rest Standard in their state. Most pronounced effects were seen several years after the standard went into effect. The methods take into account the overall decline in injury rates among the cohort over 10 years surrounding the standard, and demonstrate evaluation techniques that are useful in the absence of a control group.

A2.2

Title: A Randomized and Controlled Trial of Participative Ergonomics for Manual Tasks (PerforM)
Authors: Burgess-Limerick R, Egeskov R, Pollock C, Straker L

Between Oct – Dec 2000, 177 small to medium sized workplaces (30 – 100 employees) were audited by state government workplace health and safety inspectors. The workplaces were categorised as either food processing, construction related manufacturing and wholesaling, and nursing homes/accommodation for the aged. The information gathered covered management systems, legislative compliance, productivity, absenteeism, lost time injuries, organisational culture, safety activity and physical risk estimates. Workers compensation data was also obtained subsequently.

Following the audit, this group of workplaces was offered the opportunity to be involved in the evaluation of a participative ergonomics intervention program aimed at reducing manual tasks injury risk (PErforM). 48 workplaces volunteered and 31 were randomly assigned to an experimental group which received the intervention immediately (Mar-July 2001), with the remainder forming a control group who were again offered the intervention at the completion of the evaluation in 2002. Nine months following the intervention for the experimental group, all workplaces were audited again by government inspectors (April-July 2002).

The estimate of risk exposure to employees at a workplace reduced in the experimental group following intervention compared with no change or an increase in the control group. This suggests the participative ergonomics intervention was successful in reducing the risk of musculoskeletal disorders associated with manual tasks. Aspects of task repetition and duration and postural awkwardness appeared to be more influenced by the intervention than commonly perceived risk such as exertion force. The pattern of risk across body regions was similar. The number of formal advices provided by government inspectors was greater for the control group than the experimental group, matching the differences in physical risk estimates. The PErforM intervention also appeared to change the safety management systems, with an increase in the provision of information to employees on manual tasks and an improvement in health and safety structures.

A2.3

Title: The Use of Supervisory Practices as Leverage to Improve Safety Behavior: A Cross-Level Intervention Model
Authors: Zohar D, Luria G

The paper presents three intervention studies designed to modify supervisory monitoring and rewarding of subordinates' safety performance. Line supervisors received weekly feedback concerning the frequency of their safety-oriented interactions with subordinates, and used this to self-monitor progress towards designated improvement goals. Managers higher up in the organizational hierarchy received the same information, coupled with synchronous data concerning the frequency of workers' safety behaviors, and highlighting covariation of supervisory action and workers' behavior. In all the companies involved, supervisory safety-oriented interaction increased significantly, resulting in significant changes in safety behavior and safety climate scores. Continued improvement during the post-intervention period suggests that managerial policy concerning the role of line supervisors in behavioral safety has been modified. Applied and theoretical implications are discussed.

Session: A3.0
Title: Economic Issues in Injury Research
Moderator: Timothy Struttmann

A3.1

Title: Relationships Between Work-related Injury Costs and Individual Risk Factors
Authors: Chen GX, Jenkins E L, Biddle EA

Traditional analyses of the impact of work-related injuries have focused on numbers and rates (per 100,000 employed) of injuries and, occasionally, tabulations of injury costs from workers compensation data. This study combines workers, compensation data with actual work hours data (from payroll records) and survey data. In order to develop an additional metric for analysis, work-related injury costs were calculated as number of dollars in workers compensation per 100 work-hours and modeled using a generalized linear model.

Gamma regression was used to explore the associations between work-related injury cost rates and individual employee risk factors, taking account of the exposure variable of work-hours for each employee. This study makes use of data from a large NIOSH study in which a prospective cohort of 9,377 material handling employees was observed for up to two years from 1996 to 1998. All types of work-related injuries were included. The injury costs include medical and indemnity payments.

The 9,377 workers contributed 22.2 million work-hours. There were 2,065 injury claims with a total of $2.1 million in payments. For the study population the average work-related injury cost rate was $9.48/100 work-hours. The risk factors that were found to be significantly associated with the cost rate were history of previous back injury, age group, job title, smoking, and back belt wearing.

Analysis of cost per hours of work adds another dimension to analysis of work-related injuries and in combination with survey data, allows assessment of individual characteristics and risk factors in relationship to work-related injuries. Targeting of research prevention strategies may be enhanced with these additional analyses.

A3.2

Title: Measuring the Economic Burden of Fatal Occupational Injuries

Author: Biddle EA

Occupational injuries claimed the lives of nearly 50,000 American workers from 1992-1999 as reported through the Census of Fatal Occupational Injuries (CFOI) surveillance system. Occupational fatality counts describe only a portion of the burden to the worker, industry, and society. Measuring the economic loss of fatalities adds a valuable dimension to targeting efforts as well as a tool for assessing cost savings of prevention efforts.

This research developed an interactive computer program that unlike earlier works derives the economic burden using a bottom-up-approach—summing the cost of each individual fatality based on the decedent's characteristics as reported by CFOI. The model, consistent with the human capital theory, provides national and state estimates for the economic burden of occupational injury fatalities for selected groups such as specific industries, occupation groups, and minority workers.

Over the study period, the total cost to society for occupational injury fatalities was $33 billion, ranging from about $5 billion in 1994 to nearly $4 1/2 billion in 1999. The mean cost for this period was $784,189 and the median was $791,556. Mean costs ranged from $761,724 in 1999 to $806,892 in 1992. The highest total costs of fatal occupational injury were in the construction industry—$7 billion, or about 20% of the overall burden both in costs and number of fatalities. The public administration industry had the highest mean cost of fatalities with just over $1million and the agriculture industry had the lowest mean cost with $557,371. Similarly, the mean cost of fatalities by occupational group ranged from $1.1 million in managerial and professional specialties to $459,330 in farming, forestry, and fishing. Costs were also estimated by case and worker characteristics. Cost estimates provide additional information about how injuries affect society. They can improve injury prevention and control program planning, policy analysis, evaluation, and advocacy.

A3.3

Title: Economic Cost Model: Transferring Innovative Technology to the States

Authors: Hartley D, Biddle E, Starkey S, Fabrega V, Richardson, S

During 1992-1999 nearly 50,000 occupational fatalities were reported through the Bureau of Labor Statistic's (BLS) Census of Fatal Occupational Injuries (CFOI) surveillance system. A cost model developed at the National Institute for Occupational Safety and Health estimated that the total societal burden for 1992-1999 was nearly $40 billion. This estimate was based on nationwide medical expenses for fatal occupational injury and lost wages due to premature death.

Wages used in this model were BLS Current Population Survey national estimates of the median annual earnings by occupation. These wage estimates vary substantially by state; the highest being twice that of the lowest. Estimates from this cost model are driven, in large part, by wage data and therefore have similar variability. Cost estimates using national wages were compared to estimates generated from state wages to determine the effect on the estimates of overall societal burden of occupational injury.

During the period studied, there were 3,959 fatal occupational injuries in Texas. Truck drivers had the largest number of fatalities (587). Texas cost estimates were 10-11% lower than national estimates for the same occupation. For example, the Texas mean estimate for 47 year old white male truck drivers was $739,000 compared to $826,000, the national mean estimate for this same group. Estimates for 28 year old white male truck drivers in 1994 varied from $849,000 to $943,000.

This pilot shows substantial differences in cost estimates generated using state data versus estimates using national data. CFOI states can adopt this technology as a tool for use with frequencies and rates for targeting prevention of worker fatalities. Additionally, using state-specific wage data in the national model will improve the accuracy of societal cost estimates for fatal occupational injury.

NOIRS 2003 ABSTRACTS

CONTENTS

DAY ONE —TUESDAY, OCTOBER 28, 2003

CONCURRENT SESSION: A
10:30am - 12:00pm