

tors are identified and injury prevention strategies are developed.

Results. According to NTOF data, a total of 5,338 workers were electrocuted in 5,170 incidents from 1980-1992. An average of 411 workers were electrocuted each year, with an average annual rate of 0.4 workers per 100,000 workers. Although the number of electrocution deaths have decreased by more than 50% from 1980-1992, electrocutions accounted for 5% of all worker deaths in 1994 in the U.S. From November 1982 to December 1994, the NIOSH FACE program investigated 224 electrocution incidents resulting in 244 occupational fatalities. Recommended prevention strategies include compliance with national safety codes, proper use of personal protective equipment, appropriate worker training, and developing and implementing comprehensive written safety programs.

Conclusion. Approximately 411 workers die each year from electrocution-related incidents in the work environment, and electrocutions account for 5% of all occupational fatalities in the U.S. To reduce these numbers, prevention strategies need to be developed and disseminated to targeted audiences. The FACE model has been demonstrated as an effective tool for describing fatal occupational injuries, developing prevention strategies, and disseminating these prevention strategies to targeted audiences.

***A Profile of Occupational Eye Injuries from the West Virginia Workers' Compensation Program***—Jackson LL, Islam S, Bowers C

Eye injuries are a preventable occupational injury, yet the U.S. Bureau of Labor Statistics estimates that eye injuries account for about 4% of lost work time accidents. Analysis of workers' compensation data provides an opportunity to determine the nature of eye injury in the workplace and to target intervention efforts to higher risk industries and occupations and eventually to individual employers with high incidence rates.

West Virginia is one of only a few states that has an exclusive state-managed workers' compensation insurance fund and does not allow private third-party compensation insurance coverage, although it does allow some companies to self-insure (less than 1% of all companies). We examined 4422 compensable eye injury claims from the West Virginia Workers' Compensation Program for July 1995 through June 1996. The eye injury claims accounted for about 7.6% of the total number of injury claims (58325) during the one-year period. Eighty-seven percent of the claimants are male. The average age of claimants was 35 years, ranging from 14 to 74 years of age, with 85% of the workers in the age range of 20 to 49 years.

Sixty percent of the injuries were caused by various particulate type materials and 23% were caused by chemicals, gases, fumes, or liquids. The major types of accident events were "rubbed or abraded" (60%), "struck by" (20%), "bodily reaction" (7%), and "contact with radiations, caustics, and toxic substances" (6%). The nature of the injury was mostly foreign bodies in the eye (70%) with a fewer number of cuts, punctures, and abrasions (13%) and chemical and radiation burns (7%). Less than 1% of the total number of injuries were caused by imbedded splinters or chips or punctures.

In 82% of the claims the injury involved only one eye, whereas in 10% of the claims both eyes were injured (8% were not specifi-

cally identified). For those claims in which both eyes were injured, the proportion doubled for accidents caused by chemicals, gases, fumes, and liquids (47%) and tripled for accidents caused by contact with radiations, caustics, and toxic substances (21%). Contact with temperature and pressure extremes increased to 8% in comparison to only 2% for all eye injuries. There was also a dramatic increase in burn injuries from 7% for all eye injuries to 34% of injuries involving both eyes.

In summary, the West Virginia Workers' Compensation data provide an excellent opportunity to profile minor as well as serious eye injuries in the workplace.

***An Epidemiologist's Trek through Several Industries Injury/Incident Data***—Thomas RJ

Analyses of personal-computer-based records of injury data with company historic demographic and job history data presents a different perspective of case definitions and the populations-at-risk than the traditional 'safety' injury/incident counts to 'full-time equivalent' persons.

Data from several different industries of varying size, in scattered geographic locations, and of different types (a utility, an electrical product manufacturer, and a multi-site chemical producer) illustrate the presence of confounding in both the numerator and denominator of traditionally calculated industry rates.

One client's data on current employees, which includes work and injury data back to 1952, leads to a historic view of employee's injuries. There are three employee populations (besides the classic sub-groups of male/female, recent hires/long term employees, et cetera):

- those employees who have not had a single accident/injury
- those employees who have had one and only one accident/injury, and
- a small population of employees who have had more than one accident/injury.

***Helicopter External Load Traumatic Injuries — Epidemiology and Prevention***—Manwaring JC, Conway GA, Garrett LD

Helicopter external lift load operations are gaining wide acceptance as an alternative to conventional surface heavy lift and transportation. Such operations, however, are not without their hazards. Helicopter external load operations, such as helicopter logging, can be demanding on helicopters and the pilots who fly them. The potential for machine failure and human error has led to tragic results. Helicopter external load operations have been associated with a large number of helicopter crashes resulting in serious traumatic injuries. There were 230 helicopter external load accidents in the United States investigated by the National Transportation Safety Board (NTSB) from 1980 to 1995. These accidents resulted in 57 fatalities and 74 serious non-fatal injuries. Of the 230 accidents, 44 (19%) resulted in one or more fatalities. There was a mean of 0.25 fatalities per accident, and a mean accident pilot fatality rate of 14% (40 pilot fatalities out of 276 pilots involved in 230 accidents). Of the 230 accident reports, 190 (83%) noted a flight purpose. Of these 190 events, 65 (34%) occurred during heli-logging operations. These 65 events resulted in 26 (46%) of all fatalities, and 30 (41%) of the 74 serious non-fatal injuries.