

# Exploring admissions for Māori presenting with major trauma at Christchurch Hospital

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**I**njury remains one of the leading causes of years of life lost worldwide.<sup>1</sup> In 2015, the New Zealand Major Trauma Registry was developed to provide a comprehensive data registry within New Zealand for looking at the outcomes and determinants of major trauma. It has published yearly major trauma reports since its founding.

The relevant findings from the national trauma network annual reports include a higher incidence of trauma in Māori patients and a higher incidence rate of trauma in the South Island. Unfortunately, the analysis for Māori patients either excluded or was not specific to the South Island.<sup>2</sup> Therefore, despite Māori constituting 8.5% of the total Canterbury population, there is limited knowledge of specific demographics, patterns and outcomes for Māori patients presenting with major trauma. The health of Māori has been described as the poorest of any New Zealand group.<sup>3</sup> Injury is a more prevalent cause of death for Māori compared to non-Māori. Māori can experience injury-specific mortality up to 40%,<sup>4</sup> as well as higher rates of physical, psychological and financial disability at 3 months and 12 months post injury.<sup>5,6</sup>

This study has attempted to quantify the burden of trauma experienced by Māori within the Canterbury region. The aims of this study were to establish the basic demographics of Māori patients with major trauma presenting to Christchurch Hospital, compare the mechanisms of major trauma and admitting team and compare the major trauma incidence rates of Māori and the total Canterbury population.

## Methods

This study was a retrospective review of the Christchurch hospital trauma database between 1 June 2016 and 31 May 2018. Additional information not contained within the trauma database was supplemented from online patient notes.

### Measurement of ethnicity

The concept of ethnicity is complex and multidimensional. The current working concept adopted by Stats NZ and the Ministry of Health is a “social construct of group affiliation and identity.” There are several factors that can influence ethnicity. Ultimately, however, it is a self-defined concept that can include several ethnicities at once.<sup>7,8</sup> A “prioritised” output for ethnicity data has been used in this analysis. Prioritised ethnic groups involve each patient being allocated to one ethnic group on the basis of the ethnic groups they have identified with. This study prioritised Māori ethnicity ahead of the other ethnicity selections.

### Inclusion and exclusion criteria

The inclusion criteria were admissions with (1) an injury severity score (ISS) greater or equal to 13 or (2) in-hospital mortality due to trauma irrespective of ISS.

Exclusion criteria were:

- injuries that are the result of pathological conditions
- late trauma transfers, where a patient is transferred from another hospital where his/her initial treatment was expected to have been definitive

- admission for injuries that occurred one week or more prior to the time of presentation to hospital
- hanging and drowning
- elderly patients who sustain femoral neck fractures for simple falls or other minor injuries when admission is primarily related to an associated co-morbidity
- foreign bodies that do not cause injury
- poisoning or drug ingestion that does not cause injury
- injuries secondary to medical procedures
- patient death established at the scene or en route to hospital.

All traumas admitted to Christchurch hospital, irrespective of the location of the first presentation, were included in the analysis because Christchurch hospital is a tertiary centre that provides many services spanning the district health board (DHB) boundaries.

### Calculation of incidence rate

Numerator values were derived from the available dataset. Denominator values for Māori and the total population were derived from Stats NZ's population projections for the Canterbury region; this value included South Canterbury.<sup>10,11</sup> The incidence rate is expressed per 100,000 persons years.

## Results

There were 702 cases of major trauma recorded with 63 cases of trauma in Māori patients (9%). There was a total of 485 male cases (69% of total cases) and 217 female cases (31% of total cases). Māori patients consisted of 47 male cases (75% of trauma in Māori patients) and 16 female cases (25% of trauma in Māori patients). Motor vehicle accidents (MVA) (314 total, 28 Māori) and falls (207 total, 17 Māori) predominated as the leading mechanisms of injury in both total and Māori populations, approaching 75% of all trauma cases. Māori patients admitted with injuries from assault accounted for 32% of total patient admissions from assault (12 cases from a total of 38). The results were largely similar for mean ISS, mean length of stay, mean intensive care unit days, admitting service

and discharge location. Total patient mortality was 10.7% and mortality in Māori patients was 4.8%. The total incidence rate for Canterbury was 57.3/100,000 and the incidence rate for Māori was 57.9/100,000.

## Discussion

This study has attempted to describe and quantify the demographics and outcomes of major trauma patients in Canterbury, focussing specifically on Māori patients admitted with major trauma. This study sought to fill a gap in trauma knowledge that was acknowledged in the national trauma network annual reports. The results for Māori and total incidence rates are consistent with previous studies of trauma incidence in the South Island, which highlights the higher incidence of trauma compared to the North Island.

Gender distributions are similar between Māori and non-Māori and reflect the trend seen in the North Island, which is a predominating number of male cases (approximately 2:1 ratio). Age distributions share similar peaks in adolescence and in middle age. There was a noticeable absence of Māori trauma cases in the 60+ age group, with only four admissions in this demographic from a total of 230. A contributing factor would be the different age structure for Māori: only 5.2% of the Māori population are above 65 years of age, compared to 15.7% of non-Māori.<sup>12</sup> Additionally, there is a lower proportion of people who identify as Māori within Canterbury; Māori constitute 8.5% of the total Canterbury population, whereas they constitute 17.6% of the total population of the North Island. Despite this, age bracket proportions remain very similar between Canterbury and the North Island, particular for the 65+ age group, who make up to 4.4% in Canterbury and 5.3% in the North Island.<sup>12</sup>

A difference was observed between the mortality rates of Māori and non-Māori (4.8% compared to 10.7%) despite similarities in ISS of these demographics. The mortality rate for Māori was lower than the total mortality and the Māori-specific mortality rate observed in the North Island.<sup>2</sup> The Māori-specific mortality rate is similar to other comparatively low total mortality rates for major trauma in Australasia.<sup>13</sup> This could be a result of the different age

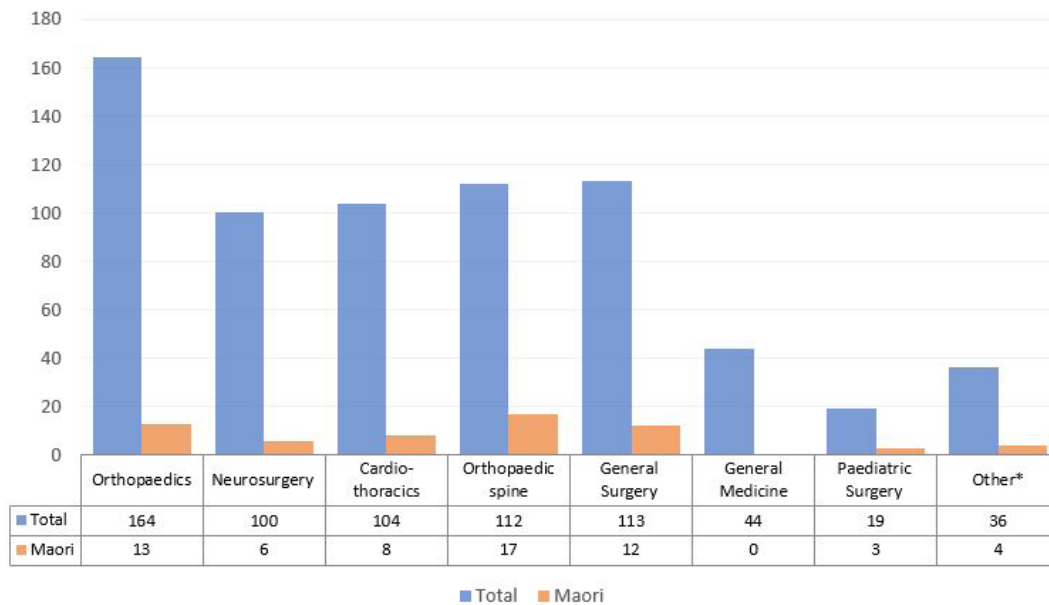
**Table 1:** Baseline demographics.

	<b>Māori</b>	<b>Total</b>
	63	702
<b>Gender</b>		
Male	47 (75%)	485 (69%)
Female	16 (25%)	217 (31%)
<b>Age</b>		
0–9	3 (4.8%)	22 (3.1%)
10–19	3 (4.8%)	46 (6.6%)
20–29	19 (30.2%)	118 (16.8%)
30–39	10 (16%)	79 (11.3%)
40–49	13 (20.6%)	98 (14%)
50–59	11 (17.5%)	109 (15.5%)
60–69	1 (1.6%)	74 (10.1%)
70–79	2 (3.2%)	69 (9.8%)
80+	1 (1.6%)	87 (12.4%)
<b>Trauma category</b>		
Motor vehicle accident	28 (44.4%)	314 (44.7%)
Fall	14 (22.2%)	207 (29.5%)
Pushbike	3 (4.8%)	59 (8.4%)
Assault	12 (19%)	38 (5.4%)
Equestrian	1 (1.6%)	29 (4.1%)
Intentional self-harm	1 (1.6%)	11 (1.6%)
Burns	1 (1.6%)	5 (0.7%)
Plane	0	3 (0.4%)
Sports	2 (3.2%)	7 (1%)
Other	1 (1.6%)	29 (4.1%)
<b>Mortality</b>	3 (4.8%)	75 (10.7%)
<b>Median ISS and interquartile range</b>	17 (16 – 25)	17 (14–25)
<b>Mean length of stay</b>	8.2	8.5
<b>Mean intensive care unit days</b>	4.5	6.5

structure and relative size of the Māori population in Canterbury. The highest mortality rates for trauma patients are in the 65+ age bracket, with the leading cause being falls, which overall contributed 46% of all fatal trauma presentations in the North Island.<sup>2,14</sup> In this study, the majority of Māori patients were within the 20–59 age bracket, who have different patterns of injury and lower mortality rates. Although ISS can usually be correlated with expected mortality, a relative under-representation of fatal and low ISS trauma would result in a lower mortality rate for a given mean ISS.

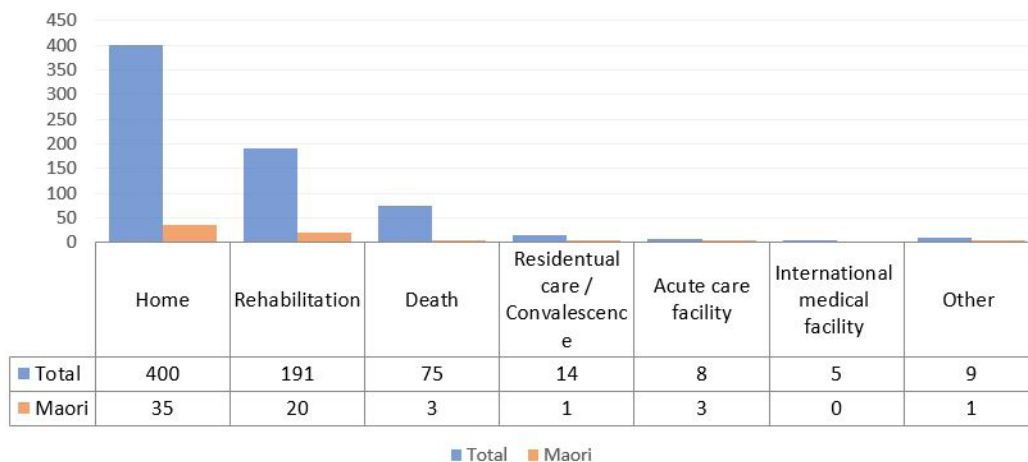
Young age and male gender are risk factors for Māori trauma. In this study, 65% of admissions were male and 35% were between 20–29 years of age. Unintentional injury is the most common cause of death for Māori aged 15–24.<sup>15</sup> Sargent et al<sup>16</sup> concluded that male Māori aged 15–39 constituted 49% of non-fatal and 39% of fatal road traffic incidents, which is disproportionate representation given that this age group constitutes 21% of the total population. Similarly, Midlands DHB's 2016–17 annual report<sup>17</sup> demonstrated that Māori have a trauma incidence 1.7 times that of

Figure 1: Admitting service.



\*Services included: otorhinolaryngology, plastic surgery, maxillofacial, urology, cardiology, emergency department, intensive care unit and ophthalmology.

Figure 2: Discharge location.



non-Māori. The majority of this difference is attributed to Māori males aged 15–24 years. Socioeconomic factors further amplify the effects in this young, high-risk group. Hosking et al concluded that household deprivation had a stratified interaction with injury risk following MVA depending on age bracket. Adults aged 25–64 had an 11% increase in injury risk per decile of deprivation, compared to 3% in the 65+ age group and 9% in the 0–14 age group.<sup>18</sup> While generalised interventions to reduce unintentional injury incidence rates have lowered Māori incidence rates<sup>18</sup>, the continuing disparity suggests that Māori-specific initiatives are also required to reduce this further towards the rate of the general population.

Several pre-injury risk factors for increased post injury disability have been identified.<sup>19,20</sup> Among the strongest predictors of disability at 24 months were having greater than two chronic conditions, reduced access to healthcare post injury and inadequate pre-injury household income. Alcohol use, illicit drug use and mental health were other predictors. As Māori experienced increased rates of post-injury disability, the collection and analysis of these variables could be a helpful factor in identifying populations of Māori patients who are at high risk for ongoing disability post hospital discharge. The Cochrane Equity Method Group has suggested developing a framework for the collection and individual consideration of these socioeconomic factors that contribute to variations in health equity<sup>21</sup>. Finally, a number of Māori patients are being transferred large distances from other areas of New Zealand and being isolated from whānau and other mental and spiritual supports required for their wellbeing.<sup>21</sup> Local organisations or provisions to address these aspects of Māori health could have benefits to Māori-inpatient outcomes and long-term disability.

## Limitations

The accuracy of these results relies on the quality of data entered into the registry. Mortality data was occasionally missing in patient datasets, including those of several Māori patients. One case was excluded from the mean ISS analysis due to missing data. Scott et al<sup>22</sup> identified incorrect ethnicity entry data in the Waikato trauma registry and suggested a revision of the protocols being used. Similar data-entry issues were possible in this study and may warrant further investigation.

There is a difference in methodology in the attribution of cases compared to the national trauma registry. This potentially reduces how comparable the results of this study are compared to those obtained in the national trauma network annual reports. But, despite this difference, the calculated incidence rate of trauma in the South Island in these two studies is very similar.

The denominators used for the calculation of incidence rate were based on population projections derived from previous census data. There is an inherent inaccuracy when utilising this method, because the denominator numbers are not an exact measure of population.

## Conclusion

In both the Māori and total populations, the incidence rate of major trauma in Canterbury is higher compared to the rates in the North Island. The incidence rate of major trauma in Māori patients in Canterbury is comparable to the overall incidence rate of major trauma. The cause for the increased rate of major trauma in the South Island remains uncertain. Motor vehicle accidents and falls remain the predominant mechanisms driving incidence rate, and falls in the 65+ age group contribute most to mortality.

**Competing interests:**

Nil.

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