Injury, Int. J. Care Injured xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Full length article

The epidemiology of work-related injury admissions to hospitals in the Midland region of New Zealand

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ARTICLE INFO

Article history:
Received 22 May 2017
Received in revised form 10 September 2017
Accepted 19 September 2017

Keywords:
Work-related injury
Trauma admissions
Epidemiology
Adults
New Zealand

ABSTRACT

Objective: To describe the epidemiological characteristics of patients with work-related injuries (WRI) admitted to hospitals in New Zealand's Midland Trauma System (MTS) during a four year period.
Methods: A retrospective review was conducted of trauma registry records for adults (≥15 years) admitted to four hospitals in the MTS as a result of WRI between 1 January 2012 and 31 December 2015. We describe the patterns of injury incidence by demographic characteristics, employment industry, mechanism of injury, body regions injured, injury severity score (ISS), month, day and time of injury, duration of hospital stay, domicile District Health Board (DHB), and discharge destination.
Results: The 2169 WRI trauma admissions, corresponded to an annualised rate of 205.8 per 100,000 workers or 234.3 per 100,000 full time employment employees (FTE). Injury rates were highest among males (238.0 per 100,000 workers) and those aged 15–24 years (227.1 per 100,000 workers), and lowest among Asians (83 per 100,000 workers). The highest injury rates occurred among the 'agriculture/forestry/fishing', 'manufacturing', and 'transport/postal/warehousing' industries. 'Contact with machinery' was the most common mechanism of injury, and the 'extremities or pelvic girdle' the most common body region injured. The in-hospital case fatality rate was <0.5%.
Conclusion: The predominance of WRI in the 'agriculture/forestry/fishing' industries in the Midland region is consistent with national estimates. The high rate of injuries amongst males, young adults, and Māori requires further exploration.

Introduction

The economic cost of work-related injury (WRI) and illness is estimated to vary between 1.8% and 6.5% of individual countries' gross domestic product (GDP) [1]. The incidence of non-fatal WRIs are increasing globally [2], with agriculture, construction, mining, and electricity/gas & water supply identified as industries with a high-risk of injury [3]. There is evidence of inequities in WRI rates by ethnicity. A recent US study analysing the American Community Survey (11,632,466 respondents) and the Survey of Income and Program Participation (198,308 respondents) data found that non-Hispanic white workers consistently had among the lowest risk of WRI, and non-Hispanic black and Hispanic workers were more likely to experience a work-related disability than other workers [4]. The study also found that minority groups' more commonly worked in hazardous jobs and, as a result, often experienced worse health, compared to whites. An Australian study of work-related fatalities, found fatal injury rates occurring in mining and rural occupations among overseas born persons were significantly higher than rates among Australian-born persons [5].

There are around 100 WRI deaths and 200,000 WRI claims made to New Zealand's (NZ) Accident Compensation Corporation (ACC) annually [6]. The annual social and economic cost of WRI and illness in NZ has been estimated at NZ$3.5 billion [7]. The overall incidence rates of WRI claims to the ACC have decreased over the last 13 years, from 158 per 1000 full-time equivalent employees (FTE) in 2002 to 110 in 2015 [8]. Ethnic differences in ACC WRI claims exist, with Pacific peoples (103/1000 FTEs) and Māori (101/1000 FTEs) experiencing higher rates than European and Asian populations (86 and 62/1000 FTEs respectively) (2015 data) [8].

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http://dx.doi.org/10.1016/j.injury.2017.09.018
0020-1383/

Due to the relatively small numbers involved, limited ethnic specific data is available for serious non-fatal WRI in NZ. However, available data for the 2012–2014 period shows Māori have a significantly higher rate than workers overall (22.0 and 17.1 per 100,000 workers respectively) [9]. Work-related fatality rates for Māori have previously been reported as 1.33 times higher than non- Māori (RR 95% CI: 1.07- 1.66) [10]. Differences in the incidence of ACC claims for WRI by industry are evident in NZ with those working in 'agriculture/forestry/fishery'(206/1000 FTEs), 'arts and recreation services' (194/1000 FTEs) and 'construction' (163/1000 FTEs) at greatest risk of injury (2015 data) [8]. Consistent with findings from a study by Feyer et al. that compared NZ, Australian and US work-related fatalities in the late 1980′s and early 1990′s and found that those working in agriculture, forestry and fishing, mining and construction, were consistently at higher risk of WRI [11]. A review of more data of recent work-related fatality rates for the 2002 to 2008 period revealed that NZ had approximately twice the rate of Australia and four times the rate of Great Britain [12].

The NZ Government has a national target to reduce work-related fatalities and serious injuries by 25% by 2020 [7], Worksafe NZ was established in 2013 to help achieve this goal [13]. The national minimum dataset (NMDS) maintained by the Ministry of Health and based on public hospital discharge data, is used by Worksafe NZ for the surveillance of serious WRI [14], and is compared to serious harm reports from Worksafe NZ, Maritime NZ and the Civil Aviation Authority for accuracy [14]. Worksafe NZ does not currently report their data by ethnicity, limiting the ability to identify potential inequities in WRI [15].

The Midland Region of NZ includes the district health boards (DHBs) of the Bay of Plenty, Tairawhiti, Taranaki, Lakes, and the Waikato (population 853,725) [16]. Each of the DHBs has a base hospital capable of providing trauma care. Compared to NZ as a whole, the Midland region has a higher number of people living in rural areas, a large proportion of Māori and low proportions of Asian or Pacific peoples, and has a relatively high proportion of people living in high deprivation areas [16]. In 2015, over 19% of WRI and over 29% of fatal WRI in NZ occurred in the Midland region (data only available for Waikato, Bay of Plenty, and Taranaki regions) [8]. The proportion of WRI claims for these three regions has remained relatively constant between 2002 and 2015 [8].

However, there remains a gap in more detailed published research regarding the descriptive epidemiology of in NZ in particular with respect to differences that may exist by ethnicity. Publicly available regionally specific WRI data is necessary for the identification of high-risk industries, trends in injury mechanisms, and trends over time in order to guide the development of regional specific WRI prevention activities and to monitor their effectiveness. The aim of this study was to describe the characteristics of adult trauma patients admitted to the Midland Region's public hospitals with WRI during a four year period. Approval to conduct the study was obtained from the University of Auckland Human Participants Ethics Committee (Reference 01076) and the Waikato District Health Board Research Office and Māori Research Review Committee (Reference RD013071).

Materials and methods

We analysed trauma registry data for adults ($\geq$ 15 years) admitted to hospitals in four of the five District Health Boards (DHBs) in the Midland Trauma System (MTS), between 2012 and 2015 as a result of a WRI. During this period, Tairawhiti DHB (serving an estimated total population of 47,680) [17] was not part of the MTS, therefore there is no data from Tairawhiti included in this study. The MTS was established in 2010 to coordinate the management of trauma care for the region [18]. The MTS trauma registry is used to monitor the quality of care delivered at both a local and regional level, and for injury surveillance activities. Trauma registries have been shown to provide a level of detail not available in national data sets or compensation data [19].

All records of people admitted within 14 days of injury during the four year period 1 January 2012 to 31 December 2015 (inclusive) were reviewed. Patients excluded from the registry include those with 'insufficiency' fractures (due to physiologic stress on weakened bone), peri-prosthetic fractures, exertion injuries with no external force, hanging, drowning, asphyxiation, poisoning without evidence of external force, ingestion of foreign bodies or injuries as a result of a pre-existing medical condition (e.g. epilepsy, Parkinson's etc.) [18]. Patients were included in the study if their injury resulted in an admission to the trauma service being studied, irrespective of the injured person's domicile of residence or the domicile where the injury event occurred.

WRI were identified by the International Classification of Disease-10 (ICD-10) activity codes U73.0–U73.07 ('while working for income'), and/or the free text description field included 'occupation', 'work', or 'work-related', and the employment status was 'employed'. Bystander injuries occurring at work places and commuting related injuries were excluded. Work-related injury cases that died at the scene or prior to arrival to hospital were not captured in this study.

Variables of interest included: demographic information, mechanism of injury, body regions injured, injury severity score (ISS), time of incidence, duration of hospital stay, domicile DHB, and employment industry. The Australia NZ Standard Industry Classification (ANZSIC06) division criteria were used to classify industrial codes [20] based on a patient's occupation, activity at time of injury, place of injury and mechanism of injury. We were unable to classify specific occupations due to a lack of relevant information in the source data. Māori vs Non-Māori subgroup analysis was carried out.

We used the ethnicity associated with patient's National Health Index (NHI) number, NZ's unique health identifier. Ethnicities were grouped according to the NZ Ministry of Health Level 1 protocol [21] which prioritises ethnicity as Māori, Pacific, Asian, other groups, and NZ European. Area level deprivation scores (NZ Dep 2013) were allocated based on the case domicile address (scores range from 1 - least deprived; to 10–most deprived) [22]. Nature of injury was classified into body regions using the Abbreviated Injury Scale (AIS), and then an Injury Severity Score (ISS) was derived from the three most severely injured body regions as scored by the AIS [23]. Mild to moderate trauma is classified as (ISS$<$15) and major trauma (ISS $>$15).

Descriptive statistics were used to summarise the data. Injury rates were calculated per 100,000 workers. Denominators for incidence rates (for the four DHBs) were sourced from the 2013 NZ Census by summing full and part time workers. Full time equivalent employees (FTE) were used when comparing statistics to ACC WRI claim data. FTE's are the sum of full time workers and half the part time workers. The census accounts for all people who usually live in NZ and were present in on the census night. Therefore it can be assumed that all persons in the census are eligible for ACC cover. Poisson intervals were calculated with a 95% confidence interval (CI) using the mid-*P* approach [24]. Pearson's Chi^2 test was used to compare the categorical variables. A two sided p value of <0.05 was considered significant in all analyses. Microsoft Excel (2010) and the Statistical Package for the Social Sciences (SPSS) were used for data processing.

Results

During the four year period reviewed (2012 to 2015), there were 2169 adult trauma patients admitted with WRI captured by the

Please cite this article in press as: B. Kool, et al., The epidemiology of work-related injury admissions to hospitals in the Midland region of New Zealand, Injury (2017), http://dx.doi.org/10.1016/j.injury.2017.09.018