

185

LETHAL SINGLE VEHICLE ACCIDENTS OF ESC FITTED PASSENGER CARS

^{1,2}Tapio Koisaari, ³Timo Tervo, ²Niina Sihvola. ¹Department of Engineering Design and Production, Aalto University, Aalto, Finland; ²Finnish Motor Insurers' Centre, Helsinki, Finland; ³Department of Ophthalmology, University of Helsinki and Helsinki University Hospital, Helsinki, Finland

10.1136/injuryprev-2016-042156.185

Background Fatal single vehicle accidents (SVA) which involved ESC fitted passenger cars were examined in order to disclose the immediate and background risk factors for the accidents as well as the validity of ESC function.

Methods The registry of Finnish Road Accident (FRA) Investigation Teams (RAIT) was analysed and all fatal passenger car accidents during the years 2009–13 (5 years) were included. SVAs (N = 351) were subjected to more detailed analysis. Suicide crashes (N = 13) and disease attacks (N = 102) were recognised but ruled out from the final results because ESC has no saving potential in such accidents.

Results ESC fitted vehicles were involved in SVAs less often (P = 0.001) than their calculated exposure would suggest and they were quite rare. The most common immediate risk factor in ESC SVAs was a steering error (56%, N = 10) but unlike in the non-ESC SVAs it did not lead to loss of control of the vehicle.

The common background risk factors in ESC SVAs were substance abuse (56%, N = 10), tiredness (56%, N = 10) and speeding (56%, N = 10). Tiredness was more common (P = 0.01) than in non-ESC SVAs and in half of the accidents it occurred together with substance abuse.

In lethal ESC SVAs the vehicle experienced multiple collisions (2.4 on average) at relatively high speed (on the average 93 km/h before first impact). This is a challenge to both passive and active safety systems. Also in ESC SVAs the seat belt use was low; nine (47%) of the killed occupants were unbelted. Seat belt use would have saved six (%) of them.

Conclusions Based on this study, ESC operates as designed in SVAs and no operational failures were found. Further research on driver fitness is required to improve active safety of the passenger cars. Vehicle systems should force everyone to use seat belt and the strength of roof structures should be improved.

186

U.S. RECREATIONAL OFF-HIGHWAY VEHICLE CRASHES; AN EMERGING HEALTH AND SAFETY CONCERN

Gerene Denning, Charles Jennissen. Department of Emergency Medicine, University of Iowa Carver College of Medicine, USA

10.1136/injuryprev-2016-042156.186

Background All-terrain vehicle (ATV) crashes have long been recognised as a public health concern, with >800 deaths and more than 400,000 injuries each year in the U.S. alone. Recreational off-highway vehicles (ROVs) have more recently been growing in popularity, but little is currently known about the impact of their use. Our objective was to determine the epidemiology, mechanisms and risk factors for ROV crashes and injuries.

Methods Descriptive and comparative analyses were performed using data from the Consumer Product Safety Commission ROV database (2003–2011).

Results The database contained 428 crashes (899 occupants). Occupants were 68% male, 31% < 16 years old, and 52% passengers. Five percent of occupants were helmeted and 27% were restrained. Half of the operators were positive for alcohol and

9% for drugs. For crashes, 53% were on roads, 12% were occupational, and 63% occurred at speeds <20 mph. The primary crash mechanism was a non-collision event, predominately roll-overs with 95% being sideways rollovers and 81% of sideways roll-overs occurring during a turn. Many crashes occurred on dry surfaces (84%), in good weather (94%), and/or on flat surfaces (63%) or gentle slopes (15%). For injuries, 22% were moderate to severe and 36% were fatal. Fifteen percent of occupants were partially ejected and 51% were fully ejected. Fatal crashes were 4 times more likely to involve an operator's death than a passenger's, rollovers increased the odds of being ejected by 13-fold, and both ejection and being pinned by the vehicle increased the likelihood of death by over 10-fold and 20-fold, respectively.

Conclusions These data provide important insights into ROV use and related crashes. Although likely to be more stable than ATVs, ROV rollovers, including at low speeds, appear to be the major crash mechanism, most often in a turn. Being unrestrained in a rollover with subsequent ejection and pinning by the ROV were the most significant risk factors for severe injury and death.

187

EXPERT-DEVELOPED ICD-AIS MAP FOR MEASURING SERIOUS ROAD TRAFFIC INJURIES

^{1,2}Jo Barnes, ^{1,3}Jan Price, ¹Patrick Gillich, ³Amy Brammer, ³Christine Read-Allsopp, ³Donna Naydich, ³Katherine Baus, ³Kathy Cookman, ³Kathryn Loftis, ³Lauren Jones, ³Maureen Brennan, ³Patsy Stanley, ³Patricia St Germain, ³Vickie Graymire. ¹Association for the Advancement in Automotive Medicine (AAAM), USA; ²Loughborough University, UK; ³Expert Panel Group

10.1136/injuryprev-2016-042156.187

Background The problem of serious road injury has not decreased in comparison to the drop in fatal road injuries. Unlike the standard definition adopted for fatal road injuries, serious injury has not been as well defined in Europe. However in 2012 the High Level Group on road safety agreed to the defining of serious injury in EU countries as Maximum Abbreviated Injury Scale 3+ (MAIS3+). The AAAM was commissioned by the Transport and Mobility, Road Safety Unit of the European Commission to develop a MAIS3+ serious injury map from the International Classification of Diseases (ICD-9 and ICD-10) to the Abbreviated Injury Scale (AIS 2005 Update 2008).

Methods The study involved an expert panel comprising ICD coding experts and certified AIS specialists to map ICD-9-CM and ICD-10-CM codes to the AIS 2005 Update 2008 identifying the following levels of severity: MAIS3+ injury, MAIS 1 and 2 and 'no map' cases. Rules were invoked based on the AIS principles of coding practice to ensure the MAIS descriptors were a true reflection of how an injury descriptor in ICD would be coded manually to the AIS by a certified AIS specialist.

Results Overall for the injury-based codes of ICD-9-CM, 781 codes (31%) were mapped to a MAIS severity at the level of MAIS3+, 1297 codes (52%) were mapped at the level of MAIS1 or 2 and 426 codes (17%) could not be mapped. For the much larger set of injury-based codes of ICD-10-CM, 2323 codes (14%) were mapped to a MAIS severity at the level of MAIS3+, 9700 codes (59%) at the level of MAIS1 or 2, and 4485 (27%) could not be mapped.

Conclusions The application of the AAAM's expert derived AIS-ICD map is a solid foundation for identifying serious injury at MAIS3+ for road traffic injuries. This AIS-ICD map offers a comprehensive approach to serious road injury definition for the EU and will enable countries to set measureable road safety

targets for the reduction of serious road traffic injury using a comparable definition.

188 LESSONS FROM TRAGEDY: AN IN-DEPTH MEDICO-LEGAL EXAMINATION OF FATAL ROAD TRANSPORT CRASHES

^{1,2}Marilyn Johnson, ^{1,3,4}Lyndal Bugeja, ¹Sjaan Koppel. ¹Monash University, Australia; ²Amy Gillett Foundation, Australia; ³Coroners Court of Victoria, Australia; ⁴Department of Forensic Medicine, Australia

10.1136/injuryprev-2016-042156.188

Background Every death on the road impacts the family, friends and relatives of the deceased as well as those people who were involved or witnessed the crash. In addition, there is a substantial economic cost of human loss. In Australia, the cost of road deaths from 2000 to 2014 is estimated at A\$458.4 million. Coronial investigations generate the most comprehensive reports of the circumstances of a fatality and while internationally coronial data has been successfully used to understand fatal road transport crashes, this data has not been used for this purpose in Australia.

Methods This study is the first Australian systematic review of coronial reports for all fatal road crashes. The data is from the Australian Capital Territory for the period from 2000 to 2014. The data will be examined to determine the frequency, nature and determinants of fatal injury involving transport across all modes (e.g. cars, trucks, bikes, walking, public transport) and to understand the contributing factors, patterns and trends.

Results In total, 191 fatal road crashes occurred in the period. Analysis of the data is underway and includes identifying patterns in the factors that contribute to these crashes including: road user types involved, impaired driving (i.e. detection of alcohol and drugs), speeding, lack of care and driver distraction, single vehicle crashes, rear end crashes and right angle crashes, and vulnerable road users particularly motorcyclists, cyclists and novice drivers. The analysis will also include a review of the coronial recommendations made and the implications for road safety.

Conclusions It is anticipated that the findings from this study will provide insights into how the road transport system can be improved to achieve safety outcomes for all road user types.

189 EXPOSURE-BASED ROAD TRAFFIC FATALITY RATES BY MODE OF TRAVEL IN FRANCE

^{1,2,3}Mohamed Mouloud Haddak. ¹University of Lyon, France; ²Ifsttar-Umrestte, France; ³University of Lyon, France

10.1136/injuryprev-2016-042156.189

Background Travel practices are changing. Active transport modes such as walking and cycling are encouraged because they are beneficial to health and reduce pollution.

Methods We estimated the exposure-based fatality rates for road traffic crashes in France, on the basis of the ratio between the number of fatalities and exposure to road accident risk. Fatality data were obtained from the French national police database of road traffic casualties in the period 2007–2008. Exposure data was estimated from the latest national household travel survey (ENTD) which was conducted from April 2007 to April 2008. Three quantities of travel were computed for each mode of transport: (1) the number of trips, (2) the distance travelled and (3) the time spent travelling. Annual fatality rates were assessed by road user type, age and sex.

Results The fatality rates differed according to road user type, age and sex. The risk of being killed was 20 to 32 times higher for motorised two-wheeler users than for car occupants. For cyclists, the risk of being killed, both on the basis of time spent travelling and the number of trips was about 1.5 times higher than for car occupants. Risk for pedestrians compared to car occupants was similar according to time spent travelling, lower according to the number of trips and higher according to the distance travelled. People from the 17–20 and 21–29 age groups and those aged 70 and over had the highest rates. Males had higher rates than females, by a factor of between 2 and 3.

Conclusions When exposure is taken into account, the risks for motorised two-wheeler users are extremely high compared to other types of road user. The difference between the fatality risk of cyclists and of car occupants is much smaller (1.5 times higher); besides, there is much room for improvements in cyclist safety, for instance by increasing the use of helmets and conspicuity equipment. Traffic calming could also benefit cyclists, pedestrians and perhaps moped users.

190 BEHIND THE WHEEL: DRIVING EXPOSURE AND PARTICIPATION FROM A RANDOMISED CONTROLLED TRIAL PROGRAM FOR OLDER DRIVERS

^{1,2}Kristy Coxon, ¹Anna Chevalier, ^{1,3}Kate Hunter, ⁴Julie Brown, ⁵Elizabeth Clarke, ¹Kris Rogers, ⁶Soufiane Boufous, ¹Rebecca Ivers, ¹Lisa Keay. ¹The George Institute for Global Health, The University of Sydney, Sydney, NSW, Australia; ²Western Sydney University, School of Science and Health; ³The Poche Centre for Indigenous Health, Australia; ⁴Neuroscience Research Australia, The University of New South Wales, Sydney, NSW, Australia; ⁵Kolling Institute, The University of Sydney, Sydney, NSW, Australia; ⁶Transport and Road Safety, The University of New South Wales, Sydney, NSW, Australia

10.1136/injuryprev-2016-042156.190

Background We used a randomised controlled trial, with nested process evaluation, to measure the impact of the Behind the Wheel program on driving and community participation of drivers aged 75 years and older in northwest Sydney.

Methods Driving exposure/week was measured by continuous in-vehicle monitoring for 12 months. The Keele Assessment of Participation (KAP), self-regulation behaviour profile and depressive symptoms were assessed at 12 months. Using intention-to-treat, generalised estimating equations modelled driving exposure, adjusting for weekly measures and ordinal regression for behaviour profiles. A logic model was built to explain program inputs, outputs and outcomes, based on relationships between process measures (program fidelity, acceptability, dose delivered and received) and program outcomes.

Results 380 drivers enrolled (mean age: 80 ± 4 years), 366/380 completed the study. There was no between group difference in distance driven/week over 12-months (−5.5 km, 95% CI: −24.5,13.5 km), or KAP (−0.1, 95% CI: −0.6,0.3). The intervention group were more engaged in self-regulation (OR: 1.6, 95% CI: 1.1,2.3). Older drivers with low-function in the intervention group were three times more likely to report depressive symptoms (OR 3.1, 95% CI: 1.04,9.2). Intervention participants who developed a retirement from driving plan, on average, reduced their total distance driven per week (38 km, 95% CI: −7.5,−68.7 km) and kilometres driven outside of daylight hours per week (7 km, 95% CI: −3.5,−10.4 km). Both understanding of program content ($\beta = 2.1$, $p = 0.03$, 95% CI: 0.2–4.1) and achieving a safe mobility plan ($\beta = 3.3$, $p = 0.003$, 95% CI: 1.2–5.5) were important to engagement in self-regulation. Females