Journal of Safety Research – rok 2010, ročník 41

Číslo 3 (June 2010)

Lluís Sanmiquel, Modesto Freijo, Joaquín Edo, Josep M. Rossell. *Analysis of work related accidents in the Spanish mining sector from 1982-2006*. Pages 1-7.

The rate for work related accidents in the Spanish mining sector is notably higher than in other countries such as the United States. It produces a very negative impact on the mining industry. This paper is the report of a study on serious and fatal accidents in Spanish mining from 1982-2006. It is based on the reports of 212 accidents (serious or fatal) carried out by the General Management of Energy and Mining of Catalonia (Spain). *Method:* The high work-related accident rate in the Spanish mining sector makes it necessary to carry out an analysis and research that can shed light on the causes of this high rate; this is the only way that a solution can be found. The study is based on Feyer and Williamson's analysis of accident causes, as they apply to 212 accidents. The types and causes of the accidents are coded according to the coding system used by the Spanish National Institute for Safety and Hygiene in the Workplace, which allows us to identify a series of direct causes and contributing factors in different accidents. *Results* If all the causes and factors that are present in the accidents are known, we are able to look for appropriate solutions to reduce them as much as possible. In short, we are able to come up with a series of conclusions that expose the weak links in the management of accident prevention in companies. This is helpful in the struggle to reduce work injuries in the Spanish mining sector.

- **Keywords:** Mining; Incident index; Event; Contributing factor; Skill-based

Douglas J. Gabauer, Hampton C. Gabler. *The effects of airbags and seatbelts on occupant injury in longitudinal barrier crashes*. Pages 9-15.

Introduction: Longitudinal barriers, such as guardrails, are designed to prevent a vehicle that leaves the roadway from impacting a more dangerous object while minimizing the risk of injury to the vehicle occupants. Current full-scale test procedures for these devices do not consider the effect of occupant restraints such as seatbelts and airbags. The purpose of this study was to determine the extent to which restraints are used or deployed in longitudinal barrier collisions and their subsequent effect on occupant injury. **Methods:** Binary logistic regression models were generated to predict occupant injury risk using data from the National Automotive Sampling System / Crashworthiness Data System from 1997 through 2007. **Results:** In tow-away longitudinal barrier crashes, airbag deployment rates were 70% for airbag-equipped vehicles. Compared with unbelted occupants without an airbag available, seat belt restrained occupants with an

airbag available had a dramatically decreased risk of receiving a serious (MAIS 3+) injury (odds-ratio (OR) = 0.03; 95% CI: 0.004-0.24). A similar decrease was observed among those restrained by seat belts, but without an airbag available (OR = 0.03; 95% CI: 0.001- 0.79). No significant differences in risk of serious injuries were observed between unbelted occupants with an airbag available compared with unbelted occupants without an airbag available (OR = 0.53; 95% CI = 0.10-2.68). **Impact on Industry:** This study refutes the perception in the roadside safety community that airbags rarely deploy in frontal barrier crashes, and suggests that current longitudinal barrier occupant risk criteria may over-estimate injury potential for restrained occupants involved in a longitudinal barrier crash.

- **Keywords:** Injury; Longitudinal Barriers; Airbags; Seatbelts

Kristen A. Conner, Huiyun Xiang, Gary A. Smith. *The impact of a standard enforcement safety belt law on fatalities and hospital charges in Ohio*. Pages 17-23.

Introduction: The purpose of this study was to analyze linked crash and hospital data to determine the effect that enactment of a standard enforcement safety belt law in Ohio would have on hospital charges and direct medical costs due to motor-vehicle crashes, focusing on the impact to the state's Medicaid system. **Method:** The linkage and analysis was conducted as part of the Ohio Crash Outcome Data Evaluation System (CODES) program. Current safety belt usage in Ohio stands at 82% with its secondary enforcement safety belt law. **Results:** Assuming an increase in usage to 92% through standard enforcement, over $15.3 million in medical costs to Medicaid for injuries that occur in a single year could be prevented over a 10-year period. Cumulative savings could reach more than $91.2 million during the 10-year period. In addition, 161 fatalities could have been prevented in one year had all unbelted occupants who sustained a fatal injury instead chosen to wear their safety belt. **Summary and Impact on Industry:** Clearly, substantial progress can be made in reducing the number of deaths and injuries, as well as medical costs associated with motor-vehicle crashes, by strengthening safety belt laws and increasing safety belt usage in Ohio.

- **Keywords:** Safety Belt; Standard Enforcement; Hospital Charges; Prevention

Wei Zhang, Omer Tsimhoni, Michael Sivak, Michael J. Flannagan. *Road safety in China : analysis of current challenges*. Pages 25-30.

Introduction: China has the world's largest population, and is the second largest automobile market. China's economy is booming, resulting in a rapid increase in both the road infrastructure and access to private vehicles. Along with economic growth, the ownership of motorized vehicles has almost quadrupled in the past 10 years, from 42.2 million in 1997 to 159.7 million in 2007. However, at the same time, China also has a very high number of road fatalities compared to other countries, with about 100,000 reported fatalities each year. **Method:** This study analyzes the Chinese road-fatality situation to identify areas in which the total harm caused by crashes can be substantially and readily reduced. It provides a comprehensive analysis of the current road-fatality situation in China using conventional indices and the likely future trends. **Results:** Four areas were identified in which countermeasures have the most potential to substantially reduce fatalities in China: pedestrians and other non-motorists, nighttime driving, vehicle passengers, and motorcycles. **Conclusion:** While China faces unprecedented road safety issues, this report identifies major areas in which there are opportunities to greatly reduce total harm.

- **Keywords:** Driving safety; China; Transportation safety; Traffic accidents; Road fatalities; Motorization

Quintin L. Williams Jr., Bruce H. Alexander, Susan G. Gerberich, Nancy M. Nachreiner, Timothy R. Church, Andrew Ryan. *Bystander injury evaluation of children from midwestern agricultural operations*. Pages 31-37.

Background: With more than a million youth living on agricultural operations, it is important for parents to understand the consequences of bystander injuries that children experience in these environments. We identified the childhood injuries for bystander status and compared the severity of these injuries to the working children in the Regional Rural Injury Study-II (RRIS-II). **Methods:** RRIS-II followed 16,546 children (~ 85% of eligible) from rural communities in the Midwest for two six-month recall periods in 1999 and 2001. Demographic, injury, and exposure data were collected through comprehensive computer-assisted telephone interviews. Child injuries were cataloged using narrative scenarios into four categories: (a) directly work-related; (b) indirectly work-related; (c) non-working accomplice; and (d) non-working attendant; the latter three all being bystander categories. Poisson regression modeling was used to calculate rates of bystander injuries. Frequencies were used for comparison of severity measures. **Results:** Among the 463 child injuries (aged < 20 yrs), 102 were bystander injuries. Of the bystander-related injuries, 14 were identified as indirectly work-related (working bystanders), 27 as non-working accomplice (passengers/tag-alongs), and 60 as non-working attendant (playing on the operation). The overall rate of bystander injuries was 6.4 per 1,000 people, 95% CI (5.0, 8.1). Males, compared with females, had more than twice the injury rate (8.7; 95% CI 6.4-11.8, and 3.9; 95% CI 2.7-5.7, per 1,000 people, respectively). Bystanders in this population had more severe injuries with 4% having life-threatening circumstances; of these, 4% of the accomplices and 2% of the attendants subsequently died. **Conclusions:** Children who live or work on agricultural operations are vulnerable to many hazards. Therefore, this study examined child injuries and found a clear difference in the consequences of these injuries between working-related and bystanding-related injuries. **Impact on Industry:** Unlike occupations such as construction and mining, where laws and organizations have been created for the protection of bystanders, agricultural bystanders have remained unprotected and have had to face the consequent injury and death outcomes. As public health professionals considering these risks, it is necessary that we work to develop more intervention studies and continue to propose suggestive guidelines for child safety in these environments so as to challenge family traditions and possibly spark public policies that will give further protection to this population.

- **Keywords:** Child bystander; Agricultural bystander; Child injury

Charles M. Farmer, Bevan B. Kirley, Anne T. McCartt. *Effects of in-vehicle monitoring on the driving behavior of teenagers*. Pages 39-45.

Objectives: The objective was to determine if teenage driving behavior improves when a monitoring and feedback device is installed in the teen's vehicle. **Methods:** Vehicles of 85 teenage drivers were fit with a device that detected all instances of sudden braking/acceleration, speeding, and nonuse of seat belts. Drivers were assigned randomly to one of four research groups, differing in whether or not an alert sounded in the vehicle and whether or not parents were given access to websites containing notification records. Time trends in event rates per mile traveled were compared using Poisson regression. **Results:** Seat belt use improved when violations were reported to the parent websites, and improved even more when in-vehicle alerts were activated. Consistent reductions in speeding were achieved only when teenagers received alerts about their speeding behavior, believed their speeding behavior would not be reported to parents if corrected, and when parents were being notified of such behavior by report cards. **Conclusions:** Electronic monitoring of teenage drivers can reduce the incidence of risky behavior, especially seat belt nonuse. More complicated behavior is more difficult to change, however. **Impact on Industry:** Parent participation is key to successful

behavioral modification, but it is yet to be determined how best to encourage such participation.

- **Keywords:** Novice drivers; Feedback; Aggressive driving

Suzanne Brixey, Karthik Ravindran, Clare E. Guse. *Legislating child restraint usage : its effect on self-reported child restraint use rates in a central city*. Pages 47-52.

Objective: To assess the effect of the newly enacted child passenger safety law, Wisconsin Act 106, on self-report of proper restraint usage of children in Milwaukee's central city population. **Method:** A prospective, non-randomized study design was used. The settings used were (a) a pediatric urban health center, and (b) two Women, Infants and Children offices in Milwaukee, Wisconsin. Participants included 11,566 surveys collected over 18 months that spanned the pre-legislation and post-legislation time periods from February 2006 through August 2008. **Results:** The study set out to assess appropriate child passenger restraint. The results showed that the changes in adjusted proper restraint usage rates for infants between the pre-law, grace period, and post-fine periods were 94%, 94%, and 94% respectively. For children 1–3 years old, the adjusted proper usage rates were 65%, 63%, and 59%, respectively. And for children 4–7 years old, the rates were 43%, 44% and 42%, respectively. There was a significant increase in premature booster seat use in children who should have been restrained in a rear- or forward-facing car seat (10% pre-law, 12% grace period, 20% post-fine; $p < 0.0005$). There was no statistically significant change over time in unrestrained children (2.1%, 1.7%, 1.7%, $p = 0.7$, respectively). **Conclusions:** The passage of a strengthened child passenger safety law with fines did not significantly improve appropriate restraint use for 0–7 year olds, and appropriate use in 1–7 year olds remained suboptimal with a majority of urban children inappropriately restrained. Although the number of unrestrained children decreased, we identified an unintended consequence of the legislation – a significant increase in the rate of premature belt-positioning booster seat use among poor, urban children. **Impact on Industry:** The design of child restraint systems maximizes protection of the child. Increasing reports of misuse is a call to those who manufacture these child passenger restraints to improve advertising and marketing to the correct age group, ease of installation, and mechanisms to prevent incorrect safety strap and harness placement. To ensure accurate and consistent use on every trip, car seat manufacturers must ensure that best practice recommendations for use as well as age, weight, and height be clearly specified on each child restraint. The authors support the United States Department of Transportation's new consumer program that will assist caregivers in identifying the child seat that will fit in their vehicle. In addition, due to the increase in premature graduation of children into belt-positioning booster seats noted as a result of legislation, promoting and marketing booster seat use for children less than 40 pounds should not be accepted. Child passenger safety technicians must continue to promote best practice recommendations for child passenger restraint use and encourage other community leaders to do the same.

- **Keywords:** Child restraint seats; Booster seats; Motor vehicle crashes; Child restraint legislation

Charles M. Farmer, JoAnn K. Wells. *Effect of enhanced seat belt reminders on driver fatality risk*. Pages 53-57.

Objective: Enhanced seat belt reminders in automobiles have been shown to increase belt use rates by approximately 3 percentage points. The objective of this study was to estimate the effect of enhanced seat belt reminders on driver fatality risk. **Method:** Data included all passenger vehicle driver deaths and vehicle registration counts in the United States for calendar years 2000-2007. Driver fatality rates per vehicle registration per year were compared for otherwise identical vehicle models with and without enhanced

seat belt reminders. **Results:** Driver fatality rates were 6% lower for vehicles with enhanced seat belt reminders compared with vehicles without enhanced belt reminders. After adjusting for vehicle age differences, the estimated effect of enhanced belt reminders on driver fatality risk ranged from a 9% reduction for General Motors vehicles to a 2% increase for Honda vehicles. Combining all manufacturers, enhanced belt reminders reduced fatality risk by approximately 2%. Although not statistically significant, the 2% reduction in fatality risk agrees with what should be expected from a 3 percentage point increase in seat belt use rates. **Conclusions:** Enhanced seat belt reminders have raised driver belt use rates and reduced fatality rates, but more aggressive systems may be needed for some drivers. It can be inferred that nonfatal injury rates also have been reduced. **Impact on Industry:** Manufacturers should be encouraged to put enhanced seat belt reminders on all vehicles as soon as possible.

- **Keywords:** Motor vehicle crashes; Traffic safety; Occupant restraints; Injuries

Yahya Thamrin, Dino Pisaniello, Sasha Stewart. *Time trends and predictive factors for safety perceptions among incoming South Australian university students*. Pages 59-63.

Problem: Young workers are over-represented in injury statistics. In order to develop injury prevention strategies, this study investigated time trends and predictive factors relating to safety skills, confidence, and attitudes. **Method:** Annual surveys were conducted from 2006-2009 among incoming students at the University of Adelaide. The questions addressed safety training, injury experience, and health and safety perceptions. **Results:** Time trends in training, perceived safety skills, confidence, and attitudes were not significant. In terms of skills and confidence, the most important correlate was safety training outside of high school (odds ratio = 1.6), especially when repeated, assessed, or in face to face mode. Feeling strongly about safety issues was best predicted by injury experience (OR = 1.7) and gender. **Discussion:** These results emphasize the value of assessed training, but they are also consistent with published U.S. data, indicating no improvement over time. It is suggested that there be a more integrated approach in safety education, involving schools and workplaces. **Impact on industry:** By developing an understanding of student safety perceptions and experiences, this research aims to target strategies to reduce the excess injury rate for young workers. Workplaces should be more aware of the limitations of school-based safety education and a more integrated and evidence-based approach should be developed, involving schools and workplaces.

- **Keywords:** Secondary school; Safety; Training experience; Incoming student; Perception; Attitude

Judy A. Stevens, S.L. Teh, Tadesse Haileyesus. *Dogs and cats as environmental fall hazards*. Pages 69-73.

Problem: Falls are the leading cause of non-fatal injuries in the United States. This study assessed the prevalence of fall injuries associated with cats and dogs in the United States and describes the types of injuries sustained, the location, activity, and circumstances under which they occurred. **Methods:** Data were from a nationally representative sample of emergency department visits from January 1, 2001 to December 31, 2006, available through the National Electronic Injury Surveillance System All Injury Program (NEISS-AIP). **Results:** Based on 7,456 cases, an estimated 86,629 fall injuries each year were associated with cats and dogs, for an injury rate of 29.7. There were 7.5 times as many injuries involving dogs as cats and females were 2.1 times more likely to be injured than males. Injury rates were highest among people aged ≥ 75, but pets were a fall hazard for all ages. Fractures and contusions or abrasions were the most common injuries; the highest rates were for injuries to the extremities. About 66.4% of falls associated with cats and 31.3 % of falls associated with dogs were caused by falling or tripping over the

pet. An additional 21.2% of falls related to dogs were caused by being pushed or pulled. **Summary:** Although pets were associated with fall injuries, this risk can be reduced by increasing public awareness about situations that can lead to falls, such as dog-walking and chasing pets, and by calling attention to the importance of obedience training for dogs to minimize hazardous behaviors such as pulling and pushing. **Impact on industry:** Fall injuries represent a burden to individuals, our society and our health care system. Increasing public awareness and implementing basic prevention strategies can help people of all ages enjoy their pets, reduce their chances of experiencing pet-related falls, and lessen the impact of fall injuries on our health care system.

- **Keywords:** Cats; Dogs; Falls; Injury; Pets