

(9%), bench work/assembly (9%), managerial (8%) and others (11%).

The case-crossover design uses cases as their own controls to assess the change in risk of a sudden-onset event during a brief “hazard” period (e.g. 10 minutes before the injury) as compared to an earlier “control” period. The control period selected for this analysis was the average exposure (frequency times duration) in the work-month prior to the injury. We found relative risks and 95% CIs as follows: using malfunctioning equipment or materials RR=12.0, (10.2-14.1), doing a task using an unusual work method, RR=11.1, (9.2-13.4), doing an unusual task RR=6.6, (5.6-7.8), being distracted RR=5.4, (4.7-6.2), rushing RR=2.4, (2.1-2.8) and glove use, RR=0.6, (0.5-0.7). The case-crossover design perfectly controlled for differences between subjects like age, gender, and occupation.

These results suggest that certain work equipment, practices and environment factors significantly increase the risk of a hand injury and glove use significantly protects against hand injury.

C3.4 Temporal Factors and the Risk of Occupational Acute Hand Injury—Lombardi DA, Sorock GS, Eisen EA, Herrick RF, Hauser RB, Racine R, Mittleman MA

Both mental and physical fatigue have been considered potential risk factors in studies of fatal and non-fatal injuries in the workplace. To evaluate associations between traumatic injuries to the hand and potentially modifiable risk factors, we enrolled 1,128 patients in a case-crossover study of occupational hand injuries. Patients were recruited over two years from 24 occupational health clinics in New England. Four temporal factors were evaluated. These factors included 1) the time of day of the injury, 2) the time since start of shift, 3) working overtime, and 4) hours of sleep before the injury relative to usual number of hours of sleep.

The median age of the subjects was 36 years and 77.5% were male. The majority of hand injuries occurred in the morning between 09:00-12:00 (43.2%), peaking from 10:00-12:00 (29.8%). The median time of injury was 3.5 hours into the work shift. The average hours worked per month was 193, including 22.5 hours of overtime, representing 11.7% of the total person-time at risk. In contrast, only 4.0% of injuries occurred while working overtime. The mean and median difference in sleep time (hours) was -0.1 and 0, respectively.

Hand injuries tend to occur early into the workday and sleep time does not appear to be a risk factor. The apparent lowered risk during overtime requires further evaluation of worker schedules and the availability of health care clinics used for data ascertainment during that time period. Alternatively, work tasks may be different during overtime as compared with regular working hours. Additional analyses are also needed

to determine if these findings are modified by workplace, individual factors, or break periods during the work day.

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C4.1 An Analysis of Serious Injuries to Dozer Operators at US Mining Sites—Wiehagen WJ, Mayton AG, Jaspal JS, Turin FE

This paper is concerned with serious injuries occurring to bulldozer operators working at domestic coal, metal and nonmetal mines. Injury data collected by the Mine Safety and Health Administration is summarized for dozer operators that incurred serious injuries while operating the equipment over a ten-year period (1988-1997).

An injury classification system was developed to code a set of fatal and nonfatal injuries. We categorize the data by activity (task being performed), result (what apparently happened to the dozer) and operator impact (how was the operator injured). Where information is available, contributing factors are identified.

The results of the study indicate that the number of serious injuries to dozer operators has declined by 30% over the time period. The reduction in serious injuries resulted in a matching reduction in days lost. This was found for all classes of dozer operator injuries: incidents due to jolts and jars, fall over / roll over, sprains and strains, struck against, and struck by.

Further reductions in injury risk will require: more widespread use of seat belts, field and laboratory research interventions to better assess the effect of alternative engineering (e.g., seat and seat suspension) designs to dampen or isolate the effects of shock and vibration, and continued attention on hazard awareness, recognition and response. Although the number of incidents have decreased, dozer operators being jolted and jarred accounts for the largest percentage (70% of the incidents) and severity (75% of the workdays lost) of serious injuries while operating the equipment.

C4.2 Haulage Truck Dump-Site Safety—Turin FC, Wiehagen WJ, Jaspal JS, Mayton AG

Dump-site injuries occur at all major mineral industries. Working in elevated areas near an edge is a common hazard for operators of off-highway mobile mining equipment. This report will examine serious injuries involving haulage trucks working at dump-sites for the period 1988 to 1997. Data were acquired from injury reports gathered by the Mine Safety and Health Administration (MSHA). This work is organized into three primary sections. The first presents an overview



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ABSTRACTS

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