

The association between time taken to report, lodge and start wage replacement and return-to-work outcomes.

Running Title: Long-term outcomes of compensation process delays.

Fiona Cocker<sup>1</sup>, Malcolm R Sim<sup>1</sup>, Helen Kelsall<sup>1</sup>, Peter Smith<sup>1,2,3</sup>

<sup>1</sup> School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia.

<sup>2</sup> Institute for Work and Health, Toronto, Canada.

<sup>3</sup> Dalla Lana School of Public Health, University of Toronto, Canada

Corresponding Author: Fiona Cocker, Ph.D.

Hobart Clinical School

HOBART TAS 7000, AUSTRALIA , E-mail:- Fiona.Cocker@utas.edu.au

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## Abstract

**Objective** Determine if prolonged times taken to notify, file, adjudicate and start wage replacement for workers' compensation claims are associated with poorer return-to-work outcomes.

**Methods** Using 71,607 claims lodged 2007-12, logistic regression determined associations between time to claim filing, adjudication and payment and; i) socio-demographic/economic, occupational, and injury-related factors; and ii) 52 weeks of wage replacement (WR).

**Results** Prolonged times for all processing steps were associated with increased odds of reaching 52 weeks of WR. Prolonged times in more than one step increased the odds of a long-term claim. Being female was the only variable consistently associated with each prolonged processing time.

**Conclusions** The predictive ability of prolonged times in claim lodgement and processing and compensation payments demonstrate that shorter claims management and adjudication times could improve return-to-work outcomes.

**Keywords:** workplace, compensable injury, delays, long-term injured workers, wage replacement

Non-fatal, work-related injuries and illnesses are a major source of ill health, disability and economic burden worldwide<sup>1-3</sup>. Direct costs of wage replacement (WR) account for 25% of these estimates. The remaining 75% is attributed to indirect costs associated with lost productivity, employers' insurance excess, staff turnover and re-training, medical treatment and rehabilitation, investigation of incidents, and the administration of compensation payments<sup>2</sup>.

Rates of return-to-work (RTW) vary by injury severity and type. However, the most recent Australian and US statistics revealed the majority of injured workers (IWs) RTW, in some capacity, after sustaining an injury<sup>4-6</sup>. For the remaining minority, the longer they are off work, the less likely they are to ever return<sup>7</sup>. These IWs with long-term claims are disproportionately responsible for the costs<sup>8-12</sup>. Therefore, it is crucial to identify how to prevent long-term work disability, promote appropriately timed RTW, improve long term health outcomes, reduce time lost to injury, and reduce insurance premiums<sup>13, 14</sup>.

Research to date has identified several factors, related to the injury, worker, workplace, and compensation system, which are important in an early RTW<sup>15-18</sup>. Interactions with various stakeholders such as healthcare providers, insurers, lawyers, mediators, and employers, are also commonly cited predictors<sup>19-22</sup>. However, the role of the time taken for a worker to inform their employer of their injury, for their employer to report the injury to the workers' compensation scheme, and the time between when the scheme receives the claim and when WR starts, has been under-examined<sup>23</sup>. Whilst previous research has identified that longer time taken to notify, file, adjudicate, and start WR for workers' compensation claims can lead to longer periods of disability, time periods were examined as one of many factors and not the main variable of interest<sup>24-27</sup>. That said, Besen et al (2016) examined these time periods as predictors of disability and found faster notification, filing, adjudication and commencement of WR was related to shorter lengths of disability<sup>23</sup>.

Some studies have attempted to identify how individual, occupational, and injury-related factors are associated with prolonged claim processing times. For example, gender has been associated with longer times due to the perceived contestability of female IW claims. This is potentially due to their injuries being more likely attributable to female-specific health behaviours, such as less physical strength, as opposed to preventable work-related conditions<sup>28, 29</sup>, and their own inclination to attribute said injuries to a non-work/personal factor<sup>30</sup>. Further, certain injury types, particularly those relating to mental illness or psychological injury, have been the subject of more in-depth investigation when it comes to

their association with prolonged claim processing times. Findings to date suggest that, unlike physical injuries, mental injury claims can be more complex and difficult to prove. This is likely due to the multi-causal nature of psychological injuries which makes it difficult to discern whether the workplace was a significant contributor, and thus may prolong the adjudication process<sup>18</sup>.

In addition, few studies have investigated how prolonged processing times at different stages of the claim process relate to each other, whether they accumulate in their effect on RTW, and, if they do, whether accumulation is associated with poorer RTW outcomes. As a result, existing evidence on claim processing times is limited in its ability to inform targeted RTW interventions focused on IW recovery and more timely resumption of work duties, nor policy designed to improve worker's compensation systems, and related health and vocational outcomes more broadly.

Longer time periods in claim submission and adjudication are an important factor to consider in relation to claim duration because they may be an early indicator of communication problems or a lack of collaboration between important stakeholders in the RTW process (i.e. the worker, their employer and the claims agent), which are potentially modifiable. As such, an understanding of how and why they occur could be used to identify IWs at risk of reaching long-term claim status early in the worker's compensation process, and inform the development of interventions designed to prevent this occurrence. Therefore, using routinely collected worker's compensation data, this study had two distinct aims. Firstly, this study investigated the association between prolonged time taken in the injured workers (IW) claim lodgement, the IWs employers' lodgement of the claim with the insurer, and receipt of first compensation payment, and accumulating 52 weeks of WR. Secondly, it investigated the association between socio-demographic/economic, occupational, and injury-related factors and prolonged times in the claims process.

## **METHODS**

### **Data Source**

This study used data from the Victorian Compensation Research Database (CRD). The CRD is a database established and held by the Institute for Safety Compensation and Recovery Research (ISCR<sup>31, 32</sup>), including information on the claimant and benefits paid. The CRD is publicly accessible under strict guidelines approved by the compensation authority in the Australian state of Victoria, and the Monash University Human Research Ethics Committee

(MUHREC)<sup>33,34</sup>. The information collected by WorkSafe Victoria (WSV), or their authorised agents which process claims, includes demographics, injury, payments and treatments. Information necessary for claims handling, such as healthcare providers (e.g. treatment invoices), is also collected. More detailed information on the variables collected in the WSV dataset has been published elsewhere<sup>35</sup>.

## Analysis Sample

The analysis sample contained accepted standard workers' compensation claims with an injury date between January 2007 and December 2012, with at least one-day of WR (N=98,149). From this sample we removed 3,925 claims (4%) which were terminated due to RTW reasons within the first 52 weeks of the claims, and 8,754 (9%) which were terminated due to non-RTW factors. Return-to-work factors were: 1-termination claim (fail to provide medical certificates), 2-termination claim (fail to participate in rehabilitation), 3-termination claim (fail to make effort to return to work), 4-termination claim (fail to participate in assessments), 5-termination claim (fail to provide information on injury), 6-termination claim (over 104 weeks benefits, not serious), 7-termination claim (fraudulence), 8-termination claim (worker has reached retirement age), 9-termination claim (superannuation or termination lump sum), 10-termination claim (non-resident), 11-termination claim (imprisonment), 12-termination claim (s115 settlement), 13-termination claim (no longer entitled for other reason), and 14-rejection liability not accepted. Further, a s115 settlement applies to a worker who:

- a) suffered an injury arising out of, or in the course of, or due to the nature of, employment on or after 12 November 1997 and before 20 October 1999; and
- b) is receiving weekly payments of compensation in respect of the injury, or who would be entitled to receive such payments but for the operation of section 96(2); and
- c) has been assessed in respect of the injury as having no current work capacity and as likely to continue indefinitely to have no current work capacity; and
- d) has received weekly payments in respect of the injury for at least 104 weeks; and
- e) has been assessed, in accordance with sections 91 and 115C, as having a 30% or more degree of impairment in respect of the injury.

Non-RTW reasons were 26-claim opened in error, 27-worker has died, 28-common law action completed, 29-other legal action completed, 30-worker no longer wants benefits (other

than RTW), 31-section 98/98a claim closure, 32-section 92 claim closure, 33-medical only closure.

An additional 5,148 claims (5%) had no WR in the three-year follow-up period, so were removed from the sample. Together removed claims totalled 17,827, leaving a final analytical sample of 80,322 claims.

### **Claim Submission Timelines**

IWs who want to claim for loss of income (weekly payments) must provide their employers with a Certificate of Capacity, which covers up to 14 calendar days, and is used to determine the IW's capacity for work and the nature of their injury. In the Australian state of Victoria, employers are required to cover loss of earnings due to injury for the first 10 working days, after which WR replacement is covered by the applicable insurance scheme. Employers are required to endorse and submit the claim to the compensation authority (WorkSafe Victoria) within 10 calendar days of receiving it from the IW. The IW will receive a decision about their claim within 28 days from the date the compensation authority received the claim from the IW's employer. After 52 weeks of WR an employer is no longer legally obligated to re-employ an injured worker, thus RTW rates may decrease after this time, as the claimant would be less likely to return to the workplace where the injury was sustained.

### **Claim processing times**

The following three steps and time periods were defined based on benchmark requirements of the claims submission process outlined above and using CRD data:

1. Reporting time: IWs are required to notify their employer of an injury within 30 days of incurring that injury. Therefore, more than 30 days between an IW's incapacity start date, which usually coincides with the date the injury was incurred, and the date the IW submitted the claim to their employer was defined as a prolonged reporting time.
2. Employer submission time: Legislation in Victoria states an employer is required to submit the claim with the compensation authority within 10 days of receiving it from the IW. Therefore, more than 10 days between the date when the IW provides their employer with the claim form and the date when the employer submits the claim to the compensation authority was defined as a prolonged employer submission time.

3. Payment time: Once a claim is submitted to a claims agent, they have 28 days to adjudicate the claim, after which WR payments will be initiated if the claim is accepted (provided the worker has lost more than 10 days from work). No information is contained in the CRD for the adjudication date, nor is there specific time periods with which WR payments should start after the adjudication date. Based on monthly reports, WSV estimates the median time between the date the scheme receives a claim and the IW receives their first compensation payment is 42 days. Therefore, we defined 45 days between the scheme received date and the first compensation received date as a prolonged WR. This provides 17 additional days from the maximum time to adjudicate a claim for WR payments to start, and represents a period of one and half months for the worker to receive payments from the insurance scheme for their work injury.

### **Individual demographic, occupational and injury-related factors**

Demographic, occupational and injury-related factors used in our analyses were age, sex, occupational physical demands, workplace size, industry, injury type, and year of incapacity. The measure of occupational physical demands was based on the Australian and New Zealand Standard Classification of Occupation (ANZSCO)<sup>36</sup> code associated with each claim. Occupational physical demands were grouped into the following four levels of load handling: limited (<5kg); light (5 but <10kg); medium (between 10 and 20kg) and heavy (>20kg). A more detailed construction of this variable has been published previously<sup>37</sup>. Workplace size was split into four categories based on the employer's remuneration in 2010/11 deflated to 2005/06 Australian dollars (AUD) of small (<1million AUD), medium (1-20 million AUD), and large (>20 million AUD), and government. Industry type categories were derived using the Australian and New Zealand Standard Industry Classification (ANZSIC 2006)<sup>38</sup> divisions. Injury type was defined using the Australian Standard Type of Occurrence Classification System (TOOCS V3)<sup>39</sup>, that defines injury type based on the nature and mechanism of injury. Year of incapacity was included in analyses in order to control for any changes that may have occurred in the time for claim adjudication processes over time. Area level factors were the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD), which is based on economic and social conditions of individuals and households within a geographical area, and the Accessibility/Remoteness Index of Australia (ARIA), which is an index of remoteness based on the physical road distance between an area

and different classes of services. Each of these indices was assigned to individuals based on their residential postal code.

### Time to first access to healthcare

The time taken to receive health care may influence the relationship between a prolonged processing time and future WR outcomes. That is, prolonged times in injury reporting, employer submission, processing and adjudication may lead to prolonged time to first access to health care and worse RTW outcomes. Employers cover the worker's salary for the first 14 days post-injury, therefore more than 14 days between the incapacity start date and first medical treatment accessed date was defined as a prolonged time to starting treatment. This time to start health care was then adjusted for in the logistic regression analyses that explored the association between time to start health care and 52 weeks of WR.

### Analysis

Of the original sample of 80,322 claims, 10.5% (n=8,453) were missing information on our main study exposure (reporting, submission or adjudication times), with another 0.3% (n=239) missing information on one or more of the study covariates (all of which were related to area level factors). Missing information was most commonly related to prolonged reporting times and in most cases was due to the date of first incapacity occurring substantially after the date when the claim was submitted to the employer. A logistic regression analysis examined factors associated with missing information on our main exposures. Older age, having an injury type classified as 'other chronic condition' (compared to chronic musculoskeletal conditions), being in a government workplace (compared to a small workplace), being male, having low physical occupational demands, and claims with an incapacity date in the later part of our study period were more likely to have missing information. After removing claims with missing information on the processing times and covariates, the final analytical sample totalled 71,607 claims.

Univariate logistic regression analyses were used to determine associations between age, sex, occupational strength requirements, industry, workplace size, injury type, and year of incapacity and each of the prolonged compensation process times, defined as a binary outcome according to the aforementioned cut-points.

Two multivariable logistic regression models were used to determine the association between the accumulation of 52 weeks of WR and: i) each prolonged processing time, defined as both categorical and binary variables, and ii) the accumulation of prolonged processing times. All

analyses were adjusted for the aforementioned demographic, occupational and injury-related factors, prolonged times in the receipt of healthcare, and for the preceding prolonged processing time where appropriate.

## **Statistical Analyses**

Stata 14.2 was used to perform the analyses (Stata Corporation, College Station, TX).

## **RESULTS**

### **Claimant Characteristics**

Of the 71,607 claims included in the analysis, the majority were men (65.8%). The age of IWs ranged from 15-84 years, with an average age of 42.8 years. Over a third of claims were from workers in the manufacturing, wholesale trade, and transport industries (34.1%), followed by the construction industry (13.2%). Over one-half of all claimants were from the two lowest occupational physical demands categories (limited and light) (Table 1). Almost 30% of claims were from small workplaces, 40.3% were from medium-sized businesses and 30.2% were from large or government workplaces. Nearly 39% of the included claims had sustained chronic musculoskeletal (MSK) injuries, with the second and third largest injury groups being wounds, amputations, burns (16.3%), and traumatic MSK (15.2%) respectively (Table 1).

### **Compensation process time periods**

Results revealed 16.9% of claims had a prolonged reporting time and 17.4% had a prolonged employer submission time. Further, 4-10 days was the most common group for both types (Figure 1). The most common payment time group was 0-30 days, and 47.2% did not receive their first payment for 45 days or more after the insurer received their claim from their employer. The majority (50.9%) of claimants accessed their first health care service within 14 days of incurring their injury, and 32.3% received their first health care services more than 14 days after sustaining it. Differences were also observed in the trends over time, with a declining likelihood of prolonged employer processing times in more recent claim years, while an increased likelihood of prolonged payment times was present in more recent years.

### **Factors associated with prolonged time to injury reporting, employer submission and compensation payment**

Only being female (compared to male) was consistently associated with each type of prolonged processing time, which persisted following adjustment for injury type (Table 2). More specifically, being female was most strongly associated with a prolonged payment time in the claim adjudication process. Older age was associated with an increased likelihood of having a prolonged reporting time, and younger age was associated with a lower likelihood of a prolonged reporting and payment time. Occupations with medium physical demands were the least likely to have a prolonged reporting and payment time, but no relationship was observed between occupation physical requirements and prolonged employer submission time. Education, public administration and health care industries were associated with a higher likelihood of prolonged employer submission times compared to manufacturing industries, although they had a reduced likelihood of prolonged payment times. Additionally, the construction industry was associated with a higher likelihood of prolonged reporting and employer submission times, and primary industry, retail, public administration and safety and other service industries were all associated with a higher likelihood of prolonged employer submission times. In contrast, compared to the manufacturing industry, the construction, public administration and safety, health and social assistance, and other service industries are all associated with lower likelihood of prolonged payment times. Medium, large and government workplaces had a lower likelihood of prolonged reporting and employer submission times, but a higher likelihood of prolonged payment times compared to smaller workplaces. Compared to claimants with chronic MSK injuries, those with fractures, wounds, amputations and burns, or traumatic MSK injuries had a lower likelihood of experiencing prolonged reporting time, in addition to these injury types those with intracranial or spinal cord injuries, other traumatic injuries, other chronic conditions and mental health claims had lower odds of experiencing prolonged employer submission times. Similarly, those with fractures, wounds, amputations and burns, or intracranial or spinal cord injuries had lower odds of prolonged time to compensation payment. Those with a mental health claims or chronic conditions had significantly higher odds of prolonged reporting and compensation payment times.

IRSAD and ARIA were also included in the analyses. Relative socioeconomic disadvantage, as measured by IRSAD, was not significantly associated with either prolonged injury reporting or employer submission times. However, compared to the top 20% (deciles 9&10), those with more relative socio-economic disadvantage had significantly lower odds of a prolonged time to compensation payment. Compared to injured workers in urban areas those

living in inner regional and outer regional or remote areas had significantly lower odds of prolonged time to injury reporting, employer submission or compensation payment.

Table 3 shows that more prolonged compensation processing time increased the likelihood of accumulating 52 weeks of WR, but this was not seen for prolonged employer submission times.

The relationship between a prolonged payment time and likelihood of accumulating 52 weeks of WR indicated a threshold effect, with all lengths of time of 31 days and greater associated with an increase likelihood of accumulating 52 weeks of WR. Models 2 and 3 demonstrate that adjusting for socio-demographic/economic, occupational, and injury related factors and preceding time periods did not change the pattern of results for any of the time periods.

Table 4 shows there is a strong relationship between the number of prolonged processing times and an increasing probability of accumulating 52 weeks of WR.

## **DISCUSSION**

Using compensation system data from the Australian state of Victoria, this study aimed to identify factors that were associated with prolonged time taken to notify, file, adjudicate and start WR in workers' compensation claims, and whether these prolonged processing times were predictive of claims becoming "long-term", as indicated by the accumulation of 52 weeks of WR. Being female (compared to male) was the only factor consistently associated with prolonged processing time. Only 38.5% of claimants had no prolongation of the three steps considered during the claim submission and compensation process. Prolonged time to payment was the most common prolonged compensation process and showed an increasing trend over the time period examined. Further, prolonged injury reporting, and compensation payment were associated with a higher probability of accumulating 52 weeks of WR. This association remained following adjustment for any preceding prolonged processing time. Finally, there was a cumulative impact of prolonged processing times, as three prolonged processing times had even higher odds of accumulating 52 weeks of WR compared to IWs with no prolonged processing time, over and above the presence of a prolonged time to first access the healthcare or treatment.

These findings support the existing studies which have identified associations between the presence of prolonged compensation processing times and claim duration<sup>23, 24, 26, 40</sup>, in

which prolonged processing times were one of many factors and specific injury groups were used. What the current study adds to the literature is the recognised impact of prolonged reporting, employer submission and payment times on claim duration across multiple injury types, the cumulative impact of the number of prolonged processing times on the probability of reaching 52 weeks of WR, and the identification of which demographic, occupational and injury-related factors are associated with each type of prolonged processing time.

Trends over time, as demonstrated by the associations between year of incapacity and each prolonged processing time, suggest prolonged reporting and employer submission times are steadily decreasing. This may indicate an increased awareness of the benefit of prompt disclosure and treatment on the part of employees and employers. However, prolonged compensation payment times increased over the same period of time, even after adjustment for differences in the type of claims submitted and other demographic changes in the claimant population over the study time period. As previously mentioned, prolonged payment times represent a lack of punctuality in the claims adjudication and start of WR process. This period could prove particularly stressful for an IW who has promptly reported their injury and has met all the requirements of claim submission, within the legislated timeframes. In turn, this stress could impact on the IWs recovery, thus delaying their RTW and prolonging their period of compensation<sup>41, 42</sup>. Therefore, despite, steady reductions in prolonged reporting and employer submission times, the adjudication process is still taking the most time. This trend is particularly pronounced among IWs with mental diseases, the recovery from which may be even more adversely affected by prolonged adjudication<sup>41-43</sup>.

Whilst different factors were associated with each prolonged processing time, only being female (compared to male) was consistently associated with prolonged reporting, employer submission, and payment times, and having a mental injury claim was associated with prolonged injury reporting and compensation payment times. This finding persisted following adjustment for injury type. Being female was most strongly associated with a prolonged time to compensation payment, which may occur as their claims are considered more contestable. For example, injuries reported by female workers are more likely to be regarded as “complaining”, “malingering”, or to have occurred as a result of female-specific health behaviours, such as less physical strength, as opposed to preventable work-related conditions<sup>28, 29</sup>. Female workers are also more likely to have an injury attributed to a non-work/personal factor than male workers<sup>30</sup>. This is potentially attributable to the fact that

women are more likely responsible for potentially, physically demanding household and caregiving duties outside of work, making it more difficult for female IWs to discern for themselves, and prove to their employers and claim adjudicators, that their injury is work-related<sup>28</sup>. Further, the occupations with the highest perceived physical demands, and thus the greatest risk of injury, are more often carried out by men, thus reducing the contestability of claims made of male workers. Conversely, as the occupations with a greater representation of female workers are believed, accurately or not, to be less physically demanding, work-related injury is more heavily scrutinised. This may support Chung et al's<sup>28</sup> suggestion for a change in the "definition of the source of women's health problems, from general life conditions or their physiology to hazardous working conditions, which requires gender sensitivity". Therefore, relying solely on a job title as a proxy for exposure in the judgement of work-relatedness of female workers' injuries may introduce inaccuracy and bias, and reduce the chances of a related claim being accepted, particularly as men and women often do different work, or experience the same work duties differently, within the same occupational group.

The strong association between payment delays and mental injuries suggests, unlike physical injuries, when it comes to demonstrating the workplace is the substantial cause for the injury, mental injury claims can be more complex and difficult to adjudicate. That is, multiple factors may have contributed to the development of a psychological injury, and work must be determined as one significant contributing factor to the psychological injury, an investigation which may prolong the adjudication process. Because of the extra time commonly required to establish the work-relatedness of female IWs injuries and mental injuries, these IWs may maintain the sick role and focus on their injury as opposed to their recovery and RTW<sup>44</sup>. The IWs may feel as though they must stay "injured" throughout the longer period of adjudication in order to increase the chances of the claim being deemed eligible for compensation. Further, the longer adjudication period could be interpreted by the IW as distrust from their employer and the system, affecting to the employer/employee relationship and further decreasing the likelihood of them attempting to RTW; an idea supported by the fact that these effects remain beyond the presence of a healthcare delay. In short, the negative effects of taking extra time to assess these claims made by female IW and those who've incurred a mental injury could prolong WR duration and lead to poorer RTW outcomes.

A notable strength of this study is the use of a large administrative dataset, which provided claims from diverse industries and occupations, and with a variety of injury types. This diversity extends to the demographic factors associated with the included claims. Overall, compensation data is a unique resource that can enable examination of population-based personal injury claims and payment records, arising from workplace accidents or other compensable conditions<sup>35</sup>. Further, the CRD uses standard coding systems which are consistent with other jurisdictions in Australia and can be mapped to international classification systems<sup>35</sup>. Therefore the findings of this study should be generalizable to a broad range of claimants and their employers both locally and internationally.

While the coverage of the administrative data is a strength, the number of potential confounders that are collected as part of the claim process is restricted, which limits the ability to adjust for a variety of confounders. It is possible that potentially important confounding variables, which could provide some insight into the relationship between prolonged processing times and duration of WR, as well as other potential correlates of prolonged processing times, would have strengthened the results of this study, if available. For example, this study was unable to investigate the influence of attitudes to injury and illness within the workplaces, the IWs relationship with their employer, and objective and psychosocial indicators of job quality such as casual, precarious employment or shift work and the IWs assessment of job security, job demands and control, respectively<sup>45-47</sup>.

Further, the use of administrative data limits our ability to determine why these prolonged processing times have occurred, if informal reporting of injuries had occurred between employees and employers prior to the submission of a formal workers' compensation claim, or if workers were continuing to be paid by their employer while the adjudication process was taking place. Finally, the information available to determine the time period for adjudication and start of WR was limited in the available data, as are specific time frames for when workers in Victoria can expect WR to start, following claim adjudication. It is also possible that employers may continue to pay the wages for workers, beyond the 10 days that they are required to. As a result, for some workers who experience a prolonged time between claim submission and WR start, may not have a cessation in employment income. In each case these factors would lead to misclassification of our primary exposure variables and as a result the impact of prolonged processing times reported in this paper may be underestimated.

The findings of this study have shown taking longer than three days to report any type of work-related injury to an employer has a dose-response relationship with an IW going on to accumulate at least 52 weeks of WR and therefore delayed RTW. This information is of particular importance to employers and insurers who may consider encouraging IWs who are considering filing a claim to do so earlier via the implementation of benchmarks of no later than 2 weeks after they have incurred and/or report their injury. For an IW reporting after two weeks the chances of reaching the 52-week milestone has already increased by over 20%. The same can be said about the prolonged employer submission, but rather than implementing a two week benchmark, workers compensation schemes could reinforce to employers the importance of meeting claim submission requirements within the legislated timeframes. Further, the quality of the primary adjudication, or the decisions made by the scheme after the employer has lodged the claim, are highly influential on other elements of scheme performance, and IW recovery<sup>7</sup>. This is why the majority of workers' compensation schemes use a measure of time elapsed between injury and notification as an indicator of the scheme's performance in providing benefits to workers in a timely manner. As a result, schemes may benefit from implementing a more ambitious target in terms of increased number of IWs returning to work and ceasing to receive WR payments. Such changes have the potential to reduce the considerable costs currently being shouldered by both employers and workers' compensation schemes.

This study revealed a cumulative impact of prolonged times to injury reporting, employer submission and adjudication and starting wage replacement payments and an increased probability of accumulating 52 weeks of WR. Focusing on specific time windows, the greater odds of accumulating 52 weeks of WR. Therefore, across all types of injury, the odds of reaching this costly 52-week WR milestone may be reduced by focusing on both earlier reporting, and timelier claim adjudication and receipt of WR payments. Different socio-demographic/economic, occupational and injury-related factors were associated with longer time periods for each part of the claim submission and adjudication process. However, female claimants were consistently likely to experience prolonged times at each stage of the claim reporting and adjudication and compensation process, and are likely to benefit in terms of earlier RTW from interventions to make the reporting and adjudication process more efficient. Further, as all three prolonged processing times are potentially preventable via interventions targeting different factors at different stages in the claims

process, tailored interventions could promote appropriately timed RTW and thus reduce the number of long-term compensation claims.

ACCEPTED

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Figure 1. Categorized times to reporting, employer submission, compensation payment, and first access to healthcare by percentage of claims. Prolonged times coloured grey.



Table 1. Distribution of all claims 2007-12 by socio-economic, demographic, work and organisation, and injury-related factors.

	<b>All claims 2007-2012 (N=71,607)</b>	
	<b>n</b>	<b>%</b>
<b>AGE</b>		
15-24 years	7677	10.7
25-34 years	12421	17.4
35-44 years	17209	24.0
45-54 years	20360	28.4
55+ years	13940	19.5
<b>SEX</b>	<b>n</b>	<b>%</b>
Male 471	55	65.9
Female 244	52	34.1
<b>OCCUPATIONAL PHYSICAL DEMANDS</b>	<b>n</b>	<b>%</b>
Limited (handling loads <=5kg	21284	29.7
Light (handling loads >=5 but <10kg)	19977	27.9
Medium (handling loads >=10 and <=20kg)	22387	31.3
Heavy (handling loads >20kg)	7959	11.1
<b>INDUSTRY<sup>#</sup></b>	<b>n</b>	<b>%</b>
Manufacturing 244	10	34.1
Primary Industry	2958	4.1
Construction 9	475	13.2
Retail 6	102	8.5
Public administration	4580	6.4
Education and Training	3976	5.6
Healthcare, social assistance	10638	14.9
Other service industries	9468	13.2
<b>WORKPLACE SIZE</b>	<b>n</b>	<b>%</b>
Small 211	30	29.5
Medium 288	74	40.3
Large 148	88	20.8
Government	6715	9.4
<b>INJURY TYPE</b>	<b>n</b>	<b>%</b>
Chronic MSK	27789	38.8
Intracranial, spinal cord	450	0.6
Fractures 9	022	12.6
Wounds, amputations, burns	11676	16.3
Traumatic MSK	10860	15.2
Other traumatic injury	948	1.3
Mental diseases	6962	9.7
Other chronic conditions	3900	5.5
<b>YEAR OF CLAIM</b>	<b>n</b>	<b>%</b>
2007 117	22	16.4
2008 123	75	17.3
2009 114	99	16.1

2010 121	21	16.9
2011 120	16	16.8
2012 118	74	16.5

\*IRSAD=Index of Relative Socio-economic Advantage and Disadvantage,  
ARIA=Accessibility/Remoteness Index of Australia.

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Table 2. Logistic regression models for covariates predicting prolonged time to reporting, employer submission, and payment.

Age	Reporting Time			Employer Time			Payment Time		
	Adj. OR*	95% CI		Adj. OR*	95% CI		Adj. OR*	95% CI	
35-44 years	1.00			1.00			1.00		
15-24 years	<b>0.85</b>	<b>0.79</b>	<b>0.92</b>	1.00	0.94	1.08	<b>0.84</b>	<b>0.79</b>	<b>0.89</b>
25-34 years	<b>0.89</b>	<b>0.83</b>	<b>0.94</b>	1.06	0.99	1.12	<b>0.92</b>	<b>0.87</b>	<b>0.97</b>
45-54 years	<b>1.09</b>	<b>1.03</b>	<b>1.12</b>	1.00	0.95	1.06	1.01	0.97	1.05
55+ years	<b>1.14</b>	<b>1.07</b>	<b>1.20</b>	1.00	0.95	1.07	1.04	0.99	1.09
Sex	Adj. OR*	95% CI		Adj. OR*	95% CI		Adj. OR*	95% CI	
Male	1.00			1.00			1.00		
Female	<b>1.08</b>	<b>1.03</b>	<b>1.14</b>	<b>1.08</b>	<b>1.03</b>	<b>1.14</b>	<b>1.19</b>	<b>1.14</b>	<b>1.24</b>
Physical demands	Adj. OR*	95% CI		Adj. OR*	95% CI		Adj. OR*	95% CI	
Limited	1.00			1.00			1.00		
Light	0.97	0.92	1.03	1.02	0.97	1.08	1.02	0.98	1.06
Medium	<b>0.90</b>	<b>0.85</b>	<b>0.95</b>	1.03	0.97	1.09	<b>0.89</b>	<b>0.85</b>	<b>0.93</b>
Heavy	0.94	0.87	1.01	1.01	0.94	1.09	0.97	0.92	1.03
Industry	Adj. OR*	95% CI		Adj. OR*	95% CI		Adj. OR*	95% CI	
Manufacturing	1.00			1.00			1.00		
Primary Industry	0.98	0.88	1.10	<b>1.12</b>	<b>1.02</b>	<b>1.24</b>	0.96	0.88	1.04
Construction	<b>1.11</b>	<b>1.04</b>	<b>1.19</b>	<b>1.11</b>	<b>1.05</b>	<b>1.19</b>	<b>0.91</b>	<b>0.86</b>	<b>0.96</b>
Retail	1.03	0.96	1.12	<b>1.26</b>	<b>1.17</b>	<b>1.35</b>	0.99	0.94	1.06
Public admin	0.94	0.84	1.04	<b>1.25</b>	<b>1.12</b>	<b>1.40</b>	<b>0.89</b>	<b>0.83</b>	<b>0.97</b>
Education and training	1.05	0.95	1.17	1.39	1.25	1.55	<b>0.72</b>	<b>0.66</b>	<b>0.78</b>
Health, social assist.	<b>0.68</b>	<b>0.63</b>	<b>0.73</b>	0.97	0.89	1.05	<b>0.84</b>	<b>0.78</b>	<b>0.88</b>
Other service industries	1.02	0.95	1.09	<b>1.09</b>	<b>1.02</b>	<b>1.16</b>	<b>0.88</b>	<b>0.84</b>	<b>0.93</b>

<b>Workplace size</b>	<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>	
Small	1.00			1.00			1.00		
Medium	<b>0.79</b>	<b>0.75</b>	<b>0.83</b>	<b>0.86</b>	<b>0.82</b>	<b>0.89</b>	<b>1.18</b>	<b>1.14</b>	<b>1.24</b>
Large	<b>0.77</b>	<b>0.73</b>	<b>0.82</b>	<b>0.45</b>	<b>0.42</b>	<b>0.48</b>	<b>1.45</b>	<b>1.39</b>	<b>1.52</b>
Government	<b>0.74</b>	<b>0.67</b>	<b>0.82</b>	<b>0.40</b>	<b>0.35</b>	<b>0.44</b>	<b>1.25</b>	<b>1.16</b>	<b>1.35</b>
<b>Injury</b>	<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>	
Chronic MSK	1.00			1.00			1.00		
Intracranial 0.78		0.60	1.00	<b>0.73</b>	<b>0.56</b>	<b>0.95</b>	<b>0.80</b>	<b>0.66</b>	<b>0.97</b>
Fractures	<b>0.50</b>	<b>0.47</b>	<b>0.54</b>	<b>0.82</b>	<b>0.77</b>	<b>0.88</b>	<b>0.56</b>	<b>0.54</b>	<b>0.59</b>
Wounds etc.	<b>0.59</b>	<b>0.56</b>	<b>0.64</b>	0.96 0.90		1.01	<b>0.65</b>	<b>0.62</b>	<b>0.68</b>
Traumatic MSK	<b>0.85</b>	<b>0.80</b>	<b>0.90</b>	<b>0.92</b>	<b>0.86</b>	<b>0.97</b>	1.01 0	.97	1.06
Other traumatic	0.90	0.76	1.07	<b>0.77</b>	<b>0.64</b>	<b>0.92</b>	0.89 0	.78	1.02
Mental	<b>1.20</b>	<b>1.12</b>	<b>1.29</b>	<b>0.76</b>	<b>0.70</b>	<b>0.82</b>	<b>1.40</b>	<b>1.32</b>	<b>1.48</b>
Other chronic	<b>1.20</b>	<b>1.10</b>	<b>1.30</b>	<b>0.80</b>	<b>0.73</b>	<b>0.88</b>	<b>1.79</b>	<b>1.67</b>	<b>1.92</b>
<b>Year of claim</b>	<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>	
2007	1.00			1.00			1.00		
2008 1.01		0.95	1.09	<b>1.09</b>	<b>1.02</b>	<b>1.16</b>	1.00 0	.95	1.06
2009 1.01		0.94	1.08	0.97	0.91	1.04	0.99 0	.95	1.05
2010 0.94		0.88	1.01	0.95	0.88	1.01	<b>1.37</b>	<b>1.31</b>	<b>1.45</b>
2011 0.98		0.91	1.05	0.97	0.90	1.03	<b>1.82</b>	<b>1.73</b>	<b>1.92</b>
2012 1.02		0.95	1.09	<b>0.85</b>	<b>0.79</b>	<b>0.91</b>	<b>1.32</b>	<b>1.25</b>	<b>1.39</b>
<b>IRSD</b>	<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>	
Deciles 9 & 10 (top 20%)	1.00			1.00			1.00		
Deciles 1 & 2 (bottom 20%)	0.95 0	.89	1.02	0.98	0.91	1.05	<b>0.92</b>	<b>0.87</b>	<b>0.97</b>
Deciles 3 & 4	0.98	0.92	1.05	1.01	0.94	1.0	<b>0.92</b>	<b>0.88</b>	<b>0.97</b>

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Deciles 5 & 6	0.94	0.88	1.00	1.01	0.95	1.08	<b>0.94</b>	<b>0.89</b>	<b>0.98</b>
Deciles 7 & 8	0.94	0.88	1.00	0.97	0.91	1.04	<b>0.91</b>	<b>0.87</b>	<b>0.96</b>
<b>Accessibility/ Remoteness</b>	<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>		<b>Adj. OR*</b>	<b>95% CI</b>	
Urban	1.00			1.00			1.00		
Inner Regional	<b>0.92</b>	<b>0.88</b>	<b>0.97</b>	<b>0.94</b>	<b>0.90</b>	<b>0.99</b>	<b>0.88</b>	<b>0.85</b>	<b>0.91</b>
Outer Regional/Remote	<b>0.88</b>	<b>0.80</b>	<b>0.97</b>	<b>0.91</b>	<b>0.83</b>	<b>1.00</b>	<b>0.85</b>	<b>0.79</b>	<b>0.91</b>

\*Adjusted for age, sex, occupational strength demands, industry, workplace size, injury type, year of incapacity and ARIA (Accessibility/Remoteness Index of Australia), IRSAD (Index of Relative Socio-economic Advantage and Disadvantage)

Table 3. Logistic regression models for delays predicting 52 weeks of WR.

Reporting Time	Model 1	95% CI		Model 2	95% CI				
		+/-3 days	<b>1.00</b>				<b>1.00</b>		
4-10 days	1.07	1.01	1.13	1.07	1.02	1.14			
11-14 days	1.15	1.07	1.23	1.13	1.05	1.21			
15-30 days	1.22	1.15	1.29	1.16	1.09	1.24			
31-90 days	1.52	1.43	1.63	1.37	1.28	1.46			
91+ days	2.43	2.23	2.65	2.01	1.84	2.19			
<b>Model Fit</b>	$\chi^2(5) = 542.3, p < 0.0001$			$\chi^2(5) = 285.3, p < 0.0001$					
Employer Submission Time	Model 1	95% CI		Model 2	95% CI		Model 3	95% CI	
		0-3 days	<b>1.00</b>					<b>1.00</b>	
4-10 days	0.96	0.92	0.99	0.97	0.93	1.00	1.02	0.97	1.06
11-14 days	1.02	0.95	1.09	1.00	0.93	1.08	1.06	0.98	1.14
15-30 days	1.02	0.94	1.11	0.97	0.89	1.06	1.01	0.93	1.10
31+ days	0.99	0.88	1.13	0.98	0.86	1.11	1.01	0.88	1.15
<b>Model Fit</b>	$\chi^2(4) = 7.45, p = 0.12$			$\chi^2(4) = 3.13, p = 0.54$			$\chi^2(4) = 2.19, p = 0.71$		
Payment Time	Model 1	95% CI		Model 2	95% CI		Model 3	95% CI	
		0-30 days	<b>1.00</b>					<b>1.00</b>	
31-44 days	1.45	1.38	1.53	1.31	1.24	1.39	1.30	1.23	1.38
45-90 days	1.43	1.36	1.49	1.29	1.23	1.36	1.26	1.20	1.33
91+ days	1.37	1.30	1.45	1.17	1.10	1.23	1.09	1.03	1.15
<b>Model Fit</b>	$\chi^2(3) = 280.5, p < 0.0001$			$\chi^2(5) = 125.9, p < 0.0001$			$\chi^2(5) = 120.9, p < 0.0001$		

**Model 1** = unadjusted model; **Model 2** = Adjusted for age, sex, IRSAD, ARIA, industry, minimum occupational strength requirements, skill level, workplace size, year of incapacity, injury type, healthcare delay; **Model 3** = also adjusted for preceding delays

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Table 4. Logistic regression models for delay times predicting 52 weeks of WR.

Number of Prolonged Processing Times	N (%)	Model 1*	95%CI		Model 2*	95%CI	
<b>0 Prolonged Processing Times</b>	27568 (38.5)	1.00					
<b>1 Prolonged Processing Time</b>	30885 (43.1)	1.10	.05	1.15	1.05	1.00	1.10
<b>2 Prolonged Processing Times</b>	11965 (16.7)	1.32	.25	1.39	1.24	.16	1.32
<b>3 Prolonged Processing Times</b>	1188 (1.7)	1.47	1.28	1.68	1.43	.23	1.66
<b>Model Fit</b>		$\chi^2(3) = 113.5,$ $p < 0.0001$			$\chi^2(3) = 61.4,$ $p < 0.0001$		

\* Model 1 = adjusted for age, sex, IRSAD, ARIA, industry, workplace size, minimum occupational strength requirements, injury type, year of incapacity; Model 2 = additionally adjusted for healthcare delay