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# HOSPITAL ADMISSIONS AND EMERGENCY DEPARTMENT PRESENTATIONS AFTER LONG- DURATION WORKERS' COMPENSATION CLAIMS

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THE TRANSITIONS STUDY  
**REPORT 2**

JUNE 2022



**Healthy Working Lives**

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## EXECUTIVE SUMMARY

What happens to workers with long duration workers' compensation claims when their workers compensation benefits stop?

This is the central research question in the Transitions Study, and is partially answered in this report. We describe emergency department presentations and hospital admissions before and after cessation of workers' compensation income support payments in two groups of workers with long-duration claims, in comparison with a group of community controls.

This is the second report in a series examining use of health services and welfare benefits after workers' compensation among people whose workers' compensation benefits ceased due to the implementation of legislative amendments to Section 39 of the Workers' Compensation Act 1987 (NSW). The amendments set a 260-week (5 year) limit on income support payments for injured workers unless they were assessed as having more than 20% permanent impairment, or were employed in an exempt occupational category (e.g. police officers, fire fighters, coal miners). Those whose payments ceased due to the 260-week rule are referred to as the Section 39 group. We compared this group to two other groups: (1) a group of people who had received workers' compensation income support payments for at least two years, but whose claims stopped independently of the Section 39 amendments (Injured Control Group); and (2) a group of community-dwelling people matched on age, gender and residential area to the Section 39 group (Community Control Group).

This report examines whether emergency department presentations and hospital admissions differ between the study groups, and whether there are any changes after workers' compensation benefits stop. To answer our study questions, we linked data from the New South Wales (NSW) hospital (public and private) and the NSW workers' compensation systems, and then performed a series of statistical analyses comparing emergency department presentations and hospital admissions between groups, before and after the implementation of the Section 39 amendment.

Across all study groups we observed that there were 41 emergency department presentations and 56 hospital admissions per 100 people. However, these rates differed between the study groups. Our findings show that while people in the Section 39 group were significantly more likely to present to an emergency department (+21% higher odds) or be admitted to hospital (+63% higher odds) than people in the community control group, this pattern did not change in the year after workers' compensation benefits ceased in the Section 39 group. This indicates that the cessation of workers' compensation income support payments did not have a short-term impact on hospital-based care.

In contrast, people in the Injured control group were more likely to present at an emergency department and be admitted to hospital in the year before the end of their workers' compensation income support payments than in the year after.

Our analysis identified a number of important differences in hospital care between the study groups, including that:

Musculoskeletal and mental health conditions are the most common diagnoses linked to hospital periods of care in the Section 39 group. Hospital admissions for these conditions are significantly more common for the Section 39 group and the Injured Control group before workers' compensation benefits stopped than in the Community Control Group, and were also more common for the Section 39 group after workers' compensation benefits stopped.

Other common reasons for hospital admission for people in the Section 39 group included conditions that are common in the Community Control group, such as injury and poisoning, cardiovascular/circulatory system diseases, and digestive conditions.

Both the Section 39 group and Injured Control Group are significantly more likely to receive care in private hospitals than the Community Control Group. For the Injured Control Group (but not the Section 39 Group), the odds of care being provided in a private hospital is significantly greater (+51% higher odds) in the year before their workers' compensation benefits cease than in the year after. One explanation for this finding is that there is less demand for scheme-funded care following return to work for some people. There was no significant change in the odds of receiving care in a private hospital for the Section 39 group after income support payments ceased. The extended eligibility of the Section 39 group for medical care (including forms of private hospital coverage) for several years after their income support ceases may contribute to this continued private hospital use.

Most people in each of the three study groups did not record an emergency department presentation or a hospital admission in the study period. A small proportion of people accounted for the majority of emergency department presentations and hospital admissions. A number of sociodemographic indicators were identified as significant predictors of emergency department presentation or hospital admission. These include older age, living in a major city, being born in Australia, having a mental injury compensation claim, and receiving the Disability Support Pension or other Centrelink income support post cessation of workers' compensation benefits. These indicators may be used by workers' compensation regulators and insurers to identify people at greater risk of emergency department presentation or hospital admission during and after the cessation of their workers' compensation benefits. These insights are also relevant for strategies within workers' compensation schemes to reduce the burden of ill health during rehabilitation, and can influence targeted preventive health approaches and health promotion programs which are anticipated to improve return to work outcomes.

This report was limited to analysis of the 12 month period before and after cessation of workers' compensation benefits. The Transitions Study has established a linked database with a much longer time series. For example, in the injured control group we have thousands of people with 5, 10 or even 15 years of hospital admissions data beyond the end of their workers' compensation claims. We also have data prior to the onset of workers' compensation claim in both the Section 39 and Injured Control group. There is potentially substantial value in further analysis of this existing data, to understand the longer-term patterns of health care use and health status in these groups of workers with long-duration workers' compensation claims.

This is the first study in Australia and one of few globally to examine post-claim health service among people with accepted workers' compensation claims. This report focuses on hospital admissions and emergency department presentations, and presents novel findings on the rate and nature of admissions and presentations among injured workers groups with long-duration compensation claims, compared to community-dwelling people of working age. Future reports from the Transitions study will examine community health service use in the Section 39 group and control groups, including use of primary and allied healthcare. These sorts of studies are critical to determining the health and social outcomes of the many thousands of Australians who exit workers' compensation systems every year, some without returning to work; for assessing the effectiveness of workers' compensation schemes, and the potential long-term impacts of being injured at work and claiming workers' compensation.

## CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	<b>3</b>
<b>CONTENTS</b> .....	<b>5</b>
<b>BACKGROUND</b> .....	<b>7</b>
New South Wales workers' compensation reform .....	7
<b>OBJECTIVE AND RESEARCH QUESTIONS</b> .....	<b>9</b>
<b>APPROACH</b> .....	<b>10</b>
Data linkage .....	10
Study groups .....	11
Study outcomes .....	12
Emergency Department presentations .....	12
Hospital admissions .....	13
Covariates .....	13
<b>DATA ANALYSIS</b> .....	<b>14</b>
Defining cohorts for analysis .....	14
Emergency Department presentations .....	14
Hospital admissions .....	14
<b>RESULTS</b> .....	<b>16</b>
Study groups .....	16
<b>EMERGENCY DEPARTMENT PRESENTATIONS</b> .....	<b>17</b>
Research Question 1 - Incidence of Emergency Department presentations .....	18
Research Question 2 - The nature of Emergency Department presentations .....	21
<b>HOSPITAL ADMISSIONS</b> .....	<b>23</b>
Research Question 3 - Incidence of hospital admissions .....	24
Research Question 4 - The nature of hospital admissions .....	28
<b>DISCUSSION</b> .....	<b>38</b>
Main findings .....	38
Strengths and limitations .....	38
Next steps .....	39
Conclusions .....	39
<b>REFERENCES</b> .....	<b>41</b>

<b>APPENDICES</b> .....	<b>42</b>
APPENDIX A - Overview of cohorts .....	42
APPENDIX B - Models for ED presentations .....	44
APPENDIX C - Details of ED presentations .....	44
APPENDIX D - Models for overnight hospital admissions .....	45
APPENDIX E - Models for private hospital use .....	46

## BACKGROUND

Hospital admission and emergency department (ED) presentation data are important sources of information for monitoring the health of populations. Such data are used commonly in epidemiological and health services research to examine trends in health across populations or population sub-groups, and to inform service planning and policy. They can also be used to examine the impact of a clinical or public health intervention in improving patient outcomes, and to investigate and quantify variations in the quality of care.

Within the field of occupational health research, studies have examined the use of hospital data for surveillance of serious work-related injury<sup>1,2</sup>, compiled hospital data to understand the nature of inpatient care funded by workers' compensation schemes<sup>3</sup> and as an outcome to determine the impacts of potentially harmful medical practices such as high-risk opioid prescribing<sup>4</sup>.

In this study we use hospital data to determine if a major reform to workers' compensation legislation affected the health of workers affected by the reform. Specifically, the study seeks to examine the incidence and nature of hospital admissions and ED presentations among a group of workers with long-duration workers' compensation claims whose income benefits ceased following a 2012 reform to the NSW workers' compensation scheme (the Section 39 group).

This report describes hospital admissions and ED presentations in the Section 39 group in the year before and the year after workers' compensation benefit ceased, compared to another group of workers with long duration claims, and a community control group matched by age, gender and residential area.

This is the second in a series of reports focused on the Section 39 group. The first report examined receipt of social welfare (i.e. Centrelink) benefits and described in detail the study design and the reforms to the NSW workers' compensation scheme. We repeat some of this information in this report, however for full detail please refer to the first report<sup>5</sup> and the study protocol<sup>6</sup>.

### NEW SOUTH WALES WORKERS' COMPENSATION REFORM

In 2012, the New South Wales government introduced the Workers Compensation Legislation Amendment Act 2012<sup>7</sup>, a major reform to their compensation system as a response to its declining financial position, which included a projected unfunded liability of \$4.1 billion and an estimated 28% increase in employer premiums<sup>8</sup>. Major reform features included restricting claim eligibility and limiting maximum duration of income support benefits. Under Section 39 of the Act, from 1 October 2012 all income support benefits were capped at 260 weeks maximum duration, with exemptions made for those workers with Whole Person Impairment assessed as being greater than 20%, and for people employed as firefighters, paramedics, police officers, coal miners or volunteers.

### **Workers Compensation Act 1987 - Section 39**

#### **39. Cessation of weekly payments after 5 years**

(1) Despite any other provision of this Division, a worker has no entitlement to weekly payments of compensation under this Division in respect of an injury after an aggregate period of 260 weeks (whether or not consecutive) in respect of which a weekly payment has been paid or is payable to the worker in respect of the injury.

(2) This section does not apply to an injured worker whose injury results in permanent impairment if the degree of permanent impairment resulting from the injury is more than 20%.

Note: For workers with more than 20% permanent impairment, entitlement to compensation may continue after 260 weeks but entitlement after 260 weeks is still subject to section 38.

(3) For the purposes of this section, the degree of permanent impairment that results from an injury is to be assessed as provided by section 65 (for an assessment for the purposes of Division 4).

The first report from the Transitions Study identified that 60% of the Section 39 group received at least one regular income support payment from Centrelink at some time in the year after their workers' compensation benefits stopped. Only 7% of this group received a Centrelink payment in the year before their workers' compensation benefits stopped. The most common Centrelink payments in the Section 39 group after cessation of workers' compensation were the Newstart allowance which was received by 41% of everyone in the group, and the Disability Support Pension (DSP) received by 19%. The Age Pension was received by 8%. Statistical analysis compared rates of Centrelink payments receipt before and after workers' compensation, adjusting for differences between groups and for a range of sociodemographic characteristics. Transition to Centrelink payments was 70 times more likely in the Section 39 group than the Community Control group and 4 times more likely than in the Injured Control group.

Prior studies of changes in the health of people as they transition on and off benefit payments<sup>9</sup> have observed that exposure to the administrative processes of applying for income support is commonly experienced as stressful<sup>10</sup>, and that this administrative stress can result in negative health consequences lasting several years or more<sup>11</sup>. There is also some evidence that Australian injured workers who have transitioned to Centrelink payments experience higher rates of financial distress<sup>12</sup>, which has also been associated with adverse health outcomes<sup>13</sup>. During 2018, shortly after benefits ceased for the bulk of people affected by the Section 39 reforms, there were multiple reports in the media of intentional self-harm resulting in hospitalisation in this group. These findings provide reason to explore the health and health service use of the Section 39 group after the cessation of their workers' compensation income support.



## OBJECTIVE AND RESEARCH QUESTIONS

In this second report from the Transition Study, we aim to describe ED presentations and hospital admissions by injured workers before and after their workers' compensation payments cease. The report is presented in two parts and considers ED presentations and hospital admission separately. Specifically, we address the following research questions:

### Part A - Emergency department presentations

1. What proportion of people affected by Section 39 of the Act present to an emergency department in the year before and the year after cessation of workers' compensation benefits, and how does this compare to other people with long duration workers' compensation claims and a community comparison group?
2. How do ED presentations differ between the Section 39 group, other people with long duration workers' compensation claims and a community comparison group?

### Part A - Emergency department presentations

3. What proportion of people affected by Section 39 of the Act are admitted to hospital in the year before and the year after cessation of workers' compensation benefits, and how does this compare to other people with long duration workers' compensation claims and a community comparison group?
4. How do hospital admissions differ between the Section 39 group, other people with long duration workers' compensation claims and a community comparison group?

## APPROACH

This is a retrospective controlled cohort study involving linkage of data across multiple state and Commonwealth datasets. We have previously published a study protocol and refer readers to this document for detail on the research methods<sup>6</sup>. In the following section we re-iterate some key parts of the methodological approach, most relevant to this report.

### DATA LINKAGE

An overview of the data linkage process is provided in Figure 1. In brief, data linkage involved five organisations including the State Insurance Regulatory Authority of NSW (SIRA), the Australian Institute of Health and Welfare (AIHW), the Centre for Health Record Linkage (CHeReL) and the Sax Institute as hosts of the Secure Unified Research Environment (SURE). These organisations executed a detailed protocol to extract and link workers' compensation, Centrelink, Medicare, Pharmaceutical Benefits, Hospital and Emergency Department datasets, while maintaining confidentiality, privacy and security of information. Data were linked probabilistically using unique person identifiers available in the study data sources. The Monash University research team executed the final linkage step of combining datasets and performing data analysis and reporting. For more detail of the linkage process please refer to the published study protocol<sup>6</sup>.

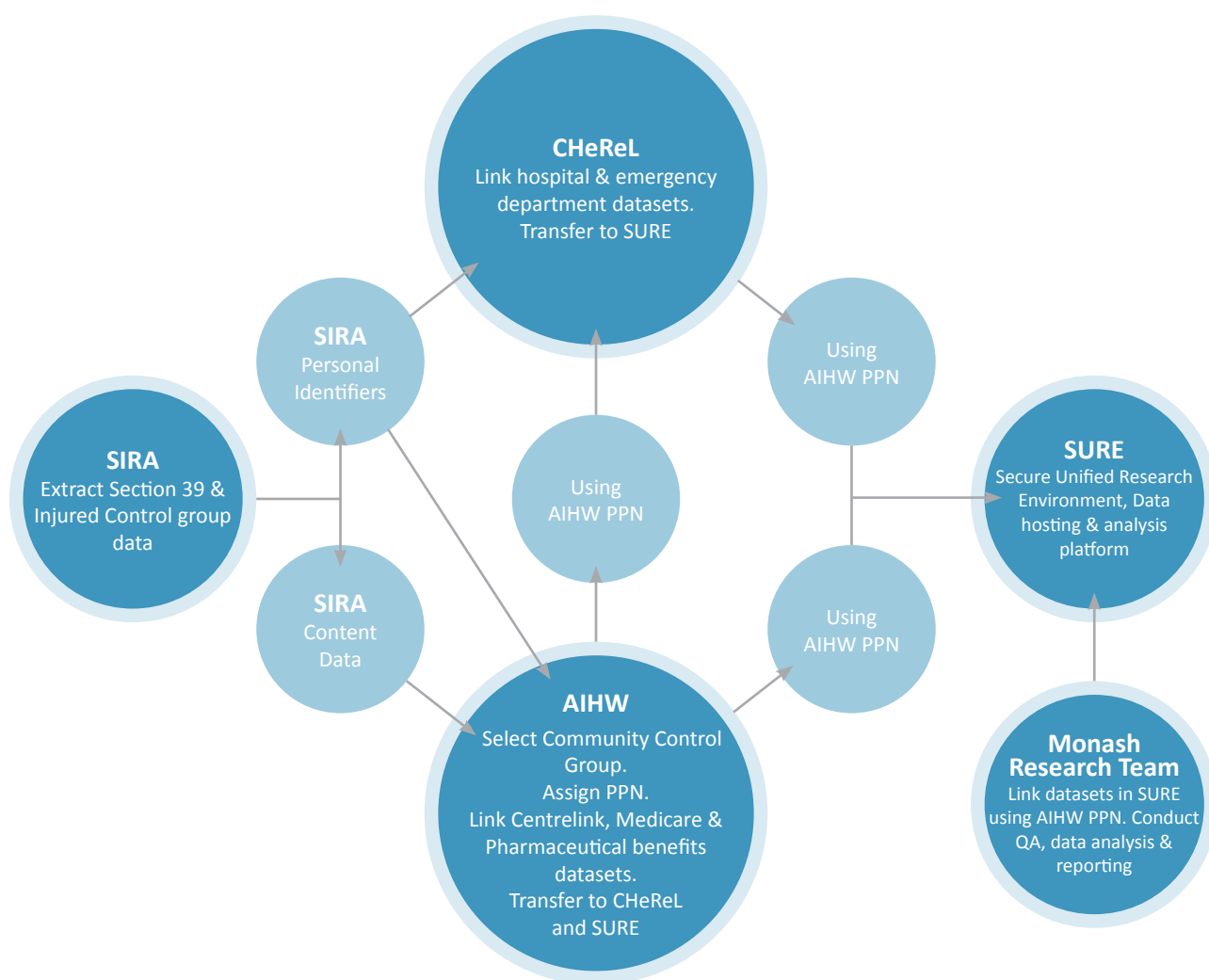


Figure 1. Overview of data linkage process

## STUDY GROUPS

Three groups were defined for inclusion in the study and are summarised in Table 1. Each person was assigned an index date. The index date refers to the end of the final workers' compensation income support payment period for members of the Section 39 group and the Injured Control group. The index date was set as 25 December 2017 for the Community Control group, which represented the median index date within the Section 39 group.

*Table 1. Description of study groups*

	Section 39 Group	Injured Control Group	Community Control Group
<b>Summary</b>	A group of injured workers with very long duration workers' compensation claims whose income support payments ceased under Section 39 of the Act.	A group of injured workers with long duration workers' compensation claims, but whose income support payments did not cease under Section 39 of the Act.	A group of people matched to the Section 39 group on age and sex and residential location, drawn from the general population of NSW.
<b>Inclusion Criteria</b>	Age 18-67 years at cessation of income support payments Accepted workers' compensation claim lodged after July 1989 and closed between 26 Sept 2017 and 30 Jun 2018 260+ weeks of income support payment	Age 18-67 years at cessation of income support payments Accepted workers' compensation claim lodged after July 1989 and closed by June 2018 104+ weeks of income support payments	Age 18-67 years at 25 Dec 2017 Residents of New South Wales
<b>Exclusion Criteria</b>		Membership of the Section 39 group	Membership of either the Section 39 or Injured Control groups
<b>Exposures</b>	<ul style="list-style-type: none"> <li>Injured at work</li> <li>Accepted WC claim</li> <li>Long duration WC income support</li> <li>WC income support ceased under Section 39 of the Act</li> </ul>	<ul style="list-style-type: none"> <li>Injured at work</li> <li>Accepted WC claim</li> <li>Long duration WC income support</li> </ul>	<ul style="list-style-type: none"> <li>None*</li> </ul>
<b>Index Date</b>	Date of final workers' compensation income support payment period	Date of final workers' compensation income support payment period	25 December 2017 (i.e. median index date of the Section 39 group)

*\*it is possible that some members of the community control group had a workers' compensation claim but this is likely to be a small percentage of this group, based on an annual incidence of claiming among working age people of around 1- 3%.*

## STUDY OUTCOMES

This report describes interactions of injured workers with the New South Wales hospital system during the year before and after cessation of income support payments. Outcomes describe the incidence of hospital use across two main categories: (1) Emergency Department presentations, and (2) Hospital Admissions (admitted patient periods of care). For each category, key variables examined are described in Table 2.

*Table 2. Overview of the major hospital variables examined in this report*

Data Source	Variable	Description
<b>Emergency Department Data Collection (EDDC)</b>	Emergency department presentation	An unscheduled presentation to an emergency department. Presentations include instances where a patient registers and does not wait for triage or treatment, and cases where a patient dies in ED or is dead upon arrival. Transfers between ED departments, or arrival via multiple modes of transport (e.g. air and road ambulance) are considered a single ED presentation.
	Triage category	Patients are allocated a triage category based on the time in which they need medical attention. Categories (from most to least urgent) include: resuscitation, emergency, urgent, semi-urgent, or non-urgent.
	Mode of separation	The status of a patient as they leave ED, which can include being admitted to hospital, emergency surgery, being transferred to another hospital, departing after treatment was completed within ED, or leaving without waiting for treatment.
<b>Admitted Patient Data Collection (APDC)</b>	Hospital inpatient period of care	A period of care describes the hospital admission until discharge from the hospital system (or death). Transfers between wards or hospitals are included within a single period of care.
	Same-day period of care	A period of care that starts and ends on the same date.
	Overnight period of care	A period of care that lasts one night or longer.
	Primary diagnosis	The primary diagnosis from the first episode of care (i.e. not complications developed during a hospital stay or non-primary diagnoses). Diagnosis information is classified according to the International Statistical Classification of Disease and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM). We report groups of diseases referred to as ICD-10 chapters, in addition to more specific categories (3-character level).
	Hospital type	Admission to a Public hospital or Private hospital. Note that a private patient can be treated in a public hospital.
	ED status	A period of care as an admitted patient that involves an ED presentation.

Study outcomes were evaluated across two study time periods: (1) within the 12-month period before an individuals' index date ('pre-index'), and (2) within the 12-month period after an individuals' index date ('post-index').

## EMERGENCY DEPARTMENT PRESENTATIONS

The NSW Emergency Department Data Collection (EDDC) describes presentations to hospital emergency departments in the state of NSW. There are many types of visits to the emergency department including those for outpatient clinics, pre-arranged return visits, private referrals, and parts of transfers between hospitals. Within the scope of this study, we only consider those termed emergency presentations, which are neither pre-arranged, part of a transfer, or where the patient is dead on arrival.

## HOSPITAL ADMISSIONS

The NSW Admitted Patient Data Collection (APDC) records all inpatient separations (discharges, transfers, and deaths) from all public hospitals, public psychiatric hospitals, multi-purpose services, private hospitals, and private day procedure centres in the state of NSW. For the purposes of this study, hospital records were combined to form periods of care. This approach combines hospital records such as transfers between hospitals or wards, and other forms of statistical changes within a hospital (e.g. a change in defining a patient type from 'acute' to 'rehabilitation'). ED-only hospital admission records (available prior to June 2017) were omitted from hospital admission analyses.

## COVARIATES

A range of other variables captured within the Department of Social Services Data Over Multiple Individual Occurrences (DOMINO) dataset, and SIRA dataset, were also used in analyses to describe study groups and as covariates in regression models. From the DOMINO dataset, these included the main type of Centrelink payment received after the index-date (Table 3), marital status, children, living arrangements, country of birth, as well as an indicator and date of death. From the SIRA dataset this included details of the compensable injury and workers' compensation claim documented by the insurer including the nature and bodily location of injury, the duration of income support (also called weeks of entitlement) and whether the person had been involved in any common law action during their claim. Variables describing age and gender were collectively derived from both the SIRA and DOMINO datasets. Receipt of welfare after workers' compensation was described in the first report from the Transition study series. This report incorporates information about transitions to social welfare payments after workers' compensation when considering engagements with the hospital system. Each person that transitioned to regular Centrelink income support payments is assigned a main type of benefit as summarised in Table 3.

*Table 3. Main types of social welfare payments*

Main type of Centrelink payment post-index date	Description
Aged Pension	Receipt of at least one record of payment for the Aged Pension
Disability support pension (DSP)	Receipt of at least one record of payment for the Disability Support Pension (and not the Aged Pension)
Newstart allowance (NSA)	Receipt of at least one record of payment for the Newstart Allowance (but not the Aged pension or DSP)
Other income support payment	Receipt of at least one regular basic payment for any one of the following (but not the Age pension, DSP or NSA): Youth Allowance, Carer Payment, Sickness Allowance, Parenting Payment, Special Benefit, Partner Allowance, Widow Allowance/Pension, Wife Pension, Farm Household Allowance, Austudy or Abstudy
None	No Centrelink regular basic income payments

Some variables change over time such as age, relationships and living arrangements for example. These time-dependent variables are calculated as at the index date for each group.

## DATA ANALYSIS

Analysis was conducted in a sequential manner involving a set of preliminary stages before addressing each research question in succession.

### DEFINING COHORTS FOR ANALYSIS

Eligibility rules defining the three study groups depended on information contained in the DOMINO dataset, as described in Report 1. For the current analysis two overlapping but slightly different samples were defined:

1. A sample with DOMINO data linked to the EDDC. This sample was used for the analysis of emergency department presentations.
2. A sample with DOMINO data linked to the APDC. This sample was used for the analysis of hospital admissions.

### EMERGENCY DEPARTMENT PRESENTATIONS

#### **RESEARCH QUESTION 1: INCIDENCE OF EMERGENCY DEPARTMENT PRESENTATIONS**

First, counts of ED presentations were calculated for the three study groups across the two study time periods (12 months pre-index date, 12 months post-index date). These were expressed as a count per 100 people per study group. This data was used to describe the incidence of ED presentations.

Second, for each individual the number of ED presentations was also calculated and grouped into categories for each time period. A binary outcome defined groups of people as having (1) One or more ED presentations, or (2) No ED presentations during a study period. This outcome was used in a multivariate logistic regression model to explore demographic, social and health factors associated with ED presentations. Results from this model are described as adjusted odds ratios in comparison to a reference group.

#### **RESEARCH QUESTION 2: THE NATURE OF EMERGENCY DEPARTMENT PRESENTATIONS**

We compared the nature of ED presentations between the study groups and study time-periods. This was achieved by first calculating the number and percentage ED presentations for each triage category, and mode of separation, between the study groups and study periods. Binary logistic regression models were used to compare each study group using pairwise comparisons.

### HOSPITAL ADMISSIONS

#### **RESEARCH QUESTION 3: THE INCIDENCE OF HOSPITAL ADMISSIONS**

The incidence of hospital admissions was investigated in a sequential manner and describe outcomes for both the total number of hospital admissions, and the number of periods of care lasting overnight or longer. These two outcomes are related but offer complimentary insights into hospital use.

Step 1: Counts of hospital admissions were calculated for the three study groups across the two study time periods (12 months pre-index date, 12 months post-index date). These were expressed as a count per 100 people per study group. This data was used to describe the incidence of hospital admissions.

Step 2: For each person, the number of hospital admissions was calculated and grouped into categories for each study period. The number of hospital admissions was used in a generalised linear model (with a negative binomial distribution) to explore differences between study groups and study periods, along with demographic, social and health factors associated with hospital admissions. Results from this model are described as adjusted odds ratios in comparison to a reference group. The odds ratio describes the odds of having an additional hospital admission.

Step 3: Steps 1 to 2 were repeated but by only considering overnight hospital admissions (same-day admissions were excluded). This analysis focused on hospital admissions other than those for routine screening services, dialysis or other forms of in-patient day-treatment. Outcomes described the number of overnight hospital admissions. This outcome was used in a generalised linear model (with a negative binomial distribution) to explore demographic, social and health factors associated with overnight hospital admissions.

#### **RESEARCH QUESTION 4 – THE NATURE OF HOSPITAL ADMISSIONS**

We sought to describe differences in the types of periods of care received by each of the study groups and study periods. Given the diverse nature of hospital admissions, this section separated periods of care into two categories based on the duration of care: (1) Same-day, and (2) Overnight (or longer). These groups were analysed separately.

The primary disease, or condition, of a patient was recorded during the first component of a period of care. This acts as a proxy for the reason for admission, whilst acknowledging that additional complications may occur or emerge within a period of care. A detailed code is recorded using the international classification of diseases 10th edition Australian modification (ICD-10 AM). For more detailed diseases or conditions (also known as 3-character codes), we identified the five most common codes for each study group and each study period.

We also assigned higher-level categories of diseases called ICD-10 chapters. These include categories that describe groups of diseases or conditions such as “Diseases of the musculoskeletal system and connective tissue”, or “Mental and behavioural disorders”. There is also a group which does not explicitly describe diseases or conditions, which is referred to as “Factors influencing health status and contact with health services”. The percentage of periods across each category (i.e. chapter) was calculated for each study group and study period. Binary regression models were evaluated comparing the incidence of disease categories during the pre-index period and the post-index period, and used the type of study group as outcomes. This analysis was first performed for same-day periods of care, and then repeated for overnight periods of care.

Periods of care were documented as either taking place in a public hospital or private hospital. While patients can be designated as private patients within a public hospital in the Australian hospital systems (or vice versa), this information was not reliably available. Differences in the proportion of periods of care within either public or private hospitals were compared between each study group and study period. This was evaluated for same-day periods of care and overnight periods of care separately. Following preliminary results, the next steps combined same-day and overnight periods of care. Workers’ compensation offers coverage for some private hospital care for injured workers, and this coverage was extended for the Section 39 group for several years after their final income support payment. A binary regression model describes changes in private hospital use between study groups and study periods, whilst accounting for sociodemographic differences, and details of compensable injury (where applicable). As a result, sociodemographic indicators for increased private hospital use were described using odds ratios.

This report presents key results from these multiple analyses. Full tables of statistical output from descriptive analyses and regression models are available from the study authors on request.

## RESULTS

### STUDY GROUPS

Two cohorts resulted from data linkage after applying eligibility criteria (including linkage to the DOMINO data of Centrelink records as described in Report 1 from the Transitions Study). The cohort selected for analysis of ED presentations consisted of 14,271 people, and the cohort for hospital admission analysis comprised of 14,586 people. The number of study groups for each cohort is listed in Table 4. The characteristics of each cohort is provided in Appendix A.

*Table 4. Summary of steps taken to select study groups for analysis*

Study Group	Section 39	Injured Control	Community Control
Identified by SIRA	3,922	11,770	N/A
Met eligibility criteria	2,761	3,980	10,114
Cohort 1: Linked to EDDC (Emergency Department Presentations) (% of eligible sample)	2,328 (84%)	3,408 (86%)	8,535 (84%)
Cohort 2: Linked to APDC (Hospital admissions) (% of eligible sample)	2,475 (90%)	3,626 (91%)	8,485 (84%)

Results are presented in the following two sections:

Part A includes analyses of emergency department presentations

Part B includes analyses of hospital admissions



# PART A - EMERGENCY DEPARTMENT PRESENTATIONS

## EMERGENCY DEPARTMENT PRESENTATIONS

### RESEARCH QUESTION 1 – INCIDENCE OF EMERGENCY DEPARTMENT PRESENTATIONS

#### Research Question #1

What proportion of people affected by Section 39 of the Act present to an emergency department in the year before and the year after cessation of workers' compensation benefits, and how does this compare to other people with long duration workers' compensation claims and a community comparison group?

#### COUNT AND INCIDENCE OF ED PRESENTATIONS

The number of ED presentations in the Section 39 group increased slightly from 1208 in the pre-index period to 1243 in the post-index period. The opposite pattern was observed in the Injured Control group, in which we observed a decrease from 3185 ED presentations in the pre-index period to 2938 in the post-index period. ED presentations within the Community Control group increased from 2938 pre-index to 3185 in the post-index period. These counts are expressed as a rate per 100 people for each study group in each study period in Figure 2, below.

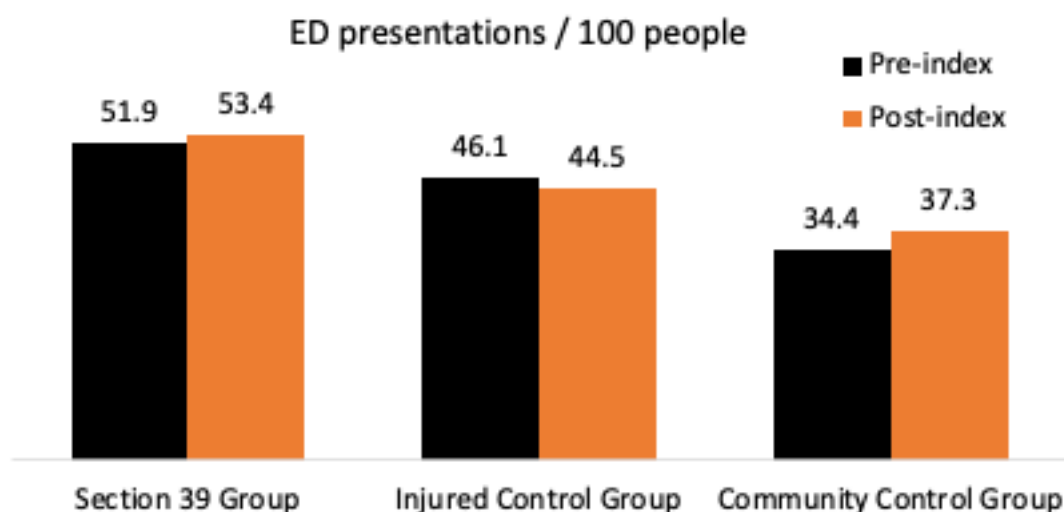


Figure 2. Average number of emergency department presentations per 100 people within each study group in the pre-index and post-index study periods

Presenting to ED was more common for people in the Section 39 group or Injured Control group compared to the Community Control group. However, most people did not present to ED during either the pre-index study period or the post-index study period (Table 5). There are small subgroups of people who are over-represented in ED presentations. For example, ~5% of the Section 39 group accounted for 43% to 44% of the ED presentations in either of the 12-month study periods for that group. Similarly, ~4% of the Injured Control group accounted for 34% to 36% of ED presentations, and ~3% of the Community Control group accounted for 32% to 35% of ED presentations.

Table 5. Number of Emergency Department presentations per person in each study group and study period

Study period:	Pre-index			Post-index		
Study group:	Section 39	Injured Control	Community Control	Section 39	Injured Control	Community Control
<b>Presentations to the Emergency Department</b>						
None	1664 (71.5)	2437 (71.5)	6673 (78.2)	1656 (71.1)	2489 (73.0)	6580 (77.1)
One	443 (19.0)	642 (18.8)	1308 (15.3)	408 (17.5)	629 (18.5)	1325 (15.5)
Two	115 (4.9)	200 (5.9)	338 (4.0)	152 (6.5)	158 (4.6)	368 (4.3)
Three or more	106 (4.6)	129 (3.8)	216 (2.5)	112 (4.9)	132 (3.9)	262 (3.1)
<b>Study group size</b>	<b>2328</b> <b>(100.0%)</b>	<b>3408</b> <b>(100.0%)</b>	<b>8535</b> <b>(100.0%)</b>	<b>2328</b> <b>(100.0%)</b>	<b>3408</b> <b>(100.0%)</b>	<b>8535</b> <b>(100.0%)</b>

Note: All data is presented as number (column percentage);

Logistic regression analysis demonstrated that ED presentations were more common for both the Section 39 group and the Injured Control group compared to the Community Control group, both during the pre-index period and the post-index period (Figure 3). For the Injured Control group, presenting to ED was significantly more common pre-index, compared to post-index (Appendix B).

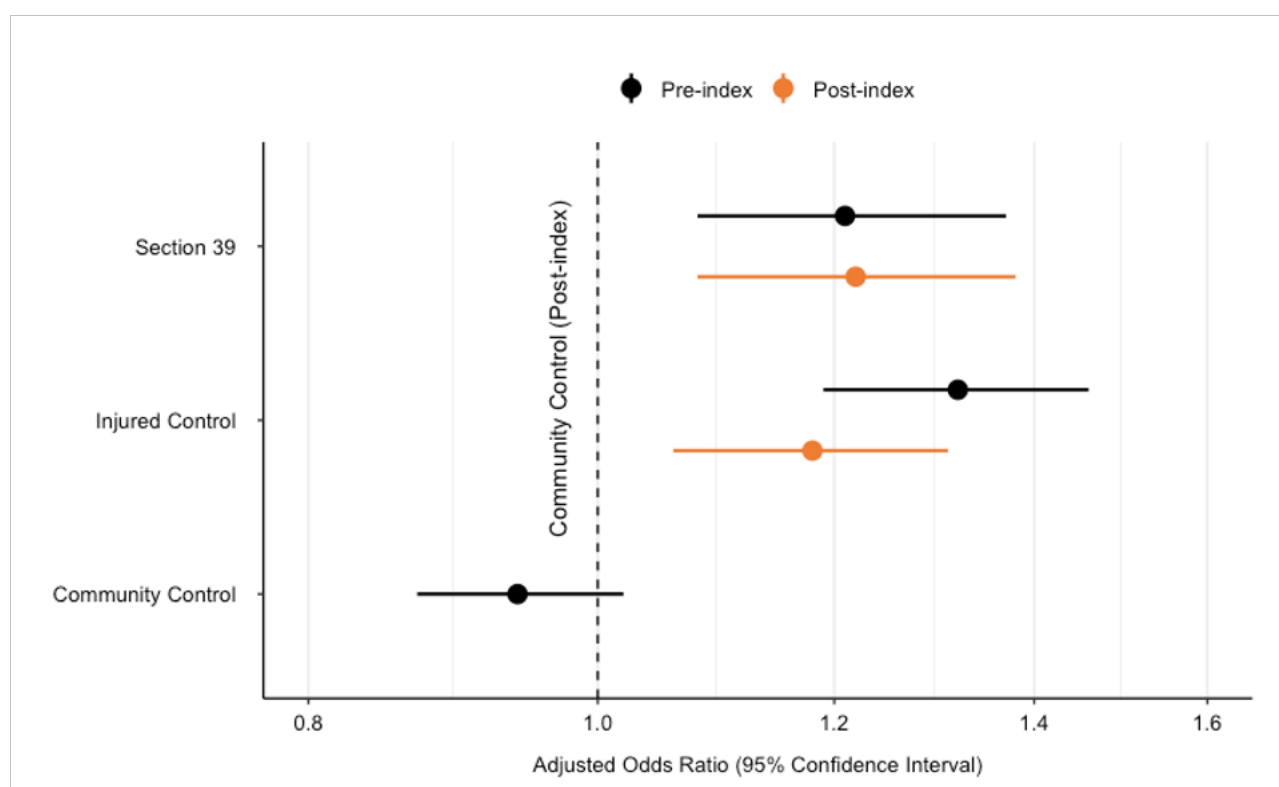


Figure 3. Adjusted Odds Ratios (AOR) and 95% confidence intervals from Generalised Estimating Equation models describing Emergency Department presentations (one or more per person)

## INDICATORS FOR EMERGENCY PRESENTATIONS

Across all study groups, generalised estimating equations identified several sociodemographic indicators as being statistically associated with presenting to the ED on one or more occasions. Indicators associated with greater odds of presenting to ED, compared to respective reference groups, included:

- Being aged 65 years or older (+24% higher odds than people aged 55 to 64 years)
- Being a single parent (+17% higher odds compared to those with a partner and children)
- Not owning your own home (+22% higher odds)
- Living outside of a major city (+25% higher odds)
- Receiving Centrelink income support payments in the post-index study period, such as either:
  - the Disability support pension (+56% higher odds)
  - the Newstart/Jobseeker allowance (+31% higher odds)
  - or other working-age income payments such as the Carer payment, Parenting payments etc. (+19% higher odds)

**Research Question #2**

How do ED presentations differ between the Section 39 group, other people with long duration workers’ compensation claims and a community comparison group?

**NATURE OF EMERGENCY DEPARTMENT PRESENTATIONS**

We examined the mode of separation for ED presentations (e.g. the way in which ED treatment ended), the triage category for ED presentations, and whether presentations involved an overnight stay (Appendix C). There were very few statistically significant differences between groups on these outcomes. Regarding mode of separation, around 60% of presentations are completed within ED, a further 25% result in hospital admissions to non-critical care, and 3% to 4% result in an admission to critical care or emergency surgery from ED (Table 6). There were some significant differences between the study groups. An ED presentation ending in a transfer to critical care or for an operation was more commonly experienced within the Injured Control group during the pre-index study period compared to the Section 39 group or the Community Control group. The Section 39 group were more likely to leave ED prior to completing treatment (including not waiting to be triaged) during the year after workers’ compensation payments ceased.

*Table 6. Emergency department presentations for each study group and study period by mode of separation*

Study period:	Pre-index			Post-index		
Study group:	Section 39	Injured Control	Community Control	Section 39	Injured Control	Community Control
<b>Mode of separation (ED outcome)</b>						
Treatment completed within ED	747 (61.8)	1001 (63.8)	1797 (61.2)	727 (58.5)	935 (63.1)	1947 (61.1)
Admitted to hospital (non-critical)	301 (24.9)	374 (23.8)	827 (28.1)	343 (27.6)	374 (25.2)	863 (27.1)
Hospital critical care / operative	40 (3.3)	60 (3.8)	81 (2.8)	44 (3.5)	49 (3.3)	92 (2.9)
Treated elsewhere	38 (3.1)	39 (2.5)	75 (2.6)	45 (3.6)	46 (3.1)	117 (3.7)
Other (Left ED / deceased)	82 (6.8)	96 (6.1)	158 (5.4)	84 (6.8)	78 (5.3)	166 (5.2)
<b>Total ED presentations</b>	<b>1208 (100.0%)</b>	<b>1570 (100.0%)</b>	<b>2938 (100.0%)</b>	<b>1243 (100.0%)</b>	<b>1482 (100.0%)</b>	<b>3185 (100.0%)</b>

*Note: All data is presented as number (column percentage);*

There were no statistically significant differences between groups with respect to triage category. Overall, around two thirds of ED presentations are triaged as either urgent or semi-urgent across groups (treatment needed within 30 mins to 1 hour), and between 17% and 20% of ED presentations are triaged as an emergency (i.e. treatment needed within 10 minutes, categorised as an imminently life-threatening condition). Overnight stays in ED are relatively uncommon (around 16% of total presentations), as shown in Appendix C, and their incidence did not differ between study groups.

## PART B - HOSPITAL ADMISSIONS

## HOSPITAL ADMISSIONS

### RESEARCH QUESTION 3 – INCIDENCE OF HOSPITAL ADMISSIONS

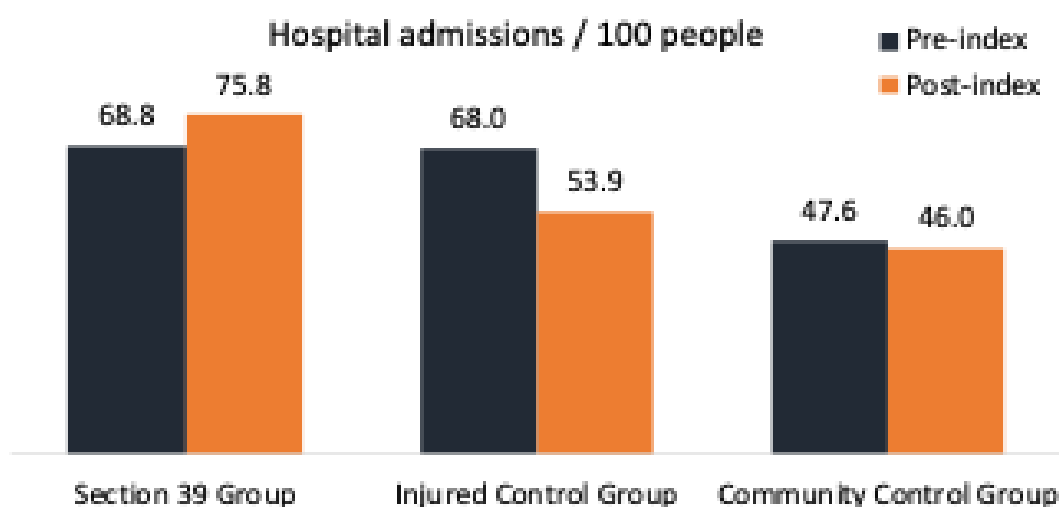
#### Research Question #3

What proportion of people affected by Section 39 of the Act are admitted to hospital in the year before and the year after cessation of workers' compensation benefits, and how does this compare to other people with long duration workers' compensation claims and a community comparison group?

To answer this question, we first looked at all hospital admissions, and then focused specifically on admissions involving an overnight stay.

#### COUNT AND INCIDENCE OF HOSPITAL ADMISSIONS

The number of hospital admissions in the Section 39 group increased slightly from 1702 in the pre-index period to 1876 in the post-index period. The opposite pattern was observed in the Injured control group, in whom we observed a decrease from 2465 hospital admissions in the pre-index period to 1954 in the post-index period. Hospital admissions within the Community Control group decreased from 4035 pre-index to 3904 in the post-index period. These counts are expressed as a rate per 100 people for each study group in each study period in Figure 4, below:



**Figure 4.** Number of hospital admissions per 100 people within each study group in the pre-index and post-index study periods

Hospital admission was generally infrequent in either the pre-index or post-index period. However, hospital admission was more common for people in the Section 39 group or Injured Control group compared to the Community Control group (Figure 5). There are small subgroups of people who are over-represented in hospital admissions. For example, ~6 to 7% of the Section 39 group accounted for 55% to 58% of the hospital admissions in either of the 12-month study periods for that group. Similarly, ~4 to 5% of the Injured Control group accounted for 48% to 56% of hospital admissions, and ~2 to 3% of the Community Control group accounted for 48 to 53% of hospital admissions.



Regression analysis demonstrated that the number of hospital admissions were higher for both the Section 39 group and the Injured Control group compared to the Community Control group, during both the pre-index period and the post-index period (Figure 5). For the Injured Control group, additional analysis demonstrated that hospital admissions were significantly more common pre-index (+30% higher odds), compared to post-index (Appendix D).

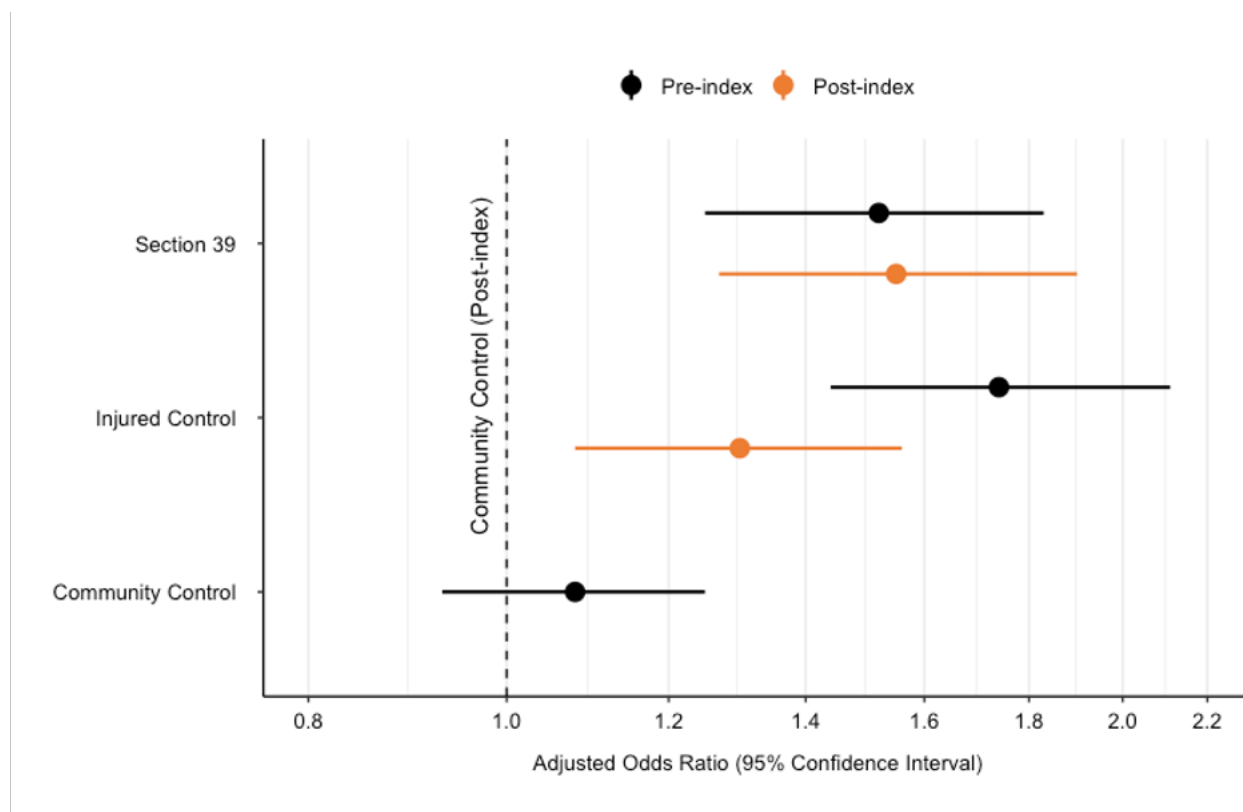


Figure 5. Adjusted Odds Ratios (AOR) and 95% confidence intervals from Generalised Estimating Equation models describing Number of hospital admissions (i.e. periods of care) between study groups and study periods

### OVERNIGHT HOSPITAL ADMISSIONS

In addition to all hospital admissions, we conducted separate analysis of admissions that involved at least one overnight stay (overnight admissions) and admissions that were completed within a single day (same day admissions). Overall, 37% of all admissions involved an overnight stay and these admissions accounted for more than 80% of all admitted days in hospital.

We present summary information only on the incidence of overnight admissions within this section for each individual. Most people (~81-87%) in the three study groups did not record an overnight admission either in the pre-index or post-index study periods (Table 7).

Table 7. Percentage of study group with a given number of overnight hospital admissions per person by study period

Study periods:	Pre-index			Post-index		
Study groups:	Section 39	Injured Control	Community Control	Section 39	Injured Control	Community Control
<b>Overnight hospital admissions</b>						
None	2003 (80.9)	3035 (83.7)	7401 (87.2)	2016 (81.5)	3059 (84.4)	7318 (86.2)
One	326 (13.2)	413 (11.4)	875 (10.3)	319 (12.9)	442 (12.2)	929 (10.9)
Two	78 (3.2)	97 (2.7)	127 (1.5)	70 (2.8)	73 (2.0)	130 (1.5)
Three or more	68 (2.7)	81 (2.2)	82 (1.0)	70 (2.8)	52 (1.4)	108 (1.3)
<b>Study group size</b>	<b>2475 (100.0%)</b>	<b>3626 (100.0%)</b>	<b>8485 (100.0%)</b>	<b>2475 (100.0%)</b>	<b>3626 (100.0%)</b>	<b>8485 (100.0%)</b>

Note: All data is presented as number (column percentage);

Generalised linear model analysis (using negative binomial distributions) demonstrated that overnight hospital admissions were more common for both the Section 39 group and the Injured Control group compared to the Community Control group, during both the pre-index period and the post-index period (Figure 6).

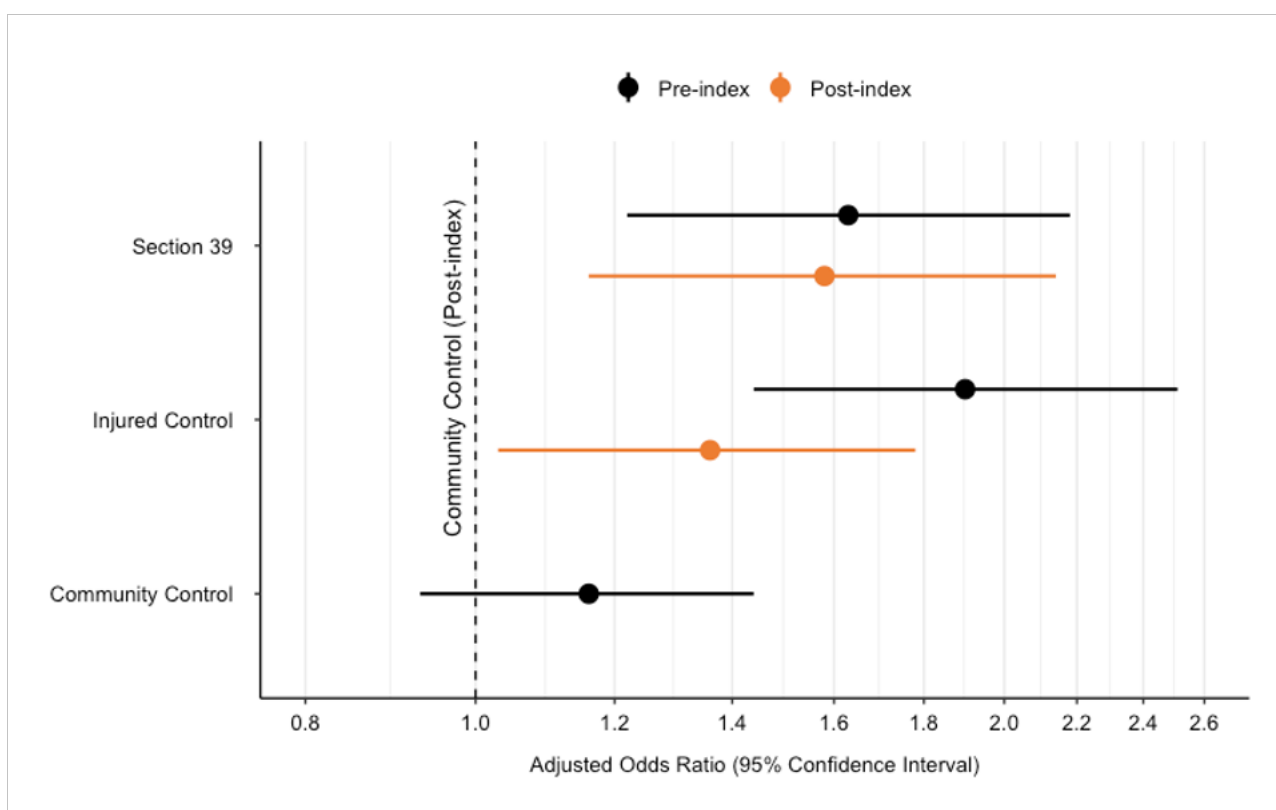


Figure 6. Adjusted Odds Ratios (AOR) and 95% confidence intervals from Generalised Estimating Equation models describing Number of overnight periods of care (periods of care lasting one night or longer) between study groups and study periods

Across all study groups, generalised estimating equations identified several sociodemographic indicators as being statistically associated with the number of overnight admissions. Indicators associated with lower odds of an additional overnight hospital admission, compared to respective reference groups, included:

- Being aged 20 to 44 years (-52% lower odds compared to people aged 55 to 64 years)
- Being born overseas (-32% lower odds compared to people born in Australia)
- Living outside of a major city (-42% lower odds than people living in a major city)

Indicators associated with greater odds of having an additional overnight hospital admission, compared to respective reference groups, included:

- People receiving the Disability Support Pension in the post-index study period (+178% higher odds compared with people who were not receiving any income support payments in the post-index study period).

**Research Question #4**

How do hospital admissions differ between the Section 39 group, other people with long duration workers’ compensation claims and a community comparison group?

To answer this question, we examined the incidence and primary diagnosis associated with both overnight and same-day hospital periods of care, whether hospital care occurred in private or public settings, and also the funding sources for hospital admissions. This section describes periods of care as an admitted patient, and therefore does not include information from people that were not admitted to hospital.

**PERIODS OF CARE**

Periods of care may involve transition of people between wards in a hospital (e.g., from a general ward to critical care or vice versa) or even between hospitals, but for the purpose of understanding hospital care our analysis aggregated these transitions, where they occurred, into single periods of care.

Across each of the study groups, around 2 in 3 periods of care are completed within the same day (i.e. hospital admission and discharge occur on a single day). This leaves around 1 in 3 periods of care which involve an overnight or longer stay in hospital (Figure 7). Periods of care within the Section 39 group and Injured Control group were more commonly overnight or longer, and less commonly same-day compared with the Community Control group.

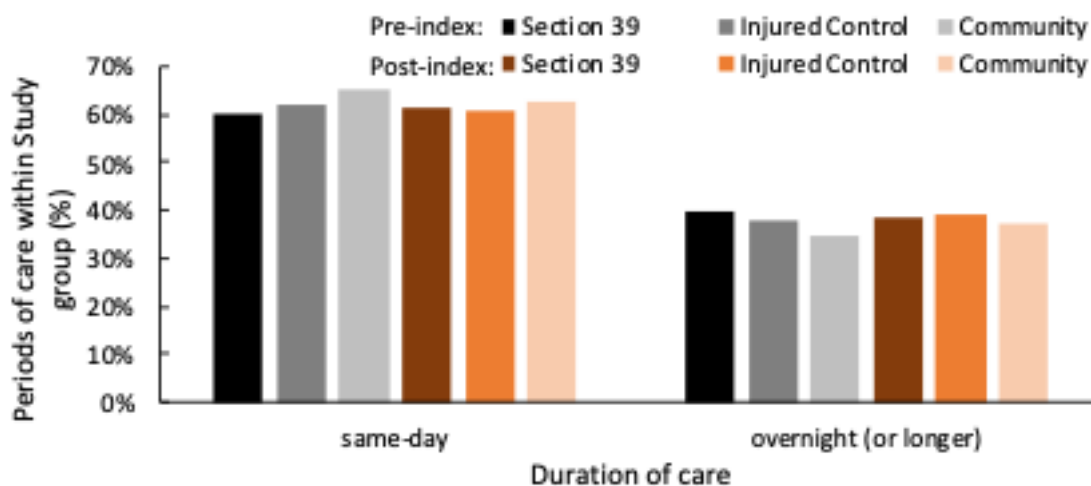


Figure 7. Periods of care for each study group and study period by the duration of care

## SAME-DAY PERIODS OF CARE

Same day periods of care involve admission and discharge from hospital on a single day. The primary diagnosis associated with same-day periods of care differed between the study groups and across the study periods. Table 8 presents a summary of these diagnoses in each group across both study periods. Boxes shaded in darker blue indicate more common diagnostic categories, and those in lighter blue or grey less common.

Some clear patterns emerge from this analysis including:

- Within the Section 39 group, the most common diagnostic category for same-day periods of care was 'Diseases of the musculoskeletal system and connective tissue' category, followed by 'Factors influencing health status and contact with health services' and then 'Mental and behavioural disorders'.
- A much higher percentage of same-day periods of care were for 'Mental and behavioural disorders' in the Section 39 and Injured Control groups in both study periods than in the Community Control group.
- A much higher percentage of same-day periods of care were for 'Factors influencing health status and contact with health services' in the Community Control group than in the Section 39 group.

Results from binary regression models (full details available upon request to the report authors) indicate that:

- Same-day periods of care resulting from musculoskeletal and connective tissue-related conditions are 4 times more common in the Section 39 group compared to the Community Control group.
- Same-day periods of care resulting from mental and behavioural disorders was 18 times more common in the Section 39 group (compared to the Community Control group) in the pre-index period, and 15 times in the post-index period.
- Same-day periods of care resulting from mental and behavioural disorders was 18 times more common in the Injured Control group (compared to the Community Control group) in the pre-index period, and 6 times more common in the post-index period.

Overall, the most common diagnostic category was 'Factors influencing health status and contact with health services' such as care involving dialysis, care involving use of rehabilitation procedures and other medical care. This category represents circumstances that cannot be attributed to other categories. This is typically when a person encounters the health services for some specific purpose, such as to receive limited care or service for a current condition, or to discuss a problem which is not, in and of itself, a disease or injury.

To further investigate common reasons for hospital admission, we also determined the top five (most common) specific conditions or diseases assigned to same-day periods of care. This data is presented in Table 9.

In the Section 39 group the most common conditions include musculoskeletal and mental health conditions, specifically back/spine pain, knee osteoarthritis, a single episode of a depressive disorder and reactions to stress. Dialysis, anorexia and other aftercare also appear in the top five for this group.

The Injured Control group has a similar pattern including back/spine pain, knee osteoarthritis, depressive disorder and reactions to stress, although the top category in both the pre- and post-index period in this group is care involving rehabilitation.

The pattern in the Community Control group is quite different, reflecting treatments for conditions and diseases that are common in society, including dialysis, cataracts, colon cancer, digestive diseases, knee osteoarthritis and other aftercare.

**Table 8. Primary diagnosis (category) for same-day periods of care within each study group and study period**

Same-day periods of care within each study group (%)	Section 39			Section 39		
	Injured Control	Community Control		Injured Control	Community Control	
Primary disease category	Pre-index			Post-index		
Certain infectious and parasitic diseases	0%	0%	1%	0%	1%	1%
Neoplasms	4%	4%	5%	4%	4%	7%
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	1%	1%	1%	1%	1%	2%
Endocrine, nutritional and metabolic diseases	0%	0%	1%	1%	0%	1%
Mental and behavioural disorders	16%	21%	2%	14%	15%	4%
Diseases of the nervous system	2%	3%	5%	2%	2%	5%
Diseases of the eye and adnexa	3%	2%	3%	4%	3%	5%
Diseases of the ear and mastoid process	0%	0%	1%	0%	0%	0%
Diseases of the circulatory system	2%	2%	2%	1%	2%	3%
Diseases of the respiratory system	0%	1%	1%	1%	1%	1%
Diseases of the digestive system	11%	8%	10%	8%	12%	11%
Diseases of the skin and subcutaneous tissue	1%	1%	1%	0%	1%	1%
Diseases of the musculoskeletal system and connective tissue	27%	18%	14%	22%	17%	16%
Diseases of the genitourinary system	6%	2%	4%	3%	3%	4%
Pregnancy, childbirth and the puerperium	0%	0%	0%	0%	0%	0%
Congenital malformations, deformations and chromosomal abnormalities	0%	0%	0%	0%	0%	0%
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	9%	6%	7%	9%	8%	10%
Injury, poisoning and certain other consequences of external causes	5%	2%	3%	7%	2%	3%
Factors influencing health status and contact with health services	14%	30%	41%	23%	27%	28%
<b>Number of same-day periods of care (N)</b>	<b>1027 (100%)</b>	<b>1528 (100%)</b>	<b>2641 (100%)</b>	<b>1156 (100%)</b>	<b>1186 (100%)</b>	<b>2445 (100%)</b>

Note: Privacy issues from small counts are addressed by data suppression where some values are not disclosed and are labelled as 0%. Percentage values are coloured with a blue gradient (darker for higher percentage values).

To further investigate common reasons for hospital admission, we also determined the top five (most common) specific conditions or diseases assigned to same-day periods of care. This data is presented in Table 9.

In the Section 39 group the most common conditions include musculoskeletal and mental health conditions, specifically back/spine pain, knee osteoarthritis, a single episode of a depressive disorder and reactions to stress. Dialysis, anorexia and other aftercare also appear in the top five for this group. The Injured Control group has a similar pattern including back/spine pain, knee osteoarthritis, depressive disorder and reactions to stress, although the top category in both the pre and post-index period in this group is care involving rehabilitation.

The pattern in the Community Control group is quite different, and reflects treatment for conditions and disease that are common in society, including dialysis, cataracts, colon cancer, digestive diseases, knee osteoarthritis and other aftercare.

**Table 9. Five most common primary conditions (at 3-character level of ICD-10 codes), or diseases, assigned to same-day periods of care within each study group and study period**

Top 5 primary conditions or diseases	Section 39			Community Control		
	Injured Control			Community Control		
	Pre-index			Post-index		
1	Back / spine pain	Care involving rehab	Dialysis	Dialysis	Care involving rehab	Dialysis
2	Depressive episode	Depressive episode	Knee osteo-arthritis	Back / spine pain	Knee osteo-arthritis	Knee osteo-arthritis
3	Other aftercare and medical care	Back / spine pain	Cataract	Anorexia	Dialysis	Other aftercare and medical care
4	Knee osteo-arthritis	Dialysis	Other aftercare and medical care	Knee osteo-arthritis	Back / spine pain	Cataract
5	Reaction to stress	Reaction to stress	Other digestive	Depressive episode	Reaction to stress	Neoplasm of colon



## OVERNIGHT PERIODS OF CARE

Overnight (or longer) periods of care involve admission and discharge from hospital that involves at least one overnight hospital stay, and may involve multiple days or weeks. The primary diagnosis associated with overnight periods of care differed between the study groups and across the study periods. Table 10 presents a summary of these diagnoses in each group across both study periods. Boxes shaded in darker blue indicate more common diagnostic categories, and those in lighter blue less common.

In contrast to same-day care, overnight periods of care are less commonly associated with 'Factors influencing health status and contact with health services' but are instead attributed to the other categories associated with problems and diagnoses.

Some clear patterns emerge from this analysis including:

- Within the Section 39 group, the most common diagnostic category for overnight periods of care is 'Diseases of the musculoskeletal system and connective tissue' category, followed by 'Mental and behavioural disorders' and 'Injury, poisoning and other external causes' and digestive and circulatory system conditions.
- There was a reduction in overnight periods of care resulting from musculoskeletal conditions in the Injured Control group between the pre-index and post-index period, from 23% to 15% of periods of care
- A much higher percentage of overnight or longer periods of care are for Musculoskeletal conditions in the Section 39 and Injured Control groups in both study periods than in the Community Control group. Regression models confirmed these patterns were statistically significant after adjusting for sociodemographic differences between groups.
- A slightly higher percentage of overnight periods of care are for mental and behavioural disorders in the Section 39 group than in the Community Control group, but otherwise the pattern of diagnostic categories broadly reflects that in the Community Control group.

Table 10. Primary diagnosis (category) for overnight periods of care within each study group and study period

Same-day periods of care within each study group (%)	Section 39	Injured Control	Community Control	Section 39	Injured Control	Community Control
Certain infectious and parasitic diseases	1%	2%	3%	3%	1%	3%
Neoplasms	4%	5%	7%	5%	6%	7%
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	0%	0%	2%	0%	1%	1%
Endocrine, nutritional and metabolic diseases	3%	1%	3%	3%	3%	3%
Mental and behavioural disorders	11%	10%	8%	9%	6%	6%
Diseases of the nervous system	5%	3%	3%	4%	4%	4%
Diseases of the eye and adnexa	0%	0%	1%	0%	1%	1%
Diseases of the ear and mastoid process	0%	0%	0%	0%	0%	0%
Diseases of the circulatory system	10%	9%	10%	10%	9%	10%
Diseases of the respiratory system	6%	6%	8%	6%	6%	8%
Diseases of the digestive system	9%	11%	12%	9%	14%	8%
Diseases of the skin and subcutaneous tissue	4%	2%	3%	3%	3%	2%
Diseases of the musculoskeletal system and connective tissue	22%	23%	11%	22%	15%	12%
Diseases of the genitourinary system	4%	6%	6%	5%	7%	6%
Pregnancy, childbirth and the puerperium	0%	2%	2%	1%	3%	1%
Congenital malformations, deformations and chromosomal abnormalities	0%	0%	0%	0%	0%	0%
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	6%	8%	8%	8%	8%	9%
Injury, poisoning and certain other consequences of external causes	11%	9%	13%	8%	10%	10%
Factors influencing health status and contact with health services	2%	2%	2%	2%	2%	2%
<b>Number of same-day periods of care (N)</b>	<b>675</b>	<b>1528 (100%)</b>	<b>2641 (100%)</b>	<b>1156 (100%)</b>	<b>1186 (100%)</b>	<b>2445 (100%)</b>

Note: Privacy issues from small counts are addressed by data suppression where some values are not disclosed and are labelled as 0%. Percentage values are coloured with a blue gradient (darker for higher percentage values).

To further investigate common reasons for overnight or longer periods of care, we also determine the top five (most common) specific conditions or diseases. This data is presented in Table 11.

In the Section 39 group the most common conditions include musculoskeletal and mental health conditions, specifically back/spine pain, knee osteoarthritis, intervertebral disc disorders, a single episode of a depressive disorder. Other common reasons include cardiovascular conditions (heart attack and throat/chest pain) as well as inflammation of the immune system (lymphangitis).

**Table 11. Five most common primary conditions (at 3-character level of ICD-10 codes), or diseases, assigned to overnight periods of care within each study group and study period**

Top 5 primary conditions or diseases	Section 39			Section 39		
	Pre-index	Injured Control	Community Control	Pre-index	Injured Control	Community Control
1	Back / spine pain	Depressive episode	Knee osteo-arthritis	Back / spine pain	Knee osteo-arthritis	Knee osteo-arthritis
2	Depressive episode	Back / spine pain	Schizophre-nia	Depressive episode	Throat / chest pain	Back / spine pain
3	Cellulitis and acute lym-phangitis	Throat / chest pain	Throat / chest pain	Intervertebral disc disorders	Gallstone	Throat / chest pain
4	Knee osteo-arthritis	Intervertebral disc disorders	Chronic ob-structive pulmonary disease	Knee osteo-arthritis	Back / spine pain	Chronic ob-structive pulmonary disease
5	Throat / chest pain	Shoulder lesions	Gallstone	Heart attack	Shoulder lesions	Heart attack

The Injured Control group has a similar pattern including musculoskeletal conditions (back/spine pain, knee osteoarthritis, shoulder lesions, intervertebral disc disorders), and throat/chest pain. Gall stones are also in the top five for this group in the post-index period.

The pattern in the Community Control group also involves common musculoskeletal and mental health conditions, but reflects some other common conditions in older people, such as chronic obstructive pulmonary disease, but also psychiatric disorders during the pre-index period (schizophrenia).

### PUBLIC AND PRIVATE HOSPITAL ADMISSIONS

Admissions to either a private hospital or a public hospital differed based on the study group, study period, and the duration of care (i.e. same-day or overnight). For all study groups, admissions to private hospital were more common for same-day care (Figure 8) than for overnight periods of care (Figure 9). A higher percentage of care was provided in private hospital for the Section 39 and Injured Control groups than the Community Control group. The percentage of care provided in private hospitals reduced from pre-index to post-index period for both the Injured Control group and the Section 39 group. The opposite pattern was observed in the Community Control Group.

Results from binary regression models indicate that periods of care within private hospitals for the Injured Control group are 1.5 times more common pre-index compared to post-index, whereas care within private hospital for the Section 39 group is 1.4 times more common than in the Community Control group during both the pre-index period and post-index period (Appendix E).

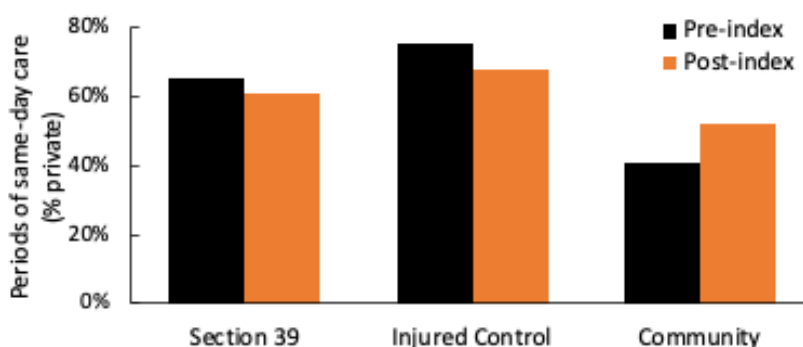


Figure 8. Admissions to private hospitals for same-day periods of care as a percentage of each study group and study period

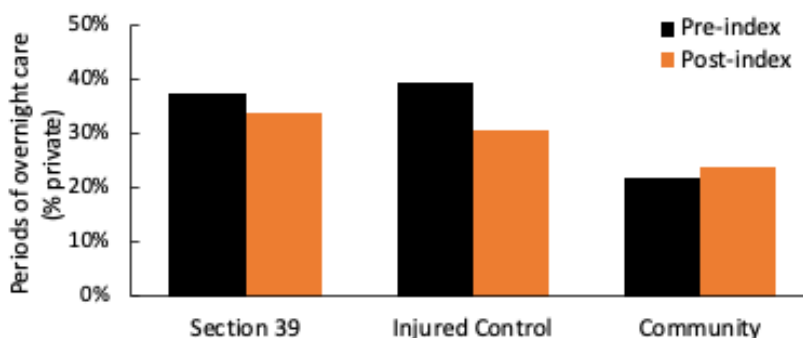


Figure 9. Admissions to private hospitals for overnight periods of care as a percentage of each study group and study period

Across all study groups, generalised estimating equations (full details available upon request from the report authors) identified several sociodemographic indicators as being statistically associated with care within private hospitals compared to public hospitals. Indicators associated with lower odds of periods of care within private hospitals included:

- Being aged 20 to 44 years (-25% lower odds compared to people aged 55 to 64 years)
- Marital status and dependent children (compared to people that were partnered with dependent children)
- Single without children (-49% lower odds)
- Partnered without children (-14% lower odds)
- Single parents (-20% lower odds)
- Non-homeowners (-50% lower odds than homeowners)
- Born overseas (-50% lower odds than for people born in Australia)
- Living in a disadvantaged area (-56% lower odds)
- Live outside of a major city (-59% lower odds than living in a major city)

Additional regression analysis compared the Section 39 and Injured Control groups specifically, and incorporated indicators within the SIRA workers compensation data (full details available upon request from the report authors). This identified several sociodemographic indicators as being statistically associated with the care within private hospitals compared to public hospitals:

- Mental compensable injury (+54% higher odds compared to compensable injuries classified as Injury and poison)

The following location of compensable injuries compared to the trunk (central body area) were more common:

- Lower limb (+62% higher odds)
- Multiple areas or systemic (+20% higher odds)

The following location of compensable injuries compared to the trunk (central body area) were less common:

- Head (-40% lower odds)
- Upper limb (-23% lower odds)
- Common law action regarding a compensable claim (+35% times more common)

## DISCUSSION

### MAIN FINDINGS

This study observed that people with long duration workers' compensation claims are significantly more likely than matched community-dwelling Australians to present to an emergency department and be admitted to hospital, both in the year prior to, and subsequent to, their cessation of benefits. The most common diagnoses associated with hospital admission in the group of people whose workers' compensation benefits were ceased under the Section 39 legislative amendment were musculoskeletal disorders and mental health conditions, reflecting the nature of their compensable injury. While hospital use was elevated relative to community controls in the Section 39 group, it did not change significantly in the year after cessation of workers' compensation benefits. This indicates that the cessation of workers' compensation income support payments did not have a substantial short-term impact on hospital care in this group.

In contrast, people in the Injured Control group were more likely to present at an emergency department and be admitted to hospital in the year before the end of their workers' compensation income support payments than in the year after. Members of the Injured Control group may have returned to work leading to the cessation of their workers' compensation income support payments. In these workers we would expect health to improve during rehabilitation and return to work, consistent with the reduced demand for emergency care after exiting the workers' compensation system, compared to periods in which they are work disabled and receiving workers compensation income support.

Our findings also demonstrate that injured workers with long duration claims receive hospital care for a range of other health conditions that are not typically covered by workers' compensation systems but that are common in society, including injury and poisoning (not limited to non-work related injury), cardiovascular and circulatory system diseases, and digestive conditions. The type of hospital care provided to injured worker groups also differs from that provided to community controls, in that the injured workers groups in this study were significantly more likely to receive care in private hospitals than the Community Control Group. For the Injured Control Group (but not the Section 39 Group), the odds of care being provided in a private hospital is significantly greater in the year before their workers' compensation benefits cease than in the year after, likely reflecting the withdrawal of workers' compensation scheme funding for private hospital care.

The majority of people in all three study groups did not record an emergency department presentation or a hospital admission in the study period. However, a small proportion of people accounted for the majority of emergency department presentations and hospital admissions. A number of sociodemographic indicators were identified as significant predictors of who will record an emergency department presentation or hospital admission. These include older age, living in a major city, being born in Australia, having a mental injury compensation claim, and receiving the Disability Support Pension or other Centrelink income support post cessation of workers' compensation benefits. These indicators may be used by workers' compensation regulators and insurers to identify people at greater risk of emergency department presentation or hospital admission during and after the cessation of their workers' compensation benefits.

### STRENGTHS AND LIMITATIONS

One of the study strengths is the large sample sizes, enabling us to estimate with confidence the proportion of Section 39 and injured worker groups who utilise hospital services. The Section 39 group included complete capture of those exposed to the NSW Section 39 legislative amendment during its period of

implementation from late 2017 until mid-2018. Another strength is the inclusion of a matched community control group, which enabled us to compare emergency department presentations and hospital admissions in the study groups to that occurring in the community. The data linkage method achieved very high rates of linkage, providing confidence in the representativeness of our findings. The linkage of retrospective data enabled us to examine ED presentations and hospital admissions both before and after cessation of workers' compensation benefits, and to incorporate the 'pre-index' state into statistical analysis, providing a more accurate estimate of the rate of transition once workers' compensation benefits ceased, rather than simply examining hospital service use in the period after workers' compensation benefits ceased. Data linkage also meant that we were able to examine multiple socio-demographic predictors of social welfare receipt including indicators not usually captured in workers' compensation data, such as home ownership status and partner status. Hospital data was sufficiently detailed to enable examination of some features of ED presentations and hospital admissions, including the primary diagnostic codes linked with episodes of care, for example.

Some study limitations include that we do not have data on injured workers who were assessed as having greater than 20% permanent impairment who were exempted from the Section 39 legislation, and categories of exempt workers such as police officers and firefighters. This report was limited to analysis of the 12 month periods before and after cessation of workers' compensation benefits based on the availability of recent datasets and a consistent analytical approach across all groups. The overall Transitions Study has established a linked database with a much longer time series. For example, in the injured control group we have thousands of people with 5, 10 or even 15 years of hospital admissions data beyond the end of their workers' compensation claims. We also have data prior to the onset of workers' compensation claim in both the Section 39 and Injured Control group. There is potentially substantial value in further analysis of this existing data, to understand the longer-term patterns of health care use and health status in these groups of workers with long-duration workers' compensation claims.

## NEXT STEPS

This is the first study in Australia and one of few globally to examine post-claim health service use of Australians with accepted workers' compensation claims. This report focuses on hospital admissions and emergency department presentations, and present novel findings on the rate and nature of admissions and presentations among injured workers groups with long-duration compensation claims, compared to community dwelling Australians of working age. Future reports from the Transitions study will examine community health service use in the Section 39 group, including use of primary and allied healthcare. These sorts of studies are critical to determining the health and social outcomes of the many thousands of Australians who exit workers' compensation systems every year without returning to work, for assessing the effectiveness of workers' compensation schemes, and the potential long-term impacts of being injured at work and claiming workers' compensation.

## CONCLUSIONS

This study sought to answer the question "What happens to workers with long duration workers' compensation claims when their workers compensation benefits stop?" and more specifically to examine emergency department presentations and hospital admissions, as important markers of health status, in people with long-duration claims before and after the implementation of the Section 39 legislative amendments. We find that injured workers with long-duration claims are significantly more likely to present to an emergency department and be admitted to hospital than people in the community control group. However, this pattern did not change in the year after workers' compensation benefits ceased in the Section 39 group, indicating that the cessation of workers' compensation income support payments

did not have a short-term impact on hospital care in this group. Musculoskeletal and mental health conditions are the most common diagnoses linked to hospital periods of care in the Section 39 group. While hospital admissions for these conditions are significantly more common for the Section 39 group than in the Community Control Group, the Section 39 group also records admissions for a range of other common health conditions including digestive and cardiovascular disease, for example. Several social, demographic, household, and claim characteristics were associated with admission to hospital. This study shows that hospital data is a valuable source of health information in injured worker groups. There is likely to be substantial value in further analysis of this linked database established for this study, to understand the longer-term patterns of health care use and health status in workers with long duration workers' compensation claims.



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## APPENDICES

### APPENDIX A - COVARIATES

Descriptive statistics of a cohort linked to the Emergency Department Data Collection (ED presentations), and a cohort linked with the Admitted Patient Data Collection (Hospital admissions and periods of care)

Cohort:	Emergency Department data-linked cohort			Hospital admissions data-linked cohort		
	Section 39	Injured Control	Community Control	Section 39	Injured Control	Community Control
<b>Study group N (%)</b>						
Total N in study group	2328 (100.0)	3408 (100.0)	8535 (100.0)	2475 (100.0%)	3626 (100.0%)	8485 (100.0%)
<b>Gender</b>						
Female	1073 (46.1)	1297 (38.1)	3684 (43.2)	1155 (46.7)	1401 (38.6)	4041 (47.6)
Male	1255 (53.9)	2111 (61.9)	4851 (56.8)	1320 (53.3)	2225 (61.4)	4444 (52.4)
<b>Age</b>						
20 - 44	246 (10.6)	837 (24.6)	1268 (14.9)	240 (9.7)	840 (23.2)	1102 (13.0)
45 - 54	638 (27.4)	1027 (30.1)	2475 (29.0)	672 (27.2)	1075 (29.6)	2433 (28.7)
65+	211 (9.1)	534 (15.7)	359 (4.2)	224 (9.1)	610 (16.8)	393 (4.6)
55 - 64	1233 (53.0)	1010 (29.6)	4433 (51.9)	1339 (54.1)	1101 (30.4)	4557 (53.7)
<b>Main* Centrelink income support post-index date</b>						
Age pension	366 (7.9)	838 (24.6)	506 (6.0)	194 (7.8)	482 (13.3)	278 (3.3)
Disability support pension	862 (18.5)	580 (8.5)	2006 (23.6)	456 (18.4)	306 (8.4)	991 (11.7)
Newstart allowance	1360 (29.2)	940 (13.8)	1478 (17.3)	709 (28.6)	474 (13.1)	711 (8.4)
Other Centrelink income payment	158 (3.4)	192 (2.8)	814 (9.6)	144 (5.8)	265 (7.3)	672 (7.9)
No Centrelink income payment	1910 (41.0)	4266 (62.6)	12266 (143.5)	972 (39.3)	2099 (57.9)	5833 (68.7)
<b>Nature of compensable injury</b>						
Musculoskeletal	200 (8.6)	294 (8.6)	-	218 (8.8)	319 (8.8)	-
Mental	162 (7.0)	308 (9.0)	-	165 (6.7)	335 (9.2)	-
Other	55 (2.4)	82 (2.4)	-	54 (2.2)	88 (2.4)	-
Injury and poison	1882 (80.8)	2704 (79.3)	-	2005 (81.0)	2860 (78.9)	-
<b>Location of compensable injury</b>						
Head	38 (1.6)	62 (1.8)	-	42 (1.7)	65 (1.8)	-
Neck	46 (2.0)	92 (2.7)	-	49 (2.0)	93 (2.6)	-
Upper Limb	507 (21.8)	852 (25.0)	-	543 (21.9)	908 (25.0)	-

Lower limb	319 (13.7)	475 (13.9)	-	335 (13.5)	519 (14.3)	-
Multiple/systemic	247 (10.6)	412 (12.1)	-	259 (10.5)	437 (12.1)	-
Non-physical	165 (7.1)	314 (9.2)	-	168 (6.8)	343 (9.5)	-
Truck	982 (42.2)	1183 (34.7)	-	1051 (42.5)	1242 (34.3)	-
<b>Claim duration (weeks of entitlement in equivalent years)</b>						
2 to 5 years	-	1643 (48.2)	-	-	1708 (47.1)	-
5 to 6 years	272 (11.7)	293 (8.6)	-	291 (11.8)	320 (8.8)	-
6 to 10 years	730 (31.4)	678 (19.9)	-	763 (30.8)	732 (20.2)	-
10 to 15 years	654 (28.1)	587 (17.2)	-	690 (27.9)	637 (17.6)	-
More 15 years	672 (28.9)	207 (6.1)	-	731 (29.5)	229 (6.3)	-

*\*people in receipt of multiple types of Centrelink payments were allocated to the following categories: Age pension (any age pension payment), Disability support pension (any DSP payment and other payment, but not the Age pension), Newstart allowance (any NSA payment or other payment, but not the Age pension or DSP payment), Other payments (any income payment received, but not the Age pension, DSP or NSA).*

## APPENDIX B - MODELS FOR ED PRESENTATIONS

Generalised estimating equations describing differences in emergency department presentations between study groups and differences 12 months pre- and post-index dates.

Study group and study time period (12 months before or after index date)	Adjusted Odd Ratio [95% Confidence interval]	
	Model A	Model B
Pre-index * Section 39	1.21* [1.08, 1.37]	1.09 [0.95, 1.26]
Pre-index * Injured control	1.32* [1.19, 1.46]	1.12* [1.00, 1.25]
Pre-index * Community control	0.94 [0.87, 1.02]	-
Post-index * Section 39	1.22* [1.08, 1.38]	1.09 [0.95, 1.25]
Post-index * Injured control	1.18* [1.06, 1.31]	1.00 (ref.)
Post-index * Community control	1.00 (ref.)	-

\* $p < 0.05$ . Model A adjusted for gender, age group, partner and children status, homeownership, country of birth, socioeconomic residential area, remoteness and receipt of Centrelink income support payment during the post-index study period. Model B adjusted for the same covariates as Model A, in addition to nature and locations of injury, and any common law action regarding the compensable injury.

## APPENDIX C - DETAILS OF ED PRESENTATIONS

Study group N (%)	Pre-index			Post-index		
	Section 39	Injured Control	Community Control	Section 39	Injured Control	Community Control
<b>Length of stay (in ED)</b>						
Same day	1020 (84.4)	1307 (83.2)	2499 (85.1)	1036 (83.3)	1262 (85.2)	2737 (85.9)
Overnight (or longer)	188 (15.6)	263 (16.8)	439 (14.9)	207 (16.7)	220 (14.8)	448 (14.1)
<b>Triage category</b>						
Resuscitation	nd	nd	nd	16 (1.3)	nd	nd
Emergency	243 (20.1)	254 (16.2)	505 (17.2)	208 (16.7)	253 (17.1)	546 (17.1)
Urgent	399 (33.0)	515 (32.8)	967 (32.9)	417 (33.5)	499 (33.7)	1038 (32.6)
Semi-urgent	404 (33.4)	616 (39.2)	1076 (36.6)	451 (36.3)	524 (35.4)	1199 (37.6)
Non-urgent	155 (12.8)	164 (10.4)	366 (12.5)	146 (11.7)	193 (13.0)	375 (11.8)
missing	nd	nd	nd	5 (0.4)	nd	nd
<b>Mode of separation (ED outcome)</b>						
Treatment completed within ED	747 (61.8)	1001 (63.8)	1797 (61.2)	727 (58.5)	935 (63.1)	1947 (61.1)
Admitted to hospital (non-critical)	301 (24.9)	374 (23.8)	827 (28.1)	343 (27.6)	374 (25.2)	863 (27.1)

Hospital critical care / operative	40 (3.3)	60 (3.8)	81 (2.8)	44 (3.5)	49 (3.3)	92 (2.9)
Treated elsewhere	38 (3.1)	39 (2.5)	75 (2.6)	45 (3.6)	46 (3.1)	117 (3.7)
Other (Left ED / deceased)	82 (6.8)	96 (6.1)	158 (5.4)	84 (6.8)	78 (5.3)	166 (5.2)
<b>Total ED presentations (number)</b>	1208 (100.0%)	1570 (100.0%)	2938 (100.0%)	1243 (100.0%)	1482 (100.0%)	3185 (100.0%)

Privacy issues from small counts are addressed by data suppression where some values are not disclosed (n.d.)

## APPENDIX D - MODELS FOR OVERNIGHT HOSPITAL ADMISSIONS

Generalised estimating equations describing differences in the number of overnight hospital admissions between study groups and differences 12 months pre- and post-index dates.

Outcome: Number of overnight hospital admissions (periods of care lasting one night or longer)	Adjusted Odd Ratio [95% Confidence interval]	
	Model A	Model B
Study group and study time period (12 months before or after index date)		
Pre-index * Section 39	<b>1.63*</b> [1.22, 2.18]	1.28 [0.88, 1.86]
Pre-index * Injured control	<b>1.90*</b> [1.44, 2.51]	<b>1.34*</b> [1.09, 1.66]
Pre-index * Community control	1.16 [0.93, 1.44]	-
Post-index * Section 39	<b>1.58*</b> [1.16, 2.14]	1.19 [0.81, 1.73]
Post-index * Injured control	<b>1.36*</b> [1.03, 1.78]	1.00 (ref.)
Post-index * Community control	1.00 (ref.)	-

\*p<0.05. Model A adjusted for gender, age group, partner and children status, homeownership, country of birth, socioeconomic residential area, remoteness and receipt of Centrelink income support payment during the post-index study period. Model B adjusted for the same covariates as Model A, in addition to nature and locations of injury, and any common law action regarding the compensable injury.

## APPENDIX E - MODELS FOR PRIVATE HOSPITAL USE

Adjusted logistic regression models describing the incidence of periods of care within private hospitals, compared to public hospitals, across study groups and differences 12 months pre- and post-index study periods.

Study group and study time period (12 months before or after index date)	Adjusted Odd Ratio [95% Confidence interval]	
	Model A	Model B
Pre-index * Section 39	2.42* [2.09, 2.79]	1.39* [1.19, 1.64]
Pre-index * Injured control	2.72* [2.38, 3.10]	1.51* [1.31, 1.75]
Pre-index * Community control	0.74* [0.65, 0.83]	-
Post-index * Section 39	2.34* [2.03, 2.71]	1.37* [1.16, 1.60]
Post-index * Injured control	1.64* [1.42, 1.89]	1.00 (ref.)
Post-index * Community control	1.00 (ref.)	-

\* $p < 0.05$ . Model A adjusted for gender, age group, partner and children status, homeownership, country of birth, socioeconomic residential area, and remoteness. Model B adjusted for the same covariates as Model A, in addition to nature and locations of injury, and any common law action regarding the compensable injury.