

# Variation in volumes and characteristics of trauma patients admitted to a level one trauma centre during national level 4 lockdown for COVID-19 in New Zealand

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## ABSTRACT

**AIM:** The aims of this study were to describe the variation in volumes and types of injuries admitted to a level one trauma centre in New Zealand over two 14-day periods before and during the national level 4 lockdown for COVID-19; and highlight communities at risk of preventable injury that may impact negatively on hospital resources.

**METHOD:** A retrospective, descriptive study of prospectively collected data in the Midland Trauma Registry in New Zealand.

**RESULTS:** Overall there was a reduction of 43% in all injury-related admissions with significant reductions seen in major injury (50% reduction), males (50% reduction) and children aged 0–14 years (48% reduction). Results for ethnicity and persons aged over 14 years were within 3% deviation of this overall 43% reduction. Injuries at home, particularly falls, predominate.

**CONCLUSION:** Despite the significant reduction in admissions during level 4 lockdown, hospitals should continue to provide full services until resource limitations are unavoidable. Immediate messaging is recommended to reduce rates of injury on the farm and at home, specifically falls prevention. Ongoing attention of road users to road safety is essential to reduce the incidence of preventable major injury. These immediate measures can potentially reduce unnecessary pressure on hospital beds and resources during the pandemic.

At the time of writing the COVID-19 pandemic is poised to challenge the capacity and capability of New Zealand's community-based and acute care facilities. If the number of patients requiring hospital-level care due to COVID-19 escalates it is likely that available resources will be repurposed to reduce the morbidity and mortality related to the virus. However, while this acute care need may rise, injuries will continue to occur in our community. In this complex situation hospital planners and clinicians must simultaneously balance the needs of these patients with those of COVID-19 patients (alongside other medical and surgical emergencies).

Little is known about the patterns and volumes of injury that can impact on hospital resources during periods of community lockdowns given the newness of this situation. The Royal Australian College of Surgeons (RACS) and the American College of Surgeons (ACS) have both warned of the possibility of the pandemic to impact on the care of critically injured patients, particularly for those patients who require time-sensitive life-saving interventions and advanced critical care to support life and recovery.<sup>1,2</sup> Through RACS, trauma surgeons have expressed concerns that an unintended consequence of the pandemic (with people living in lockdown conditions) may

be an increase in preventable injury-related hospitalisations.<sup>3</sup> In Australia doctors have reported a spike in preventable injury cases immediately prior to community lockdown measures, with concerns that alcohol-related risk-taking behaviours were behind some of that increase.<sup>3</sup> The New Zealand Association of Plastic Surgeons has advised people to be vigilant and avoid injury in lockdown as they tackle jobs around the house using machinery such as power tools.<sup>4</sup>

In New Zealand, government-led messaging has been clear that people must stay at home and remain local if they go outside for exercise, shop for essentials or to look after other vulnerable people (at all times practising social distancing). Organisations such as Federated Farmers, mountain biking and tramping clubs across the country have also been actively communicating through multiple media channels for people to observe the lockdown measures and for those working in essential services to be particularly aware of the potential for injury.<sup>5,6</sup> ACC has reminded people that most injuries happen in the home so to take precautions with any do-it-yourself (DIY) activities.<sup>7</sup>

In response to the need to quantify any change in the volume and nature of injury resulting from lockdown conditions, the Waikato Hospital Trauma Service in partnership with the Midland Trauma Research Centre conducted this study to:

1. assist with the prediction of the volume and nature of injury load on scarce hospital resources, and
2. provide information for targeted injury awareness and prevention campaigns to reduce injury rates and admissions to hospital during a time of pandemic.

## Methods

A retrospective, descriptive study was conducted on prospectively collected trauma registry data on injured patients of all age groups and injury severities admitted sequentially to a level one trauma centre before and after level 4 community lockdown in response to the COVID-19 pandemic.

The two study groups consisted of admissions over the 14 days before the declaration of alert level 2 on 19 March 2020

and 14 days after the declaration of the level 4 lockdown on 26 March 2020 by the New Zealand Government.

A week of partial lockdown between 19 March and 25 March 2020 was excluded to allow analysis of a presumed steady state of community behaviour within pre- and during-lockdown phases when national alert levels were escalating and community behaviour was changing dramatically in anticipation of level 4 lockdown.

Patients were grouped according to age group, gender, cause of injury, place of injury, injury severity, ethnicity and injury outcome. Identical patient groupings will be used in a future study of pre- and post-lockdown analyses.

Data was sourced from the Midland Trauma Registry (MTR) and analysed using Excel and R. This study was approved by and registered with the Waikato District Health Board's Clinical Audit Support Unit (registration number 4085).

Included in the MTR are patients admitted within seven days of injury; exclusions included insufficiency or peri prosthetic fractures, exertional injuries, hanging near drowning or asphyxiation, and injuries as a result of underlying medical conditions. These exclusions are broadly consistent with other registries within Australia and New Zealand.

Injuries, causes and procedures were coded using ICD10AM; additional diagnostic and injury severity scoring was done using the AIS system. The threshold for moderate to major injury is Injury Severity Score (ISS) greater than 12.<sup>11,12</sup>

## Results

### Demography

A total of 195 patients were admitted over the study period; 124 in the 14-day pre-lockdown period and 71 in the first 14 days of the level 4 lockdown period. There was an overall decrease in admissions of 43% (Table 2). Comparison was also made with corresponding 14-day periods from exactly a year before the study, confirming that the lockdown period volumes for moderate severity injury were significantly reduced from the same time period in the previous year (Table 1).

**Table 1:** Comparison of admission volumes for same time periods in 2019 and 2020.

<b>Date of ED arrival</b>				
	<b>5 March 2020–18 March</b>	<b>26 March 2020–8 April</b>	<b>P</b>	<b>Total</b>
<b>Year arrival</b>				
2020	124	71	<0.001	195
2019	108	142		250
<b>Major (ISS&gt;12)</b>				
2020	22	11	0.048	33
2019	14	19		33
<b>Moderate (ISS≤12)</b>				
2020	102	60	<0.001	162
2019	94	123		217

The most marked reductions occurred in males (50% reduction), major injury (50% reduction) children 0–14 years old (48% reduction), and non-Māori (44% reduction). Lowest reductions were seen in females (28% reduction).

### Cause of injury during lockdown

The relatively short study period has produced relatively low numbers of patients when spread across the cause categories (Table 3) however some trends appear. The highest volumes were seen in cause groups

**Table 2:** Pre-lockdown and during-lockdown period admission volumes at Waikato Hospital (date ranges represent ED arrival dates).

	<b>Total</b>	<b>Pre lockdown (5 Mar 2020–18 Mar 2020)</b>	<b>During lockdown (26 March 2020–8 April 2020)</b>	<b>% Change</b>	<b>P</b>
Overall	195	124	71	43%	
<b>Severity</b>					
Major (ISS>12)	33	22	11	50%	0.68
Moderate (ISS≤12)	162	102	60	41%	
<b>Gender</b>					
Female	69	40	29	28%	0.23
Male	126	84	42	50%	
<b>Ethnicity</b>					
Māori	58	36	22	39%	0.77
Non- Māori	137	88	49	44%	
<b>Age band (Years)</b>					
0–14	50	33	17	48%	0.90
15–64	106	66	40	39%	
65+	39	25	14	44%	

**Table 2:** Pre-lockdown and during-lockdown period admission volumes at Waikato Hospital (date ranges represent ED arrival dates) (continued).

Cause					
Assault	7	5	2		n/a
Burns	9	6	3		
Crushed	2	2	-		
Cycling	10	5	5		
Equestrian	6	3	3		
Fall	70	46	24		
Machinery	5	4	1		
Motorcycle	20	12	8		
Other	24	12	12		
Pedestrian	9	4	5		
Quad bike	1	-	1		
Road traffic crash	29	23	6		
Struck (Unintentional)	2	1	1		
Unknown	1	1	-		
Place of injury					
Farm	18	8	10		n/a
Home	75	41	34		
Industrial	5	4	1		
Other	14	7	7		
Outdoors	2	2	-		
Public building	4	4	-		
Public admin. area	10	10	-		
Road	43	30	13		
Sidewalk	9	4	5		
Sports area	10	9	1		
Water	5	5	-		

P value from Chi-square test for independence (test of whether linkage is independent between categories of the variables, n/a- insufficient data).

for falls (n=24), followed by motorcycles (n=8), car crashes (n=6), cycling (n=5), pedestrians (n=5) and ‘other’ (n=12). There were two admissions related to assault.

**Focus on falls**

There were 70 falls in total with 65% (46) occurring during the pre-lockdown period. Falls in pre-lockdown happened in a wide variety of circumstances, including; falling down stairs, from ladders, from playground apparatus (including while at school),

while riding push scooters, falling while walking and falls from mobility scooters. In comparison there were fewer falls during lockdown (n=24) by similar causes. Thirteen of the 22 falls during lockdown occurred at home—falling in the shower, from a ladder and down stairs and falling while walking.

**Place of injury during lockdown**

There were insufficient cases to show statistical significance in volume change by place of injury however several trends

**Table 3:** Pre- and during-lockdown injury events by injuries at home.

	Total	Pre-lockdown	During lockdown	P value
Overall	75	41	34	
<b>Severity</b>				
Major	6	4	2	n/a
Moderate	69	37	32	
<b>Gender</b>				
Female	31	15	16	0.36
Male	44	26	18	
<b>Ethnicity</b>				
Māori	25	15	10	0.51
Non- Māori	50	26	24	
<b>Age bands (years)</b>				
0–14	19	10	9	0.96
15–64	35	19	16	
65+	21	12	9	
<b>Cause</b>				
Assault	3	2	1	n/a
Burns	7	4	3	
Crush	1	1	-	
Cycling	1	1	-	
Equestrian	1	-	1	
Fall	36	23	13	
Machinery	3	2	1	
Motorcycle	3	1	2	
Other	14	6	8	
Pedestrian	5	1	4	
Struck (unintentional)	1	-	1	

occur. There was reduction of volumes seen in all places of injury except the farm, where there was a minor increase from five to eight cases. The most common places were: home (n=34), road (n=13), farm (10), 'other' (7) and sidewalk (5).

### Focus on injuries occurring at home (Table 3)

Pre-lockdown there were 41 injuries at home compared with 34 during lockdown. During both time periods 'falls' were the main cause of injury; 76% (n=23) and 36% (n=13) respectively. Interaction with motor

vehicles, injuries from dog bites, machinery related injuries and injuries in the kitchen were the other key categories overall, although numbers are smaller.

### Limitations and strengths

As consequence of the progression of the COVID-19 and emergent need to deliver reliable information for district health boards (DHBs) and community safety agencies to act upon, an extremely contracted timeframe was available for data collection and processing. As a result the study has small numbers of patients and

statistical significance could not be gained in the analyses with larger numbers of variables such as cause of injury. It is envisioned that follow-up studies will use expanded timeframes and larger patient numbers as all hospital admissions within the Midland region will be included (covering the Waikato, Lakes, Tairāwhiti, Taranaki and Bay of Plenty DHBs).

This study used prospectively collected data from the Midland Trauma Registry, a high-quality resource that contains data on admitted trauma patients of all age groups and injury severities, collected continuously since 2012.

## Discussion

This study has revealed significant reductions in the overall volume of all injury admissions during level 4 lockdown of 43%. The greatest reductions were seen in major injuries and males: this suggests that males are at high risk of non-lockdown activities such as road traffic crashes, work, school and sport. Although still almost halved from pre-lockdown levels, the least reductions were seen in females. Cognisant of the small numbers in this study, a greater proportion of females aged 65+ years were injured in and around the home both pre and during lockdown compared to younger women. Five of the 10 injuries for this age group pre-lockdown were falls related; during lockdown falls contributed five of the six injury events. For this group there were four road crash-related hospital admission pre-lockdown but none during lockdown.

Not surprisingly the rates of road trauma have fallen during lockdown as road use has declined, however we would expect them to be near zero if essential road users remain committed to safe driving. Conversely, there was a slight increase in the number of injuries related to farm work, as may be expected in conditions where farm work is considered an essential service and farmers continue to work under the conditions of level 4 lockdown. It is difficult to compare data in this pandemic situation, however in the UK the Royal College of Emergency Medicine has reported a 25% fall in visits

to emergency departments in the first week following their lockdown; thought to perhaps be partially attributed to fewer injury events due to lower vehicle use.<sup>8</sup> In Italy, several doctors have reported lower volumes of injury but with those requiring acute care being more severely injured.<sup>9</sup> However, these data are new (and localised) and no firm trends and analysis are currently publicly available.

ACC recently noted that across the country thousands of injury claims have come in, with people injuring themselves doing everything from home DIY to playing sports despite the country being in lockdown. There were 243 claims for DIY work in the first week of lockdown—down from 395 over the same period last year, and 116 claims related to ladder use, down from 226 the previous year. Total claims overall were down about two-thirds in the first week of level 4 lockdown.<sup>10</sup> In the Waikato district, despite the stay-at-home message promoted heavily in lockdown, the rate of home injuries has fallen, suggesting that the public are mindful of the consequences of moderate-to-severe injury and are reducing their risks of injury in the home. This is particularly encouraging given the enormous increase in overall time at home experienced by individuals complying with the national ‘stay-at-home’ message. However, there remains a large burden of injury in the community that is amenable to prevention strategies that can be enacted immediately.

## Conclusion

Trauma of all age groups and severities continues to occur, albeit at greatly reduced volumes. In terms of resource allocation, hospitals should continue to provide full services until significant resource restriction occurs. This will ensure that the highest levels of service are maintained, reducing complications and ultimately improving injury outcomes. In terms of awareness raising and injury prevention, the actions of the general public to reduce the risk of home-based trauma during lockdown should be recognised and encouraged. Further emphasis could be placed on falls avoidance

techniques in the home and near-home environments. These are already well described in advice from ACC and could be supported and amplified by primary care providers, DHBs and other agencies. Likewise, strengthening safety or avoidance measures

against injury on the farm is advised (both for farming and recreational activities for those where a farm is also home). Continued emphasis on reducing road trauma during essential activities is also recommended.

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**Competing interests:**

Nil.

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