DC 20212, telephone (202) 523–1347. Data tapes for all five cohorts as well as data from the National Longitudinal Survey of Youth are available on CD/ROM from the Public Users' Office, Center for Human Resource Research, The Ohio State University, 921 Chatham Lane, Suite 200, Columbus, OH 43221-2418, telephone (614) 442-7300. □

Footnotes

[1] Frank Stafford, "Forestalling the Demise of Empirical Economics: The Role of Microdata in Labor Economics Research," in Orley C. Ashenfelter and Richard Lazard, eds., *Handbook of Labor Economics*, vol. 1 (New York, American Elsevier Publishing Co., Inc.,1986), pp. 387–423.

[2] To date, more than 1,500 research studies using National Longitudinal Survey data have been completed. For a detailed list, see *NLS Annotated Bibliography 1968–87* (Columbus, Ohio State University, Center for Human Resource Research, 1989).

Heat burns sustained in the workplace

Martin E. Personick

The notion of burns, to some, might evoke images of shooting flames, blaring sirens, and firefighters battling against intense heat. Though less dramatic, many other employees face the specter of heat burn hazards in their daily tasks, including the welder working with molten metal and the roofer pouring hot tar. Whatever the activity, though, contact with hot objects or substances can result in severe burns requiring medical treatment (occasionally even hospital stays) and long periods of recuperation.

As part of its ongoing concern with job-related heat burns, the Occupational Safety and Health Administration (OSHA) requested a special Bureau of Labor Statistics study that focused on the characteristics of workers and their heat burn injuries as well as on the factors surrounding such incidents. In response, BLS and 23 participating State agencies identified about 1,300 heat burn cases filed as workers' compensation claims in May 1985, the reference month selected for this special study.[1] This summary highlights the study's major findings.

Of primary interest to OSHA were survey questions relating to the use and effectiveness of personal protective equipment. The study found that most of the injured were wearing some type of safety gear at the time of their accident, but that the burn area—mostly the upper or lower extremities—typically was not covered by personal protective equipment. Asked why the burn area was unprotected, the injured commonly thought that a full complement of protective gear was not needed or that employers did not provide all of the proper gear to protect against heat burns.

Even more revealing were responses from those whose burn area was covered, a group making up one-fourth of the study's injured. A large majority said that the source of their burn (usually molten metal, flames, or tar) went under or around the gear—mostly shoes or gloves. The responses of most of the remainder of this group indicated that heat penetrated or burned through the protective gear. Many of these injured sensed, however, that the protective gear helped to reduce the area burned or its seriousness.

These findings are useful to OSHA in evaluating the adequacy of and compliance with its current safety standards relating to personal protective equipment.[2] For example, OSHA might initiate research to evaluate certain design features of safety gloves, shoes, and boots, such as the size and fit of the gear and their heat-resistant properties. (See table 1 for the incidence of wearing specific safety gear and the worker's perception of its protective properties.)

How severe were the burns sustained by workers in this study? Third-degree burns, which destroy all layers of the affected skin, were reported by a little more than two-fifths of the injured. In addition, a similar proportion reported second-degree burns, resulting in blistered skin which, unlike third-degree burns, will regenerate but with varying amounts of scarring.

Besides degree of burn, two other measures—lost workdays and overnight hospital stays—help gauge the severity of injury. In this regard, slightly more than seven-tenths of the injured workers experienced lost worktime, an average (median) of 10 workdays off beyond the day of injury. And, a hospital stay, averaging 6 nights, was reported by one-sixth of those sustaining heat burns. Of course, most workers hospitalized overnight were burned extensively, typically on the upper extremeties *and* either the trunk or head.

Although the injured were comparatively young (three-fifths were under age 35), job experience does not appear to have been a major factor contributing to these heat burn cases. Two-thirds of the injured had been with their employer at least 1 year at the time of the accident; almost two-fifths had worked with their employer for 5 years or more. Also, most of the workers said they performed almost daily an activity similar to that associated with their accident.

In recounting the case, the injured worker's description of the burn accident covered a wide variety of activities. Almost two-thirds said that they were operating, maintaining, or servicing equipment, tools, or vehicles. Additionally, nearly three-tenths sustained burns while pouring or lifting hot liquids or substances, primarily tar or molten metal. At the time of the accident, the most widely used equipment or materials were welding apparatus; tar or asphalt; vehicles and parts; cleaning or sterilizing equipment; and furnaces, heaters, or stoves.

Injured workers were about evenly divided about whether they thought worksite conditions contributed to their accident (table 1). Those who believed so cited a number of factors, such as the poor quality or wrong type of tools and equipment, lack of proper labeling, and confined or cluttered work areas (that is, areas around pipes, under vehicles, and rooftops).

As with most industrial accidents, a large majority of the respondents to the heat burn study believed their accident could have been averted. When asked to suggest preventive actions, the workers

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Table 1. **Heat burn injuries, selected characteristics, May 1985**

Characteristic	Percent of total cases
Source of injury	
Chemicals and chemical compounds, including glue and plastic	5
Coal and petroleum products, including asphalts	16
Flame and fire	19
Handtools	3
Liquids, not elsewhere classified, including water	11
Machines, such as nonprinting presses	5
Metal items, including molten metal	22
Steam	9
All other	9
Activity at time of accident	
Operating equipment, tools, or vehicles	32
Repairing, adjusting, or cleaning equipment, tools, or vehicles	16
Checking or inspecting equipment, tools, or vehicles	7
Starting up or shutting down equipment, tools, or vehicles	9
Pouring hot liquids or substances or molten metal	12
Cleaning work area or work materials	5
Lifting, carrying, or moving hot objects or materials	16
Other activities involving hot objects or materials	4
Part of body affected	
Head	10
Upper extremities	43
Trunk	4
Lower extremities	20
Multiple parts	24
Personal protective equipment worn and worker's perception of effectiveness[1]	
Hard hat	25
Resistant to heat burns	3
Not resistant to heat burns	20
Safety glasses or goggles	36
Resistant to heat burns	7
Not resistant to heat burns	27
Personal protective equipment worn and worker's perception of effectiveness — Continued	
Gloves, including leather and heavy-duty canvas	36
Resistant to heat burns	18
Not resistant to heat burns	15
Face shield, welding hood, or welding sleeves	16
Resistant to heat burns	8
Not resistant to heat burns	6
Steel-toed safety shoes or foundry boots	37
Resistant to heat burns	6
Not resistant to heat burns	29
Other, including leather apron and protective overalls and jacket	24
Resistant to heat burns	13
Not resistant to heat burns	9
Worksite conditions contributing to accident[1]	
Using tools or equipment that were in bad condition	10
Using wrong tools or equipment	5
Equipment pipes or hot objects not adequately labeled	8
Working in a limited space	18
Inadequate lighting	3
Limited area to escape	10
Cluttered work area	5
Other	12
None	52
Measures that worker felt could have prevented accident[1]	
Wearing personal protective equipment or a better type of personal protective equipment	28
Using safer work procedures	25
More help or more time to do job	15
More or better safety training or warning about hazards	12
Having company enforce safe work practices	10
More or better safety features on machines	17
Other	15
Do not think accident could have been prevented	20

[1] Because multiple responses were possible to the questions about personal protective equipment, worksite conditions, and preventive measures, the sum of the percentages exceeds 100. Some workers did not specify the effectiveness of personal protective equipment; therefore these percentages do not equal the total for each item.

NOTE: Due to rounding, percentages may not add to 100.

cited several ways, such as using safer work procedures and wearing proper safety gear. (Questions relating to the circumstances surrounding these injuries and what could have prevented these accidents were posed to the injured employee only, not to the employer.)

A COMPREHENSIVE REPORT, *Heat Burn Injuries*, Bulletin 2358, may be purchased from the Superintendent of Documents, Government Printing Office, Washington, DC 20402, or from the Bureau of Labor Statistics, Publications Sales Center, P.O. Box 2145, Chicago, IL 60690. The bulletin provides detailed information on the characteristics associated with heat burn injuries. □

Footnotes

[1] The scope of this private industry study was limited in the following ways: Excluded were workers in coal, metal, and nonmetallic mining; firefighting and related fire prevention occupations; food preparation and related occupations, such as cooks and waitresses; motor vehicle and equipment accidents; assaults; and fatalities. Moreover, only workers who were directly involved with the object or substance that burned them, caught fire, or exploded were included.

Certain basic information about the worker, such as sex and age, and the injury, such as part of body affected, was obtained from State workers' compensation reports filed by employers. Detailed descriptions of the accidents, the availability and use of personal protective equipment, and related information were developed from the workers' responses to the questionnaire. Several OSHA offices, as well as the Office of Safety Research of the National Institute for Occupational Safety and Health, contributed to the planning of the survey and, in particular, to the design of its questionnaire.

[2] See *General Industry: OSHA Safety and Health Standards* (29 CFR 1910), OSHA 2206 (Occupational Safety and Health Administration, revised 1981), pp. 292–98.