



Curtin-Monash Accident Research Centre

- Identifying design and operational solutions for rural and remote roads in WA

Primary recommendations :

- Installation of wire-rope barriers on key routes
- Lowering of travel speeds to Safe System-compatible levels

Inside this issue:

Pedestrian-car crashes at Perth Central Business District intersections 2

Safer cycling study in Western Australia 3

C-MARC Seminar Series 3

C-MARC Team News 4

Upcoming Events 4

New Publications 4

Designing safer rural roads to combat driver error

Serious trauma from run-off-road crashes is the single biggest road safety problem in rural Western Australia. In regional areas 54% of all fatal and serious injuries between 2006 and 2010 (322 per annum) resulted from single vehicle crashes, while in remote WA the corresponding proportion is 71%, with an average of 297 people dying or being hospitalised each year. High speeds, alcohol consumption, lower incidences of seat belt wearing all contribute significantly to this problem, with long, monotonous routes with little traffic further exacerbating the situation, creating ready conditions for fatigue and drowsiness leading to driver error.

This project, carried out by Dr David Logan and Ms Nimmi Candappa from the Monash University Accident Research Centre, sought to identify design and operational solutions for rural and remote roads to accommodate both inadvertent errors and deliberately unsafe behaviours.

The study conducted an in-depth investigation of the Western Australian data revealing typical crash types and patterns. A comprehensive literature review identified the full range of factors contributing to crashes and developed a comprehensive taxonomy of driver error with a range of Safe System and traditional countermeasures showing potential to address these errors. Some of the countermeasures identified included:

- Ensuring number of lanes are minimised and lane widths are no wider than recommended to influence driver speed choice
- Dynamic speed alert signs with accompanying enforcement

- Speed limit reductions and gateway treatments within towns

In summary, the primary recommendations of the study were:

1. Large-scale installation of wire-rope barriers on key routes;
2. The lowering of travel speeds to Safe System-compatible levels.

On the routes where higher speeds are deemed essential, a barrier program should be made a priority, with economies of scale utilised to maximise the length of route covered within available funding. For remaining routes of concern, recommended travel speeds should be reduced and backed up with public awareness campaigns and police enforcement. Although the latter is a clearly a challenge given the vast distances involved, targeted programs around rural population centres are likely to have a beneficial effect.

There is no quick solution to reducing serious road trauma on rural routes in Western Australia, but a long-term vision that works towards ensuring that travel speeds are matched with the quality of the infrastructure provided across the state will eventually yield significant benefits.

The full report *Designing Safer Roads to Counter Driver Error* can be downloaded from: http://c-marc/local/docs/CMARC_Designing_safer_roads_to_combat_driver_errors_-_rural_crashes.pdf

From the Director

Welcome to the latest news from the Curtin-Monash Accident Research Centre. It has been an exciting and busy time with multiple research projects being undertaken, one of which is *The Safer Cycling Study* which is featured in the newsletter.

A project looking into designing safer rural and remote roads to combat driver error and an investigation into pedestrian-car crashes at Perth Central Business District intersections are both recently completed reports which are summarized in this latest issue.

We are also pleased to welcome the addition of two new staff members to the team.

We hope you enjoy the newsletter.



Lynn Meuleners

Pedestrian-car crashes at Perth Central Business District intersections



- Of n=88 crashes involving n = 93 pedestrians, 85% occurred at signalised intersections.
- Males were most frequently involved as both drivers and pedestrians
- The majority involved drivers aged 20-39 years and pedestrians aged 17-39 years

Recommendations made to Main Roads Western Australia included :

- Undertaking an observational study of pedestrian crossing behaviour
- Considering a trial of countdown timers showing time left to cross
- Reviewing the pedestrian signal cycle times
- Providing real time information on 'time to next green signal'



Pedestrians crossing midblock and at un-signalised intersections are more likely to be involved in a crash and injured compared with those that cross at signalised intersections. Nevertheless, recent investigations of pedestrian crashes have highlighted the problem in pedestrian-dense areas such as Central Business Districts where signalised intersections predominate. In 2013, C-MARC staff working in conjunction with Main Roads Western Australia (MRWA) investigated the occurrence and characteristics of pedestrian crashes at signalised and un-signalised intersections in the Perth Central Business District with the view to recommending appropriate countermeasures.

After defining the boundaries of the Central Business District of Perth, MRWA extracted all crashes occurring at CBD intersections during the period 2008-2012 from their Integrated Road Information System of police reported crashes. MRWA also supplied relevant signal and phasing information for all signalised intersections in the CBD. The two datasets were then merged for analysis.

A total of n=4,326 crashes occurring at traffic intersections in the Perth Central Business District were extracted. Disaggregating the data by the nature of the crash showed that n=88 (2%) of crashes involved a total of n=93 pedestrians. Of the 56 pedestrians for whom injury information was available, n=22 were hospitalised and one killed. Compared with females, males were more frequently involved as both drivers and pedestrians, accounting for around six in ten involved road users. The majority of involved drivers/riders and pedestrians were younger in age, that is, under 40 years. Around two-thirds (66.2%) of drivers were aged 20-39 years, while a similar proportion (64%) of pedestrians were aged 17-39 years. Crash involvement was found to significantly vary with age for both drivers/riders and pedestrians. The frequency of pedestrian crashes at intersections was noted to vary significantly with time of day. Most notably, seven in ten pedestrian crashes occurred in the 12 hours between 06:00 and 17:59. Around eight in ten crashes were noted to have occurred in 50-60km/hour speed zones, with around three-quarters of pedestrians being struck by a vehicle to the near and far side as they crossed the road. Particularly troubling was the finding that 85% of pedestrian-car crashes occurred at signalised intersections. The vast majority of these intersections operated *Walk-Don't Walk* signals; around six in ten were equipped with a 'head start' phase.

Further analysis of the crashes at signalised intersections showed that pedestrians were equally as likely to collide with a vehicle when crossing at

Exclusive Walk (0.966 crashes per 1,000 days of operation) where all vehicle movement ceases, and *Parallel Walk* (0.912 crashes per 1,000 days of operation) where vehicles move in parallel with pedestrians following a brief delay. Across both intersection signal types, pedestrians were most commonly struck to the near and far side by vehicles that were proceeding straight ahead through the intersection and not turning across the path of the pedestrian.

The absence of information linking the time of the crash with the pedestrian signal phase position means there is some uncertainty as to whether pedestrians or drivers were acting contrary to their relevant signals. Even so, there is an abundance of research to suggest that pedestrians, more so than drivers, were likely to have violated their signals and that certain pedestrians, such as the young and males, were less inclined to wait for the next green signal to cross. Following a review of countermeasures to increase pedestrian safety at signalised intersections, the report recommended that MRWA undertake an observational study of pedestrian crossing behaviour; consider a trial of countdown timers showing time left to cross; review the pedestrian signal cycle times to reduce the amount of time pedestrians 'wait on red', and provide real time information on the 'time to next green signal'. It was also recommended that consideration be given to the implementation of an education campaign, backed up by police enforcement, of legal and safe crossing behaviour.

The full report *An investigation of pedestrian crashes at traffic intersections in the Perth Central Business District 2008-2012* can be downloaded from: http://c-marc/local/docs/Pedestrian_CBD_crashes_Dec_13_Final.pdf



Safer cycling study in Western Australia

The Safer Cycling and the Urban Road Environment study is about to begin participant recruitment in WA. This multi-centre study, led by Professor Mark Stevenson of Monash University is being conducted in Melbourne and Perth with the Perth arm being led by Professor Meuleners at C-MARC. The study is funded by an ARC Linkage Grant and Main Roads Western Australia is providing funding for the Perth study. This innovative study aims to determine contributing factors to cyclist crashes in urban road environments and develop road infrastructure prototypes that improve cyclist safety.

Cycling is increasing in Australia, however, this has resulted in increased cyclist injuries. This study will use a combination of in-depth crash investigations and naturalistic video footage to examine the role of the road environment in crashes. This information will then be used to develop new urban road design prototypes that improve safety for cyclists.

The Perth arm of the study will also feature three additional components, as part of a PhD project being undertaken by Michelle Fraser. A questionnaire-based case-control study will be conducted involving cases hospitalised due to a bicycle crash and controls who have not been involved in a crash, recruited from the cases' crash sites. This component will examine behavioural risk factors for on-road bicycle crashes in Perth.

One hundred controls will also be selected to attach video cameras to their bicycles. The video data will be used to conduct an in-depth investigation of selected risk factors for crashes identified in the case-control study. Finally, cases will complete a follow-up questionnaire 12 months post-crash. This will explore the impact of the crash on cycling exposure, avoidance and behaviours.

Overall, it is envisaged that this new and exciting research will lead to the development of new road designs to make cycling safer.



Upcoming C-MARC Seminar

The second seminar for 2014 will be presented by Professor Simon Lenton "*Bridging the research policy gap: Contributing to repeat drink driving countermeasures in WA*" on 17th July 2014 at Curtin University. Professor Lenton will discuss the National Drug and Research Institute's repeat drink driving research in Western Australia and will address issues regarding the translation of research into policy in addition to presenting steps to improve such translation.

Translating research evidence into policy and practice has become an increasingly important issue in public health research, both in Australia and internationally. There are a number of useful models of policy change in the political science and public policy areas, yet only in recent years are they beginning to be applied to the drugs and public health fields in this country. John Kingdon, in his classic work in political science and public policy, *Agendas, Alternatives, and Public Policies* (1984, 2011), provides a powerful, evidence-based, framework for understanding how some policy ideas come to fruition whereas others wither and die, and the role played by research in this process. This presentation outlines Kingdon's model and applies it to the National Drug Research Institute's work in the translation of drink driving research into policy changes to prevent repeat drink driving in Western Australia. It will raise issues to be considered by those interested in translating research into policy and suggests steps which can be taken to improve that translation.

If you would like to attend please email matthew.govorko@curtin.edu.au for further information.

C-MARC Team News

C-MARC recently welcomed two new members to the team.

Matthew Govorko —Research Associate



Matthew completed a Bachelor of Science in Exercise and Health at The University of Western Australia in 2011 and a Master of Public Health at Curtin University in 2014. He recently joined the team at C-MARC in order to develop his research skills and pursue a career in public health research. Matthew will be examining driving performance, driving patterns and self-regulation behaviour of older drivers with glaucoma.

Seraina Agramunt—Research Associate



Seraina completed a Bachelor of Psychology in 2007, a Master of Science in Psychology in 2009 and a Master of Advanced Studies in Psychological Evaluation and Intervention in 2010, at the University of Geneva, in Switzerland. She has been involved in various research projects related to mental health issues, drug and alcohol problems, psychophysiology and emotions. She recently joined C-MARC and her current research focuses on the characterisation of deficits in driving performances and self-regulation practices among older drivers with bilateral cataract.

Upcoming Events

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 organizing the 9th international conference to discuss managing fatigue in transportation and other transport related industries such as resources as well as health. The conference will cover relevant research 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.

The Organising Committee are now calling for abstracts for oral and poster presentations. Abstract submissions open on 4 August 2014.

Registration opens 25 August 2014. For additional information on the conference please visit: www.fatigueconference2015.com.au

Publications

Keay L, Palagyi A, McCluskey P, Lamoureux E, Pesudovs K, Lo S, Ivers R, Boufous S, Morlet N, Ng JQ, Stapleton F, Fraser M, Meuleners L. **Falls in Older People with Cataract, a Longitudinal Evaluation of Impact and Risk: The Focus Study Protocol.** *Injury Prevention* 2014. (epub ahead of print)

Meuleners L, Fraser M. **A Validation Study of Driving Errors using a Driving Simulator.** *Transportation Research Part F: Traffic Psychology and Behaviour* (In press, accepted for publication 2014)

Stevenson M, Johnson M, Oxley J, Meuleners L, Gabbe B, Rose G. **Safer Cycling in the Urban Road Environment: Study Approach and Protocols Guiding an Australian Study.** *Injury Prevention* 2014. (epub ahead of print)

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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."

