

was 34 years, for women 32 years. 20% were head injuries, 33% fractures, higher than average fracture rate in all injuries. 80 injuries were serious (AIS 3), 8 severe (AIS 4) and 3 critical (AIS 5). 60% of the injured had used helmet, and got fewer head injuries than those without helmets. 10% were influenced by alcohol/drugs. 77% (N = 1673) happened in “inner” city, 13% in wooden areas in the city, 7% in other municipalities, and 3% abroad. In 10% (N = 164) of injuries in “inner city”, tram rails were involved. Police registered 125 bicycle injuries in “inner city” during 2014, 7% of injuries treated at OUH. Since 2003, population of Oslo has increased by 22%, bicycle injuries by 21%.

**Conclusions** Incidence of bicycle injuries in the population of Oslo seems to be rather stable during the last 12 years. They are more severe than injuries in average. Patients without helmets have more head injuries than patients with helmets.

## 295 CYCLING INFRASTRUCTURE FOR REDUCING CYCLING INJURIES IN CYCLISTS: A COCHRANE REVIEW

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**Background** Cycling infrastructure aims to make cycling more convenient and safer for cyclists. We undertook a Cochrane review to assess the effectiveness of cycling infrastructure at reducing cycling injuries in cyclists.

**Methods** Sixteen databases, twelve websites and conference proceedings were searched up to March 2015. Eligible studies included RCTs, CBAs or an ITS evaluating a cycling infrastructure and reporting injuries or collisions. Two authors independently extracted study data and quality assessment.

**Results** Twenty one studies met inclusion criteria. Meta-analyses relating to cycle lanes on roads (rate ratio (RR) 1.21, 95% confidence interval (CI): 0.70 to 2.08) and cycle routes and networks (RR 0.68, 95% CI: 0.31 to 1.47) found no evidence that either were effective at reducing cycle collisions. From a narrative review, there was some evidence that 20 mph speed limits were effective at reducing collisions. Redesigning specific parts of cycle routes that may be particularly busy or complex in terms of traffic movement may reduce the risk of collision. The conversion of intersections with and without signals to roundabouts with cycle paths may reduce the odds of collision. Findings related to the instalment of Advanced Stop Lines, use of colour, cycle tracks and cycle paths suggest these neither reduce nor increase injury collisions in cyclists. There was some evidence that the conversion of intersections to roundabouts with cycle lanes marked as part of the circulating carriageway may increase cycle collisions. There was some evidence that continuing a cycle lane across the mouth of a side road with a give way line onto the main road may increase the risk of injury collisions in cyclists.

**Conclusions** Several designs of cycling infrastructure may reduce collisions. There is a paucity of high quality evaluations of cycling infrastructure. The use of adequate data collection periods and assessment of cycle flows would improve future evaluations.

## 296 CYCLIST DEATHS IN LONDON: IMPLICATIONS FROM A SAFE SYSTEMS PERSPECTIVE

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**Background** In 2013 the London Mayor committed to increasing cycling levels by 400% (from 2001) by 2026. Although the numbers of deaths per year are relatively low cycling in London has become highly politicised with significant media focus on every cycle death in the capital. This study was commissioned by Transport for London to explore contributory factors to cyclist deaths and implications for interventions.

**Methods** This study involved an in-depth case review of 53 pedal cycle fatalities in London between 2007–2011. Police fatal reports were used in the analysis. The method involved application of a Haddon matrix approach to data analysis and a case by case review by a multidisciplinary team to explore the multifactorial nature of contributory factors from a safe systems perspective.

**Results** Over half the crashes involved a truck (>3.5 tonnes) as the primary collision partner, most happened during daylight and the commute period, on low speed (30 mph) urban roads and at a junction, particularly at a complex junction. A notable finding was the involvement of trucks in fatalities, particularly for female cyclists, where the truck was turning left. For these crashes contributory factors were identified as poor visibility of the cyclist to the truck driver related to cab design and lack of mirrors, poor positioning by the cyclist and infrastructure issues such as lane narrowing creating a conflict point between cyclist and trucks.

**Conclusions** Potential countermeasures to mitigate risks for cyclists include the design of trucks to create greater visibility of vulnerable road users, training of both drivers and cyclists to raise awareness of visibility and designing infrastructure and managing traffic to reduce the opportunities of conflicts arising in the first place. Few well designed intervention studies were identified. The overrepresentation of female cyclists in collisions with left turning trucks is an issue that warrants further investigation.

## Alcohol, Drugs and Medicines

### Parallel Tue 2.4

## 297 CONCURRENT USE OF ALCOHOL AND MARIJUANA AND FATAL MOTOR VEHICLE CRASHES: A CASE-CONTROL STUDY

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**Background** About one third of fatally injured drivers in the United States test positive for non-alcohol drugs and 20% test positive for two or more drugs. Alcohol-marijuana is the most commonly detected poly-drug combination. The role of concurrent use of alcohol and marijuana in crash causation has not been well understood.

**Methods** Using a case-control design, we assessed the individual and joint effects of alcohol and marijuana on fatal crash risk. Cases (n = 2613) were drivers who were involved in fatal motor vehicle crashes in the continental United States during specific time periods in 2006, 2007, and 2008 and controls (n = 7719)

were participants of the 2007 National Roadside Survey of Alcohol and Drug Use by Drivers.

**Results** Overall, 53.3% of the cases and 8.9% of the controls had elevated blood alcohol concentrations (BAC  $\geq$  0.01 g/dL), and 6.0% of the cases and 3.0% of the controls tested positive for marijuana. Compared to drivers testing negative for both alcohol and marijuana, the estimated odds ratios of fatal crash involvement were 11.77 [95% confidence interval (CI): 10.78, 12.84] for those testing positive for alcohol and negative for marijuana, 2.16 (95% CI: 1.85, 2.54) for those testing negative for alcohol and positive for marijuana, and 25.46 (95% CI: 21.25, 30.51) for those testing positive for both alcohol and marijuana.

**Conclusions** Alcohol and marijuana are each associated with a significantly increased risk of fatal crash involvement. When alcohol and marijuana are used together, there exists a positive interaction effect on the risk of fatal crash involvement on the additive and the multiplicative scales.

## 298 IMPACT OF COLOUR-GRADED PICTOGRAM ON MEDICINE PACKAGES TO CAUTION AGAINST THE RISK OF TRAFFIC CRASH

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**Background** In France, a colour-graded pictogram is printed on the outer packaging of medicines according to their effect on driving performance, from level 1 (low risk) to level 3 (high risk). The aim of this study was to assess the impact of labelling benzodiazepines and z-hypnotics with level 2 or 3 pictograms on the risk of road traffic crash.

**Methods** Data from three French national databases were extracted and matched: the healthcare insurance database, police reports, and the police database of injurious crashes. Drivers involved in an injury crash in France, from July 2005 to December 2011, and identified by their national identifier were included. The study period was divided into 4 periods. The first period corresponded to a period before the colour-graded three-level pictogram was set up. The immediately subsequent period was used to estimate the impact of the introduction of the three-level pictogram. The two following time-periods were defined to assess any relapse in the potential impact of the pictogram. A case-control analysis comparing responsible versus non-responsible drivers was conducted.

**Results** 142,763 drivers were included. Exposure to benzodiazepine anxiolytics (level 2 or 3) was associated with an increased risk of being responsible for a road traffic crash during the first period of the study (OR = 1.42 [1.24–1.62]). The association disappeared in the second period and became significant again during the third and the fourth period. The risk of being responsible for a crash increased in users of z-hypnotics (level 3) across the four periods (OR from 0.97 [0.81–1.17] to 1.32 [1.10–1.60]).

**Conclusions** Our results suggest that there has been a change in driving behaviour in benzodiazepine anxiolytic users after the implementation of the graded pictogram. However, there was a relapse immediately after. The increased risk associated with z-hypnotic use despite the presence of the higher level of pictogram calls for further preventive interventions.

## 299 RISK COMMUNICATION IN MEDICINES AND DRIVING USING PICTOGRAMS

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**Background:** Appropriate communication towards patients using driving impairing medicines about risk on fitness to drive can be supported by the use of pictograms. To evaluate and compare the effectiveness of various pictograms and warnings (e.g. a French, a Dutch and a newly developed EU rating model) in communicating risk, several experiments were conducted.

**Methods:** Structured interviews (experiment 1) and written questionnaires (experiment 2) were used respectively among drivers (n = 270) visiting one out of four community pharmacies in Groningen (n = 4) and patients who were drivers (n = 298) and starting a new treatment with a driving impairing medicine visiting community pharmacies (n = 38) in the Netherlands, to compare various pictograms and warnings.

**Results:** Compared to general warnings and pictograms, the EU rating model allowed patients to better understand the potential risk estimate when using impairing medicines. Addition of a side-text to the rating model resulted in a significantly higher estimated level of driving risk and a significant increase in intention to change driving behaviour. Age was the strongest predictor influencing participants' preference for pictograms to express a warning message and levels of impairment.

**Conclusions:** Implementation of the rating model in clinical practice should be considered, but factors such as age and education of patients need attention in designing and implementing new pictograms.

## 300 UNLOCKING KEYS TO EFFECTIVE IGNITION INTERLOCK PROGRAMS TO REDUCE ALCOHOL IMPAIRED DRIVING

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**Background** Ignition interlocks, when installed on vehicles of drivers convicted of alcohol-impaired driving (AID), reduce repeat arrest by 67%. However post-interlock removal, recidivism (AID re-arrest) among previous interlock users equals that of AID-convicted drivers who never used interlocks. Also, the low numbers of offenders installing interlocks limits the impact. Study objectives include determining interlock program characteristics associated with increased interlock use and evaluating including alcohol treatment in the program to reduce post-interlock recidivism.

**Methods** To determine effective program characteristics, eight interlock program keys (e.g. requirement to install interlocks) were identified and each rated on 1–5 scale for 28 U.S. state interlock programs. Correlation analysis between rate of interlocks in use/10,000 population, and program key rating was conducted. To evaluate treatment in the one state with a treatment program, survival analysis using Cox regression proportional hazards model was performed with post-interlock recidivism as the terminal event. The treatment group (n = 640) were offenders with three or more violations (two alcohol-positive start attempts