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**Romain Jallon, Daniel Imbeau, Nathalie de Marcellis-Warin. *Development of an indirect-cost calculation model suitable for workplace use. Pages 149-164.***

*Introduction:* Occupational Health and Safety (OHS) stakeholders rarely factor the cost of workplace accidents into prevention spending decisions. The lack of consideration of this key information is related to the fact that the scientific literature has failed to provide OHS stakeholders with a cost-calculation tool that is both sufficiently accurate and does not require a data-collection stage ill-suited to the time constraints of workplace decision-makers. *Method:* This study reviews the recent literature to identify key elements that should foster the use of indirect-cost calculation methods by decision makers. *Results:* A "local" approach currently appears to be the best method for calculating indirect costs of workplace incidents or accidents in comparison to "bottom-up" or "top-down" approach. This paper discusses four criteria that this type of approach must satisfy to be compatible with the time constraints and accuracy demands of OHS stakeholders in organizations. In addition, four bases for the development of a new indirect cost estimation model are presented and discussed. *Impact on industry:* this study provides bases and criteria to help the development of indirect-cost calculation models better suited to workplace use than those currently available.

- **Keywords:** Accident costs; Indirect costs calculation model; Occupational injuries; Ergonomic interventions; Occupational Health and Safety

**Linda Hill, Jill Rybar, Sara Baird, Susanna Concha-Garcia, Raul Coimbra, Kevin Patrick. *Road safe seniors : Screening for age-related driving disorders in inpatient and outpatient settings. Pages 165-169.***

*Introduction:* Older drivers are increasing in number and they often have health conditions that place them at high risk for motor-vehicle crashes (MVC). Screening is underutilized, and is rarely done in hospital settings. *Methods:* A convenience sample of 755 older adults completed age related driving disorders screening at University of California, San Diego inpatient and outpatient health centers. Screening included three strength/frailty tests, two vision tests (acuity and fields), and two cognitive tests, based on AMA recommendations. The average age of participants was 72.5; 55.5% were male and 94% English-speaking; 17.8% of older adults failed at least one aspect of screening. *Results:* In multivariate analysis, significant associations of failed status were age, male sex, selfrestrictions of driving, and inpatient screening locations. The screening identified one in six adults to be 'high-risk' for age related driving disorders. Screening was

effective and feasible in both inpatient and outpatient settings. Impact on industry: As the driving population ages, industry, government and health care providers need to plan for the management of driving impairments in older adults.

- **Keywords:** Older drivers; Aging; Crashes; Traffic safety; Cognition

**Idlir Licaj, Mouloud Haddak, Martine Hours, Mireille Chiron. *Deprived neighborhoods and risk of road trauma (incidence and severity) among under 25 year-olds in the Rhône Département (France)*. Pages 171-176.**

Introduction: Previous research has shown that there are inequalities with regard to traffic accident risk between different social categories. This study describes the influence of the type of residential municipality (with or without deprived urban areas, "ZUS, zones urbaines sensibles"), used as an indicator of contextual deprivation, on the incidence and severity of road trauma involving people of under 25 years of age in the Rhône. Method: Injury data were taken from The Rhône Road Trauma Registry. The study covers the 2004–2007 period, with 13,589 young casualties. The incidence of traffic injury of all severities were computed according to the type of municipality and the age, gender, and type of road user. The ratios of the incidences of deprived municipalities, compared with others were calculated. Subsequently the severity factors and incidences according to the severity level (ISS 1–8, ISS 9+) were studied. Results: For the main types of road users except motorized two-wheeler users, the incidences were higher in the deprived municipalities: the greatest difference was for pedestrians, where the incidences were almost twice those of other municipalities. This excess risk, constituting a health inequality topic rarely considered, was even greater in municipalities with two or three ZUSs. It was essentially observed for minor injuries among motorists, cyclists, and pedestrians. Conclusions: While the incidence increased among people less than 25 years of age, the severity of road injuries was lower in deprived neighborhoods, contrary to what is suggested by other studies. This lower severity disappeared when taking into account the crash characteristics. Impact on industry: The incidence of injuries as a pedestrian, cyclist or motorist is higher among young people living in deprived municipalities. These areas should therefore be the targets of dedicated education programs, as well as further investigations about urban planning.

- **Keywords:** Contextual deprivation; Road trauma; Children; Young; Health inequalities

**Anne T. McCartt, Laura Blunar, Eric R. Teoh, Laura M. Strouse. *Overview of motorcycling in the United States: A national telephone survey*. Pages 177-184.**

Objectives: Motorcycle registrations have risen in recent years. Although motorcyclist crash fatalities in 2009 were 16% lower than in 2008, they were double the number of deaths in 1997. The present study examined current motorcyclists' travel patterns and views of motorcycle helmets and other safety topics. Methods: Motorcycle drivers were interviewed in a national telephone survey conducted in 2009. A weighted sample of 1,606 motorcyclists resulted from adjusting for the oversampling of those younger than 40 and those in the three states without a motorcycle helmet use law (Illinois, Iowa, New Hampshire). All analyses were based on the weighted sample, which was intended to result in a nationally representative sample of motorcyclists. Results: About one-quarter of respondents said they did not always wear helmets. Of these respondents, 57% said a law requiring helmet use would persuade them to do so, and 27% said nothing would. Ninety-four percent of respondents in states with universal helmet laws said they always ride helmeted, compared with about half of respondents in other states. About half of all respondents favored these laws. About three-quarters said they believe helmets keep riders safer, including two-thirds of respondents who oppose universal laws and almost half of drivers who rarely/never wear helmets. Drivers ages 18–29 and drivers of

sport/unclad sport, sport touring, and super sport motorcycles were more likely to always wear helmets, support universal helmet laws, and believe helmets keep riders safer. About half of respondents said antilock braking systems (ABS) enhance safety and that they would get ABS on their next motorcycle. Less than one-quarter thought an airbag would protect a motorcyclist in a crash, and even fewer would consider getting one on their next motorcycle. Forty-three percent of motorcyclists said they had crashed at least once; 62% of the most recent crashes involved no vehicles besides the motorcycle. Respondents reported riding their motorcycles about 5,400 miles, on average, during the past year. Drivers ages 18–29 reported riding fewer miles, on average, than older drivers and more often rode at night and to/from work or school. Drivers of touring and sport touring motorcycles traveled more miles and took more long trips. Conclusions: Motorcyclists' travel patterns and views vary widely, but there are distinct patterns by driver age and motorcycle type. Drivers who believe helmets keep riders safer are more likely to always wear them, but this belief appears insufficient to motivate some drivers to wear them. However, universal helmet laws appear effective in increasing helmet use. Many drivers are receptive to purchasing ABS on their next motorcycle. Impact on industry: States should be encouraged to enact universal helmet laws, and motorcycle manufacturers should be encouraged to offer ABS.

- **Keywords:** Motorcycles; Motorcyclist travel patterns; Motorcycle helmets; Motorcycle antilock braking system (ABS); Motorcyclist attitudes

**Hyun J. Lim, Timothy R. Black, Syed M. Shah, Sabuj Sarker, Judy Metcalfe. *Evaluating repeated patient handling injuries following the implementation of a multi-factor ergonomic intervention program among health care workers. Pages 185-191.***

Objective: The objective of this study was to evaluate repeated patient handling injuries following a multi-factor ergonomic intervention program among health care workers. Methods: This was a quasi-experimental study which had an intervention group and a non-randomized control group. Data were collected from six hospitals in Saskatchewan, Canada from September 1, 2001 to December 1, 2006. Results: A total of 1,480 individuals who had a previous injury were eligible for the study. Medium and small size hospitals in the intervention group had significantly fewer repeated injuries than in the control group. Multivariate analysis showed that the intervention group had 38.1% lower odds of having repeated injury compared to the control group, after adjusting for hospital size. Conclusions: The work-related repeated injury after a multi-factor intervention program was reduced. The synergistic relationships between components of multi-factor intervention and applicability of injury prevention programs to different settings need to be further explored. Impact on Industry: Implementing a multi-factor program with the right equipment and training can lower the risk of injury among health care workers.

- **Keywords:** Transfer, Lifting and repositioning (TLR) program; Repeated injuries; Health care workers; Injury prevention; Occupational health

**J.P. Ehsani, C.R. Bingham, J.T. Shope. *Driving exposure by driver age in Michigan. Pages 193-197.***

Background: This study compared driving exposure between two high-crash-risk groups (16–17 and 18-24-year-olds), with a low-crash-risk group (35-64-year-olds). In addition, patterns of association between driving exposure measures and demographic and driving behavior variables were examined. Methods: Respondent's total miles, minutes, and trips driven were calculated within a 48-hour period, using state-wide survey data collected in 2004 and 2005. Results: The youngest drivers drove fewer miles and minutes, but a comparable number of trips as the two older groups. Employment and high vehicle access were associated with greater driving exposure for 16-17-year-olds and 18-24-year-olds. Employment, high household income, large household size, and low vehicle

access were associated with greater driving exposure for 35-64-year-olds. More driving was done alone than with passengers present and during the day than at night across all ages. There was a positive association between two driving exposure measures (miles and minutes driven) and demographic and driving behavior variables, which did not extend to trips driven. Discussion: Driving exposure is directly related to stage of life. The entire sample of 16-17-year-old respondents were in high school, which directly influenced their driving times, destinations, and purpose. Those aged 18-24 years displayed driving behavior patterns that were closer to the older drivers, while retaining some differences. The oldest drivers were likely to be shouldering the greatest household responsibilities, and their greater driving exposure may reflect this reality. Impact on industry: These findings provide new information about driving exposure for two high-risk and one low-risk group of drivers. They also raise concern over potential workplace safety issues related to teens' higher driving exposure, and concomitant crash risk, related to being employed. Future research should examine this issue more carefully so that evidence based recommendations can be made to enhance the safety of teens who are employed, especially those who are employed as drivers.

- **Keywords:** Driving exposure; Motor vehicle injury; Young driver; High-risk driving conditions; Workplace safety

**Steve Wurzelbacher, Yan Jin. *A framework for evaluating OSH program effectiveness using leading and trailing metrics.* Pages 199-207.**

Introduction: Many employers and regulators today rely primarily on a few past injury/illness metrics as criteria for rating the effectiveness of occupational safety and health (OSH) programs. Although such trailing data are necessary to assess program success, they may not be sufficient for developing proactive safety, ergonomic, and medical management plans. Methods: The goals of this pilot study were to create leading metrics (company self-assessment ratings) and trailing metrics (past loss data) that could be used to evaluate the effectiveness of OSH program elements that range from primary to tertiary prevention. The main hypothesis was that the new metrics would be explanatory variables for three standard future workers compensation (WC) outcomes in 2003 (rates of total cases, lost time cases, and costs) and that the framework for evaluating OSH programs could be justifiably expanded. For leading metrics, surveys were developed to allow respondents to assess OSH exposures and program prevention elements (management leadership/ commitment, employee participation, hazard identification, hazard control, medical management, training, and program evaluation). After pre-testing, surveys were sent to companies covered by the same WC insurer in early 2003. A total of 33 completed surveys were used for final analysis. A series of trailing metrics were developed from 1999-2001 WC data for the surveyed companies. Data were analyzed using a method where each main 2003 WC outcome was dichotomized into high and low loss groups based on the median value of the variable. The mean and standard deviations of survey questions and 1999-2001 WC variables were compared between the dichotomized groups. Hypothesis testing was performed using F-test with a significance level 0.10. Results/Discussion: Companies that exhibited higher musculoskeletal disorder (MSD) WC case rates from 1999-2001 had higher total WC case rates in 2003. Higher levels of several self-reported OSH program elements (tracking progress in controlling workplace safety hazards, identifying ergonomic hazards, using health promotion programs) were associated with lower rates of WC lost time cases in 2003. Higher reported exposures to noise and projectiles were also associated with higher rates of WC cases and costs in 2003. Impact on Industry: This research adds to a growing body of preliminary evidence that valid leading and trailing metrics can be developed to evaluate OSH effectiveness. Both the rating of OSH efforts and the regular trending of past loss outcomes are likely useful in developing data-driven improvement plans that are reactive to past exposures and proactive in identifying system deficiencies that drive future losses.

- **Keywords:** Leading; Trailing; Workers compensation; Program evaluation; Effectiveness

**Esmaeel Ayati, Ehsan Abbasi. *Investigation on the role of traffic volume in accidents on urban highways. Pages 209-214.***

Roadway safety is a major concern for the general public and public agencies, as roadway crashes claim many lives and cause substantial economic loss each year. In Iran, a large number of vehicles are involved in road accidents each year, which cause many deaths and extensive property damage; such accidents are among the major causes of death and disability in the country. Method: To reduce roadway accidents, the factors that affect the occurrence and severity of accidents should be scrutinized to prevent or reduce their effect. The method that many researchers have adopted to determine the effective parameters surrounding road accidents in recent years is through statistical modeling of accidents. In this article, the role of different kinds of vehicles in traffic flow are investigated separately in terms of the likelihood of crashes on urban highways, and the vehicles are divided into three groups: passenger cars, heavy vehicles, and light non-passenger car vehicles. Poisson and negative binomial (NB) regression models were applied to model the accidents in this research, which were categorized into two groups: no injury (property damage only) accidents and more severe (injury and fatal) accidents. Results: Ultimately, we conclude that light non-passenger car vehicles (i.e., taxis and motorcycles) play the largest role in the occurrence of crashes on urban highways for both types of accidents.

- **Keywords:** No injury accidents; More severe accidents; Urban highways; Light non-passenger car vehicles; Negative binomial (NB) regression model

**Jennifer M. Rodríguez, Stephanie C. Payne, Mindy E. Bergman, Jeremy M. Beus. *The impact of the BP baker report. Pages 215-222.***

Introduction: This study examined the impact of the British Petroleum (BP) Baker Panel Report, reviewing the March 2005 BP-Texas City explosion, on the field of process safety. Method: Three hundred eighty-four subscribers of a process safety listserv responded to a survey two years after the BP Baker Report was published. Results: Results revealed respondents in the field of process safety are familiar with the BP Baker Report, feel it is important to the future safety of chemical processing, and believe that the findings are generalizable to other plants beyond BP-Texas City. Respondents indicated that few organizations have administered the publicly available BP Process Safety Culture Survey. Our results also showed that perceptions of contractors varied depending on whether respondents were part of processing organizations (internal perspective) or government or consulting agencies (external perspective). Conclusions: This research provides some insight into the beliefs of chemical processing personnel regarding the transportability and generalizability of lessons learned from one organization to another. Impact on Industry: This study has implications for both organizational scientists and engineers in that it reveals perceptions about the primary mechanism used to share lessons learned within one industry about one major catastrophe (i.e., investigation reports). This study provides preliminary information about the perceived impact of a report such as this one

- **Keywords:** BP Baker Panel Report; Process safety culture; Safety climate; Contractors; Safety surveys

**José I. Castillo-Manzano, Mercedes Castro-Nuño, Diego J. Pedregal. *Can fear of going to jail reduce the number of road fatalities? : the Spanish experience. Pages 223-228.***

The goal of this article is to evaluate the impact of the drastic Spanish Penal Code reform on the number of road deaths in Spain and the time that the effects might last. This is

achieved by means of multivariate unobserved component models set up in a state space framework estimated using maximum likelihood. In short, with this reform Spain might be considered to be closing the final gap that kept it apart from other developed countries as far as the road accident rate is concerned. We have found two different types of effects on Spanish road traffic fatalities. Initially, a month before the reform was passed there was a 24.7 percent fall in Spanish road deaths. After the Bill had been passed and for the following thirteen months, the reduction stayed at a constant sixteen percent. This reform has reduced Spanish road fatalities by 534 in all between November 2007 and December 2008 and the effects will foreseeably continue during 2009.

- **Keywords:** Penal Code reform; Road traffic fatalities; Public law enforcement; State space system