

A centre within the Monash University Injury Research Institute

### Finding evidence-based strategies to improve motorcycle safety: a case-control study on serious injury crashes in Victoria

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# Increased popularity of motorcycles

Motor vehicle registrations in Australia 700 Passenger Vehicles Number of Registered Passenger Vehicles (x  $10^3$ ) 12,000 MOTORCYCLES 650 Number of Registered 11,000 600 550 10,000 500 9,000 450 8,000 400 Motorcycles 350 7,000 300 6,000 × 250 10 5,000 200 4,000 2010 1970 1975 1980 1985 1990 1995 2000 2005 Year

#### Motor vehicle use in Australia (million km travelled)

	2003	2010	•
Car	151,743	163,360	8%
Motorcycle	1,376	2,394	74 %



Source: Australian Bureau of Statistics

## **Vulnerability of motorcyclists to injury**



Sources: Australian Bureau of Statistics, Transport Accident Commission (VIC)



Motorcycle Safety Study – Early case series report

### Managing Increasing Challenges in Motorcycle Safety (MICIMS) Aims

 To determine risk factors for motorcycle-related crashes involving serious injury

Specific focus on:

- 1. Role of speed incl. "excessive" vs. "inappropriate"
- 2. Role of road infrastructure and environment
- 3. Role of rider factors incl. age & rider experience

### This presentation:

Data from first 75 recruited cases (recruitment continuing to early 2014)

- Comparison with previous studies in Victoria (Haworth et al. 1997, Stephan et al. 2008)



### **Methods**

- **Population:** Motorcycle riders aged 18yrs & older
  - riding on public roads (150km radius of Melbourne, 6am-midnight)
- Study Design: Case-control + in-depth investigation
- 1. Rider is unit of analysis (road environment is controlled)

Group 1: Case riders - seriously injured riders admitted to hospital

Group 2: Control riders - riders passing crash sites

2. <u>Site is unit of analysis (rider is controlled)</u>

Case site + Case motorcycle - Site of crash + Motorcycle inspection Control site - 1km upstream of crash site



## **Measurement Modules: Case-series report**

#### **Rider Questionnaire (self reported)**

- Crash details & circumstances (eg. number of vehicles involved)
- Contributing factors, trip-related factors, motorcycle factors
- Rider factors (incl. age, experience)

#### **Crash site inspection**

- Crash event investigation, contributing factors, travel speed estimation (where possible)

- Features of road environment (eg. road type, intersection type)

#### **Case motorcycle inspection**

- Crash investigation (incl. speed estimation where possible)
- Motorcycle type, engine capacity, safety features



### **Results:** Rider factors & involvement of other road users

	Single- vehicle	Multi- vehicle	All crashes
Intersection	5	30	35
Mid-block straight	11	12	23
Mid-block curve	14	3	17
TOTAL	30	45	75

### Multi-vehicle crashes

- 60% of crashes involved another vehicle(s)
- Over two-thirds occurred at an intersection
- Most common scenario was another vehicle turning into path of rider (69%)

#### Single-vehicle crashes

- 40% of cases were single vehicle crashes
- For 70% of cases a misjudgement/control error on part of the rider was a contributing factor
- Ineffective braking was the most common control error



### **Results: Features of road environment**

	Urban	Rural	All roads
Intersection	28	7	35
X-Intersection	13	4	17
<b>T-Intersection</b>	13	1	14
Y-Intersection	2	2	4
Not intersection: straight	19	4	23
Not intersection: curve	4	13	17
TOTAL	51	24	75

#### Urban areas (68% of cases)

- 55% of crashes occurred at an intersection (X-Int. 25%, T-Int. 25%)

#### Rural areas (32% of cases)

- 54% of crashes occurred on a curve (incl. corner or bend)



# **Results – Speed related factors**

Excessive speed (=exceeding speed limit)

	Current Study (MICIMS)	Haworth et al. (1997)	Stephan et al. (2008)
Study period (years)	2012-2013	1995-1996	2000-2005
Injury type (inclusion criteria)	Serious injury	Serious Injury + Fatal	Fatal
Region type	Vic Metro + Vic Regional	Vic Metro	Vic Metro + Vic Regional
Number of cases	75	222	201
Number (%) of cases where speed could be evaluated	37 (49%)	118 (53%)	109 (54%)
% of cases where excessive speed judged to be involved	27 %	23 %	47* %



## **Results: Rider factors**

Rider age





Mean age of on-road motorcyclists admitted to Hospital (1995-2012)



Source: Victorian Admitted Episodes Dataset (VAED)



## **Results: Rider factors**

Age vs. experience (licence years)





# **Results: Motorcycle characteristics**

Motorcycle type



- 2 case motorcycles (3%) were fitted with an anti-lock braking system (ABS)



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Motorcycle Safety Study – Early case series report

# **Results: Motorcycle characteristics**

### Engine Capacity





# **Summary & Conclusions**

- 60% of PTW crashes investigated involved another vehicle
- The most common scenario was another vehicle turning into the path of the rider (69% of multi-vehicle crashes)
- For single-vehicle crashes, 54% occurred on a curve
- The age of riders seriously injured has increased substantially in recent years
- Very small number (3%) of motorcycles fitted with anti-lock brakes (ABS)
- At study completion, the case-control analysis will provide much more valuable information about the risk factors associated with rider characteristics, the road environment and motorcycle characteristics.



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**Project Team: Field-based** Geoff Rayner Rob Jackel

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#### Research Partners: Aust. Research Council VicRoads Transport Accident Commission Victoria Police

Dept. of Justice Vic. Auto. Chamber of Commerce

#### Study Hospitals (Victoria):

The AlfredGeelongAustinGoulburn ValleyBallaratLatrobeBendigoMaroondahBox HillMonashDandenong NorthernFrankstonRoyal Melbourne