



Contents lists available at ScienceDirect

## Accident Analysis and Prevention

journal homepage: [www.elsevier.com/locate/aap](http://www.elsevier.com/locate/aap)



# Falling while walking: A hidden contributor to pedestrian injury

Jennifer Oxley<sup>a,\*</sup>, Steve O'Hern<sup>a</sup>, Duane Burt<sup>b</sup>, Ben Rossiter<sup>b</sup>

<sup>a</sup> Monash University Accident Research Centre, Monash University, Clayton, Australia

<sup>b</sup> Victoria Walks, Melbourne, Australia

### ARTICLE INFO

#### Article history:

Received 12 September 2016

Received in revised form 6 January 2017

Accepted 17 January 2017

Available online xxx

#### Keywords:

Pedestrian safety

Falls risk

Injury

Countermeasures

### ABSTRACT

Walking is a sustainable mode of transportation which is beneficial to both individuals and to the broader community, however, there are risks and it is essential that road design and operation provides safe conditions for walking. In Victoria, pedestrians represent one of the most vulnerable road user groups, accounting for approximately 12% of all road fatalities and serious injuries. These figures largely represent injuries where the pedestrian has been struck by a vehicle with the extent of pedestrian-only injuries largely un-reported.

Falling while walking may be a significant contributor to pedestrian only injuries. Indeed, the World Health Organisation has identified falls generally as the second leading cause of unintentional injury death in older populations. Despite the prevalence of fall-related injuries, there has been relatively little research undertaken to address the issues surrounding falls that occur while walking for transport and in public spaces. This study, therefore, aimed to address this gap in our knowledge.

Analyses of various data sources were undertaken to enhance our understanding of fall-related injuries while walking in Victoria. Two sources of data were accessed:

- Hospital data: Victorian Injury Surveillance Unit (VISU) Data (5-years between 2009 and 2014)
- Crash data: Victorian Police Report Crash Data (Crash Stats) (5 years between 2008 and 2013)

Only 85 fall-related incidents were reported in the crash-based data, however, pedestrian falls while walking in the road environment accounted for an average of 1680 hospital admissions and 3545 emergency department presentations each year, and this number is rising.

The findings in this study show clearly that Police data is of little use when attempting to understand issues of safe travel for pedestrians other than vehicle-pedestrian incidents. However, analysis of hospital data provides a more realistic indication of the extent of pedestrian fall-related injuries and highlights the significant number of pedestrian fall-related injuries that occur each year. Moreover, the findings identified that older pedestrians are significantly over-represented amongst fall-related injuries that require hospital admission, while also having the highest rate of emergency department presentations when adjusting for age and exposure based on estimates of aggregate walking distances. The study also highlighted that the most common injury sustained from a fall were fractures.

The implications of these findings and identification of 'best-practice' within a Safe System context are discussed in terms of enhancements to the physical environment (particularly footpath, kerb and ramp construction and maintenance), implementation of fall hazard assessment and management strategies, and educational programs to highlight the risks for falls and recommend preventative strategies, and overall enhancements of general fall interventions to include falls while walking outside (including exercise interventions). In addition, a number of research and data needs, particularly collection of in-depth data to identify contributory factors and injury outcomes related to falls while walking incidents.

© 2017 Elsevier Ltd. All rights reserved.

### 1. Introduction

Walking is a sustainable mode of transportation which is beneficial to both individuals and to the broader community (Kingham and Ussher, 2007). Despite the many benefits associated with walking, it is essential that road design and operation provides safe

\* Corresponding author.

E-mail address: [jennie.oxley@monash.edu](mailto:jennie.oxley@monash.edu) (J. Oxley).

conditions for walking. With an increased focus on active transportation by governments in Australia and elsewhere, there is growing awareness within the road safety community of the potential for an increase in pedestrian serious casualties over the coming years and the need to address the specific needs of vulnerable road users when interacting with the transport network.

In Victoria, pedestrians represent one of the most vulnerable road user groups. On average there are approximately 50 fatal traffic-related pedestrian injuries annually and a further 1100 hospital admissions and emergency department presentations (Cassell et al., 2010; Cassell et al., 2011; O'Hern et al., 2015), accounting for approximately 12% of all road fatalities and serious injuries. These figures largely represent injuries where the pedestrian has been struck by a vehicle, with the extent of pedestrian-only injuries largely un-reported in police crash datasets.

There is a wide range of contributing factors associated with pedestrian traffic-related injuries including, alcohol consumption, pedestrian and driver behaviours, and characteristics and design of the roadway and the surrounding built environment. While there has been substantial research into the field of pedestrian traffic-related injuries, much less has been undertaken to understand the issues surrounding pedestrian only injuries and in particular injury related falls while walking.

Globally, falls are the second leading cause of unintentional injury death. It is estimated that approximately 37.3 million falls occur each year that are severe enough to require medical attention, with an estimated 424,000 falls occurring that result in fatal injuries (WHO, 2014). While only 10% of falls among younger adults result in injuries that require medical attention (Li et al., 2006), the Centre for Disease Control (CDC) ranks falls as the number one cause of unintentional death for persons over the age of 65 years, representing 55% of all unintentional injury deaths amongst this age group (Kramarow et al., 2015).

Falls and fall-related injuries amongst older people continue to be a long-term population health issue worldwide, often resulting in significant mortality and morbidity, including decreases in functional status (Wagner et al., 2011). Major falls are a significant cause of increased utilisation of medical services, hospitalisation, institutionalisation and functional dependency among older adults (Azidah et al., 2012; Fonad et al., 2008; Yarmo-Roberts et al., 2010). Falls and fall-related injuries also impose a heavy burden in terms of social, medical, and financial outcomes (Bradley, 2013; Roudsari et al., 2005).

In Australia, while a high proportion of fall-related hospitalisations result from injuries in the home (49.1%) or in an aged care facility (22.8%), a substantial proportion also occur outside the home (approx. 30%) (Bradley, 2013). Outside of the home, fall-related injuries can occur in various places and during most activities, including walking. Many studies focus on hospitalisations due to falls without specifically considering falls in public spaces or the street environment. As a consequence, there is very little known about the incidence, contributing factors, and injury outcomes of fall-related injuries while walking.

The overall objective of this research is to improve our understanding of the issues surrounding fall-related incidents and contributing factors to falls while walking. Specifically, the research aims to examine both police-reported crash and hospital-based injury data to quantify and describe the prevalence, contributing factors and injury outcome of fall-related injuries when walking in Victoria Australia.

## 2. Methodology

Analyses of two Victorian data sources were undertaken to enhance our understanding of fall-related injuries while walking:

- Victorian Injury Surveillance Unit (VISU) Data
- Victorian Police Report Crash Data (Crash Stats)

The VISU holds hospital-treated injury data at two levels of severity: hospital admissions and Emergency Department (ED) presentations. De-identified unit record files on Victorian injury hospital admissions and ED presentations are provided to VISU by the Department of Health. The VISU dataset includes both the Victorian Admitted Episodes Dataset (VAED) and the Victorian Emergency Minimum Dataset (VEMD). The VAED records all hospital admissions in public and private hospitals in the state of Victoria and the VEMD records all presentations to Victorian public hospitals with 24-h emergency departments (excluding patients who are subsequently admitted to hospital). Data from the Victorian Injury Surveillance unit was analysed for the most recent five year period available in the dataset, July 1st, 2009 to June 30th, 2014.

The VEMD is an ongoing surveillance dataset of injury presentations to 39 Victorian public hospital emergency departments. The VEMD data is collected in accordance with National Minimum Data Standards (NMDS) for injury surveillance. While data is not coded using the ICD-10-AM system, the code set in the VEMD is similar and comparable. Cases recorded in the VEMD were extracted using the following criteria:

- Injury cause codes: 9 & 10 related to falls
- Place where injury occurred: (Road, street or highway)
- Human Intent: "Non-intentional harm"

For cases in the VAED, the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification external cause codes were used to extract data (ICD-10-AM). ICD-10-AM consists of a tabular list of diseases and accompanying index. Cases were extracted from the VAED that met the following criteria

- Place of occurrence indicated a road/street and highway: Y9240 – Y9249. These codes relate to sidewalks (designated walkway, footpath next to road and pavement), cycleway, other specified public highway, street or road and unspecified public highway, street or road (freeway, motorway & roadway).
- All ICD-10-AM external causes codes in the range of W00-W1999 (Falls), but excluded codes W020-W029, W061-W069, W072-W079, W130-W139, W05, W11 & W12 (which are related to falls associated with skateboards, scooters, wheel chairs, beds, chairs, buildings and similar structures, ladders and scaffoldings)
- Data on body region and injury type are based on primary diagnosis code.

All admitted cases identified using this method of identification were examined for further details about the injuries. The mechanisms (or causes) of the falls are not recorded in the VAED – this is a limitation of the dataset.

To complement the hospital data, pedestrian injuries due to falls were collected within the Victorian Police-reported mass crash dataset. The dataset provides a valuable tool for identifying trends in crashes, however, it is important to note that the dataset only records Police reported injuries and that many minor injury collisions or events are not reported to Police or do not require Police attendance. Analysis of the database was undertaken for the period of 2009–2013 to assess if pedestrians falls were recorded within the dataset and to make some comparisons of falls-related injuries with other causes of pedestrian injury.

For each dataset, three sub-sets of older pedestrians were examined, 65–74 years, 75–84 years and 85+ years, and compared with younger pedestrians aged 0–14 and 15–34 and 35–64 years.

Download English Version:

<https://daneshyari.com/en/article/6965186>

Download Persian Version:

<https://daneshyari.com/article/6965186>

[Daneshyari.com](https://daneshyari.com)