Reducing pedestrian collisions in Melbourne’s Central Business District

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Increased amount of walking

- Obvious benefits for health and well-being, and many environmental benefits

- City of Melbourne promotes active transport
  - Sets key directions and targets for a growing city
  - Supports convenient and safe walking, cycling and public transport use as the dominant modes of transport
  - Currently 51% of all trips to and within the city are by walking, cycling or public transport – this is expected to increase to 80% by 2030
  - Around 800,000 people move through the city every day; this is expected to increase to more than one million by 2030
The risks.....

- This major modal shift means:
  - Many more vulnerable road users
  - Potentially increased risks amongst vulnerable road user groups
  - We need to understand the risks and provide a safe and comfortable walking environment.

- There is little consideration of the impact of the built environment on overall safety of vulnerable road users

- Aims:
  - Identify key factors in pedestrian collisions in the Melbourne CBD area.
  - Make recommendations for countermeasures that can achieve major steps forward to eliminating serious pedestrian trauma
Methods

- Analysis of Victorian Police-reported crash data between January 2000 to December 2011.

- Serious casualty pedestrian collisions within the CBD defined areas extracted.
  - Area defined as Melbourne city grid within Spring St, Flinders St, Spencer St & La Trobe St, plus segment of Flemington Rd (north of CBD)

- Selected variables analysed to highlight pedestrian collision patterns and contributing factors, including:
  - Pedestrian characteristics (age, gender, BAC level, activity, etc.);
  - Environmental characteristics, road geometry, DCA, time of day and day of week, speed zone, and traffic control type; and
  - Injury severity.
Victoria:
- 17,301 pedestrian collisions (3% fatalities, 43% serious injuries, 53% other injuries)
- An overall downward trend, but no significant reduction

CBD:
- 451 pedestrian collisions (2% fatalities, 70% serious injuries, and 28% other injuries)
### Key findings:

- Higher proportion of males involved in collisions
- Majority were young adults aged between 18-34 years
- Males over-represented in young adult age groups, females over-represented in very young (under 17 years) and older (65+ years)
- Majority of collisions occurred while pedestrians were crossing the carriageway, and significant proportion while boarding/alighting trams

#### Table 1. Characteristics of pedestrians involved in collisions

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Fatalities (n=10)</th>
<th>Serious Injuries (n=316)</th>
<th>Other Injuries (n=125)</th>
<th>Total (n=451)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;17 years</td>
<td>0</td>
<td>5.8</td>
<td>7.4</td>
<td>6.1</td>
</tr>
<tr>
<td>18-34 years</td>
<td>20.0</td>
<td>49.8</td>
<td>51.2</td>
<td>49.7</td>
</tr>
<tr>
<td>35-64 years</td>
<td>60.0</td>
<td>36.9</td>
<td>34.7</td>
<td>36.8</td>
</tr>
<tr>
<td>&gt;65 years</td>
<td>20.0</td>
<td>7.4</td>
<td>6.6</td>
<td>7.4</td>
</tr>
</tbody>
</table>

#### Gender:

<table>
<thead>
<tr>
<th>Gender</th>
<th>Fatalities (n=10)</th>
<th>Serious Injuries (n=316)</th>
<th>Other Injuries (n=125)</th>
<th>Total (n=451)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>50.0</td>
<td>53.9</td>
<td>52.8</td>
<td>53.6</td>
</tr>
<tr>
<td>Female</td>
<td>50.0</td>
<td>46.1</td>
<td>46.4</td>
<td>46.4</td>
</tr>
</tbody>
</table>

#### Pedestrian movement:

<table>
<thead>
<tr>
<th>Pedestrian movement</th>
<th>Fatalities (n=10)</th>
<th>Serious Injuries (n=316)</th>
<th>Other Injuries (n=125)</th>
<th>Total (n=451)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossing Carriageway</td>
<td>70.0</td>
<td>71.2</td>
<td>78.4</td>
<td>73.3</td>
</tr>
<tr>
<td>Working/lying/standing on carriageway</td>
<td>0</td>
<td>6.0</td>
<td>4.0</td>
<td>5.4</td>
</tr>
<tr>
<td>Walking on carriageway</td>
<td>10.0</td>
<td>7.3</td>
<td>4.0</td>
<td>6.5</td>
</tr>
<tr>
<td>Pushing/working on vehicle</td>
<td>0</td>
<td>0.6</td>
<td>0</td>
<td>0.4</td>
</tr>
<tr>
<td>Walking to/from or boarding tram/vehicle</td>
<td>10.0</td>
<td>6.3</td>
<td>8.8</td>
<td>7.2</td>
</tr>
<tr>
<td>Not on carriageway</td>
<td>10.0</td>
<td>5.1</td>
<td>3.2</td>
<td>4.7</td>
</tr>
<tr>
<td>Unknown</td>
<td>0</td>
<td>0</td>
<td>0.8</td>
<td>1.6</td>
</tr>
</tbody>
</table>
DCA:

- Near-side collision (DCA 100) was the most common crash type, especially for a fatal outcome.
- Substantial proportion were far-side collisions (DCA 102), especially for serious and other injury outcomes.
Additional collision characteristics

- **Location:**
  - Almost half of collisions (49%) occurred at cross intersections, and additional 12% at T-intersections. The remainder (39%) occurred at mid-block locations.

- **Speed zone:**
  - Most occurred in 60 km/h and 50 km/h speed zones (32% and 63%, respectively).

- **Time:**
  - Collisions occurred on all days of the week, slightly higher on Fridays.
  - One-third occurred at night (especially between midnight and 6am).
  - Almost one-quarter occurred during late afternoons.

- **Vehicle:**
  - The majority (64%) were private passenger vehicles.
  - Public transport vehicles also contributed to a substantial proportion of collisions (tram: 9%; bus: 4%).
Spatial mapping
Satellite view of Melbourne CBD collisions
Spatial mapping findings

- Examination of the spatial pattern of collisions revealed some clustering of collisions

- Collisions at night and weekends:
  - Clustered around night clubs and bars
  - Involved a higher proportion of young adult males
  - Intersection crossings
  - Higher severity injury outcomes

- Collisions during business hours:
  - Evenly distributed throughout weekdays,
  - Across multiple locations on streets,
  - More prevalent around public transport facilities
  - Less severe injury outcomes
Implications of findings

- **Speed reduction**
  - Adoption of lower speed limits (30-40 km/h) on roads within the CBD area with high pedestrian activity
  - Additional measures to increase speed limit compliance and appropriate travel speed and include ITS applications and traffic calming measures.

- **Improved intersection design**:
  - Provide adequate sight distance for both pedestrians and drivers
  - Minimise pedestrian crossing distance, time and exposure to potential conflicts
  - Maximise pedestrian visibility
  - Measures to slow traffic on intersection approaches
  - Appropriately reflect the street and transportation context
Implications (cont.)

- **Enhanced public transport stops**
  - Successful transit systems have safe and convenient pedestrian access and provide comfortable waiting areas.
  - Select appropriate and safe locations, taking into consideration:
    - Adequate sight lines between approaching vehicles and passenger waiting and loading areas,
    - Convenience – minimising walking distance and reduce the number of roadway crossings for pedestrians and located with good proximity to destinations in the surrounding area.
  - Provide effective ‘safety zones’ and safe conditions for pedestrians travelling to and from transit stops
    - Ensure walking and public transport systems are balanced and supportive of each other
    - Adequate footpaths, pathways and safe access roadway crossings
Implications (cont.)

- **Night time collisions:**
  - Educational and behavioural measures such as ‘Responsible Serving of Alcohol’ and safe drinking guidelines
  - Enforcement measures
  - Infrastructure-based countermeasures:
    - Reduced pedestrian exposure to high crash risk: i) reducing excessive roadway widths, ii) encouraging greater use of crossing facilities by providing fences/barriers to direct pedestrians to cross-walks, iii) automatic pedestrian phases on every cycle;
    - Simplified crossing task: i) highly responsive pedestrian-operated signals, ii) medians or refuges, iii) well-maintained lane line markings to strengthen driver lane discipline, iv) ‘dwell-on-red’ initiative to improve driver responses at/on approach to intersections;
    - Improved driver responses: i) above-standard street lighting, skid resistant pavement surfaces and pedestrian warning signs
Conclusions

- Meeting the current and predicted volumes of pedestrians requires an understanding of mobility and safety needs
  - The City of Melbourne Transport Strategy 2012

- Findings of this analysis identified a number of approaches to manage key pedestrian collision types in the built environment, including
  - Improved land use and spatial design and planning of the pedestrian environment to enhance the ‘walkability’ of the city centre
  - Enhancements to intersection design and operation
  - Improved pedestrian access to and from public transport vehicles
  - Measures to improve pedestrian facilities around entertainment areas at night
  - Measures to moderate vehicle speeds
Thank You

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