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Driving Health

Health Service Use Following Work-Related
Injury and Illness in Truck Drivers

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Executive Summary

Australian workers' compensation schemes provide a range of benefits and payments for health services for people with work-related injury and illness. Health service use following work-related injury contributes substantially to the overall cost of workplace injuries. Understanding the pattern of health service use in truck drivers is important for planning the delivery of health system and workers' compensation systems resources to support recovery and return to work.

This report, the third from the Driving Health Study, presents findings from analysis of Victorian workers' compensation data in order to:

1. Examine patterns of health service use by truck drivers and other transport workers following a work-related injury and illness; and
2. Identify demographic, occupation, injury/condition, claim and geographic factors that are associated with health service use.

In total we included 13,371 accepted workers compensation claims from truck drivers, 8,361 claims from other drivers, 11,137 claims from non-drivers, and 55,416 claims from all other workers between July 2004 and June 2013. Seven categories of health service use were examined, including General Practitioner (GP), Specialist Physician, Mental Health, Surgery, Return to Work (RTW), Physical Therapy, and Independent Medical Examinations (IME). Descriptive and inferential analytical techniques were used to describe overall health service use. Latent class analysis was used to identify and characterise distinct profiles of users with different patterns of health service use. Finally, spell-analysis was applied to identify periods of consecutive health service use during the follow-up period.

Truck drivers were more likely to use at least one health service than other workers. Truck drivers had significantly more GP consultations, and were more likely to undergo surgery, than other workers. However truck drivers were less likely than other workers to access mental health services including those provided by GPs, psychologists and psychiatrists. Older age and living in a metropolitan area was associated with greater health service use. Around 30% of the health service use for workers with fractures, musculoskeletal and neurological injury occurred within the first 4 weeks after claim lodgment. However, the majority of mental health services were accessed in the persistent phase beyond 14 weeks after claim lodgment.

We identified four different profiles of health service users among injured truck drivers: Low Service Users, High Service Users, Physical Therapy Users and GP/Mental Health Users. Low Service Users, comprising approximately 55% of the sample, had the lowest likelihood of utilising all services. They were more likely to be younger, have an injury that did not result in time off work and have conditions other than a musculoskeletal injury. High Service Users, accounting for 10% of the sample, had generally high use of all service types. High users tended to be those who were between the age of 45 and 64 years, lived in major cities and had musculoskeletal conditions that resulted in time away from work. Physical Therapy Users tended to use physical therapy heavily but use fewer other health services. They were more likely to be between 45–64 years old, live in major cities and have non-traumatic injuries that resulted in time off work. Finally, GP/Mental Health Users had a high likelihood of GP and mental health service use in conjunction with low rates of physical therapy and surgery. These users were more likely to be over 24 years of age, from the lowest socio-economic band, be employed by smaller employers and have a claim for a mental health condition.

Combined, these findings provide new insight into the volume and timing of health service use following work-related injury and illness among truck drivers. These data demonstrate that a number of factors can influence injured workers' health service use, including the type of injury, sociodemographic characteristics and the accessibility of health services. Our findings of relative low use of mental health services in the early phases of injury is noteworthy, and potentially reflects a missed opportunity for early intervention in the initial stages of mental illness. Considering their greater risk of suicide, truck drivers who experience mental health issues should be encouraged to seek professional support at an early stage.

Combined with the findings of our first two reports from the Driving Health study, this study describes the challenges faced by truck drivers in being healthy and staying healthy at work. The next phase of the Driving Health study will complement these analyses by collecting detailed information on the overall health status of truck drivers, directly from the drivers themselves. This will include information beyond work-related injury and provide a more complete picture of the health status of Australia's transport workforce.

Overview of the Project

Rationale

Australian workers' compensation schemes provide a range of benefits and services to people with work-related injury and illness. These include income benefits during periods of time off work (often capped at a maximum weekly amount and/or time limited); payments for medical and related expenses; and lump sum payments for permanent impairment or death.^[1] For instance, under Victorian workers compensation legislation, most injured workers are eligible for income replacement for a period of up to 130 weeks, and funding for health and medical care related to their compensable injury for up to 52 weeks from cessation of weekly payments.^[2]

Paying for third parties to provide health and medical services is one of the main mechanisms via which Australian workers' compensation schemes seek to assist injured workers to recover and return to work. Health service use following work-related injury contributes substantially to the overall cost of workplace injuries. In 2014–15 Australian workers' compensation schemes made total payments of \$8.43 billion, of which 53% was paid directly to the injured worker as income support or lump-sum payments, and 22% (or \$1.85 billion) was spent on medical and other service costs.^[3]

The transport industry continues to report one of the highest work-related injury and illness rates in Australia, resulting in a considerable burden of disability and associated economic costs ^[4]. As shown in the first report from the Driving Health study, truck drivers recorded a rate of compensable work-related injury and disease three and a half times higher than Australian workers in other non-driving occupations.^[5] Previous studies have demonstrated that a number of factors can influence people's decision to seek healthcare, including the individual's health status, sociodemographic characteristics and the accessibility of health services.^[6, 7] Truck driving is a predominantly male occupation with a rapidly ageing workforce.^[8] Drivers are more likely to live in rural and regional locations.^[9] Health conditions such as diabetes, cardiovascular disease and obstructive sleep apnoea may be prevalent in this group.^[10]

At present there is limited knowledge of the nature, intensity, duration or patterns of health care accessed by truck drivers following the onset of an injury or illness. Understanding the pattern of health service use in truck drivers is therefore important for planning the delivery of health system resources to support recovery and return to work. Identifying workers, geographic and employer factors that impact on service use is important for targeting services to those most in need.

Objectives

This report presents findings from analysis of Victorian workers' compensation data. The objectives of this analyses were:

1. To examine patterns of health service use by truck drivers and other transport workers following a work-related injury and illness in the state of Victoria, Australia;
2. To determine the associations between demographic, occupation, injury/condition, claim and geographic factors and health service use.

Methods

Data Sources

A retrospective cohort analysis was conducted using the Compensation Research Database (CRD). The CRD contains de-identified case-level administrative data from the Victorian workers' compensation scheme between 1986 and 2016. The Victorian scheme provides compensation insurance for the majority of employers in Victoria, representing approximately 85% of the Victorian working population. A standard claim is recorded in the CRD only after 10 days have been lost from work or a threshold of health care expenditure has been reached (\$682 in the 2016/17 financial year). In most cases a worker will be eligible to access funding for health care related to their compensable injury for up to 52 weeks from cessation of income support.^[2]

Four sub-datasets from the CRD were used for this report:

- **Claim dataset:** contains data on accepted workers compensation claims. Each record consists of worker demographic details (e.g. gender, age at injury, postcode and occupation group), worker geographical details (e.g. socio-economic advantage, remoteness index), claim details (e.g. unique de-identified claim number, date the insurer agent receives claim, and number of incapacity workdays), injury details (e.g. nature of the injury, mechanism of injury and agency of injury), and cost details (e.g. total cost of doctor, hospital and legal services). The dataset contains a single record for each accepted claim.
- **Payments dataset:** represents the money paid by the Victorian workers' compensation scheme to service providers for various services that facilitate recovery and return to work, including payment details such as payment date, type of payment made, and amount paid by the scheme. The dataset contains a single record for each payment.
- **Service dataset:** contains data on services used by injured workers for which a payment has been recorded, including the service date, type of service and amount paid by the WC scheme. The dataset contains a single record for each service.
- **Hospital admission dataset:** contains hospital admission records of injured workers, including date admitted, date discharged, and number of days of hospital stay. The dataset contains a single record for each episode of hospitalization.

These four datasets were merged for the analysis using a unique de-identified project worker number. Ethics approval for receipt, use, analysis and reporting of the claims data was received from Monash University Human Research Ethics Committee (approval number 2017-10758-10677).

Study Population and Measurement

INCLUSION AND EXCLUSION CRITERIA

All cases of accepted workers' compensation claims with date of lodgement between 1st July 2004 and 30th June 2013 were included in the study. Date of lodgement was defined as the date that the workers' compensation insurer received and date-stamped the workers' compensation claim form. Consistent with our prior studies, cases were excluded from analysis if they:

- (a) were missing occupation or industry codes;
- (b) contained unlikely age ranges (< 15 years and > 100 years); or
- (c) contained unlikely weekly working hours (< 1 hours and >100 hours)

OUTCOMES

The main outcome of this study was health service utilization. We examined seven categories of health service use, primarily grouped by provider type. [\[Table 1\]](#)

1. General Practitioner (GP),
2. Specialist Physician,
3. Mental Health,
4. Surgery,
5. Return to Work (RTW),
6. Physical Therapy, and
7. Independent Medical Examinations (IME)

Episodes of health service were identified using the service, payments and hospital datasets. The extracted data were limited to those episodes of health service use where there was a patient—provider interaction, by excluding services with descriptions that indicated there was no direct engagement between the worker and the healthcare provider (e.g., psychology notification and review forms consultation, work site visit and audiovisual viewing by GPs). Hospital admissions not resulting in surgery, ambulance services, nursing, diagnostic imaging and pathology services were also excluded from the analysis.

Episodes of health service were included in analysis if they occurred in the period 12 weeks prior to claim lodgement and up to 130 weeks post claim lodgement.

These time periods were chosen as:

- (a) health services for work-related injury and illness can occur prior to the date of claim lodgement with a workers' compensation insurer (for example in the case of traumatic injury services may be provided on the same day but claim lodgement may take days or weeks)
- (b) in the Victorian workers' compensation system income payments may be made for up to 130 weeks (2 ½ years) and we sought to characterize healthcare use during this period of potential income replacement.

TABLE 1 SERVICE TYPE CATEGORIES AND DESCRIPTION OF SERVICES INCLUDED

Service Type	Service items included
General practitioner (GP)	All professional attendances by a general practitioner excluding GP mental health treatment plans.
Specialist physician	All professional attendances by a specialist physician excluding independent medical examinations, psychiatry and surgery.
Mental Health	All professional attendances by a psychiatrist or a psychologist, and Psychological Therapy Services, GP Mental Health Treatment Items, and Allied Mental Health but excluding independent medical examinations.
Surgery	An episode of surgery that resulted in hospital admission (at least one day of hospital stay) OR episodes of surgery in which there were 'theatre' or 'accommodation' use recorded.
Return to Work	Counselling, assessments and consultations from (a) Occupational rehabilitation; (b) Rehabilitation services; (c) Internal rehabilitation providers; (d) External rehab providers
Physical therapy	Professional attendances by a physiotherapist, chiropractor, osteopath as well as remedial massage, but excluding independent medical examinations.
Independent medical examinations (IME)	Independent medical examinations conducted by a medical doctor or allied health practitioner.

PREDICTORS

Relationships between the following sample and injury characteristics and health service use were explored in statistical analysis.

Demographics

Gender and Age. Age was converted to categorical variable by 10-year grouping. (≤ 24 , 25-34, 35-44, 45-54, 55-64, 65+ years old).

Socioeconomic status

The Index of Relative Socio-economic Disadvantage (IRSD) quintiles of injured workers' postcode were used to measure the socioeconomic status, from 1 (the most disadvantaged area) to 5 (the least disadvantaged area).

Occupation

As per our prior analysis in the Driving Health study, we used standardised industry ^[11] and occupation coding systems ^[12] to identify three mutually exclusive groups of transport workers, as well as accepted workers' compensation claims from all other workers over the same time period as reference occupational group:

- Truck drivers: ANZSCO 3-digit code 733 across all industries
- Other drivers: ANZSCO 4-digit code 7311-7313, 7321 across all industries
- Non-drivers in the transport sector: including all other occupations in transport sector apart from occupations captured by above
- All other workers: 20% random sample of all other workers not captured by the other categories

Employer size

Indicates whether the current managing employer is classified as Small, Medium, Large or Government based on the employer's remuneration in 2010/11 deflated to 2005/06 dollars: < \$1 million = Small, \$1 to \$20 million = Medium, and > \$20 Million = Large.

Type of injury

To account for coding differences between the workers' compensation systems, types of work-related injury and disease were categorized using a modified version of the TOOCS version 3, as per previous reports.^[13] We focused on seven major categories: [\[Appendix I\]](#)

- fractures
- musculoskeletal (MSK)
- neurological injury
- mental health conditions
- other traumatic injury
- other diseases
- other claims

Mechanism of injury

Mechanism of injury refers to the manner in which a physical injury occurred (e.g., fall from a height, ground-level fall, high- or low-speed motor vehicle accident, ejection from a vehicle, vehicle rollover). In the report, the mechanism of injury was classified into traumatic injury and non-traumatic injury based on TOOCS version 3. [\[Appendix II\]](#)

Claim type

Indicates whether the worker received payments for income loss (time loss claim) or medical expenses only (medical only claim)

Analysis Strategy

The analysis was conducted in two phases. First, we performed a combination of descriptive and inferential techniques to describe overall service use following work-related injury and illness in transport workers. An initial series of descriptive analyses were performed to examine the percentage of injured workers using health services by service type and occupational groups. The mean and median number of episodes and cost of service use per injured worker were also described for each service category and compared between occupational groups.

In the second phase, inferential statistical analyses were used to further explore the health service use among truck drivers including following measurements:

- Percentage of workers using health service
- Weekly frequency of health service use
- Timing in the delivery of health services (relative to claim lodgement)
- Patterns of health service use
- Duration of health service use

Univariate analyses were first performed to examine the influence of each predictor on whether an injured worker did or did not use a particular service category following their injury. Second, the aggregated weekly total episodes of service use for each service category over the entire follow-up time period were plotted. The median duration of each service use (weeks from the first use to the last use) were also explored. In order to identify and characterise the distinct profiles of users with different patterns of health service use for injury treatment, we used latent class analysis. Latent class analysis is a method of identifying distinct subtypes based on individual responses from multivariate categorical data. The use of GP, specialist physician, psychological therapy, RTW service and physical therapy were included in the model as continuous events, while the use of surgery was included in the model as a binary event. The IME category was excluded from the latent class analysis since it has no treatment component. Akaike and Bayesian Information Criterion were performed and a balance was sought between numerical best fit and parsimony of interpretation ^[14]. The pooled data were then entered into a multinomial logistic regression model in which latent class was regressed along those demographic and injury-related factors. Adjusted relative risk ratios (RRR) and 95% confidence intervals (CIs) are reported for linear trends. A p value of 0.05 was taken to indicate statistical significance.

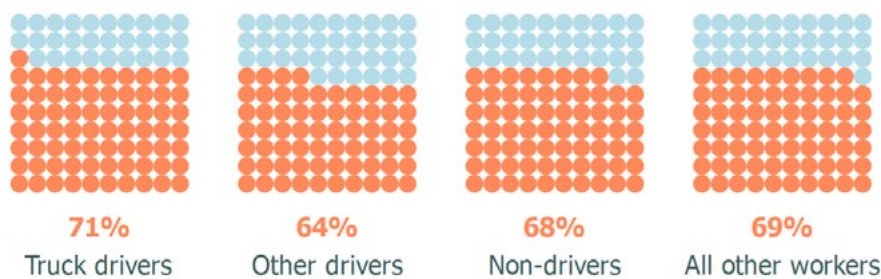
Third, to identify periods of consecutive health service during the follow-up time period, the longitudinal data were converted to spell-type data. The 'spell' or 'run' statistics are of interest in longitudinal data to identify periods that are homogenous in their characteristics. A spell was defined as the use of a health service in consecutive months. End of spells, or gaps between spells, were defined as months in which no health services were used. For each worker the total number of spells and the time interval between spells was quantified up to 130 weeks following injury. The surgery and IME service categories were excluded from this part of analysis as they were relatively rare events post injury.

Research Findings

Overall Service Use Following Work-Related Injury and Illness in Transport Workers

In total, we included 13,371 accepted work-related injury and illness claims from truck drivers, 8,361 claims from other drivers, 11,137 claims from non-drivers, and 55,416 claims from all other workers in the Victoria transport sector over the study period. As shown in [Figure 1](#), of the total accepted claims, 71% of truck drivers, 64% of other drivers, 68% of non-drivers in transport sector and 69% of all other workers used at least one service from the seven health service categories between 12 weeks prior to claim lodgement to 130 weeks post claim lodgement.

Figure 1 Percentage of injured workers using health services by worker group



[Figure 2](#) provides the percentage of the sample using health service according to service categories across occupational groups. Overall, GP, physical therapy and specialist physician were the most common health services used by injured workers. Around 54% of injured truck drivers attended a GP service, compared to 47% of injured other drivers. Physical therapy was used by 40% of truck drivers and non-drivers in the transport sector, which was slightly higher than other drivers and all other workers (38%). In addition, truck drivers had a higher proportion of specialist physician appointments (40%) ($p < 0.001$), surgery (27%) ($p < 0.001$) and RTW services (24%) ($p < 0.001$) than other occupational groups. A much lower proportion, less than 10% of the sample, accessed mental health.

Figure 2 Percentage of injured workers using health service by service type

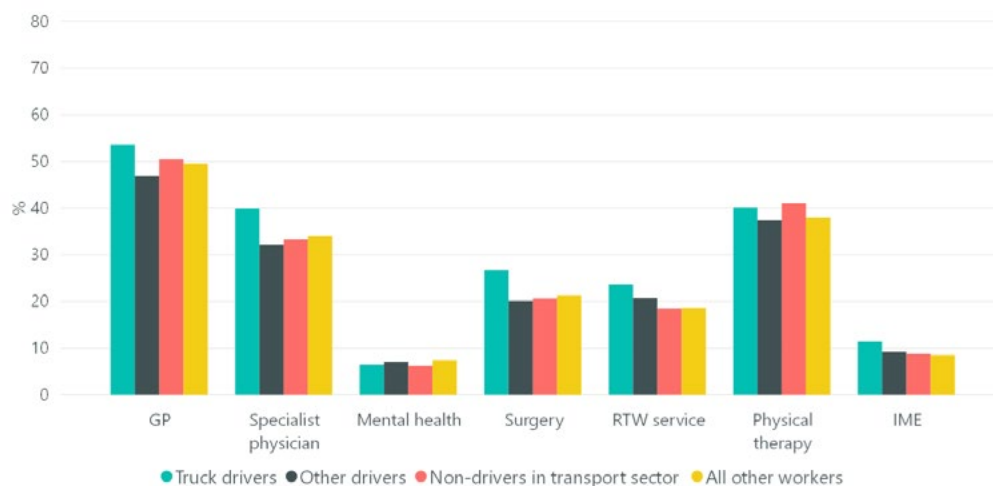


Figure 3 shows the mean frequency of health service use by injured workers across occupational groups and service categories. Overall, injured truck drivers had significantly more episodes of physical therapy (Mean = 12.4; SD = 28.3) than the other occupation categories, with a mean of 11.9 (SD = 27.3), 11.8 (SD = 26.1) and 11.2 (SD = 25.8) episodes for other drivers, non-drivers in transport and all other workers, respectively ($p < 0.001$). Compared to other occupational groups, truck drivers recorded a significantly higher frequency of GP and specialist physician service use with an average 7.1 (SD = 13.1) and 2.1 (SD = 5.0) episodes respectively ($p < 0.001$). However, truck drivers reported a significantly lower mean frequency of mental health service use, with an average 1.1 (SD = 7.1) episodes compared to 1.43 (SD = 8.7) episodes for all other workers ($p < 0.001$). There was little variation between injured worker groups in the remaining service categories, with a mean of 1.1 to 1.2 episodes of RTW service use, 0.3 to 0.4 episodes of surgery and 0.1 to 0.2 episodes of IME.

Figure 3 Average number of health services per injured worker by occupation group

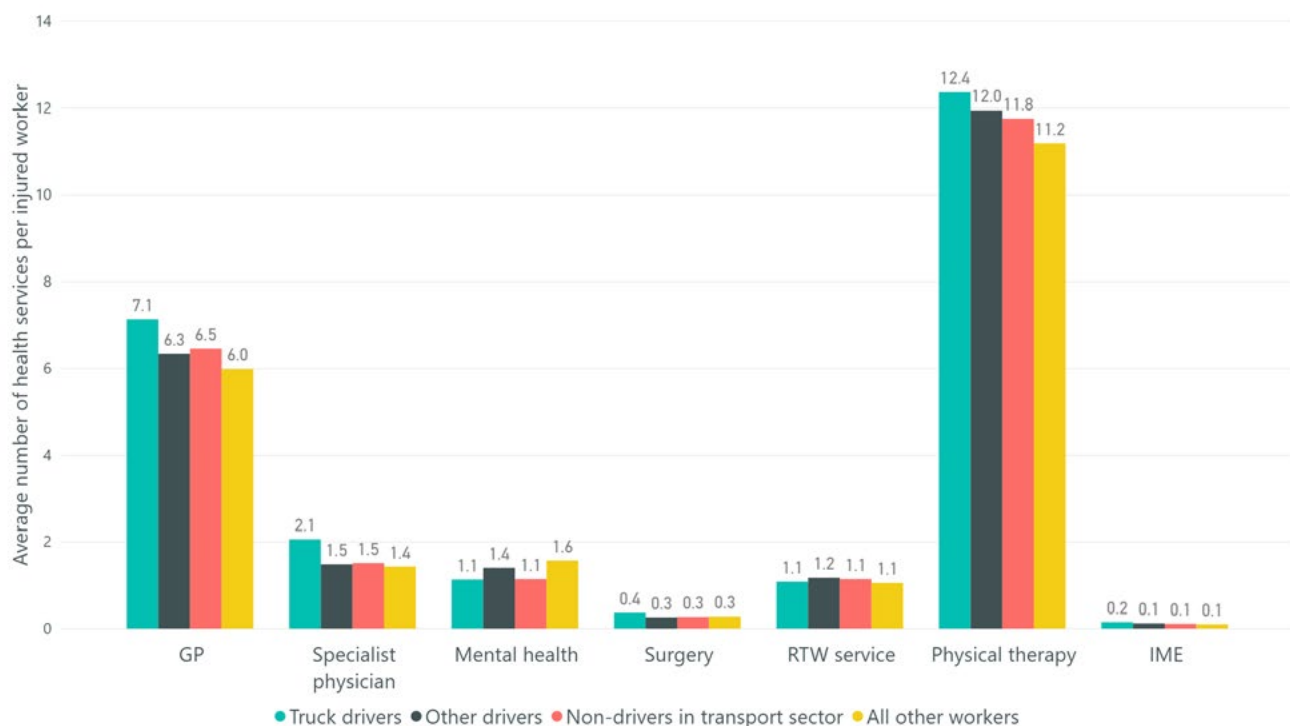
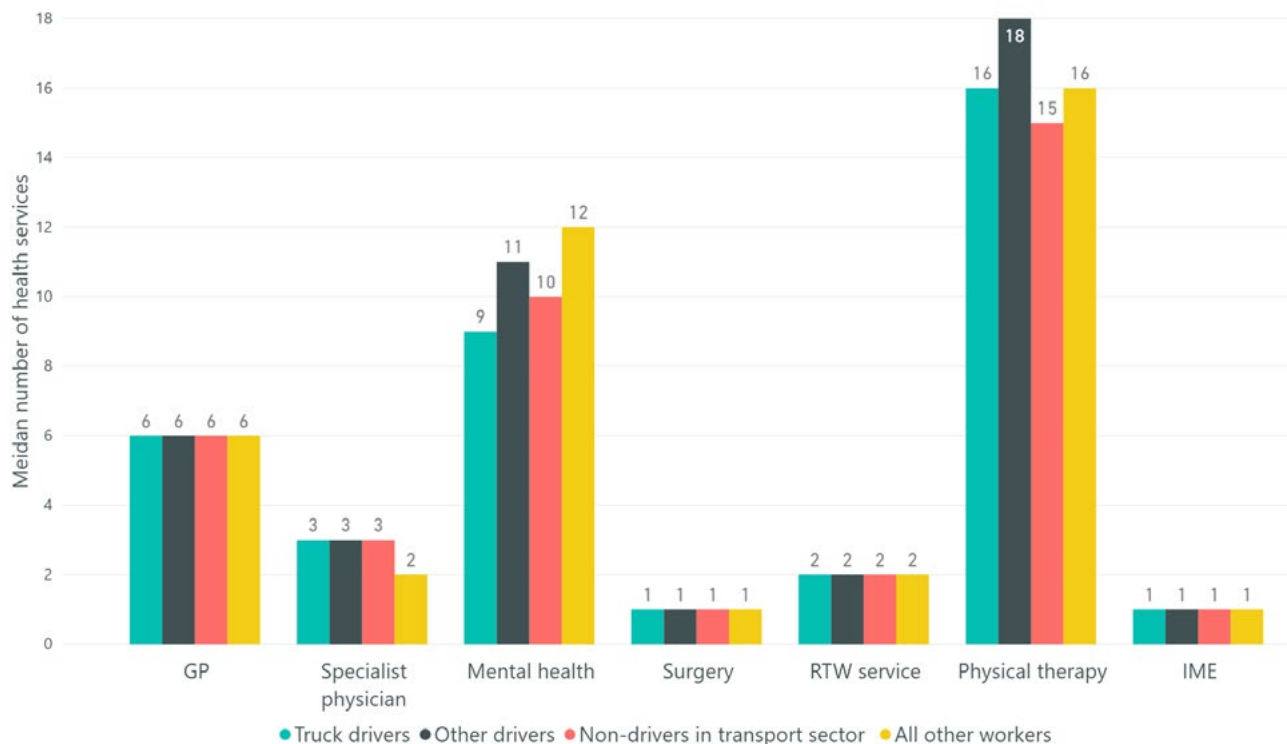


Figure 4 details the median number of health services utilised by injured workers across occupational groups and service categories, removing instances of zero use. The median number of physical therapy services was 16 for truck drivers and 18 for other drivers. Compared to all other workers, truck drivers had a lower median number of mental health services used (9 vs 12) ($p < 0.001$). Overall, the median number of physical therapy sessions was 2-3 times higher than GPs and 45 times higher than specialist physician use for transport workers ($p < 0.001$).

Figure 4 Median number of health services used by occupation group where at least one service was used



The mean total health service costs per injured worker for each service category across occupational group are displayed in Figure 5. The average total costs per injured truck driver for each service were higher than the other occupational groups, except for mental health services. In particular, the mean total surgery costs per injured truck driver was \$543, and this is almost 50% higher than in the other occupational groups ($p < 0.001$). The costs of GP services were also the highest among truck drivers ($p < 0.001$), while the costs of mental health services were highest among all other workers and lowest among truck drivers ($p < 0.001$).

Figure 5 Average cost of health services per injured worker by occupation group

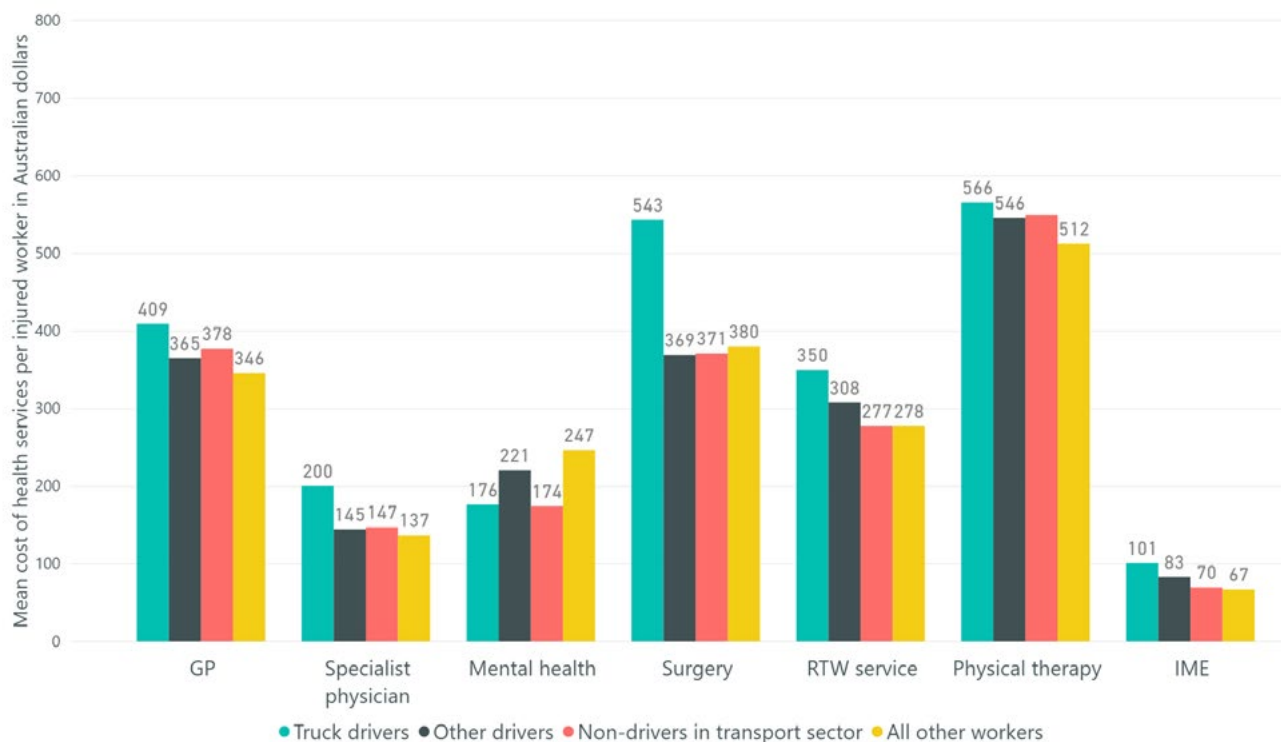
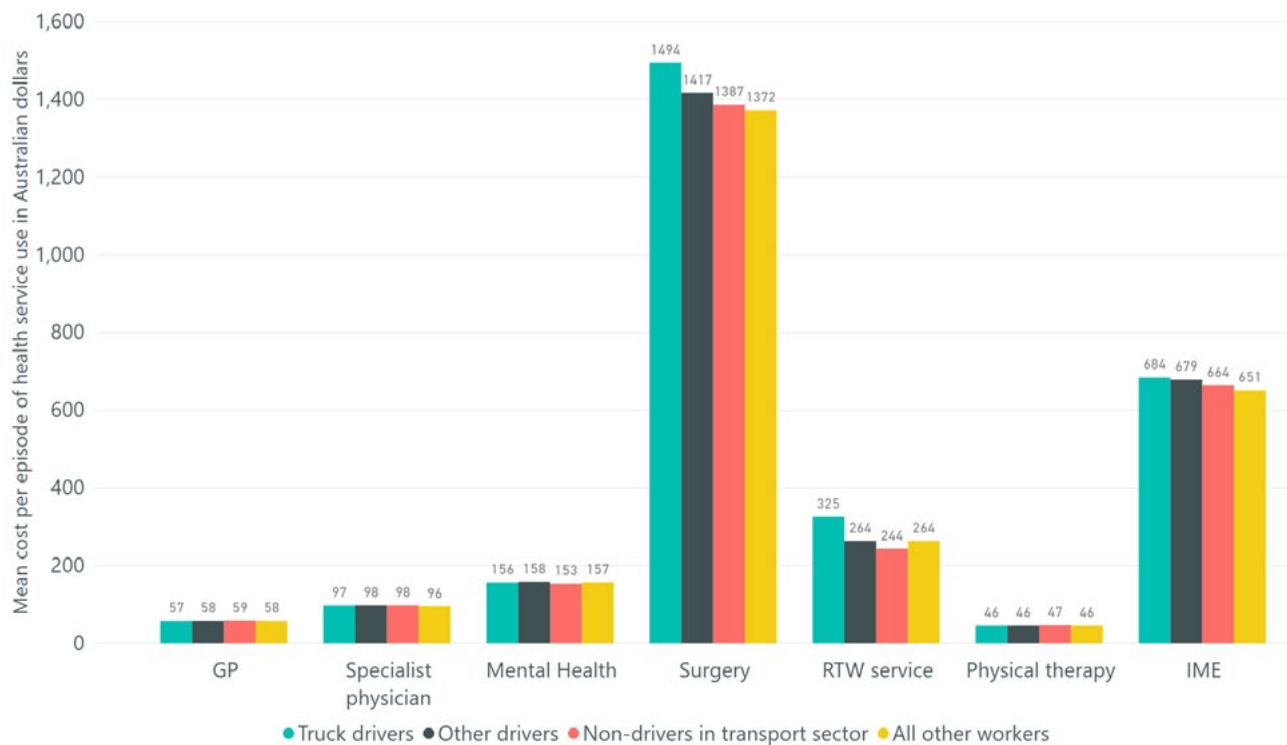


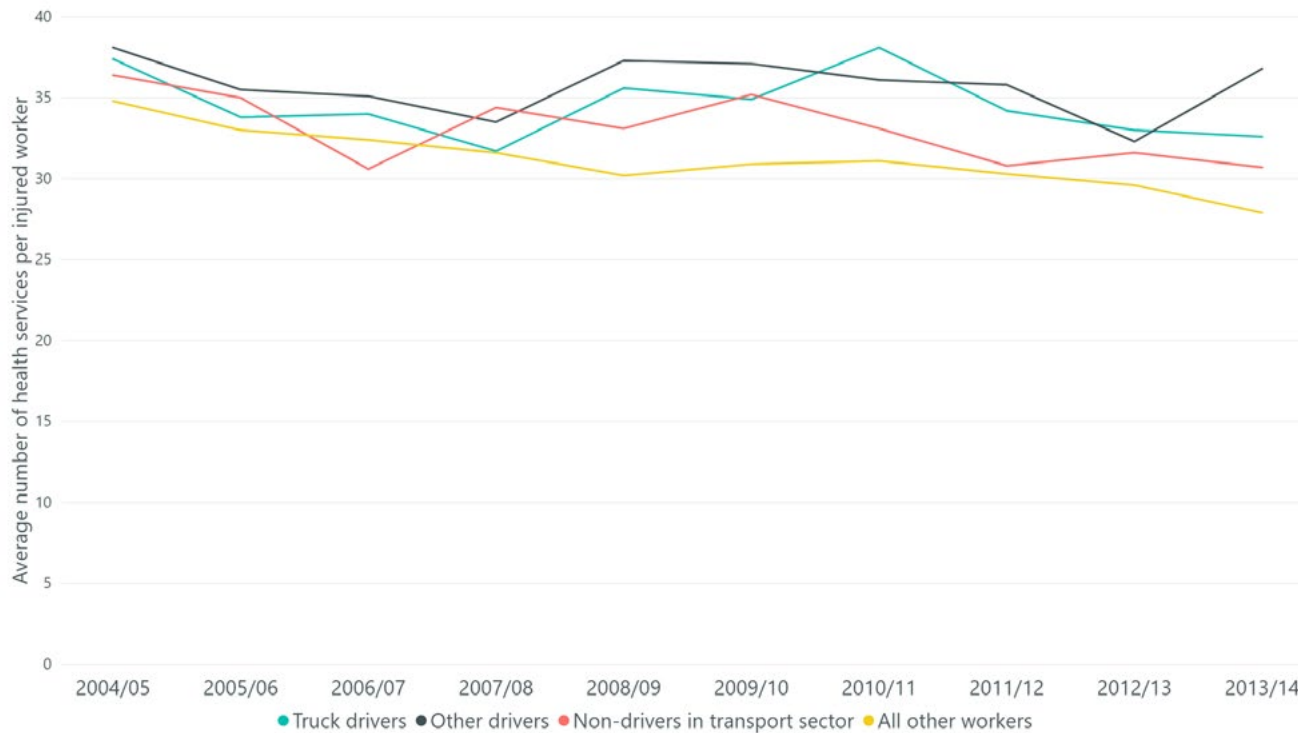
Figure 6 describes the average cost of health service use per episode across occupational groups. Overall, there were no significant differences between occupational groups in the GP, specialist physician, mental health, physical therapy and IME average cost. Truck drivers had significantly higher average costs in the surgery and RTW service categories ($p < 0.001$).

Figure 6 Average cost of health services per episode by occupation group



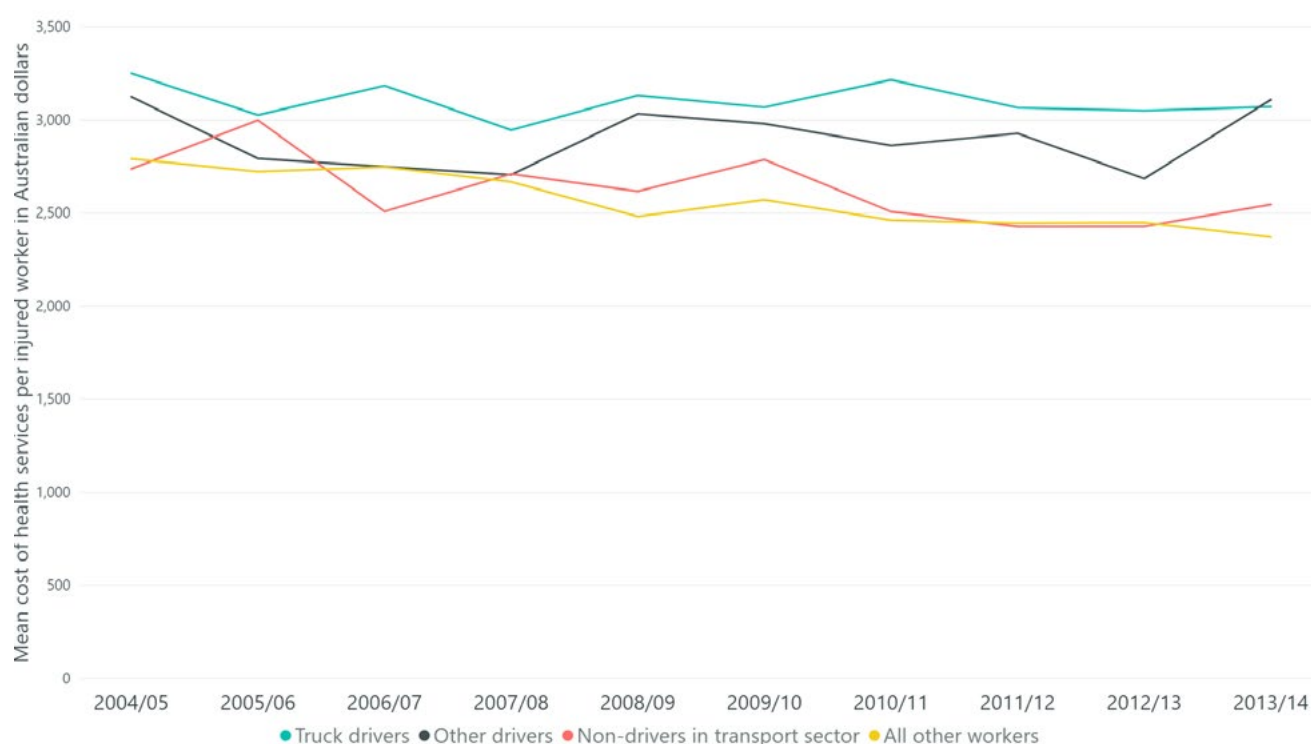
The line graph in [Figure 7](#) shows the average total health service use during the study period among injured truck drivers and other occupation groups, by year of claim lodgement. Overall, the total health service use decreased slightly for truck drivers, and the difference is statistically significant ($p < 0.05$).

Figure 7 Year trend of average number of health services by occupation group



The total average costs (adjusted for inflation) of health service use, per injured worker showed a slight decrease over the study period [Figure 8]. Overall, the average costs of health service use gradually decreased over the time in all occupational groups. The largest decrease was seen in truck drivers and other drivers, with the annual decrease rate at 2.3%. The average cost in other drivers was \$3251 in 2004/05 and decreased to \$3072 in 2013/14. The average cost in other drivers was \$3125 in 2004/05 and decreased to \$3109 in 2013/14. However, the overall changes in the average cost in those two groups were not statistically significant ($p = 0.48$ for truck drivers and $p = 0.11$ for other drivers). A significant change in the average cost among all other workers was observed, with \$2792 in 2004/05 to \$3034 in 2013/14 ($p < 0.05$).

Figure 8 Average cost of health services per injured worker by occupation group and year of injury (adjusted for inflation)



Health Service use by Truck Drivers

OVERALL SERVICE USE

Table 2 presents the characteristics of truck drivers with an accepted work-related injury or illness claim, and the proportion of drivers in each category with at least one episode of health service use during the study period.

Statistically significant differences in service use were observed by gender, age, remoteness, type of claim and type of injury. While there were very few work injury claims from women in the sample, male truck drivers were more likely to use health services than female truck drivers. Older age was associated with a higher proportion of health service use, with the 55-64 year old group having the highest proportion of health service use. Drivers living in regional or remote areas were significantly less likely to access health services than those residing in metropolitan areas. Drivers making claims that included compensation for time loss were more likely to access health services.

Musculoskeletal injuries and other traumatic injuries were the most common injury type among truck drivers. Drivers making mental health condition claims were least likely to access health services. Overall, almost two thirds of accepted claims were categorized as traumatic injury claims, however, there were no significant differences in the proportion of health service use between traumatic and non-traumatic injuries for truck drivers.

TABLE 2 CHARACTERISTICS OF INJURED TRUCK DRIVERS AND PROPORTION OF HEALTH SERVICE USE

Factor	Total claims N (column %)	Claims with at least one service N (column %)	% using services	p-value
Total	13371	9427	70.5	
Gender				
Male	13177 (98.5)	9304 (98.7)	70.6	0.029
Female	194 (1.5)	123 (1.3)	63.4	
Age group				
< 24 years	305 (2.3)	187 (2.0)	61.3	< 0.001
25-34 years	1947(14.6)	1311 (13.9)	67.3	
35-44 years	3722 (27.8)	2616 (27.8)	70.3	
45-54 years	4042 (30.2)	2862 (30.4)	70.8	
55-64 years	2955 (22.1)	2168 (23.0)	73.4	
65+ years	400 (3.0)	283 (3.0)	70.8	

TABLE 2 CHARACTERISTICS OF INJURED TRUCK DRIVERS AND PROPORTION OF HEALTH SERVICE USE

Factor	Total claims N (column %)	Claims with at least one service N (column %)	% using services	p-value
Socioeconomic status				
1 (Most disadvantage)	2589 (19.4)	1813 (19.2)	70.0	0.22
2	3054 (22.8)	2129 (22.6)	69.7	
3	3284 (24.6)	2294 (24.3)	69.9	
4	3131 (23.4)	2252 (23.9)	71.9	
5 (Least disadvantage)	1279 (9.6)	916 (9.7)	71.6	
Remoteness				
Major cities	8323 (62.2)	5970 (63.3)	71.7	< 0.001
Inner regional	4164 (31.1)	2864 (30.4)	68.8	
Outer regional	884 (6.6)	593 (6.3)	67.1	
Employer size				
Small	4892 (36.6)	3440 (36.5)	70.3	0.33
Medium	6315 (47.2)	4473 (47.4)	70.8	
Large or government	2464 (18.4)	1514 (16.1)	61.4	
Medical only claim				
No	11426 (85.5)	8286 (87.9)	72.5	< 0.001
Yes	1945 (14.5)	1130 (12.0)	58.1	
Type of condition				
Fractures	1664 (12.4)	1250 (13.3)	75.1	< 0.001
MSK	7330 (54.8)	5468 (58.0)	74.6	
Neurological	630 (4.7)	458 (4.9)	72.7	
Mental health conditions	416 (3.1)	177 (1.9)	42.5	
Other traumatic	2549 (19.1)	1592 (16.9)	61.6	
Other claims	782 (5.8)	482 (5.1)	64.2	
Mechanism of injury				
Traumatic injury	7735 (57.8)	5363 (56.9)	69.3	0.34
Non-traumatic injury	5648 (42.2)	4076 (43.2)	72.2	

PATTERNS OF SERVICE USE

Figure 9 shows the density of each type of health service use for truck drivers from 13 weeks before claim lodgement to 130 weeks after claim lodgement. Overall, GP service use peaks between 2 weeks before and 10 weeks after claim lodgement and then decreases gradually. The use of specialist physician services peaks between one week before and after claim lodgement. Physical therapy service use peaks between 5 and 15 weeks after claim lodgement before declining steadily up to the conclusion of the 130 week follow up period. The use of mental health services shows a different pattern compared to other service types. We found less use of mental health services within the first 5 weeks after lodgement, increasing sharply and then remaining stable up to 130 weeks following claim lodgement. We also observed two peaks in the pattern of independent medical examination. The first peak occurred around 5 to 10 weeks after claim lodgment and the second peak started around 55 weeks following lodgment.

Figure 9 Weeks in which health services were delivered to injured truck driver by service type

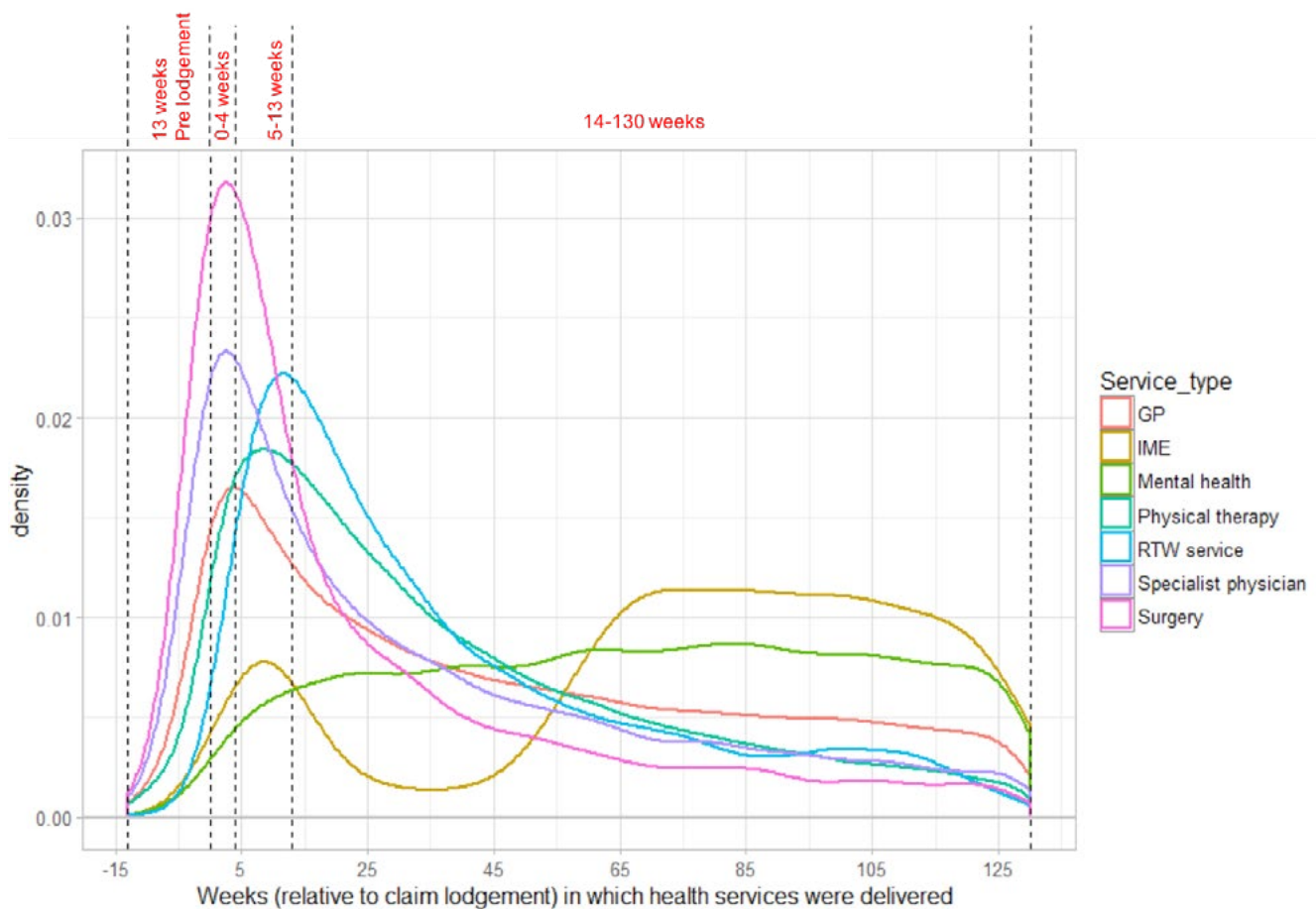


Figure 10 further demonstrates the distribution of each service use across four time periods: 13 weeks pre-lodgement, 0-4 weeks, 5-13 weeks, and 14-130 weeks after claim lodgement. Generally, around 6% of the GP use occurred before the claim lodgement and 24% of the GP use occurred within 13 weeks after the lodgement. Approximately 40% of the specialist physician use occurred in the early stage of the injury. In terms of surgery, nearly 20% of this service use occurred before the claim lodgement, whilst 37% of surgery occurred within 13 weeks after lodgement. In contrast, less than 1% of the psychological service use and RTW service occurred before claim lodgement, and we also found lower use of these services within the first 4 weeks after claim lodgement. IME tended to commence later with 85% occurring at least 13 weeks after claim lodgment.

Figure 10 Timing of delivery of health service use relative to date of claim lodgement by service type

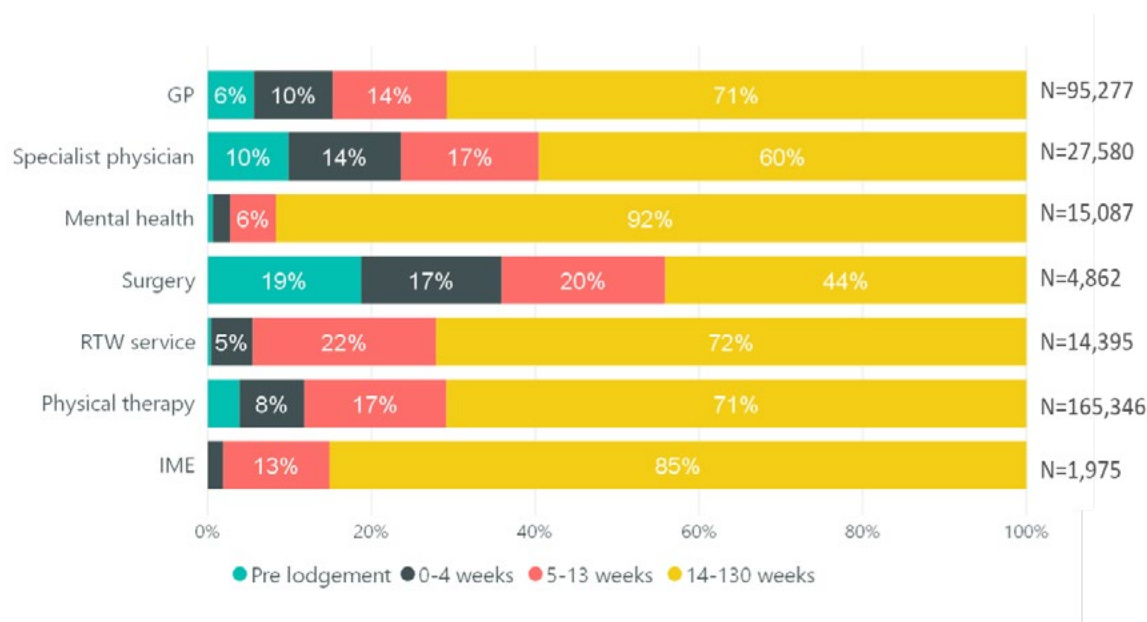


Figure 11 shows the density of health service use for each type of injury in truck drivers from 13 weeks before claim lodgement to 130 weeks after claim lodgement. In brief, there was a similar pattern of health service use for all types of injury except mental health conditions and other claims. As shown in Figure 12, around 30% of the health use for fractures, musculoskeletal and neurological injury occurred within the first 4 weeks after the claim lodgement. However, the majority of health service use for mental health was observed to be in the persistent phase beyond 14 weeks post lodgement.

Figure 11 Weeks in which health services were delivered to injured truck driver by injury type

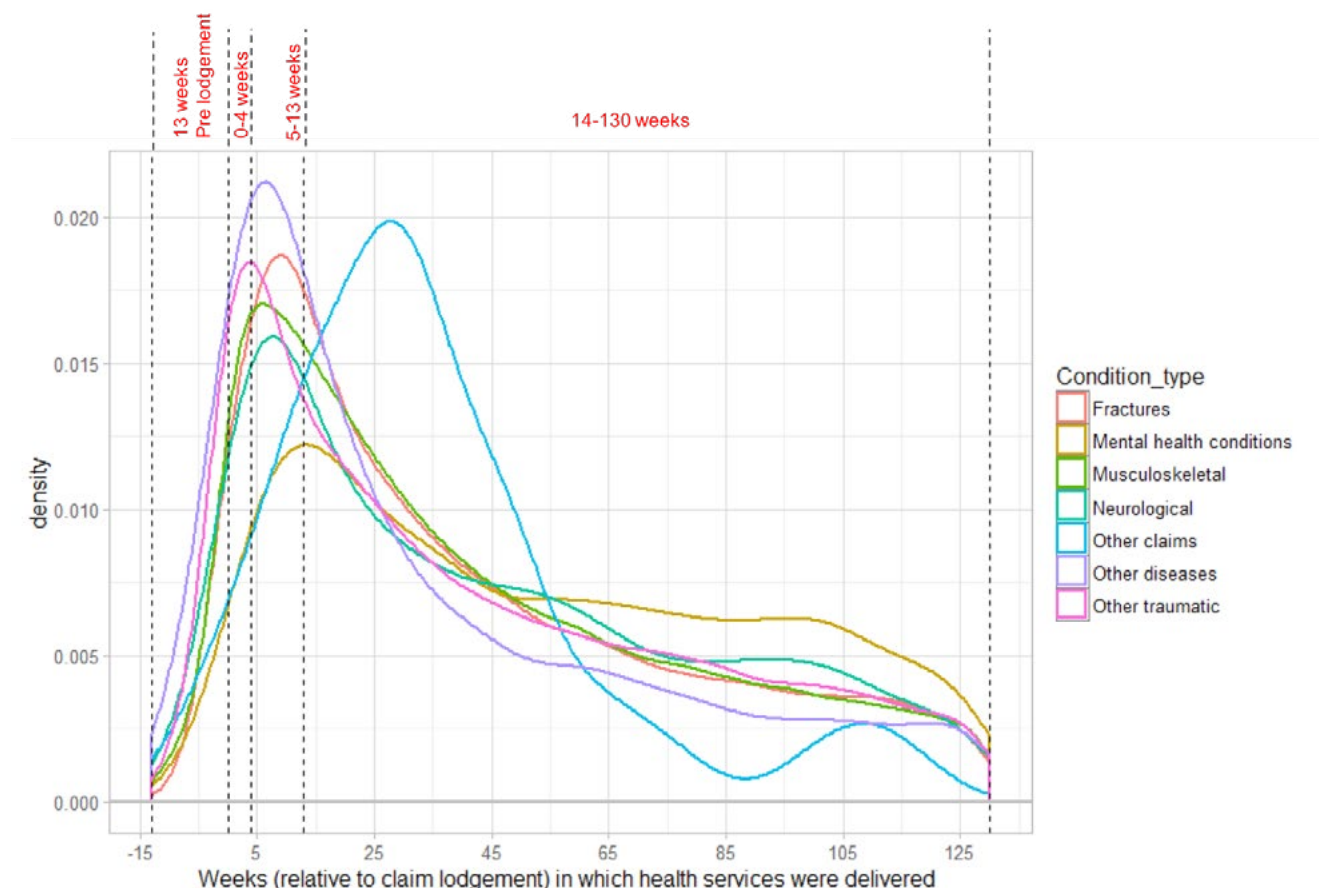


Figure 12 Timing of delivery of health service use relative to date of claim lodgement by injury type

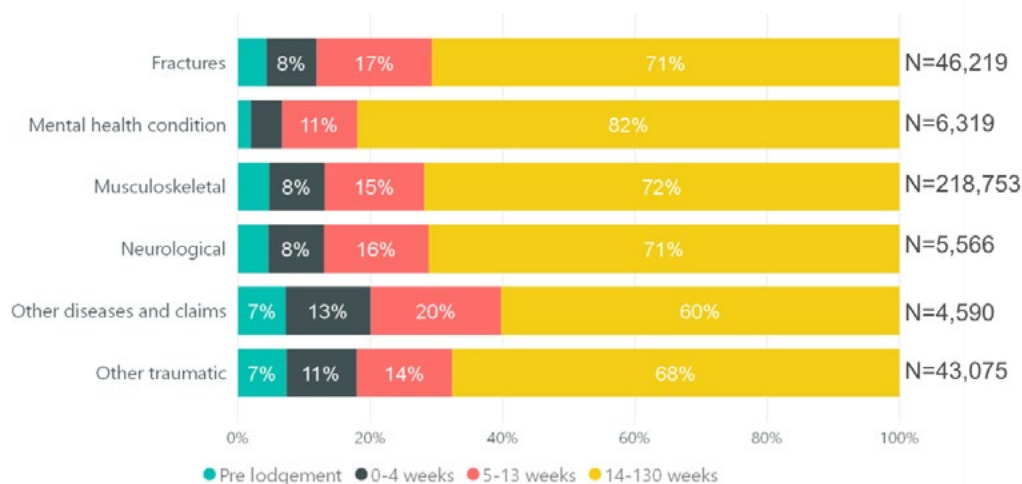
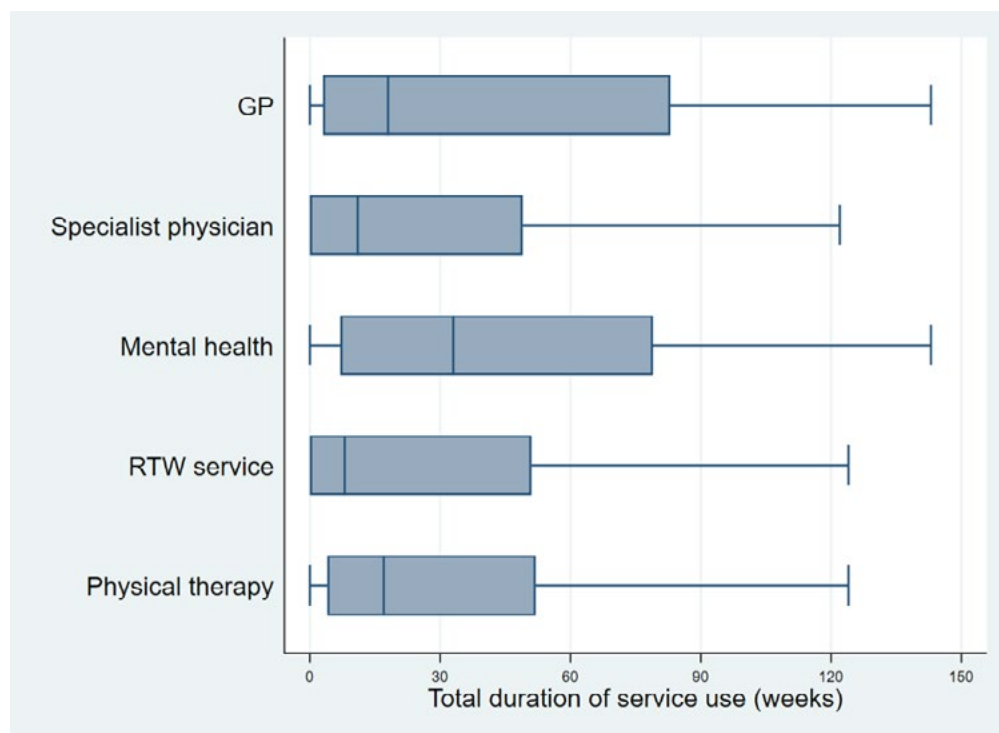


Figure 13 shows the median duration for health service use by service categories in injured truck drivers. Using GP as the reference group (18 weeks, IQR: 3 to 83), the median duration of mental health use was significantly longer (33 weeks, IQR: 7 to 79, coef:15, 95%CI:11.9 to18.1). However, there was no significant difference in the median duration for GP use and physical therapy use (17 weeks, IQR: 4 to 52, coef:-1, 95%CI:-2.6 to 0.6). The median duration of specialist physician and RTW service use were around 11 (IQR: 0 to 49) and 8 (IQR: 0 to 51) weeks respectively, which were significantly shorter than GP use (coef: = -10, 95%CI: -11.9 to -8.1 and coef = -7, 95%CI: -8.6 to -5.4 respectively)

Figure 13 Duration of health service use in truck drivers by service type



Note: Box represents the 25th and 75th percentile of the duration of service use for each service type, with the median indicated by the vertical line within the box. The whiskers at each end of the line represent the lower and upper adjacent values (within 1.5 IQR of median), demonstrating the range of values observed for each service type.

PATTERNS OF HEALTH SERVICE USE

Latent class analysis was used to identify groups of truck drivers with different patterns of health service use. This analysis suggests four classes of health service use.

Table 3 shows the marginal predicted counts (means) of the outcome within each group. Each of the groups is described as follows:

- Low Service Use Group (Class 1). Truck drivers in this class represent the lowest users of health services, with smallest average number of GP, specialist physician, physical therapy, mental health, RTW service uses and the lowest probability of surgery.
This group accounts for 55.1% of all drivers included in the sample.
- Physical Therapy Group (Class 2). Truck drivers in this group are relatively heavy users of physical therapy, with a mean physical therapy service use of 24.6 per driver, but were light users of other health services.
This group accounts for 24.8% of drivers in the sample.
- GP and Mental Health Group (Class 3). Truck drivers in this group were the most frequent users of mental health service with a mean of 9.2 services per driver and were also the highest users of GP services. Compared to class 2, they were less frequent users of physical therapy.
This group accounts for 10.2% of drivers included in the sample.
- High Service Use Group (Class 4). Truck drivers in this group represent the highest users of health services. The predicted counts (means) for this group were high for GPs, specialist physicians, RTW services, physical therapy and surgery.
This group accounted for 10.0% of the drivers included in the sample.

TABLE 3 MARGINAL PREDICTED COUNTS AND 95% CI OF SERVICE TYPE BY HEALTH SERVICE USER GROUP

	<i>Mean, 95%CI</i>			
	Low Service Use	Physical Therapy	GP and Mental Health Service	High Service Use
GP	2.67 (2.62, 2.73)	7.41 (7.19, 7.63)	31.90 (31.49, 32.32)	31.84 (31.44, 32.24)
Specialist physician	1.14 (1.11, 1.17)	2.40 (2.32, 2.48)	7.12 (6.94, 7.29)	8.90 (8.70, 9.09)
Mental health	0.07 (0.06, 0.08)	0.04 (0.03, 0.06)	9.20 (8.97, 9.43)	5.27 (5.11, 5.43)
RTW service	0.30 (0.29, 0.32)	1.01 (0.95, 1.07)	5.48 (5.32, 5.64)	4.92 (4.77, 5.06)
Physical therapy	1.25 (1.19, 1.30)	24.59 (24.19, 25.00)	7.45 (7.16, 7.75)	93.89 (93.00, 94.77)
Surgery	0.38 (0.37, 0.39)	0.46 (0.44, 0.48)	0.54 (0.51, 0.54)	0.77 (0.74, 0.79)

The characteristics of the four groups are shown in [Table 4](#). [Table 5](#) reports the findings of multivariate multinomial regression models and shows the following significant associations, with the 'Low Service Use Group' being the reference group.

Age

Injured truck drivers who were 25 years or older had significantly higher relative chance of being in the GP and Mental Health Group compared with those under 25 years of age. Those who were 45 to 64 years old were significantly more likely to be in the Physical Therapy Group and also had significantly higher chances of being in the High Service Use Group than drivers under 25 years.

Socioeconomic status

Injured truck drivers residing in areas with higher SES were less likely to be classified in the GP and Mental Health User Group than those residing in lower SES areas.

Remoteness

Injured truck drivers from inner and outer regional areas had significantly lower chances of being in the Physical Therapy Group and High Service Use Group compared to those living in major cities.

Employer size

Truck drivers employed by large companies had higher relative risk of being members of the Physical Therapy Group, but were less likely to be members of the GP and Mental Health Group compared to those employed by small employers.

Medical only claims

There was a significant association between whether the claim was a medical only claim and health service use group. The probability of belonging to the High Service Use Group increased by nearly 250% in truck drivers in drivers with time loss claims compared with those with medical only claims.

Type of condition

Compared with musculoskeletal conditions, other injury conditions had significantly higher chances of being in the Low Service Use group. However, drivers with mental health conditions were significantly more likely to be in the GP and Mental Health Group.

Mechanism of injury

Truck drivers with traumatic injuries were more likely to belong to Physical Therapy Group than those with non-traumatic injuries.

TABLE 4 NUMBER AND PERCENTAGE OF DRIVERS IN EACH OF FOUR HEALTH SERVICE USER GROUPS BY DRIVER CHARACTERISTIC

	<i>Mean, 95%CI</i>			
	Low Service Use	Physical Therapy	GP and Mental Health Service	High Service Use
Total	5175 (55.1)	2287 (24.8)	1011 (10.2)	1010 (10.0)
Gender				
Male	5118 (98.9)	2250 (98.4)	998 (98.7)	994 (98.4)
Female	57 (1.1)	37 (1.6)	13 (1.3)	16 (1.6)
Age group				
< 24 years	123 (2.4)	43 (1.9)	10 (1.0)	14 (1.4)
25-34 years	770 (14.9)	320 (14.0)	121 (12.0)	113 (11.2)
35-44 years	1396 (27.0)	646 (28.2)	322 (31.8)	265 (26.2)
45-54 years	1516 (29.3)	740 (32.4)	306 (30.3)	315 (31.2)
55-64 years	1179 (22.8)	493 (21.6)	230 (22.7)	277 (27.4)
65+ years	191 (3.7)	45 (2.0)	22 (2.2)	26 (2.6)
Socioeconomic status				
1 (Most disadvantage)	996 (19.3)	408 (17.9)	246 (24.4)	174 (17.3)
2	1208 (23.4)	458 (20.1)	235 (23.3)	244 (24.2)
3	1249 (24.2)	574 (25.2)	230 (22.8)	250 (24.8)
4	1248 (24.2)	569 (25.0)	209 (20.8)	243 (24.1)
5 (Least disadvantage)	466 (9.0)	269 (11.8)	87 (8.6)	97 (9.6)
Remoteness				
Major cities	1663 (32.1)	611 (26.7)	346 (34.2)	264 (26.1)
Inner regional	3164 (61.1)	1558 (68.1)	581 (57.5)	698 (69.1)
Outer regional	348 (6.7)	118 (5.2)	84 (8.3)	48 (4.8)
Employer size				
Small	2289 (36.4)	897 (31.7)	524 (45.3)	447 (39.4)
Medium	2985 (47.5)	1432 (50.6)	518 (44.7)	537 (47.3)
Large	1006 (16.0)	503 (17.8)	116 (10.0)	151 (13.3)

Medical only claim				
No	4284 (82.8)	2091 (91.4)	1000 (98.9)	1002 (99.2)
Yes	891 (17.2)	196 (8.6)	11 (1.1)	8 (0.8)
Type of condition				
Fractures	707 (13.7)	279 (12.2)	113 (11.2)	162 (16.0)
Musculoskeletal	2452 (47.4)	1767 (77.3)	551 (54.5)	710 (70.3)
Neurological	398 (7.7)	12 (0.5)	36 (3.6)	14 (1.4)
Mental health conditions	75 (1.4)	0 (0.0)	102 (10.1)	0 (0.0)
Other traumatic	1102 (21.3)	219 (9.6)	177 (17.5)	122 (12.1)
Other claims	441 (8.4)	10 (0.3)	32 (3.0)	2 (0.2)
Mechanism of injury				
Traumatic injury	2990 (57.8)	1194 (52.2)	628 (62.1)	597 (59.1)
Non-traumatic injury	2185 (42.2)	1093 (47.8)	383 (37.9)	413 (40.9)

TABLE 5 CHARACTERISTICS ASSOCIATED WITH THE PATTERN OF HEALTH SERVICE USE IN TRUCK DRIVERS

<i>Mean, 95%CI</i>			
	Physical Therapy	GP and Mental Health Service	High Service Use
Gender			
Male	Ref	Ref	Ref
Female	1.45 (0.94, 2.26)	1.09 (0.58, 2.07)	1.60 (0.80, 2.32)
Age group			
< 24 years	Ref	Ref	Ref
25-34 years	1.21 (0.79, 1.59)	2.03 (1.03, 4.02)	1.37 (0.75, 2.48)
35-44 years	1.37 (0.95, 1.99)	3.00 (1.54, 5.84)	1.83 (1.03, 3.26)
45-54 years	1.54 (1.07, 2.23)	2.65 (1.36, 5.16)	2.10 (1.18, 3.75)
55-64 years	1.51 (1.03, 2.20)	2.87 (1.47, 5.62)	2.73 (1.53, 4.88)
65+ years	1.12 (0.68, 1.86)	2.28 (1.02, 5.06)	1.99 (0.98, 4.04)

Socioeconomic status			
1 (Most disadvantage)	Ref	Ref	Ref
2	0.8 (0.76, 1.05)	0.78 (0.63, 0.96)	1.13 (0.92, 1.39)
3	1.02 (0.87, 1.20)	0.72 (0.59, 0.89)	1.04 (0.83, 1.29)
4	1.03 (0.87, 1.21)	0.70 (0.56, 0.87)	1.04 (0.83, 1.30)
5 (Least disadvantage)	1.17 (0.96, 1.44)	0.76 (0.57, 1.01)	0.97 (0.73, 1.30)
Remoteness			
Major cities	Ref	Ref	Ref
Inner regional	0.76 (0.67, 0.85)	0.97 (0.83, 1.13)	0.65 (0.55, 0.76)
Outer regional	0.73 (0.58, 0.93)	0.99 (0.75, 1.30)	0.54 (0.39, 0.75)
Employer size			
Small	Ref	Ref	Ref
Medium	1.07 (0.95, 1.20)	0.74 (0.64, 0.85)	0.89 (0.77, 1.04)
Large	1.22 (1.04, 1.42)	0.54 (0.42, 0.68)	0.80 (0.39, 0.75)
Medical only claim			
No	Ref	Ref	Ref
Yes	2.05 (1.71, 2.46)	20.03 (10.78, 37.23)	25.2 (12.37, 51.37)
Type of condition			
Fractures	Ref	Ref	Ref
Musculoskeletal	0.60 (0.51, 0.71)	0.57 (0.45, 0.72)	0.73 (0.59, 0.90)
Neurological	0.06 (0.03, 0.11)	1.09 (0.74, 1.60)	0.33 (0.18, 0.58)
Mental health conditions	—	5.41 (3.91, 7.48)	—
Other traumatic	0.30 (0.26, 0.36)	0.64 (0.52, 0.78)	0.38 (0.30, 0.47)
Other claims	0.03 (0.02, 0.05)	0.28 (0.19, 0.42)	0.01 (0.01, 0.50)
Mechanism of injury			
Traumatic injury	Ref	Ref	Ref
Non-traumatic injury	0.81 (0.72, 0.91)	1.02 (0.86, 1.20)	0.90 (0.77, 1.06)

Note: The table shows adjusted relative risk ratios (RRR) and 95% confidence intervals (CIs) from multinomial logistic regression model. The Low Service Use Group is the reference category. Ref = reference category; Shaded cells indicate statistical significance. RRR > 1 indicate a greater risk compared to the reference group, RRR < 1 indicate lower risk compare to the reference group. Service use spells and duration of service use.

Figure 14 shows the frequency density of the number of health service use spells by service categories. A spell was defined as the use of a health service in consecutive months, with gaps between spells defined as a month in which there was no health service use. Most injured truck drivers had relatively few service-use spells. For example, over 85% of injured truck drivers who used GP services had three or fewer spells. Patterns were broadly similar across service categories, although it was more common to have a single spell of physical therapy and less common to have a single spell of mental health service.

Figure 14 Number of service spells for health service utilisation in truck drivers by service type

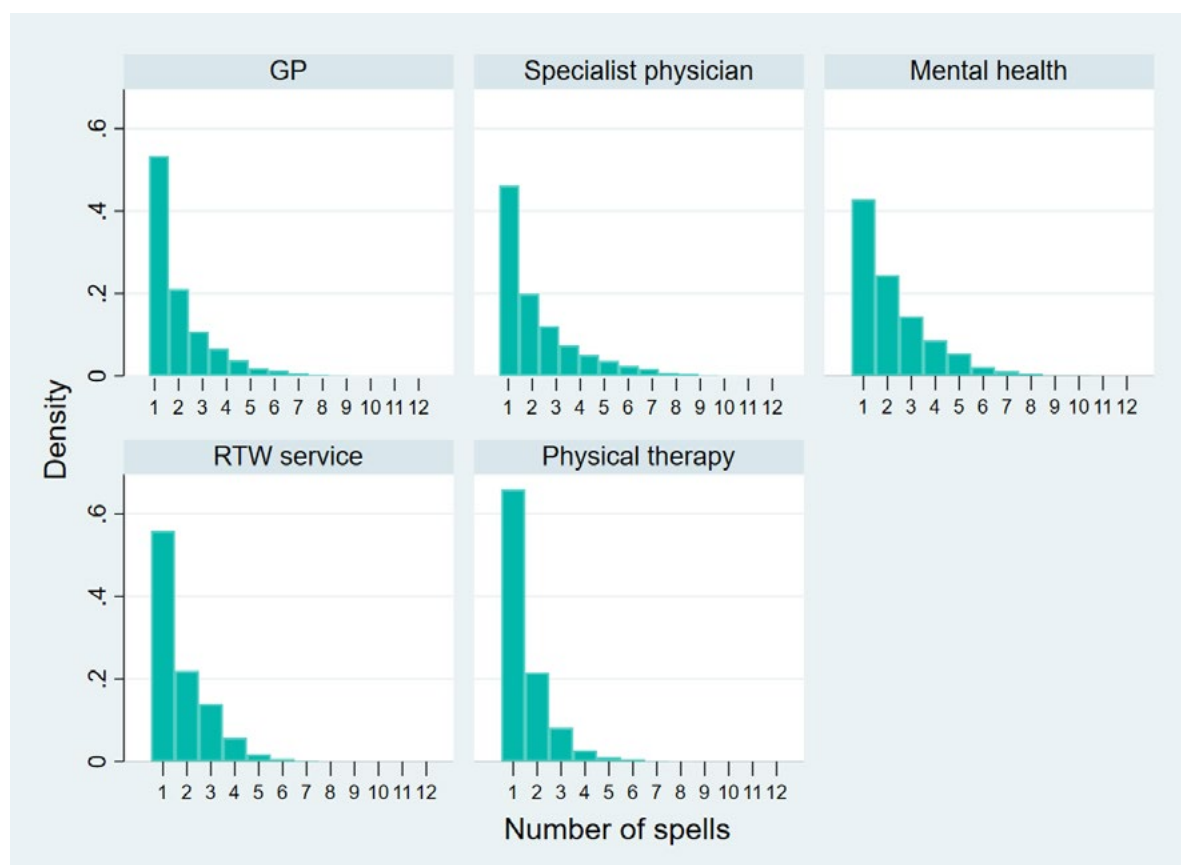
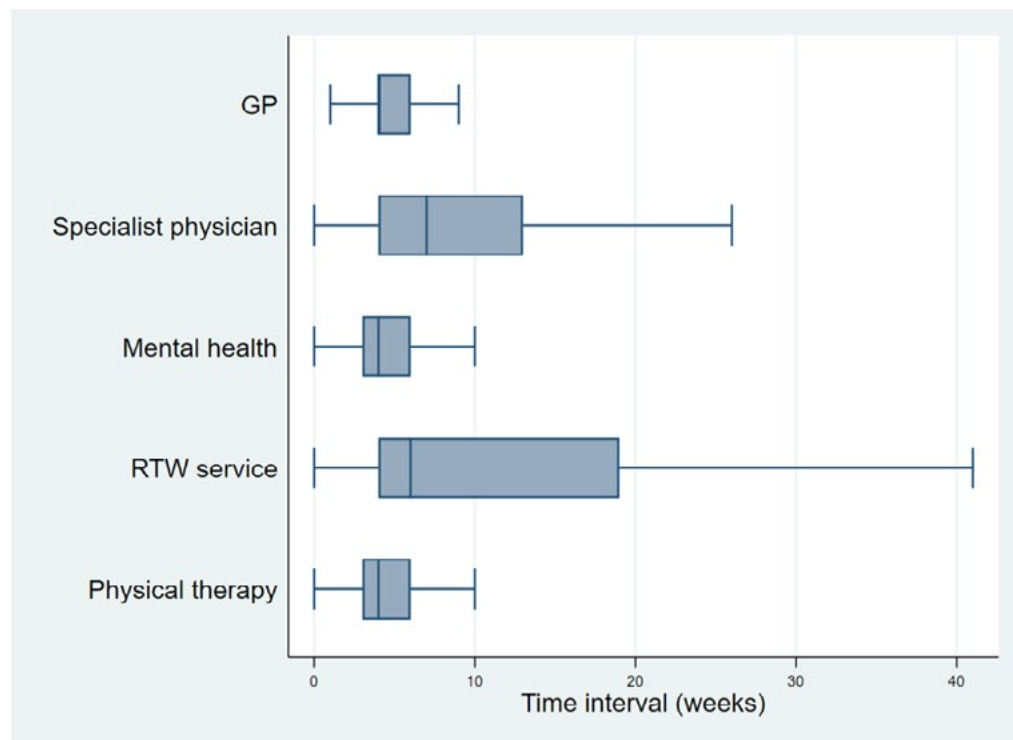


Figure 15 demonstrates the median time interval between service spells by service type in truck drivers. The shortest time interval between spells was seen in GP and mental health use (median 2 months, IQR: 2-3), the second shortest time interval was seen in specialist physician (median 3 months, IQR: 2-4) and physical therapy service use (median 2 months, IQR: 2-5). The longest median time interval between service spells was found in RTW service (median 5 months, IQR: 3-10).

Figure 15 Median time interval between service spells in truck drivers by service type



Note: The box represents the 25th and 75th percentile, with the line within the box representing the median time interval between spells for each service type. The whiskers at each end of the line represent the lower and upper adjacent values (within 1.5 IQR of median), demonstrating the range of values observed for each service type

Summary and Conclusions

This is the third report of Driving Health, a national study of the health of workers in the transport and logistics industry. The first report presented an overview of work related injury and disease in the transport industry over a twelve year time frame.

The second report focussed specifically on work related injury and illness in truck drivers, the most common male occupation in Australia. This third report describes compensated health service use patterns for transport workers, especially for truck drivers, following the onset of injury or illness.

The findings show that following a work-related injury or disease, truck drivers have significantly more GP consultations and are more likely to undergo surgery than other workers. However truck drivers are less likely to access mental health services including those provided by GPs, psychologists and psychiatrists.

One recent Australian study suggested that suicide among male road and rail drivers is higher than other male occupations and the majority of suicides in this occupational category occurred in truck drivers.^[15] Past studies indicated that males are more likely than females to focus on physical problems and are less likely to disclose mental and emotional problems.^[16] People who are living in regional or rural areas are also found to be less likely to report mental illness,^[17–19] while fear, low mental health literacy, helplessness, remoteness and getting time off work for treatment could be barriers to accessing mental health services.^[18] In addition, access to mental health treatment may be influenced by a range of factors such as diagnosis, the severity of the condition, treatment options and personal preference. In 2011, there were 3.2 million Australian who accessed at least one MBS or PBS subsidised mental health-related treatment.^[19] Around one-quarter of them used services only and around one half used medication only.^[20] To date, there has been limited research investigating barriers to reporting mental health conditions and/or accessing mental health services for truck drivers in Australia. Further studies are needed to characterise the mental health status of truck drivers.

We also observed that the costs of health service use are greater in truck drivers compared to injured workers in other occupations. Specifically the cost of surgery per injured driver was almost 50% higher than that of other occupational groups. It is known that truck drivers are at elevated risk of traumatic injury such as those occurring following vehicle crashes and falls.^[5, 9] As shown in the first report from the Driving Health study, the incidence rate of fracture and other traumatic injury in truck drivers was 5 times and 2.5 times higher than all other workers.^[5] A study from the United States reported that commercial truck drivers are seven times more likely to have an accident related death when compared to the average population^[20] and the risk of truck drivers suffering serious injuries after a collision is high.^[21] The complexity of the injury may explain the higher cost of surgery in truck drivers documented in this report.

We also observed that the average health service utilisation per injured worker for all occupational groups decreased slightly over the study period. Similarly, after adjusting for inflation, the average costs of health services also decreased slightly in truck drivers. This is in contrast to our prior finding that the duration of time lost to work-related injury and disease is increasing in this population,^[9] suggesting an increase in severity of injury and illness. Combined, these two findings suggest a need for further investigation into the nature of health service use in truck drivers and its impact on function and health of drivers.

The findings in this report provide a new insight into the volume and timing of health service use following work-related injury and illness among truck drivers. Generally, for all occupational groups including truck drivers and other drivers, physical therapy and GP were the most commonly used health services post work-related injury and illness. Mental health, IME and RTW services were the least commonly used. These findings align with the findings from the second Driving Health report that musculoskeletal injury was the most common type of injury for Australian truck drivers.^[9] In addition, the timing of health service use varies substantially by service type. The GP, specialist physician and surgical services tended to peak within the acute period post-injury. In particular, surgery often occurred around the date of claim lodgement and GP and specialist physician services commonly occurred in the few weeks after claim lodgement. The use of physical therapy and RTW services commonly peaked in the sub-acute period between 5 and 13 weeks after the claim lodgement, while the use of IME and mental health services peaked in the persistent period 14 weeks after claim lodgement. Previous studies have shown that early intervention in mental illness can have a significant positive impact on a patient's prognosis, whereas treatment delay is independently associated with poor outcomes.^[22] Therefore, our findings of relative low use of mental health in the early phases of injury suggest there may be missed opportunities for early intervention in the initial stages of a mental illness. Considering their greater risk of suicide,^[15] truck drivers who experience mental health issues should be encouraged to seek professional support at an early stage.

There were also some variations in time to first use and duration of service use across service categories. Previous research identified that a number of factors may influence the time from injury to health service use including type of injury and severity, health care delivery system as well as workers' compensation policy.^[23] Our findings indicate that injured truck drivers with musculoskeletal and mental conditions could have persistent healthcare needs that extend at least 2.5 years post-injury. Our findings may also partly reflect workers' compensation policy choices. For instance, GPs are the main gatekeepers to worker's compensation entitlements in Victoria, thereby tend to be utilised in the early stage after injury. The relatively late initiation of mental health services may be attributable, in part, to the time taken to refer to secondary and usually more specialised services from the primary health care setting. For instance, a previous study suggested that claim processing times were consistently longer for claims involving neurological and mental health conditions.^[24]

We identified four different types of health service use through latent class analysis.

Class 1

The 'Low Service Use Group' typically consisted of younger workers, with non-musculoskeletal medical only claims.

Class 4

The 'High Service Use Group' tended to be those between 45 and 64 years of age, living in major cities, with some working time loss due to a musculoskeletal condition.

Class 2

The 'Physical Therapy Group' tended to comprise those between the ages of 45 and 64, living in major cities, with some working time loss due to non-traumatic injuries.

Class 3

The 'GP and Mental Health Group' were more likely to be over 24 years of age, be in the lowest socio-economic band, be employed by smaller employers, and have a claim for a mental health condition.

These findings demonstrate that both intensity and patterns of service use are influenced by demographic and social factors beyond the nature of the injury or disease the worker is experiencing. Service use was influenced by the characteristics of the worker including their age and socioeconomic status, the region in which they live, and by employer characteristics. This reinforces the need for taking a biopsychosocial approach to planning and delivery of healthcare service use in injured worker populations, taking into account not only the type of injury or disease, but also these worker and employer characteristics.

Strengths and Limitations

The strengths of this report include the use of a database with population coverage of workplace injury and disease in the state of Victoria. The longitudinal nature of the data provides the opportunity to track individuals' detailed service level information on a daily basis. The data also allows examination of the type, intensity and duration of healthcare service use across multiple health providers and service types over time. In addition, the service data is collected directly from the health providers which obviates recall biases apparent in survey based studies of health service use. However, this study does have a number of limitations. Within this database it is not possible to identify individuals who have made more than one claim, and it is possible that not all episodes of acute hospital admissions are captured as payments may be covered by private health insurers in some instances. Self-employed workers are not covered by workers' compensation in the state of Victoria and thus our sample does not include every case of work-related injury and disease in truck drivers during the study period. This also limits generalisability of study findings to self-employed truck drivers. The database does not include information on service use for non-compensable injury and disease, and thus represents a snapshot of service provision for compensable, work-related injury and illness. Access to other sources of health service information such as Medicare will be necessary to establish a more complete picture of health service use in this population. Finally, several variables that might influence health care uses are absent from the database including injury severity, pre-injury or co-morbid health conditions and education level.

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Appendix I

TABLE 6 INJURY TYPE CATEGORIES AND CORRESPONDING TOOCS GROUP

Type of condition	TOOCS Major Group
Fractures	B: Fractures
Musculoskeletal	F: Traumatic Joint/Ligament and Muscle/Tendon Injury
	H: Musculoskeletal and Connective Tissue Diseases
Neurological	A: Intracranial Injuries
	E: Injury to Nerves and Spinal Cord
	L: Nervous System and Sense Organ Diseases
Mental Health Conditions	I: Mental Diseases
Other Traumatic	C: Wounds, Lacerations, Amputations and Internal Organ Damage
	D: Burn
	G: Other Injuries
Other Diseases	J: Digestive System Diseases
	K: Skin and Sub-cutaneous Tissue Diseases
	M: Respiratory System Diseases
	N: Circulatory System Diseases
	O: Infectious and Parasitic Diseases
	P: Neoplasms (Cancer)
	Q: Other Diseases
Other Claims	R: Other Claims

Appendix II

TABLE 7 MECHANISM OF INJURY AND CORRESPONDING TOOCS GROUP

Mechanism of injury	TOOCS Major Group
Traumatic injury	0: Falls, trips and slips of a person
	1: Hitting objects with a part of the body
	2: Being hit by moving objects
	5: Heat, electricity and other environmental factors
	9: Vehicle incidents and other
Non-traumatic injury	4: Body stressing
	8: Mental stress
	3: Sound and pressure
	6: Chemicals and other substances
	7: Biological factors