through collaborative efforts.

THE FACE PROGRAM

The FACE program is located in the Division of Safety Research, a division of the National Institute for Occupational Safety and Health (NIOSH). Its primary goal is to prevent occupational fatalities by identifying industries and workers at high risk for fatal injury, investigating work situations where fatalities occur, and formulating and disseminating prevention strategies to those who can intervene in the workplace. The program has two components: A NIOSH based component established in 1982 and a state based component established in 1989.

ABOUT THE AUTHORS

Ms. Higgins is Safety and Occupational Health Specialist, Division of Safety Research, Fatality Assessment and Control Evaluation Team, National Institute for Occupational Safety and Health, Morgantown, WV. Ms. Tierney is WI FACE Director, WI Department of Health and Family Services, Madison, WI. Dr. Hanrahan is WI Department of Health and Family Services, Madison, WI.

Currently, North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia report fatalities from targeted causes to NIOSH and NIOSH staff investigate reported fatalities. Fifteen state based FACE programs in Alaska, California, Iowa, Kentucky, Massachusetts, Minnesota, Nebraska, New Jersey, New York, Michigan, Oklahoma, Oregon, Washington, West Virginia and Wisconsin currently conduct state based traumatic occupational fatality surveillance, targeted investigation, and prevention activities at the state level through cooperative agreements with NIOSH (Higgins, 2001).

Targets for investigation are determined by NIOSH after reviewing surveillance data and scientific literature, and after considering needs expressed by stakeholders and opportunities for influencing prevention efforts. Targets have included confined spaces, electrocutions, falls from elevation, and logging. Current causes of death targeted for investigation include machine related and highway and street work zone construction. Although young worker deaths had been investigated as part of established targets earlier, NIOSH began targeting youth as a special population for nationwide investigation in 1999.

The DOL Employment Standards Administration's Wage and Hour Division, which is responsible for promulgating and enforcing federal child labor laws, began notifying NIOSH of young worker deaths in 1999 and began collaboration with NIOSH on dissemination activities. State based programs investigate targets established by NIOSH and may add targets based on fatality trends identified in their states. State based FACE programs in Massachusetts, Minnesota, and Wisconsin targeted young worker fatalities for investigation prior to 1999. Since the program began in 1982, indepth FACE investigations have been completed on more than 1,700 fatalities, including 59 youths.

METHODS

The youth worker population included for investigation in the FACE program was defined as workers younger than 18 who suffered a traumatic fatal occupational injury at work. Operational guidelines for determining "injury at work" were developed jointly by The Association for Vital Records and Health Statistics, the National Institute for Occupational Safety and Health, the National Center for Health Statistics, and the National Center for Environmental Health and Injury Control (NIOSH, 2001).

Indepth investigations of work related deaths were conducted using the FACE model. This model was derived from research conducted by William Haddon Jr. and reflects the public health perception that the etiology of injuries is multifaceted and that injuries are largely preventable (Haddon, 1968).

Using a standardized protocol, FACE investigators conducted indepth investigations of selected fatalities. The investigators collected information on factors associated with the host (i.e., young workers who died), the agent (i.e., mode of energy exchange—for example thermal energy, mechanical energy, electrical energy, chemical energy), and the environment (i.e., the physical and social aspects of the workplace) during the pre-event, event, and post-event time phases of the incident. This information was obtained through employer and witness interviews, discussions with investigators from regulatory agencies, examination of the incident site, and review of multiple source documents such as police, medical examiner, Occupational Health and Safety Administration (OSHA), and the Employment Standards Administration's (ESA) Wage and Hour Division reports.

What Does This Mean for Workplace Application?

Common contributors to young worker deaths include failure to recognize hazardous work situations, absence of company safety programs, failure of employers to comply with safety and heath standards, lack of supervision, lack of personal protective equipment, and a poor understanding of the types of work prohibited by child labor laws. The FACE program formulates recommendations to help eliminate these factors. Occupational health nurses work in the FACE program as field and principal investigators. Nurses working where young workers are employed can use FACE findings to improve working conditions in their work settings, and can encourage workers who are parents to become more involved in their children's work choices.

The FACE investigators developed narrative reports detailing organizational, behavioral, and environmental factors contributing to the death. Investigative findings, literature searches, and consultation with safety experts and equipment manufacturers were used to develop recommendations for prevention. Frequently, engineering controls, compliance with safety and heath laws and regulations, and improved education and training related to hazards in the workplace were recommended. The FACE reports were widely disseminated for each fatality to help prevent future incidents of a similar nature.

The FACE program submitted the FACE youth fatality reports to the Wage and Hour Division's Child Labor and Special Employment Team for review. The purposes of this review were:

- To determine if employment of the injured minor was covered by (i.e., subject to) the provision of the Fair Labor Standards Act (FLSA).
- To determine if the employment or activity being performed by the minor at the time of death was in violation of the FLSA child labor provisions.

The Team determined coverage through review of size and type of business involved, activities being performed, and the Wage and Hour Division's knowledge of the incident. In a few cases, coverage could not be determined with complete accuracy. Determinations concerning whether the employment was in violation of the child labor provisions of the FLSA were based on the Team's knowledge of these provisions and the supporting regulations.

FACE PROGRAM RESULTS

From May 1986 to February 2002, 59 incidents of traumatic occupational fatal injuries involving workers younger than age 18 were investigated by the FACE program. The incidents occurred in 26 states. The young victims' ages ranged between 9 and 17 years, with a mean age of 15.3 years and a median age of 16 years. Fifty-five

Table 1

Young Worker Fatalities in Agriculture, Forestry, and Fishing

E-Coded Cause of Death	*Fatalities Investigated*
Farm machinery (E919.0)	7
Machinery other than farm (E919)	3
Motor vehicle traffic accident ...loss of control without collision on the 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 (E869)	1
Animal-drawn vehicle (E827)	1
Accident to watercraft causing submersion (E830)	1
Total	**21**

(93%) were young men. Twenty-one worked in the agriculture, forestry, and fishing industry, 12 in construction, 10 in manufacturing, 8 in services, and 8 in the retail industry.

FACE INVESTIGATIONS CONDUCTED IN THE AGRICULTURE, FORESTRY, AND FISHING INDUSTRY

Fatalities were grouped by external cause of injury (E-code) according to the International Classification of Diseases, Ninth Revision (World Health Organization, 1977). According to the DOL Child Labor and Special Employment Team's review, 19 of the fatal incidents, grouped by E-code in Table 1, occurred on farms covered by the FLSA. Four of these involved young workers on family farms at the time of their deaths and were exempt from Federal agricultural child labor provisions. Ten incidents involved workers age 16 or older at the time of their fatal incident, and therefore their employment was not subject to the Federal child labor agricultural provisions. Unlike the nonagricultural child labor provisions which govern the employment of young people until they are age 18, the agricultural provisions no longer apply when they are age 16.

Table 2 provides a summary of hazardous occupations orders for nonagricultural work (HOs) and hazardous occupations orders for agricultural work (HO/As) covered by FLSA. Five incidents involved farms on which young workers were employed in violation of Federal child labor provisions. These fatal incidents included a 13 year old boy riding between a seeder and tractor (HO/A1), a 13 year old boy assisting operation of a forage harvester (HO/A2), a 12 year old boy operating a tractor (HO/A1), and a 15 year old boy working near a manure pit (HOA/8). A 9 year old boy was riding on the back of an open cargo truck used to pick up pails of harvested blueberries when he fell and was run over. His employment was a violation of the Federal child labor provisions because he did not meet minimum age requirements for hand harvesting.

Two of the 21 fatal incidents grouped by E-code in Table 1 involved young workers in industries classified as agriculture, forestry, and fishing industries, but they were working in jobs that do not fall under agriculture as defined by the FLSA. In one incident, a 14 year old worked for a landscaping business and was caught in a wood chipper. This work would have been in violation of Federal nonagricultural child labor provisions prohibiting individuals younger than 16 from operating power driven machinery and workers younger than 18 from operating power driven wood working equipment (HO 5), if the business was covered. In the second incident, a 16 year old fisherman was riding in a towed fishing vessel when he fell overboard and drowned. Fishing businesses are covered by the FLSA when fishing in coastal waters. However, in this instance, the young worker was not performing a job subject to Federal child labor provisions.

Case summaries below illustrate 2 of the 19 incidents in which young workers died while working in agricultural production. All occurred on small farms with fewer than 11 employees, and were exempt from OSHA enforcement.

Case No. 1

In 1999, a 17 year old worker died when he became entangled in the unshielded power take off (PTO) driveline of a grinder mixer. He was a part time worker, and was supervised by the farm owner. He been helping the farmer add sacks of feed supplement to ground corn in the mixer. While the farmer closed a cover, the boy stood next to the revolving PTO driveline. The farmer heard a thump, then noticed the boy had been caught and entangled around the driveline. He died instantly of severe head injuries (Iowa Department of Public Health, 1999).

Case No. 2

In 1994, a 10 year old worker died when the farm tractor he was operating overturned. He was driving the tractor on a public highway, pulling a baler and hayrack loaded with bales of hay, with his father following. The tractor was not equipped with a rollover protective structure or a seat belt, which when used together, are designed to protect drivers in the event of overturns. When the boy attempted to make a right turn on a gravel road, the tractor slid to the edge of the road and overturned. The boy was pinned under the tractor (Minnesota Department of Health, 1994).

FACE INVESTIGATIONS IN OTHER INDUSTRY GROUPS

According to the DOL Child Labor and Special Employment Team's review of FACE reports, 27 of 38 nonagricultural incidents grouped by E-code in Table 3 were covered by the FLSA, and 2 were not covered. The remaining 9 cases lacked sufficient detail to make a coverage determination. Of the 27 incidents occurring in nonagricultural businesses covered by the FLSA, 10 incidents involved young workers employed in violation of HOs shown on Table 2. In addition, 3 incidents involved violations of the Fair Labor Standards Act Child Labor Regulation No. 3, which further limits the type and hours of work

Table 2

Hazardous Occupations Orders for Nonagricultural Work (HOs) and for Agricultural Work (HO/As) under the U.S. Fair Labor Standards Act (FLSA)

*NonAgricultural work**	*Agricultural work†*
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 blowers, 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‡	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‡	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)‡	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‡	
HO 13. Manufacturing brick, tile, and related products	
HO 14. Power-driven circular saws, band saws, and guillotine shears‡	
HO 15. Wrecking, demolition, and ship-breaking operations	
HO 16. Roofing operations‡	
HO 17. Excavation operations‡	

** Seventeen hazardous nonagricultural jobs are prohibited under the FLSA. Generally, workers younger than age 18 cannot perform work involving these activities. [Note: Additional restrictions are in place for workers younger than 16 years of age.]*

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

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

Adapted from U.S. Department of Labor (1990, 2001).

for nonagricultural employees younger than age 16, and 14 incidents involved no FLSA violation.

The 10 incidents determined to be in violation of the Federal child labor provisions for nonagricultural businesses included:

- Three incidents in which young workers were operating a forklift (HO 7).
- Two incidents involving young workers performing roofing work (HO 16).
- One incident involving a young worker working in a trench (HO 17).
- One incident in which a young worker was using a power driven wood working machine (HO 14).
- One incident involving a young worker employed in a saw mill (HO 4 and HO 5).
- One incident involving a young worker participating in demolition activities (HO 15).
- One incident in which a young worker was operating a trash compactor (HO 12).

The 3 incidents determined to be in violation of Child Labor Regulation No. 3, involved a 14 year old worker operating a riding tractor, a 15 year old worker operating a six wheeled utility vehicle, and a 15 year old individual working in a car wash.

The 14 incidents not in violation of Federal child labor provisions for nonagricultural businesses were young workers employed in the following positions:

- Lifeguard (2).
- Delivering newspapers (2).
- Cashier (1).
- Cleaning a smoke stack (1).
- Summer camp worker (1).
- Working from a ladder (1).
- Driving a golf cart on the golf course (1).
- Working on a barge (1).
- Painter on a telecommunication tower (1).
- Working in salvage (1).
- Amusement ride attendant (1).
- Plastics plant worker (1).

Table 3

Young Worker Fatalities from 1986 to 2002 in All Other Industry Groups, Excluding Agriculture, Forestry, and Fishing

E-Coded Cause of Death	*Fatalities Investigated*
Machinery (E919)	13
Falls from elevation (E880-888)	9
Electric current (E925)	6
Struck by falling object (E916)	3
Other motor vehicle/nontraffic collision with moving object (E822)	2
Accidental poisoning (E868-862)	2
Accident caused by firearm missile (E922)	1
Unspecified accidental drowning (E910)	1
Noncollision motor vehicle traffic accident while boarding or alighting (E817)	1
Total	**38**

The young workers involved in these 14 incidents were either 16 or 17 years old.

Case summaries below illustrate three cases in which young workers died while performing work tasks in construction, manufacturing, and retail industries.

Case No. 1

In 2000, a 17 year old worker died, and his coworker was injured when an unprotected wall of a sewer trench collapsed, partially burying them with soil. The young man was employed by a temporary employment agency and had been sent to the construction company to work as a laborer. He was working in an 11 foot deep trench to reset sewer pipe. The trench shield had been removed the previous day and not replaced. A 30 foot long section of the trench caved in on the young worker and buried him. He was removed from the trench after 22 minutes, but died at the hospital 5 hours later from abdominal trauma (NIOSH, 2000).

Case No. 2

In 2000, a 16 year old laborer was electrocuted while working at a sawmill. He was using a compressed air hose and nozzle to blow sawdust from a 440 volt electric re-saw machine. Apparently, he knelt down on wet ground under the machine and contacted the machine's metal framework. The machine was not grounded, and the electrical supply wires were exposed to wet earth and sawdust below and above ground. Coworkers at the mill saw the victim collapsed under the machine and came to his aid. A life flight helicopter transported him to a trauma center where he was pronounced dead (Missouri Department of Health, 2000).

Case No. 3

In 2000, a 16 year old woman restaurant cashier died when she was shot in the head during an armed robbery attempt. At 1:15 p.m., a man approached the victim and her mother, a co-owner of the restaurant, at the cash register. He pointed a gun at the victim, demanded money, and immediately shot her in the face. The victim's father was working behind the counter and immediately activated a security system, which alerted emergency responders. The victim was transported to the hospital where she was pronounced dead soon after the incident (Wisconsin Department of Health and Family Services, 2000).

It is important to note that young workers employed by nonagricultural industries are no longer covered by the Federal child labor provisions when they reach age 18. Young workers employed in agricultural work are no longer covered by the Federal child labor provisions when they reach age 16.

COMMON CONTRIBUTORS TO YOUTH WORKER DEATHS

The 59 FACE investigations of young worker deaths identified factors contributing to each fatal incident. The following list illustrates factors common to many of these incidents.

- Failure of employers and workers, including young workers, to recognize hazardous work situations.
- Absence of comprehensive safety programs including 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 guarding around moving parts and rollover protective structures and seat belts.
- Lack of availability or appropriate use of personal protective equipment.
- Lack of appropriate supervision.
- Employer failure to understand and comply with child labor laws.
- Inexperience of young workers.
- Young workers learning unsafe behaviors by watching coworkers.
- Failure of parents and school personnel using work permit systems or school related job training programs to recognize work prohibited by child labor laws.

The following types of prevention strategies are typically found in FACE recommendations:

- Employers should develop, implement, and enforce a comprehensive injury prevention program defining processes for identifying and correcting safety and health problems in their businesses, and indicating appropriate safety training, supervision, personal protective equipment, and safe equipment and tools to be provided to all employees.
- Employers should comply with all applicable occupational safety and health regulations. The report would include the applicable regulations and a reference for them.
- Employers should become knowledgeable about and 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 OSHA or ESA's Wage and Hour Division, whenever they have questions or concerns related to their children's work.

A copy of each investigated FACE case and relevant prevention recommendations can be obtained by contacting the NIOSH FACE program or by visiting the NIOSH website at http://www.cdc.gov/niosh/face/faceweb.html.

WISCONSIN'S FACE PROGRAM BUILDS PARTNERSHIPS TO ADDRESS YOUTH FATALITIES

Wisconsin is one of 15 states currently conducting occupational fatality surveillance and investigations as part of the State based FACE program. In addition to the targeted events for investigation provided by NIOSH, FACE states are encouraged to focus on other incidents based on the individual needs of the state. This section focuses on Wisconsin FACE (WI FACE) activities for surveillance and prevention of young worker fatalities as an example of how state based FACE programs work with other agencies to prevent young worker injuries.

Since the WI FACE program began in 1991, information has been collected on more than 1,150 Wisconsin fatalities, including 29 young workers. Six of these 29 youth cases were investigated using the FACE model. Five of these six Wisconsin youth investigations resulted in finalized FACE reports by February 2002 and were included within the 59 young worker cases analyzed earlier.

In 1998, the WI FACE program identified young workers as an at risk population for serious and fatal work injuries and recognized a need for more focused prevention strategies. To better understand the magnitude of the problem, WI FACE compiled information from the FACE surveillance system, and from WI OSHA, workers' compensation, and agricultural injury databases. Wisconsin FACE staff presented a summary of the data to representatives of agencies and organizations sharing an interest and responsibility for young worker safety and health.

These organizations and agencies offered to commit resources to help facilitate safer working conditions for young people in Wisconsin. In 1999, NIOSH added youth fatalities as an investigative target in all state based FACE programs, resulting in increased capacity for youth prevention activities.

Collaboration between the WI FACE program and other national and state agencies and organizations in a 4 year period has resulted in more integrated efforts to reduce young worker injuries and fatalities. Important actions aimed at improving working conditions for young people in Wisconsin include:

- Local public health departments disseminate WI FACE youth fatality reports and injury prevention materials to nurses working in the school system and to the public through local health fairs.
- The WI FACE program manager meets with the WI Child Fatality Review Team, an official state advisory group for legislative activities and a resource for public education on child safety issues, to assist in identifying work related child fatalities, and to share prevention strategies.
- The U.S. DOL Wage and Hour Division and the Wisconsin Department of Workforce Development, Bureau of Labor Standards, have strengthened their inter-agency referral systems for follow up of child labor complaints.
- National Children's Center for Rural and Agricultural Health and Safety, located in Marshfield Wisconsin, provides resources and leadership for causes of youth agricultural injuries and their prevention.
- University of Wisconsin-Extension youth outreach staff provide training and resources for instructors in the Safe Operation of Tractor and Machinery Certification Program. The program meets the child labor requirements in agriculture under the FLSA, pertaining to the employment of individuals ages 14 and 15 on farms not operated by their parents or guardians, as well as state certification requirements for young tractor drivers. Outreach staff also provide assistance to groups working with young people in agriculture (e.g., 4-H, Future Farmers of America, Safety Days Camps for Kids).
- Wisconsin Department of Workforce Development, Division of Workers' Compensation, provides statistical summaries related to young worker injuries to the WI FACE program.
- The OSHA offices in Wisconsin receive referrals from and provide referrals to DOL Wage and Hour Division about child labor issues. This exchange of information is formalized through a memorandum of understanding.
- Wisconsin FACE works with the Youth Employment Safety Training Program, another NIOSH funded cooperative agreement, to facilitate surveillance and intervention activities aimed at preventing traumatic injuries in young workers.
- The Wisconsin Comprehensive School Health Program incorporates work injury prevention strategies into recommendations for secondary school curricula development.

DISCUSSION

The FACE investigations demonstrate that young workers are killed at work while performing tasks prohibited by federal labor laws. An association between employment of young people in jobs prohibited by child labor laws and deaths at work has been previously documented (Castillo, 1994; Dunn, 1993; U.S. General Accounting Office, 1990). An association between violations of occupational safety and health regulations and death of young workers has also been documented previously (Suruda, 1991).

The FACE investigations of deaths also revealed that young workers die performing jobs not covered by OSHA or the FLSA. Therefore, education about safe employment of young workers is a necessary complement to rigorous enforcement of both child labor laws and occupational health and safety laws. In their report, Protecting Youth at Work, the National Research Council indicated

> not only are children and adolescents not receiving health and safety information 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).

The FACE investigations revealed employers and parents are frequently unaware of the types of work prohibited for young workers and are unaware of the safety and health safeguards that should be in place where they work.

NIOSH believes the FACE program can help educate the public through investigating youth fatalities and disseminating findings to regional and national audiences. To increase public awareness of the risks for injury and death faced by adolescents in the workplace, the FACE program has distributed a NIOSH document entitled "Preventing Deaths and Injuries of Adolescent Workers" (NIOSH, 1995) along with its youth fatality reports.

Investigative findings and prevention recommendations produced at NIOSH can be adapted readily by state based FACE programs and other state health or labor departments to meet specific regional needs and can be rapidly disseminated to the audience best suited to implement workplace controls. The FACE program is committed to collaborating with other federal and state agencies, as well as with employers; workers; organizations that represent employers and workers; equipment manufacturers; safety and health professionals; parents; and other individuals and groups who can intervene in the workplace to help prevent and reduce young worker fatalities.

IMPLICATIONS FOR OCCUPATIONAL HEALTH NURSING PRACTICE

On average, 67 younger workers die each year as a result of traumatic injuries sustained at work. More needs to be done to ensure safe early work experiences for young people. Through their work in academia, government, health care facilities, and on worksites, occupational health nurses have an opportunity to inform their peers as well as employers, workers, educators, and parents about research findings from the FACE program. They can expand their knowledge of occupational safety and heath laws and child labor laws, and help educate others about safety at work and the type of work prohibited for young workers. Nurses working where young people are employed can use their knowledge of safety and health, and research findings from the FACE program directly to help improve working conditions in the work settings they oversee.

More frequently, occupational nurses oversee the work settings where adult workers are employed. They have an opportunity to disseminate materials related to young worker safety to adult workers and their families through company newsletters and wellness campaigns, posting the DOL FLSA list of hazardous jobs from Table 2 on their company's bulletin board, or through distributing young worker safety information with workers' paychecks. Nurses are in a position to encourage workers who are parents to become more involved in their children's work choices.

Nurses frequently are used as a referral source, and therefore, are in a position to refer those with detailed questions related to safety for young workers to the DOL, or to the website at http://www.dol.gov/dol/topic/youthlabor/index.htm. Information related to the NIOSH FACE program can be obtained by contacting the authors, or by accessing the NIOSH website at http://www.cdc.gov/niosh.

The Wisconsin FACE program is funded by Cooperative Agreement #U60/CCU507081-10-1.

REFERENCES

Castillo, D.N., Landen, D.D., & Layne, L.A. (1994). Occupational injury deaths of 16- and 17-year-olds in the United States. *American Journal of Public Health, 84*(40), 646-649.

Dunn, K.A., & Runyan, C.W. (1993). Deaths at work among children and adolescents. *American Journal of Diseases of Children, 147*, 1044-1047.

Haddon, W.H. (1968). The changing approach to the epidemiology, prevention, and amelioration of trauma: The transition to approaches etiologically rather than descriptively-based. *American Journal of Public Health, 58*(8), 1431-1438.

Higgins, D.N., Casini, V.J., Bost, P., Johnson, W., & Rautianinen, R. (2001). Fatality Assessment and Control Evaluation program's role in the prevention of occupational fatalities. *Injury Prevention, 7*(Suppl. 1), i27-i33.

Iowa Department of Public Health. (1999). *Youth farm worker is killed when he becomes entangled in PTO driveline of an old grinder-mixer* (FACE Report No. 99IA00301). Iowa City, IA: University of Iowa, Department of Occupational and Environmental Health, IA Fatality Assessment and Control Evaluation Program.

Minnesota Department of Health. (1994). *Farm youth dies after tractor he was driving rolled over on him* (FACE Report No. 94MN04101). Minneapolis, MN: Minnesota Department of Health, MN Fatality Assessment and Control Evaluation Program.

Missouri Department of Health. (2000). *Child laborer electrocuted while working at sawmill in Missouri* (FACE Report No. 00MO06301). Jefferson City, MO: Missouri Department of Health and Senior Services, MO Fatality Assessment and Control Evaluation Program.

National Institute for Occupational Safety and Health. (1995). *NIOSH Alert: request for assistance in preventing deaths and injuries in adolescent workers* (DHHS [NIOSH] Publication No 95-125). Cincinnati, OH: National Institute for Occupational Safety and Health.

National Institute for Occupational Safety and Health. (2000). *Worker dies in trench collapse—Michigan* (FACE Report No. 2003-03). Morgantown, WV: US Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, NIOSH, Division of Safety Research, Fatality Assessment and Control Evaluation.

National Institute for Occupational Safety and Health. (2001). *Fatal injuries to civilian workers in the United States, 1980-1995* (DHHS [NIOSH] Publication No 2001-129S). Cincinnati, OH: National Institute for Occupational Safety and Health.

National Research Council, Institute of Medicine. (1998). *Protecting youth at work: Health, safety, and development of working adolescents and children in the United States.* Washington, DC: National Academy Press.

Suruda, A., & Halperin, W. (1991). Work-related deaths in children. *American Journal of Industrial Medicine, 19*, 739-745.

U.S. Department of Labor (DOL). (1990). *Child Labor requirements in agriculture under the Fair Labor Standards Act* (Child Labor Bulletin No. 102, WH 1295). Washington, DC: U.S. Government Printing Office.

U.S. Department of Labor (DOL). (2000). *Report on the youth labor force* (DOL Publication No. 2000—475-319/30247). Washington, DC: U.S. Government Printing Office.

U.S. Department of Labor (DOL). (2001). *Child Labor requirements in nonagricultural occupations under the Fair Labor Standards Act* (Child Labor Bulletin No. 101, WH330). Washington, DC: U.S. Government Printing Office.

U.S. General Accounting Office. (1990). *Child labor: Increases in detected child labor violations throughout the United States* (GAO/HRD-90-116). Washington DC, Government Printing Office.

Windau, J., Sygnatur, E., & Toscano, G. (1999). Profile of work injuries incurred by young workers. *Monthly Labor Review, 122*(6), 3-10.

Wisconsin Department of Health and Family Services. (2000). *Youth restaurant cashier shot to death during attempted robbery* (FACE Report No. 00WI01201). Madison, WI: WI Department of Health and Family Services, Division of Public Health, WI Fatality Assessment and Control Evaluation Program.

World Health Organization. (1977). *International classification of diseases: Manual on the international classification of diseases, injuries, and causes of death* (9th rev.). Los Angeles: Practice Management Information Corporation.