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Curtin-Monash Accident Research Centre

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Illicit drugs in driving: An investigation of fatalities and traffic offences in Western Australia

- *23% (n=312) of fatally injured drivers tested positive for one or more illicit substances*
- *1,630 WA drivers were charged with a Section 64AC offense between 2008-2012*
- *Males 2.4 times more likely than females to be repeat offenders*

New research has reinforced the association between illicit drug use and the risk of fatal injury among drivers. The research by C-MARC staffers Peter Palamara, Michelle Broughton and Fiona Chambers undertaken in conjunction with the WA Police and the ChemCentre WA found that 23% of 1,375 drivers and motorcycle riders fatally injured during the period 2000-2012 were positive to one or more illicit drugs such as cannabis, methylamphetamine or ecstasy. The annual rate of detection (per 100,000 licensed drivers) was reasonably consistent up until 2008, with some evidence of a decline thereafter, perhaps because of the introduction of roadside oral fluid testing in late 2007.

Nearly two-thirds of positive results were for cannabis (detected as THC), followed by methylamphetamine (27%). Of the 312 drivers who tested positive, 20% tested positive for two or more illicit drugs. In addition, around half of the affected drivers tested positive for alcohol (>0.000gm%).

A number of risk factors were identified for driver/riders testing positive for an illicit substance. The odds of testing positive was significantly higher for males, those aged under 40 years, those driving without a valid licence, those testing positive to alcohol in the range 0.05gm%-0.149gm%, and those using benzodiazepines with and without opioids.

The study also analysed Western Australian Police (WAPOL) records of drivers and riders charged with a Section 64AC offence (illicit substance in oral fluid), 2008-2012. Around 4% (n=1,630) of drivers and riders undertaking a roadside oral fluids test between 2008-2012 were charged with a Section 64AC offence. The annual offence rate significantly increased over the period. Drivers aged 25-39 years (56.9%) and 15-24 years (21.8%) accounted for the majority of offending drivers. Males accounted for close to eight in ten offending drivers. Around 95% of drivers charged during the period were single offenders, with males 2.4 times more likely than females to be repeat offenders.

Various recommendations were proposed including ways to improve WA's enforcement of illicit drug driving in combination with alcohol breath testing, and opportunities for further research using linked data to better understand and manage those at risk of drug driving.

The full report '*Illicit drugs in driving: An investigation of fatalities and traffic offences in Western Australia*' will be made available for download in the next month from the C-MARC webpage www.c-marc.curtin.edu.au

Inside this issue:

From the Director

Welcome to the first issue of the Curtin-Monash Accident Research Centre newsletter for 2015.

Last year was a busy and productive year and 2015 looks set to be even busier. In this issue we will profile a recently completed report on the prevalence and characteristics of illicit drug-related driving in Western Australia. I am pleased to introduce The DIAMOND Study, a new line of research funded by the Neurotrauma Research Program. C-MARC and ARRB have also bought a state of the art advanced driving simulator set to arrive later this year. You will also find a list of upcoming seminars and conferences.

We hope you enjoy the latest newsletter.

Lynn Meuleners

The DIAMOND Study: Diverging Diamond Interchanges in Western Australia: PerforMance ON a Driving Simulator

- *The Diverging Diamond Interchange (DDI) is an innovative design that has been shown to reduce serious injury crashes overseas*
- *A Neurotrauma Research Program grant will fund a study that will investigate how Australian drivers perform whilst navigating a DDI on a driving simulator under different environmental conditions and with various levels of signage*
- *This project will be the first study of its kind to provide evidence on the difficulties West Australian drivers may experience while negotiating a DDI*

Over one-third of fatal crashes and close to half of serious injury crashes occur at intersections in metropolitan Perth. Intersections have a higher level of crash risk compared to other types of road infrastructure with crashes at intersections frequently resulting in severe injuries to the head and spine. Therefore, significant effort is being made to reduce crashes at intersections through innovative designs that seek to minimise crash risk and, in particular, eliminate conflict points with other vehicles.

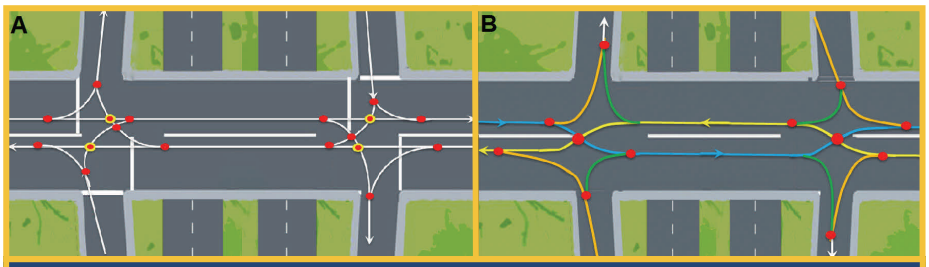
C-MARC's Professor Lynn Meuleners and Dr Kyle Chow in addition to Dr David Logan from Monash University Accident Research Centre and Dr Paul Roberts from ARRB have recently been awarded a research grant from the Neurotrauma Research Program to investigate the Diverging Diamond Interchange (DDI), an innovative intersection design that has shown promising results in terms of reducing serious injury crashes overseas.

The DDI is an intersection where traffic is diverted to the opposite side of the road (depicted by the blue and yellow lines in Image B) which allow right turns to be completed without conflict with other traffic, after which traffic is diverted back to the original side of the road with two-phase traffic signals controlling traffic flow at the cross-overs. The road safety benefits of DDIs include the elimination of right angle crashes, improved sight distance, better traffic calming, reduced crossing distances for pedestrians and fewer conflict points. However, before DDIs can be introduced in Western Australia, it is essential to investigate how drivers, particularly high risk groups such as younger and older drivers, perform on these new designs.

The aims of this study are to evaluate driver performance and cognitive/physical workload while navigating a DDI under different environmental conditions and signage (normal versus enhanced) using a driving simulator.

The study will involve the development of six DDI driving simulator scenarios, which will be specially developed in consultation with mechanical engineers and a human factors/psychology expert for use on the new C-MARC—ARRB advanced driving simulator. A total of two hundred drivers aged between 18 and 80 years will be recruited into the study and will be required to complete two questionnaires and have their driving simulator performance assessed for each of the six scenarios. Driving performance measures to be tested will include wrong-way violations, navigation errors, red-light violations and speed. Each participant's driving performance will be assessed while navigating the DDI using normal versus enhanced signage as well as under different environmental conditions. Drivers will also be required to undertake a dynamic mental workload assessment via an auditory detection task while driving in the simulator.

This project will be the first study of its kind to provide objective comprehensive evidence on the difficulties West Australian drivers may experience while negotiating a DDI under a variety of different environmental conditions. It will also determine which signage (normal versus enhanced) is needed for drivers to safely negotiate the interchange as evidence suggests that excessive road signage can increase clutter, distraction and mental workload. As a result, the findings will guide road authorities to ensure maximum safety benefits when implementing DDIs.



Above Figure A shows a standard WA interchange with 18 possible conflict points of which 4 are classified as causing serious injury. Figure B shows the layout of the DDI with 12 conflict points of which none are classified as serious thereby significantly reducing the potential for death and serious injury from vehicular impact.

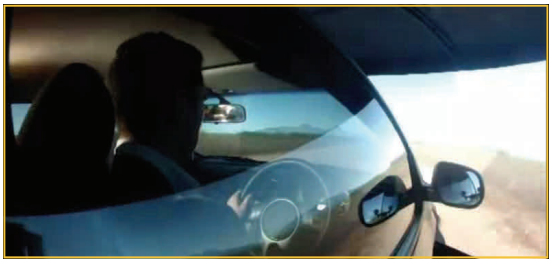
C-MARC and ARRB's New Advanced Driving Simulator

C-MARC is excited to announce that a state of the art advanced driving simulator will be installed at the Centre in June 2015. The purchase of the simulator has been made possible through a collaboration between C-MARC, the Faculty of Health Sciences and the ARRB Group.

This $600,000 simulator, developed by CKAS Mechatronics, incorporates a complete Holden Commodore vehicle with working controls and instruments which is completely enclosed in a cabin mounted on a full motion system. A full 360° visual system in combination with genuine transmission, brake, accelerator and power steering systems makes driving the simulator as realistic as possible. The simulator also gives the driver the ability to make necessary head movements and allows for full use of the mirrors during simulations. All these features combine to recreate the forces, loads, sounds and feel of real-world driving.

The first C-MARC/ARRB simulator project is likely to be the study of driver behaviour when negotiating a diverging diamond interchange, funded by the Neurotrauma Research Program. It is expected that future projects will investigate other novel intersection treatments and that the simulator will be a key research tool within ARRB's Driverless Cars Initiative. Furthermore, the collaboration between C-MARC and ARRB will bring together researchers from disciplines including ophthalmology, psychology, mathematics, physiology, engineering and road safety. It will provide researchers with new opportunities to study driver behaviour in different driving conditions, with a high degree of realism, but free of crash risk.

If you would like more information or are interested in undertaking research using the simulator please contact Professor Lynn Meuleners via phone 9266 4636 or email L.Meuleners@curtin.edu.au after June 2015.



Publications

Meuleners, L., Fraser, M. L., Govorko, M. H., & Stevenson, M. R. (2015). **Obstructive Sleep Apnea, Health-Related Factors, and Long Distance Heavy Vehicle Crashes in Western Australia: A Case Control Study**. *J Clin Sleep Med*. (Epub ahead of print).

Meuleners L, Agramunt S, Ng J, Morlet N, Keay L, McCluskey P, Young M. (2014). **The CEDAR Study Protocol (Cataract Extraction and Driving Ability Research): Characterisation of deficits in driving performance and self-regulation among older drivers with bilateral cataract.** *Injury Prevention*. (Epub ahead of print).

Meuleners LB, Fraser ML, Ng J, Morlet N. (2014) **The impact of first- and second-eye cataract surgery on injurious falls that require hospitalisation: A whole population study.** *Age and Ageing.* 43(3), 341-346.

To KG, Meuleners L, Fraser M, Do DV, Duong DV, Huynh V, To QG, Phi TD, Tran HH, Nguyen ND. (2014). **The Impact of Cataract Surgery on Vision-Related Quality of Life for Bilateral Cataract Patients in Ho Chi Minh City, Vietnam: A Prospective Study**. *Health and Quality of Life Outcomes*, 12 (1), 16.

To KG, Meuleners L, Fraser M, Do DV, Duong DV, Huynh V, To QG, Phi TD, Tran HH, Nguyen ND. (2014). **A longitudinal study of the impact of first- and second-eye cataract surgery on falls and other injuries in Vietnam.** *Clinical Intervention in Ageing*, 9, 743-51.

Upcoming Seminars and Conferences

Event: Self-Driving Vehicles: Human Factors Challenges and Opportunities presented by Professor Mike Regan as part of the C-MARC Seminar Series 2015

Date & Time: 2:00—4:00pm**,** Monday 30 March 2015

Venue: Seminar Room 3, Technology Park Bentley—Conference & Business Function Centre

Professor Regan is Chief Scientist-Human Factors for the ARRB Group and Adjunct Professor at the School of Aviation, University of New South Wales. In this seminar he will describe the Australian Driverless Vehicle Initiative and outline some key human factors challenges and opportunities to be addressed and embraced in deploying self-driving vehicles on Australian Roads.

For further information please email matthew.govorko@curtin.edu.au

Event: 9th International Conference on Managing Fatigue

Date: Monday 23– Thursday 26 March 2015
Location: Perth, Western Australia
Venue: Esplanade Hotel Fremantle

C-MARC and the Perth based Australian Road Research Board (ARRB) are organising the 9th international fatigue conference to be held in Western Australia. The conference will cover issues related to research investigating fatigue management in transportation and other related industries and its subsequent translation into practise. The fatigue conference will attract professionals from a broad array of disciplines including road safety experts, occupational health and safety professionals, researchers, transportation staff, road authorities, military personnel, aviation experts and medical professionals, amongst others. For additional information on the conference please visit: **www.fatigueconference2015.com.au**

Event: 7th Australasian Drug & Alcohol Strategy Conference

Date: 17—20 March 2015
Location: Brisbane, Queensland
Venue: Brisbane Convention and Exhibition Centre

The theme of the conference is ***Building Collaborative Partnerships - responding within and across borders***. The conference will see a variety of policing jurisdictions, health service providers, policy analysts, academics and industry representatives come together to provide a forum in which to highlight and strengthen partnerships. For further information please visit: **www.adasc2015.com**

Event: 2015 Australasian Road Safety Conference

Date: 14—16 October 2015
Location: Gold Coast, Queensland
Venue: Gold Coast Convention and Exhibition Centre

ARSC2015 is a direct response to the United Nations call for a Decade of Action on Road Safety. The conference will deliver research results, showcase innovative solutions, and provide educational and networking opportunities across disciplines in all 5 pillars of the United Nations call for a Decade of Action on Road Safety. For further information please visit: **http://australasianroadsafetyconference.com.au/**

Event: 12th Australasian Injury Prevention and Safety Promotion Conference

Date: 25—27 November 2015
Location: Sydney, New South Wales
Venue: Sydney Law School, The University of Sydney, Darlington campus

The theme of the conference is ***Impact and Innovation: Preventing Injury in a Changing World***. The conference will be a multi-disciplinary event featuring representatives from all facets of injury prevention including research, teaching, practice and policy. For further information please visit: **www.injuryprevention2015.com**

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C-MARC is a West Australian based independent multi-disciplinary road safety research centre established by the West Australian State Government's Office of Road Safety in 2009.

The Centre represents a significant partnership between the Office of Road Safety, Curtin University and Monash University's Accident Research Centre (MUARC).

C-MARC's mission is "*to be a Centre of excellence in road and other injury research and the translation of that research into policy and practice that will inform government, industry and the wider community.*"

Curtin University

MONASH University