

# Characteristics of Adolescent Work Injuries Reported to the Minnesota Department of Labor and Industry

## ABSTRACT

**Objectives.** The purpose of the study was to provide descriptive data and incidence data on adolescent work-related injuries and to determine whether such injuries are underreported to the Minnesota Department of Labor and Industry.

**Methods.** The study consisted of a 1-year survey of 534 adolescent work-related injuries reported to the Department of Labor and Industry and a cross-sectional survey of 3312 public high school students from throughout Minnesota. The high school survey used an abbreviated questionnaire with a subset of items from the Department of Labor and Industry survey.

**Results.** Ninety-six percent of the injuries were strains and sprains, cuts and lacerations, burns, bruises and contusions, and fractures. There were 11 hospitalizations; 4 were for burns that occurred during work in restaurants. Eighty workers (15%) reported permanent impairment as a result of their injuries. It was estimated that there were 2268 reportable injuries to working adolescents in Minnesota during the study year.

**Conclusions.** The most common serious injuries were injuries to the lower back and burns. The demographic characteristics of adolescents whose injuries were reported to the Department of Labor and Industry were similar to those of injured adolescent workers identified through the high school survey. The results suggest that there is substantial underreporting of adolescent work injuries. (*Am J Public Health*. 1994;84:606-611)

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## Introduction

National estimates of the rate of injury to adolescent workers range from 6.6 per 100 full-time female workers to 12.6 per 100 full-time males.<sup>1</sup> In a recent study from Massachusetts the injury rate for adolescents working part-time was estimated to be equivalent to 16 per 100 full-time workers.<sup>2</sup> Most of these injuries are lacerations, strains and sprains, and heat burns.<sup>1</sup> These data are supported by findings from Minnesota.<sup>3</sup>

Although it has been postulated that many adolescent work injuries may be severe, there are few descriptive data on the severity of adolescent occupational injuries.<sup>4</sup> It has also been suggested that such injuries may be underreported to workers' compensation systems in different states.<sup>5</sup>

In this paper we compare the occupational injury experience of adolescent workers identified through two methods: a survey of public high school students and interviews with adolescents identified via First Reports of Injury compiled by the Minnesota Department of Labor and Industry (DLI). We also evaluate the nature and severity of adolescent work injuries reported to the DLI during the period August 15, 1990, through August 14, 1991. Finally, we analyze the reporting of adolescent work injury events to the DLI, comparing these reports with data obtained from the survey of high school students.

## Methods

### Department of Labor and Industry Reports

Minnesota law requires that employers file a First Report of Injury for individuals who are fully or partially dis-

abled from work for 3 or more days or who have permanent impairment as the result of a work-related injury or illness. Permanent impairment is defined by Minnesota statute for each condition. Data available from the DLI include personal identifiers for the injured worker, information on the source of the injury (e.g., hot oil, knife), the nature of the injury (e.g., cut, fracture), the event type (e.g., fall, explosion), the part of the body injured, and the date of injury.

For this study, we examined all reports for teenagers younger than 18 years at the time of injury who were injured during the period August 15, 1990, through August 14, 1991. Data from the reports were coded according to standards set by the American National Standards Institute (ANSI).<sup>6</sup> Employer and injury data from the reports were compared with data obtained by telephone interviews.

Parents of injured youths received a letter from the DLI explaining the nature of the Minnesota Department of Health study. A consent form asking for permission to obtain medical records and a postage-paid envelope were included with the letter. When telephone contact was made with the parents, information about family finances and

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**Editor's Note.** See related editorial by Pless (p 537) in this issue.

health care insurance was obtained. Permission was also obtained to interview the injured youth. If contact was not made with both a parent and the injured worker, a time was arranged during which the interview could be completed. If there was no contact with any member of the family after six calls, a repeat mailing was sent requesting the family to contact the Department of Health.

Information was obtained from injured workers about their work history, the type of work in which they were engaged at the time of injury, the nature and severity of the injury, events surrounding the injury, and the possible impact of the injury on work, school, athletics, and other extracurricular activities. Injuries were coded according to ANSI guidelines as well as the 9th revision of the *International Classification of Diseases*.<sup>7</sup> Up to four types of injury (e.g., laceration, contusion) and four body parts (e.g., finger, elbow) were coded for each injury event. The source of injury was defined as the object, substance, exposure, or bodily motion that directly produced the injury (e.g., floor, hot oil). Event type (e.g., fall, explosion) was defined as the occurrence that led directly to the injury.

After receipt of a medical release form, the Department of Health obtained medical records from individual health care professionals. The nature and severity of the injury, the need for hospitalization, and permanent sequelae were validated by medical record review. Validation was done by an experienced nurse practitioner trained in medical record validation.

### Survey of High School Students

In a second study, a sample of 3312 students enrolled in Minnesota public schools was selected through a two-stage stratified cluster sampling procedure.<sup>8</sup> For this sampling procedure, a list of all Minnesota public schools was compiled and grouped into strata according to the number of students in the school. Each stratum contained approximately 25% of the public high school population. Ten schools were contacted from each stratum to obtain administrative approval to conduct the survey. Within each school district, one teacher was chosen to coordinate the survey effort. That individual selected one classroom in each of the school's upper grades (10th, 11th, and 12th) to receive the survey. Data from St. Paul included a sample of

**TABLE 1—Sociodemographics of Working Students in the Minnesota High School Work Injury Survey and Students Filing a First Report of Injury**

	High School Survey <sup>a</sup>						First Report of Injury <sup>b</sup>	
	St. Paul		Other Urban <sup>c</sup>		Rural		No.	%
	No.	%	No.	%	No.	%		
<b>Sex</b>								
Female	124	52	365	48	323	47	225	42
Male	116	48	386	52	364	53	309	58
<b>Race</b>								
White	163	68	713	95	665	97	494	92
Asian	34	14	10	1	4	<1	7	1
Other/unknown	43	18	28	4	18	2	33	7
<b>Residence</b>								
Farm	4	2	84	6	503	73	56	10
Non-farm	236	98	667	94	184	27	478	90
Total	240	100	751	100	687	100	534	100

<sup>a</sup>Data represent only students younger than 18 years at the time of the survey. Students in job training and work experience programs are excluded.

<sup>b</sup>Data represent persons younger than 18 years whose work-related injuries were reported to the Minnesota Department of Labor and Industry. Only injuries that occurred between August 15, 1990, and August 14, 1991, were considered in this study.

<sup>c</sup>Urban schools are those in which 13% or fewer students indicated that they lived on a farm.

9th-grade students. Survey questions were identical to those used in telephone interviews of workers with injuries reported to the DLI. Again, event type and source of injury were coded according to the ANSI classification system. Analysis was confined to students younger than 18 years at the time they completed the survey.

### Analysis

Data were analyzed with SPSS software (SPSS Inc, Chicago, Ill) for Unix operating on a Sun computer. Injuries were considered severe if they limited normal activity and/or resulted in missed work for more than 3 days or resulted in permanent impairment from a herniated lumbar disc, amputation, or other chronic problem such as vision loss, hearing loss, or sensory loss. The possible association of injury severity with type of industry, nature of injury, source of injury, and event type was assessed. Significant differences were assessed by means of a chi-square statistic for two-way contingency tables.<sup>8</sup>

For subjects in the high school survey, total hours worked (exposure) were computed from the date a student began working at his or her most recent job or August 1, 1990, whichever occurred later. Accumulation of work hours ended with the date of survey. A severe injury was defined as one causing

the student to miss more than 3 days of normal activity or one that caused a permanent problem. This definition was based on reporting laws in Minnesota that require employers to file a First Report of Injury for individuals who are fully or partially disabled from work for more than 3 days or who have permanent impairment as the result of a work-related injury or illness. Confidence intervals for rate of injury, average hours worked per week, and percent of students working were computed by the jackknife method with data aggregated by classroom.<sup>9</sup>

Estimation of the degree of underreporting of injuries was based on grade- and sex-specific data from the high school survey. These data were used to estimate (1) the percentage of students younger than 18 years in the sample who were working, (2) the percentage who experienced work-related injuries, (3) the percentage of all injuries that were reportable according to Minnesota law, and (4) the total number of reportable injuries for public high school students in Minnesota during the 1990/91 school year.

### Results

A total of 742 adolescent work injuries were reported to the DLI from August 15, 1990, through August 14,

**TABLE 2—Age at First Job and Hours Worked per Week Reported by Adolescents in Minnesota**

	High School Survey <sup>a</sup>				First Report of Injury <sup>b</sup>			
	Females (n = 812)		Males (n = 866)		Females (n = 225)		Males (n = 309)	
	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Age at first job	14.6	14.4, 14.7	14.1	14.0, 14.3	15.1	13.2, 17.0	14.9	12.7, 17.1
Hours/week in August 1990	25.0	23.6, 26.4	30.1	27.8, 32.5	28.9	26.8, 30.9	32.2	30.5, 34.0
Hours/week in 1990/91 school year	15.3	14.2, 16.3	17.1	16.0, 18.3	20.4	19.1, 21.7	22.6	21.3, 23.8

<sup>a</sup>Data represent only students younger than 18 years at the time of the survey. Students in job training and work experience programs are excluded.

<sup>b</sup>Data represent persons younger than 18 years whose work-related injuries were reported to the Minnesota Department of Labor and Industry. Only injuries that occurred between August 15, 1990, and August 14, 1991, were considered in this study.

**TABLE 3—Percentage of Adolescents Performing Specific Types of Work**

Primary Industry	Type of Work	High School Survey <sup>a</sup>		First Report of Injury <sup>b</sup>	
		Females (n = 812)	Males (n = 866)	Females (n = 225)	Males (n = 309)
Agriculture	Farm laborer	5	20	1	1
	Yard keeper/landscaper	3	14	0	2
Construction	Laborer	1	8	0	0
Professional	Nurse's aide	5	<1	7	4
Restaurant	Dish buser	11	10	7	6
	Carhop	13	7	8	13
	Cashier	35	16	14	14
	Fast-food cook	9	8	14	12
	Short-order cook	7	11	7	11
	Dishwasher	12	12	11	13
Wholesale/retail	Waiter/waitress	19	1	5	4
	Janitor	9	15	45	43
	Sales clerk	12	5	2	2
	Stock clerk	5	8	15	16
	Bagger/carry-out person	3	8	15	16

Note. Numbers are percentages of column n's

<sup>a</sup>Data represent only students younger than 18 years at the time of the survey.

<sup>b</sup>Data represent persons younger than 18 years whose work-related injuries were reported to the Minnesota Department of Labor and Industry. Only injuries that occurred between August 15, 1990, and August 14, 1991, were considered in this study.

<sup>c</sup>Each participant indicated from one to three activities that best described the work done on the job; therefore percentages may total to more than 100.

1991. For 78 workers (10.5%), neither the worker nor a parent could be reached after repeated attempts by telephone and mail. Of the remaining 664 workers, participation was refused by 47 parents or guardians (7.1%). Contact with 83 parents (12.5%) resulted in a brief interview with the

parent only. Therefore, complete survey information was provided by 534 of 664 study participants (80.4%). According to information from the First Reports of Injury, no significant differences in age, sex, nature of injury, or industry of employment were seen between the 208 nonparticipants or incomplete partici-

pants and those who completed the entire interview process. These 208 were excluded from further analysis.

Medical records were obtained from 17% of the participants. The only discrepancy between participant interviews and medical records concerned the presence of permanent impairment. The concordance between the reports of study subjects and medical records on permanent sequelae was 63%. Information was not available in the medical record to make a decision about permanent sequelae in 24% of the cases.

Tables 1, 2, and 3 compare the sociodemographic characteristics, work profiles, and job activities of the 534 subjects who had injuries reported to the DLI with those of subjects from the high school survey. Except for subjects from St. Paul, the two samples had similar age, race, and sex distributions for working adolescents. More jobs such as janitor, stock clerk, and bagger occurred in the job descriptions of the DLI sample. School survey respondents from St. Paul were different from all other school survey respondents and from the DLI sample in the following ways: (1) a higher percentage of students were from minority groups and (2) fewer students reported living on farms.

Table 4 shows the injuries most commonly reported to the DLI that resulted in altered activity such as missing school or missing work. In order of frequency of occurrence, these injuries were strains and sprains, cuts and lacerations, burns, bruises and contusions, and fractures. These five groups accounted for 96% of the injuries.

In addition to being the most frequent injury, sprains and strains were the most common cause of severe injury. Injuries to the low and mid back accounted for 73% (147) of all sprain and strain injuries. Most back injuries occurred in janitorial work (48%) and nursing work (21%).

The likelihood of sustaining a back injury was positively associated with the amount of weight individuals lifted at work ( $\chi^2 = 17.1, P < .0001$ ). Of the 157 severe injuries, 61 were to the back ( $\chi^2 = 14.3, P < .001$ ), and 13 workers reported injuries to the lumbar disc. Larger individuals tended to lift larger amounts of weight than smaller workers. Whether size was determined by body weight ( $\chi^2 = 8.1, P < .005$ ) or body mass index<sup>10</sup> ( $\chi^2 = 7.9, P < .005$ ), back injuries were more common in smaller workers than larger workers. For those

suffering from severe back injuries, there was a trend for smaller individuals to have more serious lifting injuries than their larger peers. No other injuries were associated with the size of the worker.

Lacerations, cuts, and abrasions were the second most common injuries and most frequently affected the hand (16%) and fingers (61%). Lacerations were often less severe than other injuries. No specific industry or job activity appeared to place workers at increased risk for these types of injury. Although few in number, those working as butchers tended to have severe lacerations.

Burns were the third most common injury. Although only 13% of all injuries were burns, burns contributed to 36% of hospitalizations. Fast-food and full-service restaurants contributed 28 (39%) and 26 (37%) burns, respectively. The most common sources of burn injuries in fast-food restaurants were cooking oils and grills and other cooking equipment. In full-service restaurants, the most common sources of burn injuries were cooking oils and hot water.

Sixty-seven individuals sustained bruises and contusions. These injuries tended to be less severe than others. The most commonly affected sites were the hand and fingers (25%), knee and arm (16% each), and back (15%). The most common event types were being struck by or against objects (37%) and falls (38%). These injuries were positively associated with two jobs: bagger and stock clerk.

Forty-seven individuals sustained fractures, and these injuries were often severe ( $\chi^2 = 18.4, P < .001$ ). The most commonly affected site was the finger (43%), followed by the foot and toe (19%). Other significant sites included the skull, face, neck, and back. No specific industry appeared to place individuals at increased risk for fracture injuries.

Eighty workers (15%) indicated that they had permanent impairment as a result of their injuries (Table 5). There were no statistically significant associations between permanent impairments (e.g., amputations) and school days missed. However, the amount of school missed was associated with injury to the back and neck, but not to other body areas. Burns and strains and sprains were the injury types that most commonly resulted in missed school days.

Data from the high school survey were used to calculate the rate of injuries that resulted in adverse out-

**TABLE 4—Nature and Consequences of Injuries to Adolescent Workers Most Commonly Reported to the Minnesota Department of Labor and Industry (DLI)**

Result	Strains and Sprains (n = 201)	Cuts and Lacerations (n = 129)	Burns (n = 70)	Bruises and Contusions (n = 67)	Fractures (n = 47)	All Injuries (n = 534)
<b>Limited activity days</b>						
<4	34 <sup>a</sup>	65	43	59	19	44 <sup>a</sup>
4-13	15	13	27	13	6	15
14-29	20	11	17	18	26	18
30+	31	11	13	10	49	23
<b>Missed school days</b>						
0	65	87	68	68	68	72 <sup>a</sup>
<2	11	8	9	15	15	10
2-7	17	5	14	15	11	14
8-90	7	0	9	2	6	4
<b>Missed work days</b>						
0	17	23	19	21	11	17
<4	25	42	23	45	17	30
4-13	15	19	21	12	11	16
14-29	30	11	24	18	23	23
30+	13	5	13	4	38	14

Note. Numbers are percentages of column n's. The five types of injury shown here accounted for 514 (96%) of the 534 injuries for which DLI information was complete. Data for the remaining 20 injuries (not shown) were taken into account in computing the percentages shown for all injuries.  
<sup>a</sup>Includes one person for whom injury severity data were incomplete.

**TABLE 5—Characteristics of Permanent Impairments for Adolescents with Work Injuries Reported to the Minnesota Department of Labor and Industry**

Characteristic	No. of Injuries in Each Category Possessing Characteristic					All Injuries <sup>a</sup>
	Strains and Sprains	Cuts and Lacerations	Burns	Fractures	Amputations	
Chronic pain	13	1	0	3	0	21
Scarring	0	11	31	2	1	45
<b>Limited use of</b>						
Finger(s) or hand(s)	1	6	0	5	3	15
Arm(s)	1	0	0	0	0	2
Leg(s)	1	0	0	1	0	2
Sensory loss	1	6	0	0	1	10

<sup>a</sup>A total of 80 workers reported some type of permanent impairment. The numbers in this column total to more than 80 because some workers reported multiple impairments.

comes: 16 per 100 000 hours worked for all urban and rural students (95% confidence interval = 12, 19). Although it was not statistically significant, there was a trend for an inverse relationship between risk of injury and grade level. That is, fewer job injuries were observed at higher grade levels.

An estimated 2% of all working students had injuries that resulted in more than 3 days of limited activity and

at least some missed work. There were 189 000 public school students in grades 9 through 12 in the 1990/91 school year in Minnesota,<sup>11</sup> and the results of the high school survey indicated that 60% of public high school students (113 400) held a regular job at some time during the study period. Therefore, our results suggest that 2268 reportable injuries occurred to adolescents during the study year ( $0.60 \times 189\,000 \times 0.02 = 2268$ ).

## Discussion

This study provided the opportunity to evaluate adolescent work injuries by two methods. The DLI study allowed for an evaluation of the nature and severity of adolescent work injuries, and the school survey provided information on the proportion of adolescents who work and the frequency of adolescent work-related injuries. The DLI study was constrained by probable underreporting and a small number of injuries. The school survey was limited by administrative constraints in obtaining a truly random sample of public high schools. Students from the larger population centers constituted 30% of the school survey population, compared with 41% of the 1990 Minnesota student population.

The primary source of data for the DLI is the First Report of Injury submitted by employers and insurance carriers to the state. In Minnesota, there has been no independent audit of the completeness of workers' compensation reporting by employers. Because the primary reason for reporting is missed work time, use of this measure alone may be misleading if workers return to work prematurely or in a limited capacity.<sup>5,12,13</sup>

In the school survey, disability was measured by the length of time the injury limited a worker's normal activities, the duration of missed work and/or school, and the presence of permanent sequelae. In the DLI study, disability was measured by the duration of missed work and/or school and the presence of permanent sequelae. Each of these methods portrayed a slightly different picture of injury-related disability. Although missed work was the most common limitation experienced by workers whose injuries were reported to the DLI, approximately 12% of the study subjects reported having missed no work.

This study suggests that two thirds of adolescent work injuries were not reported to the Minnesota DLI. This estimate is conservative for several reasons: (1) A large number of adolescent work injuries reported to the DLI did not result in missed work. (2) Agriculture-related work injuries constituted only 1% of all adolescent injuries reported to the DLI, and approximately 40% of male students in rural Minnesota were engaged in agricultural work according to the school survey. (3) There was a 3% high school dropout rate

during the 1989/90 school year. Neither these individuals nor individuals who left school in previous years were included in estimates of the number of high school workers or the population upon which this estimate was based. The risk of injury to those who left school is unknown.

Sample size limited our ability to assess the effect of age and stature on injury occurrence and severity. When age was controlled, smaller workers did, however, experience back injuries more frequently and have more severe injuries than larger workers.

Although the epidemiology of low back pain in adolescents is not well understood, it is a matter of concern that approximately 9% of all acute back injuries resulted in herniated lumbar intervertebral discs. A recent prospective survey of 1246 students<sup>14</sup> indicated that 22% of adolescents experienced low back pain within the previous 12 months, and the risk of experiencing low back pain increased with age. This estimate is similar to the 26% reported in a study of secondary school students in Britain.<sup>15</sup> Data from the Minnesota high school survey suggest that 2% of all high school students may experience a work-related back injury each year. This estimate suggests that work contributes to, but is not a primary cause of, back pain in adolescents.

In past studies, burns constituted approximately 11.4% of work-related injuries to adolescents vs 1.8% of all occupational injuries.<sup>3</sup> According to data compiled by the New England Regional Burn Center, for burns requiring hospitalization, 25% of burns to boys and 19% of burns to girls aged 16 through 19 years were work-related. The rate for work-related burns was 143 per 100 000 for boys and 15 per 100 000 for girls.<sup>16</sup> No explanation was presented for the large discrepancy between boys and girls.

In general, work-related burns appear to be a substantial but largely neglected problem in the working population.<sup>16</sup> Existing studies suggest that Black men, food preparers, and younger workers are among those at high risk for work-related burns. Although scalding is the most common cause of industrial burns, flame and electrical burns are the most severe.<sup>17</sup> Grease burns constitute about 8% of all burn injuries in Utah and frequently result in admission to hospital burn units.<sup>18</sup> Deep-fat-fryer oils are maintained at approximately 350°F

(177°C), and some filtering systems require as many as four steps of lifting and pouring hot oils.<sup>18</sup> The disposal of oils may require that large quantities of oil be carried in a bucket by hand. No protective equipment is used during either process. Hot oil accounted for 35% of all burn injuries in the DLI study.

Serious work-related injuries were identified in the course of this study. These included numerous cases of herniated intervertebral discs, burns, traumatic brain injuries, and amputations. These data suggest that adolescent work injuries may be a serious problem deserving increased attention. Similarities between the two study samples support underreporting of adolescent work injuries to the DLI. Currently, there is a lack of even the most basic descriptive information on adolescent and child employment in the United States.<sup>4</sup> Owing to the sporadic nature of adolescent work, information on adolescent work and occupational injuries should be obtained by population-based surveys. Estimates based on workers' compensation data leave doubts about the completeness of case ascertainment. □

## References

1. Schober SE, Handke JL, Halperin WE, Moll MB, Thun MJ. Work-related injuries to minors. *Am J Ind Med.* 1988;14:585-595.
2. Brooks DR, Davis LK, Gallagher SS. Work-related injuries among Massachusetts children: a study based on emergency department data. *Am J Ind Med.* 1993;24:313-324.
3. Parker DL, Clay RL, Mandel JH, Gundersen P, Salkowicz L. Adolescent occupational injuries in Minnesota. *Minn Med.* 1991;74:25-28.
4. Pollack SH, Landrigan PJ. Child labor in 1990: prevalence and health hazards. *Annu Rev Public Health.* 1990;11:359-375.
5. *Position Papers from the Third National Injury Control Conference.* Atlanta, Ga: Centers for Disease Control; April 1992.
6. National Safety Council and Association of Casualty and Surety Companies. *Method of Recording Basic Facts Relating to the Nature and Occurrence of Work Injuries.* New York, NY: American National Standards Institute; October 4, 1962.
7. *The International Classification of Diseases.* 9th Revision, Clinical Modification. Hyattsville, Md: National Center for Health Statistics; 1980. DHHS publication PHS 80-1260.
8. Conover WJ. *Practical Nonparametric Statistics.* 2nd ed. New York, NY: John Wiley & Sons Inc; 1980:183.
9. Cochran WG. *Sampling Techniques.* 3rd ed. New York, NY: John Wiley & Sons Inc; 1977:174-180.

10. Kahn HS. A major error in nomograms for estimating body mass index. *Am J Clin Nutr.* 1991;54:435-437.
11. *Annual Public School Enrollment Report.* St. Paul, Minn: Minnesota Department of Education; October 1990.
12. National Research Council. *Injury in America: A Continuing Public Health Problem.* Washington, DC: National Academy Press; 1985.
13. *Occupational Safety and Health Statistics, Part II: Supplementary Data System.* Washington, DC: US Dept of Labor, Bureau of Labor Statistics. Handbook of Methods, Bulletin 2134-1.
14. Olsen TL, Anderson RL, Dearwater SR, et al. The epidemiology of low back pain in an adolescent population. *Am J Public Health.* 1992;82:606-609.
15. Fairbank JCT, Pynsent PB, Van Poortvliet JA, Phillips H. Influence of anthropometric factors and joint laxity in the incidence of adolescent back pain. *Spine.* 1984;9:461-464.
16. Rossignol AM, Locke JA, Burke JF. Employment status and the frequency and causes of burn injuries in New England. *J Occup Med.* 1989;31:751-757.
17. Pegg SP, Seawright AA. Burns due to cooking oils—an increasing hazard. *Burns.* 1983;9:362-369.
18. Hayes-Lundy C, Ward S, Saffle JR, Reddy R, Warden GD, Schnebly WA. Grease burns at fast-food restaurants: adolescents at risk. *J Burn Care Rehabil.* 1991;12:203-208.

## American Congress of Rehabilitation Medicine to Hold Annual Meeting in June

The American Congress of Rehabilitation Medicine (ACRM) will hold its 71st annual meeting, "Benefits of Rehabilitation—Measure for Measure," June 10 through 12, 1994, at the Hyatt Regency Minneapolis in Minneapolis, Minnesota. The latest theories and techniques in outcome measurement will be featured. The meeting will be an opportunity to showcase what rehabilitation professionals do know about the benefits of rehabilitation and to suggest what still must be demonstrated about the cost-effectiveness of rehabilitation care. The conference is designed for members of ACRM and other healthcare professionals with the responsibilities of delivering high-

quality rehabilitation services and achieving positive outcomes for patients.

The education program will feature a variety of presentation methods, including breakfast focus sessions with small-group participation, courses led by experts in specialized areas of study, symposia and scientifically-based panel presentations, workshops providing hands-on experience, and scientific paper and poster presentations. Content will cut across all rehabilitation professions, roles and practice settings.

For more information, contact the ACRM, 5700 Old Orchard Rd, First Floor, Skokie, IL 60077-1057; tel (708) 966-0095; fax (708) 966-9418.