Back Injury in Municipal Workers: A Case–Control Study

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ABSTRACT

Objectives. The purpose of this study was to identify factors associated with acute low back injury among municipal employees of a large city.

Methods. For each of 200 injured case patients, 2 coworker controls were randomly selected, the first matched on gender, job, and department and the second matched on gender and job classification. In-person interviews were conducted to collect data on demographics, work history, work characteristics, work injuries, back pain, psychosocial and work organization, health behaviors, and anthropometric and ergonomic factors related to the job. Psychosocial work organization variables were examined with factor analysis techniques; an aggregate value for job strain was entered into the final model. Risk factors were examined via multivariate logistic regression techniques.

Results. High job strain was the most important factor affecting back injury (odds ratio [OR] = 2.12, 95% confidence interval [CI] = 1.28, 3.52), and it showed a significant dose–response effect. Body mass index (OR = 1.54, 95% CI = 1.08, 2.18) and a work movement index (twisting, extended reaching, and stooping) (OR = 1.42, 95% CI = 0.97, 2.08) were also significant factors.

Conclusions. Results suggest that increasing workers' control over their jobs reduces levels of job strain. Ergonomic strategies and worksite health promotion may help reduce other risk factors. (*Am J Public Health.* 1999;89:1036–1041)

Low back injuries cause more absence from work than any other injury or disease.[1] In 1992, 792 000 back injuries accounted for 24% of all work-related injuries.[2] Compensation for back injury was higher than for all work-related injuries, at $36 billion, or 31% of total compensation costs.[2] The National Council on Compensation Insurance estimated the average cost of a single on-the-job back injury in 1990 at $24 080.[3] Rates of low back injury vary widely by industry and occupation, with one study reporting that the highest rates per 100 workers occurred in miscellaneous laborers (12.3/100) and garbage collectors (11.1/100).[1]

Municipal workers represent a group of workers at particular risk for all injuries, because many work outdoors in a wide variety of high-risk activities and locations. Although three fourths of all fatal work injuries occur outdoors,[4] little research has focused on injuries in unstructured environments such as those common among municipal workers. One study showed that workers in the New York City Department of Sanitation had overall injury rates that were 20 times the US average and that back injuries alone were the largest cause of injury and days lost from work.[5]

Studies have demonstrated that work-related stress is associated with low back injuries. Risk factors include frequent job changes[6,7]; briefer periods of adaptation to new jobs[8]; repetitive work requiring little concentration and offering little control over procedure and tempo[9–11]; and work conditions involving low peer cohesion, physical comfort, and job clarity.[12] In a major literature review, Bongers and associates suggested that psychological job demands, work control, and social support are associated with low back pain.[13] Most studies are cross sectional and do not consider these job factors together. Karasek and Theorell, however, developed a demand–control–support model of job strain that provides for assessment of job strain, a combination of high psychological demands and minimal control over one's work.[14]

Low back injuries, particularly those occurring outside of industrial settings, involve multiple interacting causes that have not been studied within a comprehensive framework. Most studies of back injuries have been conducted in highly structured work environments such as assembly plants. This study examined the effects of anthropometric, ergonomic, and psychosocial factors on the risk of low back injury among municipal workers who perform a wide variety of tasks.

Methods

Study Design

A case–control study was conducted among workers for the city of Baltimore, Md, through its Office of Occupational Medicine and Safety. Four departments that together

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include almost half of all city workers were selected for inclusion in the study: Education, Public Works, Recreation and Parks, and Transportation. The Department of Education was selected because it had the largest number of employees and therefore a large number of back injuries, although the rate of injuries was low. The other 3 departments were chosen because of their high rates of back injury, determined in a preliminary survey.

Injured workers who had been assigned restricted activity or had lost time beyond the day of back injury between March 1, 1990, and April 1, 1991, were identified from clinic records. All workers from the 4 departments are required to report any work-related injury to the city's Occupational Medicine Clinic. A case patient was defined as a worker who experienced acute onset of symptoms of low back pain or muscle strain associated with work activity or a traumatic event in the workplace and who exhibited 1 or more of the following signs: pain upon flexion, extension, or rotation; muscle spasm or tender areas; positive straight leg–raising sign (pain on raising the leg straight up); asymmetry in the reflexes of lower extremities; differences in sensory modalities in lower extremities; or restricted range of motion.

For each case patient, 2 noninjured controls were selected at random from city personnel records. The first control was matched to the case patient by department, job, gender, and having been at work on the day the case patient was injured. The second control was similarly matched, except that he or she could be employed in any of the 4 departments; the specific job might differ even though the broad job classification had to be the same. For example, the first control for a case patient who drove a sanitation truck would be another sanitation truck driver in the same department. The second control could have been employed as a driver in any of the 4 departments; he or she would have the same job classification ("laborer-chauffeur") in another department (e.g., delivering parcels or transporting workers to a worksite).

The rationale for using 2 sets of controls was that the first set would be closely matched according to work tasks and could therefore be used to examine the importance of nonergonomic factors; the second set of controls, with more variation according to the exact nature of the job, was expected to provide an opportunity to measure the effect of differences in job tasks. Individuals included in this second set of controls, however, were found to be sufficiently similar to the first group, such that they were combined for many analyses. To be eligible, neither case patients nor controls could have had a back injury or back pain in the previous 12 months that caused lost time or restricted duty. The study was limited to full-time employees. In-person interviews of 200 case patients and 400 controls were conducted within 10 days of the injury.

The questionnaire, finalized after a pilot study designed to test it, contained variables related to work history, work characteristics, work injuries, back pain, psychosocial and work organization, health behaviors, and demographics. The Job Content Questionnaire, a previously standardized and widely used instrument, was used to measure the psychosocial work environment. Questions for the psychosocial work organization section of the interview were based on the instrument developed by Karasek and Theorell.[14] The Work Control Scale is a linear combination of 9 items, each with 4 response categories scaled from strongly disagree (1) to strongly agree (4). The items inquired as to whether the respondent's work activities involved possibility for flexibility, exercise of skill and creativity, opportunity to learn new things, and freedom to make decisions. The Psychological Job Demands Scale consists of 9 items that measure quantitative (speed, pace, intensity, amount) and qualitative (interruptions and conflicts) aspects of performance demands.

Anthropometric data were also obtained by the interviewers, who had been trained to measure weight and the circumference of the worker's wrist, upper arm, and waist. The method for measuring ergonomic factors, including the most strenuous task assignments and generic working postures, has been described elsewhere.[15]

Case patients and controls were asked to identify the 4 most strenuous physical activities performed in the course of a typical workday. They then described each of the 4 tasks with regard to type of exertion (e.g., lift, push, carry) and other characteristics (hand forces, exertion frequency, magnitude of weight lifted). As a means of examining the potential effects of workload and compressive force on the risk of low back injury, workers were questioned as to the specific work postures and activities they considered most strenuous and were asked to identify postures by referring to stick-figure icons.

On the basis of the worker's specific job title and the *Dictionary of Occupational Titles* Classification of Jobs,[16] the strenuousness of each worker's job was classified as light, medium, or heavy, as indicated by lifting weight capacity and frequency and the duration of sitting–standing–walking activity. The lifting weight capacity standards, for example, define "light" as a maximum of 20 lb (9 kg) occasionally and 10 lb (4.5 kg) frequently, "medium" as a maximum of 50 lb (22.5 kg) occasionally and 25 lb (11.25 kg) frequently, and "heavy" as a maximum of 100 lb (45 kg) occasionally and 50 (22.5 kg) frequently. "Occasionally" was defined as an activity or condition that occurs up to one third of the time; "frequently" was defined as an activity or condition that occurs more than one third of the time.

Statistical Analysis

Using Statistical Analysis System software,[17] we first analyzed information on work characteristics, psychosocial factors, demographics, and medical conditions separately. We fitted conditional and unconditional logistic regression models by means of the PECAN procedure of EGRET.[18] Models included information on ergonomics, psychosocial factors, demographics, and medical conditions.

We used variables identified as statistically significant from the sub–data set analysis that was used to obtain reduced and final models (both unconditional and conditional logistic regression models on case patient vs first control, case patient vs second control, and case patient vs both controls). We screened 2-way, 3-way, and 4-way interaction terms via a stepwise strategy. Although this was a paired matched case–control study, unconditional logistic regression models were also fitted to increase the study power at the cost of potential bias toward unity in the estimated odds ratios (ORs).[19,20]

We reduced the final models by constructing several aggregate variables. We computed a work movement index by pooling the 3 activities most associated with back pain: twisting, extended reaching, and stooping. We calculated body mass index (BMI) by dividing body weight in kilograms by height in meters squared.

We constructed psychosocial variables measuring psychological job demands, work control, and job strain with the Job Content Questionnaire,[14] following the established protocols.[21] A factor analysis and reliability assessments were conducted to examine the utility of using the Job Content Questionnaire with this particular study sample; the results indicated excellent factorial validity and internal consistency. All psychosocial variables were grouped into dichotomous variables (on the basis of median values) or into 3 categorical variables (on the basis of tertiles). The results of the bivariate analyses have been presented in detail elsewhere.[22] Introduced into the final models from the psychosocial sub–data set was an aggregate variable measuring job strain, created by combining psychological demands and work control following Karasek and Theorell's model. Strain results from the interaction of

TABLE 1—Description of Back Injury Case Patients and Controls, by Selected Variables: Municipal Workers in Baltimore, Maryland, 1990–1991

Characteristic	Case Patients (n = 200), No. (%)	Control 1[a] (n = 200), No. (%)	Control 2[b] (n = 200), No. (%)
Worked for city ≤1 y	17 (8.5)	6 (3.0)	10 (5.0)
Injured in year prior to study	96 (48.0)	37 (18.5)	37 (18.5)
Current smoker	98 (49.0)	103 (51.5)	91 (45.5)
≥5 alcohol drinks on 1 occasion in past month			
Yes	34 (17.0)	35 (17.5)	35 (17.5)
No	64 (32.0)	65 (32.5)	56 (28.0)
No response	102 (51.0)	100 (50.0)	109 (54.5)
Always/usually use seat belt	146 (73.0)	127 (63.5)	140 (70.0)
Twist torso often	92 (46.0)	79 (39.5)	84 (42.0)
Extend reach often	95 (47.5)	78 (39.0)	83 (41.5)
Stoop often	80 (40.0)	56 (28.0)	52 (26.0)
Physical work demands			
Light	51 (25.5)	50 (25.0)	56 (28.0)
Medium	52 (26.0)	58 (29.0)	53 (26.5)
Heavy	97 (48.5)	91 (45.5)	91 (45.5)

[a]Matched on department and job title.
[b]Matched on job title only.

demands and control; as demands increase and control decreases, aversive strain is predicted to occur.

A 3-level ordinal form of job strain was created from a 9-cell matrix constructed from the 3 levels of control and psychological demands. Each of these 9 cells was then classified into 1 of the 3 levels of strain on the basis of the demand–control–support model.[23] High strain represents an excess of job demands over control; medium strain is the condition in which demands are equal to the possibilities of control; and low strain represents an excess of control over demands.

Results

Study Population

Two hundred seventy-four cases of low back injury were identified among the 4 departments over a 13-month period (March 1, 1990, through April 1, 1991). Sixty-nine injured workers (25%) refused to participate, and 5 (2%) could not be contacted or were too ill to participate. The overall response rate was 73%. Workers who declined to participate did not differ significantly from case patients with regard to mean age or gender. Thirty-three (48%) of the 69 who refused were injured by motor vehicles. Many refusals were at the request of workers' legal counsel.

Annualized incidence rates of back injury per 1000 employees were 36 for Public Works, 31 for Recreation and Parks, 24 for Transportation, and 5 for Education. The case patients and controls were matched on gender, resulting in 49 sets of women and 151 sets of men.

Case patients were younger than controls. Their mean age was 38.7 years, as opposed to 40.8 years for the first group of controls ($P < .05$) and 41.1 years for the second group of controls ($P < .03$). Mean weights were 84.9 kg for case patients and 81.4 kg for controls ($P < .01$). Mean BMIs for the 2 groups were 27.9 and 27.0, respectively ($P < .05$).

Time Off Work or Assignment to Restricted Duty

The mean time off work owing to injury was 16 days (median = 7 days). Forty-two case patients (21%) did not require time away from work but were assigned to restricted duty (mean = 14 days, median = 5 days).

Ergonomic Factors

According to the job classification, almost half (47%) of the case patients and controls had jobs with heavy physical demands; 27% had jobs with medium demands, and 26% had jobs with light demands.[16] No significant difference between case patients and controls was found in this variable (Table 1), a result of matching on jobs. About half of the case patients and controls reported that their most strenuous typical activity involved lifting.

More case patients than controls reported spending 2 hours or more each day stooping (24% of case patients vs 17% of controls; $P = .07$), and more case patients than controls spent 2 hours or more squatting (13% vs 7%; $P < .05$).

Unconditional logistic models adjusted for age and using those "never exposed" as a reference group revealed that among the work movement variables, "often" extended reach was associated with a significantly increased risk of back injury (OR = 2.04, 95% confidence interval [CI] = 1.13, 3.67) (Table 2), as were "often" twisting (OR = 1.8, 95% CI = 0.98, 3.32) and "often" stooping (OR = 1.59, 95% CI = 1.01, 2.48). The specific questions related to these 3 movements were (1) "How often do you twist your torso without moving your feet?" (2) "How often do you perform extended reaches with arms nearly straight?" and (3) "How often do you stand stooped over while performing work with your hands located at or below the level of your knees?" A positive work movement index was assigned to any worker who answered "often" to 1 or more of these 3 questions.

Case patients and controls described the 4 most strenuous tasks performed in the course of a typical workday. As assessed via the equations contained in the National Institute for Occupational Safety and Health's (NIOSH) *Work Practices Guide for Manual Lifting*,[24] the most strenuous typical activities ranged between the action limit (which represents nominal risk to most individuals in the workforce) and the maximum permissible limit (3 times the action limit). For both case patients and controls, the median load for the most strenuous task was 2.3 times the action limit.

Injured workers also described the task being performed at the time of injury. The average load:action limit ratio for the task that produced a low back injury exceeded the maximum permissible limit and was nearly twice that of the most strenuous typical activity. Only 19% of the injuries occurred with 1 of the 4 types of tasks reported by the case patient to be the most strenuous activities in a typical workday. High load:action limit ratios that were found with tasks provoking injury were strongly associated with high levels of lumbar spine compressive force, suggesting that elevations in load:action limit ratios were due to mechanical loading rather than increased aerobic demand.

Multivariate Analysis

A significant dose–response effect was found with job strain and risk of low back injury (Table 3). When persons with low job strain were used as the reference group, the likelihood of low back injury was about 1.7 times as high for the medium job strain group and 2.1 for the high job strain group, after adjustment for other variables. Risk of low back injury increased by 54% as BMI increased by 1 unit. This corresponded, when other variables were held constant, to a 54% increase in back injury risk for a 7-lb (3.15-kg) weight increase in an individual 5 ft 10 in (1.78 m) tall and weighing 170 lb (76.5 kg). Workers who responded "often" to questions related to frequency of stooping, twisting, or extended reaching had a 42% increase in likelihood of injury. The odds of low back injury decreased by 2% with each 1-year increase in age (this finding was marginally significant).

TABLE 2—Estimated Odds Ratios for Work Movement Variables: Municipal Workers in Baltimore, Maryland, 1990–1991

Variable	Response	Odds Ratio[a]	95% Confidence Interval
Lift	Sometimes	0.86	0.33, 2.25
	Often	1.01	0.39, 2.59
Lower	Sometimes	0.58	0.32, 1.05
	Often	0.81	0.46, 1.43
Push	Sometimes	0.83	0.48, 1.45
	Often	1.27	0.75, 2.16
Pull	Sometimes	0.79	0.46, 1.38
	Often	1.23	0.73, 2.10
Press	Sometimes	1.05	0.72, 1.51
	Often	1.22	0.73, 2.03
Carry	Sometimes	1.27	0.58, 2.77
	Often	1.39	0.65, 2.97
Twist	Sometimes	1.68	0.91, 3.10
	Often	1.80	0.98, 3.32
Extended reach	Sometimes	1.76	0.98, 3.19
	Often	2.04	1.13, 3.67
Elevated reach	Sometimes	0.89	0.57, 1.39
	Often	1.18	0.74, 1.90
Bend forward	Sometimes	1.16	0.39, 3.39
	Often	1.46	0.52, 4.14
Bend to side	Sometimes	1.22	0.78, 1.92
	Often	1.35	0.84, 2.16
Stoop	Sometimes	0.85	0.54, 1.34
	Often	1.59	1.01, 2.48

Note. All values are from unconditional logistic models; those workers responding "never" were the reference group, and age was adjusted.
[a]For both control groups combined.

Discussion

Our findings, along with those of other investigators, underscore the importance of adopting a model that does not focus entirely on physical factors in relation to the multifactorial problem of back injury. On the basis of the 7-fold difference among municipal departments in back injury rates, however, it is likely that if controls had not been matched on job category, physical aspects of the jobs would have been found to be far more prominent. It is important to distinguish between psychological factors that are attributes of an individual (e.g., his or her personality, mood, and attitudes concerning work, such as job satisfaction) and the psychosocial structure of a work organization itself. The demand–control–support model focuses on distinguishing properties of the work environment that can be thought of as objectively stressful. The results demonstrate the value of the demand–control–support model[14] and the deleterious effect on back injury risk of job strain, the combination of high psychological demands and low control over one's work.

Few studies have used the demand–control–support model to examine the etiological significance of job strain for low back injury.[14] One component of Karasek's Job Content Questionnaire,[21] used in our study, is the Work Social-Support Scale that measures supervisor support and coworker support. Bigos et al.[25] reported the use of a modified family APGAR (adaptability, partnership, growth, affection, resolve), referred to as the work APGAR, to examine perceptions of support at the workplace. Similar to our findings, those of Bigos et al. showed that these work APGAR variables had the strongest influence of all variables on the occurrence of acute back injury. Control over work and autonomy on the job have consistently been found to be among the strongest predictors of well-being at work.[26]

Nachemson's[27] critical review of low back pain emphasizes that psychosocial factors play a more important role than the extensively studied mechanical factors. In a study conducted among Scandinavian female health care personnel, social support and job strain were examined in relation to musculoskeletal pain (low back, neck, and shoulder); findings revealed that the higher the job strain, the more symptoms in the low back.[28] In a prospective study of 902 blue- and white-collar workers in the metal industry, work-related psychosocial factors predicted changes in the occurrence of musculoskeletal disorders when age, gender, social class, and physical workload were controlled.[29]

Using the work movement index to measure risk of low back injury is intuitively plausible; the potential usefulness of this simple index may merit its validation for use by other investigators. Activities involving twisting, extended reaching, and stooping, the 3 activities incorporated in the work movement index, appear to be more harmful to the low back than other activities. Lüra et al. reported that a physical exposure index (composed of exposure to bending and lifting, operating vibrating vehicles or equipment, and working with the back in an awkward position) was associated with 2 to 3 times the likelihood of long-term back problems.[30] Frequent bending and twisting have been reported by others[7,28,31,32] to be associated with low back disorders. Working with the back in an awkward position has been shown to double the likelihood of long-term back problems in blue- and white-collar occupations.[28] Other investigators have explored the materials-handling capabilities of subjects in a variety of nonstandard postures[33] and have examined the postural effects on biomechanical and psychophysical weight-lifting limits.[34]

BMI is a good measure of obesity and a crude measure of physical fitness. Increased risk with increasing BMI suggests that weight management is protective against not only cardiovascular disease but also low back injury. We found that a greater BMI was associated with low back injury. Other investigators have found that those who are underweight[35] or have a low body mass[36] are also more likely to sustain a low back injury. Ryden and colleagues' explanation was that those with small stature may have a decreased capability of managing heavy loads; obesity had a protective effect in this study.[35]

Conclusions

All of the risk factors for low back injury identified in this study are modifiable, with the exception of age. Our findings indicate that the psychosocial work environment

TABLE 3—Factors Associated With Low Back Injury: Municipal Workers in Baltimore, Maryland, 1990–1991

	Unmatched Analysis		Matched Analysis	
Variable	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Case patient vs first control				
Medium job strain	1.36	0.86, 2.15	1.27	0.78, 2.08
High job strain	1.76	1.01, 3.07	1.74	0.97, 3.13
Body mass index	1.47	0.99, 2.19	1.46	0.98, 2.18
Work movement index	1.42	0.94, 2.15	1.51	0.96, 2.37
Age[a]	0.99	0.97, 1.01	0.99	0.97, 1.01
Case patient vs second control				
Medium job strain	2.16	1.35, 3.46	2.47	1.46, 4.21
High job strain	2.40	1.34, 4.23	2.49	1.31, 4.74
Body mass index	1.67	1.11, 2.52	1.88	1.11, 3.20
Work movement index	1.39	0.90, 2.13	1.34	0.86, 2.11
Age[a]	0.99	0.97, 1.01	0.98	0.96, 1.00
Case patient vs both controls				
Medium job strain	1.69	1.13, 2.53	1.73	1.14, 2.63
High job strain	2.04	1.27, 3.29	2.12	1.28, 3.52
Body mass index	1.54	1.09, 2.16	1.54	1.08, 2.18
Work movement index	1.40	0.97, 2.02	1.42	0.97, 2.08
Age[a]	0.99	0.97, 1.00	0.98	0.97, 1.00

Note. Estimated odds ratios and 95% confidence intervals were derived from the final logistic regression models.
[a]In 1-year increments.

is very important and that giving workers greater decision latitude in their work and more control over their work environment is beneficial in the prevention of low back injury. Health promotion activities that emphasize weight control and fitness are also of possible benefit.

Complaints about poor design, storage, and transport of tools and equipment were abundant throughout both individual worker recommendations and notes from safety engineers and ergonomists who inspected injury sites. Comprehensive programs should include reducing the physical demands of jobs and empowering employees to develop and use strategies and equipment that reduce the strenuousness of their jobs. Tasks that involve handling extremely heavy loads or awkward positions and movements, such as stooping, twisting, and bending, should be modified.

Haag's review[37] points out that employers implementing ergonomic programs not only have lowered recordable injuries, saved hundreds of thousands of dollars in labor and materials, and reduced turnover but also have increased productivity and quality. NIOSH guidelines categorize lifting tasks between the action limit and the maximum permissible limit (3 times the action limit) as "unacceptable without administrative or engineering controls."[24] The fact that the most strenuous tasks among both case patients and controls involved loads that were 2.3 times the action limit implies a need for attention to the demands of the tasks encountered by many municipal workers, including evaluation of manual exertions to determine whether biomechanical stresses are excessive. Reinforcing this recommendation is the finding that the average loads lifted during tasks that provoked injuries exceeded the maximum permissible limit.

The importance of the nonindustrial work environment is reflected by national data revealing that construction workers and nursing aides are at highest risk for work-related back pain.[38] The unstructured work environment remains a challenge in reducing the pain, disability, and high costs associated with low back injury. □

Contributors

A. H. Myers helped to secure funding, conceptualized research questions and study design, guided management of data, interpreted data, and wrote drafts of the manuscript. S. P. Baker helped to secure funding, conceptualized research questions and study design, interpreted data, developed the movement index, and helped to draft the manuscript. G. Li was responsible for all data analyses, interpreted data, developed tables and graphs, and contributed to manuscript preparation. G. S. Smith prepared medical and health data collection tools, reviewed medical data, helped to secure funding, conceptualized research questions and study design, interpreted data, and contributed to the preparation of the manuscript. S. Wiker was responsible for the ergonomic component and relevant training of interviewers, participated in data analysis and interpretation of these variables, and contributed to the preparation of the manuscript. K.-Y. Liang advised regarding statistical techniques for analyses and guided the research team in relation to design and analysis. J. V. Johnson was responsible for the work organization component, supervised analyses of these variables and their interpretation, and contributed to the preparation of the manuscript.

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Injury Section Schedules Late-Breaker Sessions

APHA's Injury Control and Emergency Health Services (ICEHS) Section will again sponsor 2 late-breaker sessions during this year's Annual Meeting in Chicago. The poster session is scheduled for Monday, November 8, from 12:15 PM to 11:45 PM, and the verbal session is scheduled for Tuesday, November 9, from 8:30 AM to 10:00 AM. These sessions are meant to provide a forum for presentation of cutting edge research.

Abstracts should feature work in progress or completed within the last few months, i.e., after the February deadline for the Annual Meeting's regular symposia. It is anticipated that 6 papers will be accepted for each session. The Section will accept abstracts of no more than 250 words until August 27, 1999. Preference for an oral or a poster presentation should be indicated; however, final decisions will be made by the ICEHS Latebreakers Program Committee. Abstracts must contain at least preliminary results and will be judged on scientific merit, originality, importance to injury control/emergency health services, and generalizability.

Although no special form is required, authors should provide the following information *in the order listed*: author's name, address, telephone number, fax number, e-mail address, title of abstract, abstract. Please e-mail with the word *Latebreaker* as the subject (preferred method), mail, or fax to Dr Jean Langlois, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention, Mail Stop F-41, 4770 Buford Highway, NE, Atlanta, Georgia 30341-3724, e-mail jal7@cdc.gov, telephone (770) 488-4031, fax (770) 488-4338.

Notification of decisions will be e-mailed or faxed to all submitters by October 1.