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Development of a Standardised Measure of Return-to-Work in Workers' Compensation

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Abstract

This paper describes an ongoing project to measure the success of schemes in actually returning injured workers to work - as opposed to measuring whether the injured worker has simply ceased to receive benefits. Workers Compensation schemes aim to help injured workers while off work and get them back to work. Historically, success of a scheme was measured by financial outcomes, such as average claim cost. This is recognised as being inadequate: schemes need to know how they are performing in achieving genuine return-to-work. However, there is no agreed methodology to measure this.

We discuss the need for a standardised measure of RTW by reviewing the merits and limitations of the existing measures from past studies. We propose approaches to analysing claims and survey data and outline potentially useful standardised measures. Further developments await the arrival of the data from the providers.

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Keywords : Return-to-work, WC schemes, survival analysis, multiple-state modeling.

1 Introduction

Workers' Compensation (WC) schemes provide injured workers with financial benefits while unable to work and aim to assist them to return to work (RTW). The sooner an injured worker returns to their former full time duties the sooner benefits cease.

One measure of the success of a scheme is the time it takes an injured worker to RTW and to cease receiving benefits. This has been a major area of interest for researchers for at least 30 years.

The question remains, what does RTW mean? This term has been used interchangeably to define outcomes ranging from the claimant performing paid work duties to the claimant performing their pre-injury duties, without recurrences of their past injuries and experiencing physical, mental, social and financial well-being. The following definitions of RTW have been used:

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- **First RTW.** The claimant has made a first return to paid work, whether this may be the same level or type of duties as their pre-injury duties.
- **Durable RTW (DRTW).** The claimant has made a return to paid work and has continued their duties without further interruptions. Again, this does not consider the nature of the duties.
- **Temporary RTW.** Any non-durable RTW outcome.
- **Partial RTW.** The claimant has made a return to paid work. However, for reasons such as change of duties or residual injuries, their post-return salary is less than their pre-injury salary. So, schemes have to supplement this shortfall with “top-up” benefits.
- **Successful RTW.** The claimant has achieved the highest possible stable level of recovery and is now working with the same employer in their pre-injury duties. Furthermore, the claimant is experiencing satisfaction with all aspects of life. This paper defines this as **stable recovery** and this term will be used from this point to represent successful RTW.

Past studies have summarised a measure of RTW, such as the probability of RTW or duration to RTW without referring specifically to an outcome. Interest centres on stable recovery, rather than just at the resumption of work duties at a performance level that best matches their skills and residual work disability without further work interruptions on account of the injury. We wish to emphasise the difference between defining RTW and stable recovery. The former focuses on the financial and employment aspect, that of the claimant being back at work and not receiving injury benefits.

However, not all claimants recover meaning allowances have to be made to prevent measuring bias. Focus should be placed on measuring the claimant’s stable health outcome. A suitable approach of measuring scheme performance is the “Time To Stable Health” (TTSH). However, obstacles have to be overcome in the performance measurement process because of data reliability and differences in scheme design, claimant characteristics, etc. A standardised measure that accounts for such differences is desirable as this allows for better practices in data collection and increased comparability across schemes. In turn, this provides scope for more effective rehabilitation measures and policy-setting.

The aim of the project described in this paper is to combine the merits of existing RTW measures and develop a standardised TTSH measure. The standardised measure will be tested and verified using claims and appropriate supplementary data such as surveys on claimants and employers. Various definitions of RTW are investigated, with a view of including the desirable features into defining stable health. Our focus is on the claimant's long-term health status, using the claimant's full history in the recovery process.

Analysis of the data will be implemented using a survival regression model framework. This aims to identify and quantify the major factors that determine the achieved stable recovery outcome and how their impact differs across schemes, claimants' occupation and personal characteristics, including type of injury or illness. The coefficients from the fitted survival model form a basis for standardisation, adjusting for differences across claimants so progress to stable recovery is more readily compared. Claims data will be provided by the Heads of WC Authorities (HWCA).

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The focus of this paper is to describe the background to the problem and argue for a standard TTSH measure and discuss the approaches that can or have been used. Modeling and data analysis are described in general terms, as no data has as yet been provided.

The further sections of this paper are structured as follows. The next section outlines the Australian institutional framework for delivering WC. Section 3 discusses the reasons for measuring health stability and the associated complications. Section 4 reviews the developments to date in measuring RTW and identifies areas that need further refinement. Section 5 presents our proposed approach to defining and measuring health stability. Section 6 discusses the sources of data to be used in our project. Section 7 outlines the model structure and the steps we plan to take in the analysis stage. Section 8 reviews the challenges that the project faces and how they may hinder the project.

2 Workers' Compensation in Australia

Each Australian state and territory operates its own WC scheme. In addition, the Australian Federal government has a WC scheme for its public servants (Comcare) while large private sector companies (such as Telstra) are self-insured. All schemes operate under their own regulations; have their own premium rates, levels of benefits, exclusion conditions and other rules. HWCA oversees and coordinates activities across all the schemes and comprises of the managing directors of each scheme.

All 10.3 million Australian employees (ABS, 2006) are covered by a WC scheme. The business is huge – the cost of claims exceeds \$6bn per annum, a significant component of the Australian GDP.

The myriad of schemes with their individual rules and regulations hampers comparability across schemes. These differences also hamper the identification of effective practices in one scheme that can be usefully applied elsewhere. Schemes have different approaches to collecting, presenting and summarising WC data. This creates further difficulties as non-comparable data can lead to misleading interpretations and unwarranted conclusions. The motivation of this project is to circumvent these difficulties to develop standardised measures not bound by scheme design, rules or regulations, or data collection issues.

3 Measuring time to stable health and its complications

Getting an injured worker fully recovered and back to work is beneficial to both the claimant and those paying WC benefits. The sooner the claimant is back at stable employment the sooner the WC benefits cease. Claimants are often paid a reduced level of payment while out of work so for them RTW is also financially beneficial. There are also social and psychological benefits – most claimants dislike at least long absences from work. The TTSH

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measure aims to capture the claimant working under stable arrangements and incorporate physical, emotional and social well-being.

In an ideal world there are no workplace injuries and hence there is no need to measure RTW or health stability. The next best thing is where injured employees are off work for a limited time and then return to permanent full time employment in their pre-injury occupation at their original level of performance. While off work they receive an agreed amount of compensation. In this environment RTW is directly related to paid worker compensation and given the rate of payment, it is a simple matter to infer the duration to RTW once the worker has in fact returned to work.

TTSH focuses on a stable outcome. Such outcome is not known till the injured worker actually returns to work on a sustainable basis and has regained their physical, social and emotional well-being. At any point of time only those who have achieved stable recovery contribute to the TTSH measure. This argues for “waiting” a suitably long time for all to have achieved a stable recovery (or be classified as unable to achieve stable recovery) and then measuring TTSH. However, the longer the wait, the less relevant and timely are the resulting conclusions. Hence, a “snap-shot” approach where all those still making a recovery at a particular point of time may be suitable. But this also suffers from disadvantages because the resulting sample is heavily biased towards the longer term work disabled and discards recent other “snapshots.” Thus in an idealised world there are complications to measuring TTSH.

In practice further complications arise:

- At any point of time a claimant's length of time to return to work is not known. Hence their TTSH is unknown. The claimant may never recover. For example, a claimant may retire while receiving benefits. In this situation it cannot be inferred the scheme is ineffective in assisting them achieve a stable recovery outcome.
- The health of the claimant and their observed RTW outcome is not an all-or-nothing event. For example, previous claimants may experience injury relapses and resume receiving injury benefits. Similarly, returned workers can experience further gradual health improvements.
- Returning workers do not always recover to the extent where they can work at their pre-injury capacity. Claimants may depart to another employer with their previous employer incurring recruitment and training expenses. These examples illustrate less than ideal outcomes.
- Each WC scheme has its own specialized data collection system. These systems are often related to financial control relating to WC payments. They are generally not set up to capture non-financial information relevant to a proper appreciation of TTSH. For example, in South Australia claims remain “open” even if a claimant makes a stable medical recovery. Data gathering systems imperfectly measure partial RTW or recovery and do not measure psychosocial aspects of the recovery process.
- WC schemes record information differently and in a non-uniform manner. Reasonable TTSH proxies for one scheme may be inadequate for another.
- WC schemes have distinct rules for paying compensation different rates of payments and the benefit periods. Studies show claimants in schemes paying more generous benefits

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take longer, on average, to achieve RTW (Meyer et al, 1990). Scheme design thus influences claimant behaviour, complicating comparisons across schemes.

4 History of measuring time to return to work

The past 30 years has seen extensive research into the duration of work disability (DOWD), and the effects of scheme benefits on claimants. DOWD measures the length of time the claimant spends off work before returning to work. The traditional definitions of RTW refer mainly to the financial outcomes such as the amount of injury benefits being paid to the claimant and whether they are currently working. Over time, the definition began to expand towards defining recovery, as the focus shifted towards the durability of RTW, the claimant's perceptions and motivation to their work and social life.

This section deals with developments in measuring DOWD, DRTW and the importance of surveys in supplementing research studies in this area.

From our review of cross-sectional studies, we identify the importance of standardising the results across different groups. Our section concludes with a review of the Australian and New Zealand National Return-to-Work Monitor, published by Campbell Research & Consulting that reports on the relative rates of claimants returning to work in each state scheme.

Existing studies into RTW and its impact on WC schemes are mainly based in USA and Canada, with some studies were performed on claimants in the Netherlands (Joling et al, 2004; Lötters et al, 2005; Faber et al, 2006). Australia has recently begun performing studies into RTW, namely the National RTW Monitor by Campbell Research & Consulting and the joint study by PWC and WorkCover NSW in 2003 (PWC, 2003).

4.1 Duration of work disability (DOWD)

Studies in Johnson et al (1979), Fenn (1981) and Johnson et al (1990) focused on identifying the factors that affect the DOWD and disincentives for RTW resulting from the level of benefits paid by schemes. These studies measured the duration as the length of time between the onset of injury or first day of work absence due to work injury to the time when the claimant first returns to work.

However, Butler et al (1995) performed a study on a large sample of Canadian workers who suffered permanent partial work injuries over a 13 year period and found that reporting the first RTW as a real or successful RTW underestimates the true value of the length of time

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taken to fully RTW by at least 25%. The study has been recognised as a milestone paper and many studies now consider **durable** RTW (DRTW) as an indicator of stable recovery. DRTW is defined as the claimant working for an extended period after the most recent RTW. DRTW has been differently defined in various studies. For example, Galizzi & Boden (1996) defined DRTW as the claimant being continuously at work for at least 3 months since their initial RTW; the PWC study (2003) defined it in terms of whether the claimant reported him/herself to be at work all of the time, most of the time or none of the time, while Fox et al (2005) defined DRTW as the claimant being continuously at work for at least 1 month since their

initial RTW. However, some studies since the Butler et al paper (Evanoff et al, 2002; Pransky et al, 2004; Gillen et al, 2004; Joling et al, 2004) made no accommodation for DRTW, preferring to measure duration to first RTW. Krause et al (2001a) identified this as a key challenge for further research and how clearly defined RTW outcomes that accommodate the different stakeholders in their decision making process will allow DRTW to be better employed as a performance measure for workers' compensation schemes.

4.2 Measuring DOWD using survey data

While DOWD has long been the key performance measure for workers' compensation schemes, in the previous decade researchers began to question to initial approach to measuring DOWD using claims data. Claims data was predominantly the sole data source used in determining DOWD during the 1970's and 1980's although survey data was employed in a few studies during this time. It was only in 1999 that the role of survey data in enhancing the measurement of DOWD and other aspects of recovery was officially recognised.

A composite study by Dasinger et al (1999) and Krause et al (1999) compared various measures for DOWD. Prior to this composite study, researchers used different types of measures without referring to the inherent differences, merits or limitations. This study also found the claims data underestimated the true DOWD compared to self-reported duration, determined using telephone surveys on the claimants. Evanoff et al (2002) found that the claims database is accurate in measuring the initial DOWD, but underreports the total DOWD as stated in the claimant's medical record. The study also concluded that the true extent of the post-injury quality of life, important in defining the achieved stable recovery outcome, cannot be found in the claims database. Given that over time the definition of RTW has steered towards recovery in terms of health, social well-being and functional capacity, we endorse using surveys to extract more information regarding the claimant's health, functional limitations and perceptions on life.

4.3 Developments in defining recovery

Melles et al (1995) first recognised the need for a suitable definition for successful RTW requires the capture of “key benefits” of different stakeholders (quoted from Krause et al, 2001a). Developing a suitable measure that satisfies all the stakeholders can be difficult since their interests conflict. This issue was also raised by the representatives of the different state WC schemes in Australia during an annual meeting hosted by Campbell Research and Consulting on reviewing the Australian and New Zealand RTW Monitor. Studies have shown that social costs (the emotional cost for the claimant and their immediate family, the costs

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borne by the employer for recruitment and retraining purposes and the economic cost of lost productivity) often exceed the financial costs as recorded in the claims data. In other words, what the industry aims to measure is in fact the claimant's stable recovery outcome, rather than just RTW outcomes.

Galizzi & Boden (1996), Krause et al (2001b) and Evanoff et al (2002) suggest traditional RTW measures are limited in perspective and underestimate the true costs associated with the recovery process, as they focused predominantly on DOWD and the claims cost. More recent studies assessed the extent to which non-financial measures, such as functional capacity evaluations (FCE), psychosocial factors, post-injury health and mental outcomes enhance the outcome determined using traditional RTW measures (Krause et al, 2001b; PWC, 2003; Pransky et al, 2005; Ferguson et al, 2005 and Faber et al, 2006). We discuss FCE below as this concept has recently become a main area of interest due to its potential in explaining the stability and level of recovery. Since FCE is currently undergoing development and refinement, we can only speculate on its application in our project.

In the past few years, researchers have suspected the limitations of using RTW as an indicator of health stability for claimants suffering low back injury. Given that most claimant's injuries reduce their physical function, recovery should be measured according to the amount of limitations in their physical function instead. FCE measures the extent of the claimant's recovery in terms of the claimant's ability to perform certain actions after having sustained work injuries. Assessment tools that measure the claimant's functional limitation, motivation at work and other lifestyle factors have been developed over the past decade (Ren et al, 1999; Pransky et al, 2002b; PWC, 2003; Faber et al, 2006 and Gross & Battié, 2006). While extensive work have been performed in developing a more effective FCE, the association between functional limitations and RTW is still not fully mapped out (Faber et al, 2006). We still need to ascertain whether the claimant's functional capacity alone leads to the claimant's RTW or that lifestyle factors also contribute to the outcome. Only if the claimant's overall health and lifestyle are reported to be satisfactory can we conclude that they have fully recovered.

While functional capacity has a potential to measure the claimant's level of recovery at a given point in time, full recovery depends on their health stability. However, current studies have only started to recognise this issue. Lötters et al (2005) performed a study on claimants from the Dutch work health service register suffering from musculoskeletal disorders (MSDs) to determine how improvements in pain perception and functional disability are associated with the time of RTW and also after they have been working for a period of time. A notable conclusion from this study is that there is evidence showing that claimants who initially return to work still experience significant improvements in their health and functional capacity over time. That is, the recovery process does not cease upon RTW. Another conclusion from this study is that medical and psychosocial factors are necessary in explaining the claimant's recovery. While the study focused on a particular group of claimants, we believe that measuring health stability is superior to simply measuring RTW for the claimant.

4.4 Assessing performance across schemes and industries

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Previous studies, most notably by Galizzi & Boden (1996), Krause et al (2001b), Evanoff et al (2002), PWC (2003), Gillen et al (2004), Joling et al (2004), Krause et al (2004) and Fox et al (2005) identified a myriad of determinant factors that influence DOWD and other measures of RTW success, as well as quantifying the size and direction of the association. To date, no studies have attempted to standardise the results based on the inherent differences in the claimants' characteristics. Existing cross-sectional studies that include the general claimant population only reported the aggregate results, meaning direct comparison between claimants from one group with another is not appropriate.

Researchers agree that claimants suffering from more severe chronic back injury spend longer time on injury benefits than those who suffer minor burns, sprains and abrasions from workplace accidents. For example, Butler et al (1995) observed that claimants suffering from low back pain face the risk of having recurrences of their workplace injuries, meaning that their first RTW does not equate to achieving a stable recovery outcome. However, Seland et al (2006) did not account for recurrences of injuries in their study on claimants suffering from ankle or wrist injuries, because recurrences among these claimants are rare and hence statistically insignificant. If a study is performed across the general claimant population, a suitable approach to measuring TTSH must account for the inherent difference in the pattern of recovery for the different injury groups.

Traditional approaches to analysing claimants conclude that older claimants take longer to recover than younger claimants. Furthermore, claimants who suffer from chronic injuries (DOWD greater than thirty days) are less likely to make an early recovery compared to those with acute injuries (DOWD less than thirty days). Two recent studies used age and disability phase-specific analysis and the conclusion was that the absence of such analyses distorts the observed association between the determinant factors and the probability of RTW and DOWD (Krause et al, 2001b; Pransky et al, 2005). The studies observed that the existing beliefs about the recovery patterns of claimants of different ages and in a different injury phase were not valid as a direct comparison ignored the relative difference in their respective recovery process.

As mentioned in this section, existing cross-sectional studies have not attempted to standardise the results. However, we do recognise that index models have been developed in this area and some of these models warrant further investigation in the future. For example, standard risk index models, such as that employed by Folkard et al (2006) in modelling the impact of long work hours on the incidence of workplace accidents and injuries, may be used to compare outcomes across claimants with different characteristics. We briefly discuss our proposed method in Section 5.

4.5 The Australian and New Zealand RTW Monitor

Currently, Campbell Research and Consulting publishes the Australia and New Zealand Return-to-Work Monitor on behalf of the HWCA. This is an ongoing study that attempts to provide a more detailed picture of what happens to claimants after their recovery from their workplace injuries. Two surveys are carried out each year, in May and November, on a sample of claimants from every state scheme (with the exception of Western Australia). The

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final sample selected for the study is adjusted based on the estimated population of claimants from each state. RTW is defined as full, partial and no RTW, depending on the level of post-injury income and injury benefits received since returning to work, and durable and non-durable RTW, depending on whether the claimant who has already returned to work has remained at work at the time of the survey.

A clear merit of the Australia and New Zealand Return-to-Work Monitor is the consideration of the claimant's durability of RTW, post-RTW employer, occupation and the claimant's perception of the RTW process, factors which contribute to the claimant's extent of recovery. The RTW Monitor demonstrates good practice of how such data can be collected and analysed. Results are reported in a table, detailing how the claimants respond to each question (measured as a percentage). In addition, the survey has a high response rate, meaning the data collected is likely to be reliable. The study's limitations, however, include the separation of durability and extent of RTW, not defining different partial RTW outcomes and non-rigorous statistical data analysis framework. We believe that a more rigorous statistical framework and the combination of the various aspects yield a more robust measure for health stability.

5 Defining the ideal time to stable health measure

This section summarises features of health stability that have been used in past studies, with a view of combining the most desirable features into TTSH. We initially describe the desirable attributes for defining TTSH. We also discuss how the TTSH measure is operationalised for data analysis. Finally, we review the data sources that could be used and assess their appropriateness.

5.1 Attributes of an effective time to stable health measure

An effective TFR measure need to incorporate the following attributes:

- 1 Post-RTW capacity.** A pilot study by PWC (2003) on the New South Wales claimants revealed that 34% of all claimants who return to work at partial capacity since the closure of their claims. This highlights the importance of differentiating between claimants who return at full capacity or partial capacity. Past studies have often treated post-RTW capacity as a separate outcome to whether the claimant has returned to work. However, Krause et al (1999) explicitly accounted for partial RTW by using a cumulative time measure, which adjusts the claimant's DOWD based on the number of equivalent full days of injury benefits received.
- 2 Post-RTW employer and occupation.** Researchers and employers agreed that the definitions for the various stable recovery outcomes should account for whether the claimant returns to the same employer and performs the same duties because it reduces the training costs incurred when the employer has to search for a replacement (Butler et al, 1995; Galizzi & Boden, 1996; PWC, 2003; Fox et al 2005). Pransky et al (2002b) reported that despite a high proportion of claimants achieving RTW, only half of the

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claimants surveyed returned to the same employer and duties so claimants who return to work do not necessarily do so under the same employer nor do they perform the same duties.

- 3 Psychosocial factors.** For example attitude to social life, perceptions of pain and level of job motivation and so on. The claimant does not attain full recovery if their lifestyle is still detrimentally affected by residual work injury. The study by PWC (2003) measured the social, financial and health outcomes of claimants in conjunction with RTW outcomes and they concluded that lower pre-injury job satisfaction and job ergonomic risk delay the DOWD, while lack of medical support, employer's failure to offer work duties accommodation and job ergonomic risk increase the likelihood of re-injuries. Furthermore studies by Fox et al (2005) and Ferguson et al (2005) both concluded that claimants who return to work are not necessarily satisfied with their work, social life or are still experiencing residual pain that affects their productivity and lifestyle.
- 4 Stability of employment and medical status.** Stable recovery, strictly speaking, depends on the claimant's long-term health condition rather than employment status. Just because the claimant is working, one cannot assume that they have achieved a stable recovery outcome. Gross, 2006 found that the associations between a claimant's post-RTW functional capacity and their sustainability of RTW, future pain intensity and self-reported level of disability are insignificant. Lötters et al (2005) found evidence of the claimant's health continuing to improve after first RTW, especially in the first month. This further reinforced the need to monitor the claimant's physical health and mental well-being after RTW. We suggest the use of maximal medical recovery (Galizzi & Boden, 1996) as an appropriate definition for stable full recovery.
- 5 Standardisation for the claimant's characteristics.** Claimants experience different patterns of recovery depending on their personal characteristics, the type of injury and occupation. In addition, the scheme's rules and regulations play a role in influencing the claimant's TTSH. If the measure is indiscriminately applied across the claimant population, the measure will be weighted towards the claimants who are considered as not having recovered, but have in fact achieved maximal medical recovery. This results in the underestimation of the performance of schemes in assisting the claimants achieve stable recovery.

5.2 Operationalising the TTFR Measure

In this section, we discuss the operationalisation of the TTSH measure and how the various attributes are defined and classified. Firstly, we outline how stability of the claimant's employment and medical status can be operationalised. Next, we define partial RTW and investigate how our approach incorporates the claimant's post-RTW capacity, employer and occupation. Finally, we outline how the standardisation for various claimant characteristics can be implemented.

5.2.1 Stability of claimant's employment and medical status

From Section 4, we reviewed the various RTW measures used in previous studies. DRTW is commonly considered a superior definition of a permanent and stable RTW outcome. However, the deficiency of the current definitions is that they do not fully address the long-term stability of the claimant's conditions. That is, DRTW takes a snapshot approach of the

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claimant's employment status, which is only a partial component of their recovery. We suggest an enhanced approach below.

To account for the stability of the claimant's employment and medical status, we propose to define the claimant's status being "stable" if the claimant's proportion of income comprising of injury benefits and their medical status (based on doctor's diagnosis of the claimant's health) has remained the same for some time period, x . When we obtain the data and perform our analysis, we will select a suitable value for x by identifying an appropriate cutoff point.

5.2.2 RTW on partial capacity or income

Another problem with the current approach to defining stable recovery is that existing survival regression models often treat RTW as a dichotomous outcome; either the claimant achieves RTW or not due to censoring or other causes. This is inadequate because claimants achieve various degrees of RTW in terms of their work capacity, income and the compatibility of their post-RTW duties with their pre-RTW duties. In previous studies, defining full RTW and no RTW outcomes are straightforward. However, the definition of partial RTW is inconsistent. Some studies defined partial RTW as a claimant who is working but still receiving partial benefits (Dasinger et al, 1999), while other studies account for the claimant's post-RTW employer/duties (PWC, 2003, Fox et al, 2005). We believe that a more precise definition of partial RTW, or partial recovery, should consider all of these attributes. The new definitions have the added advantage in that it better meets the different stakeholders' perspectives.

For the purpose of data analysis, partial RTW can either be defined as a discrete categorical variable (based on the extent of the claimant's post-RTW injury benefits and/or post-RTW employer/occupation) or a continuous variable (based on some % measure of their current status with the "ideal" definition of successful RTW). Our preference is to define partial RTW as a discrete categorical variable for practicality. We observe the claimant's status and where they reach stability over the long-term in their employment status, level of benefits received and post-RTW conditions, they are assumed to have achieved a stable recovery outcome. As a result, we define partial RTW based on the following aspects (in order of least successful outcome to most successful outcome) :

- **Proportion of income made up of injury benefits.** The proportion of income can either be a continuous variable (ranging from 1-99%), or a discrete categorical variable (e.g. 1-24%, 25-74% and 75-99%), depending on the sample size for the study. If the sample size is small, the logical choice is to use a discrete categorical variable.
- **Post-RTW employer.** Different employer and same employer.
- **Post-RTW occupation.** Totally different (different industry/duties), similar (nature of work comparable) and same occupation. The measurement of the similarities can be based on the level of training required to adjust the claimant to the new job.

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To combine these aspects and obtain an ordinal measure for partial RTW, each aspect is assigned a score and these are added up to give a total. The scores may be as simple as 0 for the lowest and then 1, 2 etc. or it may be weighted based on perceived importance of different aspects. For example, if the costs of retraining new employees are greater than the claimant receiving benefits, we may assign higher scores for claimants who return to the same employer. To determine the scoring system, we plan to survey industry practitioners in order to understand their perspectives and priorities. The resulting stable RTW outcome is hence an ordinal variable ranging from no stable RTW, several levels of partial stable RTW to full stable RTW.

5.2.3 Psychosocial and lifestyle factors

Past studies concluded that psychosocial and lifestyle factors do contribute to defining stable recovery outcomes but we believe these factors need to be reviewed because of the lack of agreement between the studies and their questionable study design. Current measures for certain psychosocial and medical factors rely on medical questionnaires, for which no standard exists. Examples of medical questionnaires used included the SF-36 (and its abbreviated versions) survey for general health (Galizzi & Boden, 1996; PWC, 2003; Fox et al, 2005; Ferguson et al, 2005), Kessler-10 survey for measuring psychological stress (PWC, 2003), Roland-Morris Disability Questionnaire for functional limitations on low back injury sufferers (Lötters et al, 2005; Faber et al, 2006), Job Content Questionnaire (Krause et al, 2001b; Lötters et al, 2005) although most studies opted to employ customised surveys that focused on the restrictions of the claimant's ability to perform activities of daily living, self-efficacy after RTW or post-RTW experience of residual pain, etc. (Gross & Battié, 2006; Pransky et al, 2006; Pole et al, 2006). To date, functional capacity evaluations have only been applied to low back injury claimants (Gross & Battié, 2006), but this has yet to be applied to claimants suffering other work injuries. As a result, we cannot confirm the appropriateness of such evaluations for our analysis.

Given the broad spectrum of approaches to collecting and measuring data to analyse the psychosocial factors, we need to consider the feasibility and practicality of including these factors in our project. The benefits and costs need to be weighed up first as the exercise of identifying what factors to include and how they should be collected and measured will be demanding. We propose to return to this in more detail in the future, with the guidance and advice from experts in this area.

5.2.4 Standardising across different characteristics

Past studies that studied RTW across a broad spectrum of claimants only reported results from each group, rather than employing some form of standardising that allows better comparability. Our project attempts to be the first to standardise the results by different characteristics. We propose to adjust the TTSH measure for the claimant's level of recovery by ranking them against other claimants with the same or similar characteristics. The ranking process should reduce the bias which will exist if the claimant's level of recovery is treated as an absolute measure. We shall discuss this in more detail when the data arrives and the analysis proceeds.

5.3 Assessment of Current Data Gathering and Analysis

This section reviews the role of various data sources in past studies into measuring RTW. We also outline the attributes of data that is appropriate for our analysis.

The general consensus formed from past studies was that claims data need to be combined with data collected from surveying the claimants. Information regarding the psychosocial aspects of recovery, the emotional cost and the exact date of their recovery, rather than the date of benefit payments ceasing, cannot be extracted from claims data. Such data is desirable as the nature of the various stable recovery outcomes is considered in broader aspects, providing more reliable results from which decisions can be made. Surveys are often implemented by market consulting firms, as they have greater experience and access to the participants.

Data collected from surveys on claimants usually include the claimant's reported date of RTW, dates and/or length of recurrences of injuries, post-RTW attitudes to employer/workplace and claimant's perceived functional capacity and pain levels. While the data collected is relevant and contributes to a more accurate TTS measure, there are setbacks with using such data. These setbacks include recall bias, selective sampling bias, high implementation costs and questionable reliability of the data. We discuss these in greater detail below.

Recall bias is a major issue because claimants are surveyed some time after they have recovered. As is the nature of memory, the claimant's reported dates of RTW and any injury recurrences are not likely to be completely accurate. Where this occurs, a possible approach used by Pole et al (2006) involves asking the claimant the approximate time of the month they achieve stable recovery and then assume an arbitrary day of the month for that claimant.

Our project aims to develop TTS as a measure that can be applied across different injuries, occupations and state schemes. However, to feasibly implement the analysis, the sample size used needs to be manageable. This implies the selection of claimants from various schemes, occupations, etc. Selective sampling leads to bias as the results observed from the analysis may only be representative of the sample, rather than the general claimant population.

Survey data is unlike claims data in that the data usually needs to be collected, as it is not stored by schemes or insurers. As mentioned before, survey data aims to delve into the claimant's attitudes and perceptions, rather than simply recording objective information. To extract such data reliably, the appropriate questions need to be asked and the range of possible responses need to be carefully considered in order that the final collected data can be appropriately analysed. Currently, the common practice is to seek external market research firms to implement such surveys. The obvious issue is the cost, as such surveys involve appropriately trained staff working outside of normal hours in order that the claimants can be successfully contacted.

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The final major issue is that the reliability of the data collected is often hard to verify, given the subjective nature of the questions and the inevitable deviation of the claimant's response from the possible responses. A long-term strategy to remedy the situation is to have schemes and insurers collect such information when a claim is filed with them. The schemes can also administer regular surveys that accompany the claimant's payment of injury benefits. However, a standard for data collection would also need to be in place, and this is beyond the scope of our project.

6 Australian Data Sources

This section describes the scheme configurations in the Australian WC scheme and how this affects their approach to data collection. We also discuss the nature of the claims data - its limitations and what steps can be taken to overcome such limitations.

In Australia, each state operates their WC schemes and are in charge of the rules and regulations, level of benefits and exclusions. NSW, Victoria and South Australia operate their schemes using insurers from the private sector as the claims agents. Queensland, New Zealand and Comcare are managed by a government agency while the Australian Capital Territory, Tasmania, the Northern Territory and Western Australia are all privately underwritten by insurers. Other than the structure of the schemes being different, some schemes store their data with the insurers as the Australian system does not have a proper central scheme database. The closest to a central scheme database is the National Dataset, but this is only a combination of the data from each scheme. The National Dataset is recognised as being insufficient as the data is neither complete nor consistent. At this stage of our project, we are unable to comment further about the nature of the data, as we have not inspected it closely. However, we recognise some of the major issues with the data in the Australian system and we aim to identify approaches to overcome these in the future.

Ideally, we want access to complete data with claims data that are timely and not subject to censoring and short-term volatility. However, in reality, this is not possible. In past studies, researchers needed to account for censoring of claimants whose claims recently closed. For example, Butler et al (1996) excluded any claim where the time between the injury and the interview is less than three years because low back injury claimants experience longer durations of work disability and if claims of short duration are not excluded, higher censoring rates will result. Another data issue is short term claims, where the duration of injury benefit payments is a few days because these claims add noise to the overall sample. Dasinger et al (1999) excluded any claim where the duration of injury benefit payments is less than one day within the first fourteen days since the date of injury. Another issue is when a study utilises recent claims data, which can be affected by the short term claims volatility problem. Claims data are known to lack stability over a short period of time due to the dynamics of the recovery process (Pole et al, 2006). Data stability can be preserved if there is a lag between the survey of a claimant and when the corresponding claims data is extracted for analysis.

At this stage, we are finalising details of a pilot study to determine whether the project should be implemented. In this pilot study, we plan to restrict the sample to consist of claims from a

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limited number of schemes to reduce the scope for variation. We also plan to analyse claims from one or two major occupation groups for simplicity of implementation. Further details regarding our pilot study will be discussed in a future paper.

Permission to proceed with this project has been granted by the Macquarie University Ethics Committee. Strict confidentiality will be enforced throughout this investigation, given the sensitive nature of the data.

7 Model Specifications

In this section, we discuss in broad terms the possible modelling approaches that we plan to take on arrival of the data. We also outline some of the key issues about modelling RTW outcomes, based on reviews of past studies in this field. Our aim is to create a model that will provide us with a standardised index that describes the claimant's recovery.

We aim to develop a standardised TTSH measure that accounts for the differences in the claimant's personal characteristics, injury type, occupation and, if feasible, psychosocial factors. However, to standardise across the aforementioned factors, a statistical framework needs to be in place so the standardisation process is consistent and gives realistic results. Our approach is to firstly quantify how the various factors contribute to the observed stable recovery outcomes using a survival model. Next, we plan to standardise across the different factors using some form of ranking of claimants for each factor group. Finally, we summarise the ranking into an index by combining the personal, work-related and medical characteristics of the claimant. This index ideally measures the extent of the claimant's recovery relative to full recovery.

In the first stage, when we quantify the effects of various factors on the claimant's observed stable recovery outcome, a survival model will be used. Fenn (1981), Fox et al (2005), Galizzi & Boden (1996), Krause et al (2001b), Pransky et al (2002a, 2002b), Pransky et al (2005), Seland et al (2006) and Wasiak et al (2006) used various forms of survival regression models to achieve this. We believe that this approach is reasonable because RTW outcomes are similar to observing deaths in a population and our aim is to determine which factors contribute to the likelihood of a claimant achieving some form of stable recovery outcome. Our aim is to attempt to reconstruct the claimant's full history, which includes their date of injury, the date(s) of RTW and the date(s) of recurrences of the injury. The main difference with our approach is that a temporary RTW outcome is accounted for in the model as a transition, but not an exit from observation. The only modes of exit from our proposed model is if the claimant achieves one of the following outcomes :

- The claimant achieves stable full recovery, which means they are now working at full capacity, their post-RTW employer and duties are the same as pre-injury and they report satisfaction with all other aspects of their lives.
- The claimant achieves maximal medical recovery, but falls short of full recovery due to the extent of their injuries or illness. We can classify this as stable partial recovery.

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- The claimant is no longer under the coverage of the scheme as they have died, retired or leave the scheme for other reasons prior to them being back at work.

The advantage of our approach is that the claimant's status is considered in broader terms, rather than simply focusing on their current employment status. We also account for different levels of recovery, rather than treating it as a dichotomous outcome; that of the claimant experiencing full recovery or no recovery which is unrealistic and has little practical use.

The standardisation process is implemented after we have fitted the survival model and identified the factors that drive the claimant's recovery. Our aim is to obtain a standardised TTSH measure, that combines the various outcome measures that explain the claimant's current state of health. To standardise the individual outcome measures, we plan to split the claimant into their age or industry group and take their ranked outcome within that particular group, as claimants within that group can be compared that way. Next, the individual standardised outcome measures are then integrated into the final measure to form standardised TTSH measure. This approach has not been applied before in measuring RTW or health stability. In Section 4, we mentioned that the standard risk index model has been used in modelling the impact of long hours on workplace injuries and accidents (Folkard et al, 2006). The standard risk index model is an additive model of individual components of risk. We believe this approach may be suitable because our TTSH measure applies to claimants from different occupations, suffering various forms of injuries and having unique personal characteristics.

Other issues which we will also consider are the applications of age-specific and disability phase-specific analysis on the data. Past studies Krause et al (2001b) and Pransky et al (2005) have observed that claimants of a different age and disability phase experience different patterns of recovery from their workplace injuries. Prior to Pransky et al (2005), the general consensus was that older claimants were less likely to achieve RTW. However, the study suggested claimants above age 55 behaved similarly as did claimants below age 55. To account for differences in the pattern of RTW for disability phase, we plan to adopt the approach of splitting the study into two stages - the first thirty days of injury (acute phase) and the subsequent period (chronic phase). This approach has been used in the past, with results showing that the same risk factors have a different effect on the claimant's RTW outcome when disability phases are considered (Oleinick et al, 1996; Krause et al, 2001a; Krause et al, 2001b). The applicability of these approaches will be tested once data is becomes available.

8 Anticipated Challenges

To date, research into measuring health status is hampered by many obstacles. In this section, we discuss some of the obstacles encountered in the past studies and also the anticipated limitations to our study, namely the reliability and accuracy of the data, difficulty in comparing across a broad range of industries and the tradeoff of accuracy by including medical and psychosocial factors and the practicality of doing so. While some of the limitations to obtaining an ideal TTSH measure may never be fully overcome, we believe that increasing the awareness of the shortcomings of current industry practice may spur early

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reform, and hence open up more opportunities in improving the measurement and monitoring of WC schemes.

8.1 Data reliability and accuracy

One of the biggest limitations to developing a desirable TTSH measure is the accuracy and reliability of data. Researchers and practitioners both agree that claims data is reliable but limited in its ability to determine the true DOWD (Butler et al, 1995; Dasinger et al, 1999; Evanoff et al, 2002). They do not provide the exact dates of RTW, as claimants can take unpaid leave after their benefits cease or they become unemployed and hence receive social security benefits instead. Survey data, while proven to be a more reliable determinant for DOWD (Dasinger et al, 1999; Fox et al, 2005) is limited by recall bias and the reliability of the respondent's answers which depend on the wording of the questions. We believe that the same issues that limit the reliability of measuring DOWD is applicable to measuring TTSH given that the two measures share common characteristics. To reduce the impact of recall bias of the claimants, we are considering the use of employer's payroll data in order to verify when the claimant is back at work and when they have taken sick leave, etc. However, we need further time to analyse the feasibility of this approach.

Other factors that limit the reliability of survey data are time lags between the data collection and the results being made publicly available. Time lags are difficult to overcome and a counterargument for releasing the survey results too early is the risk of the information being affected by data volatility as we have mentioned in Section 4. At this preliminary stage, our planned approach is to control the effects of time lag by suitably defining the time criteria for a claimant's status to be considered as being stable.

8.2 Accounting for differences in scheme structure and rules

Differences in legislations and rehabilitation policies in each scheme affect the level of benefit payment and the claimants' recovery pattern. This in turn can interfere with the measurement of TTSH across different states, as is the case with the difficulties encountered by Campbell Research & Consulting in their Australian & New Zealand RTW Monitor (Campbell, 2006). For example, results have shown that the claimants under the South Australian worker's compensation scheme take the longest time to achieve some form of RTW. A contributing factor of this observed result is due to the relative generosity of injury benefits paid to South Australian claimants, which increase their likelihood of remaining off work for longer. We can speculate that either the South Australian claimants experience more severe injuries that require longer time to recover or there are incentives for them to remain longer on benefits. Either way, different scheme structures form an obstacle to developing a straightforward TTSH measure.

We mentioned in Section 5 our standardisation procedures to account for differences between various schemes. While the concept is logical, we recognise that the implementation is far

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from being straightforward. A study by Douphrate et al (2006) reviewed the level of claims incidence rates, distribution of sources, causes, types of body locations of injuries and the costs of these injuries across different agribusiness operations. This study concluded that direct comparison within a single industry is difficult because of the need to classify different roles into suitable occupational classification codes for analytical purposes. We expect that the comparison across a broader range of industries and occupations will be even more difficult. Further from the problem of finding a suitable coding system to classify the claimant's occupation and/or industry, the inherent differences between occupations and industries may not be comparable, meaning that our standardised TTSH measure risks giving nonsensical output, due to a fundamental flaw in implementing our proposed adjustments.

Suppose that the above approach is feasible and that differences between occupations and industries can be compared, we still need to overcome the issues with the current data. In the meeting with representatives from the various workers' compensation schemes, it was agreed that any attempt to standardise across the schemes will be difficult because each scheme collects different data and they are not coded uniformly. Before we can suggest any measures to overcome this major obstacle, we need to review the data.

8.3 Tradeoff between accuracy and practicality

The final limitation of such a study concerns the tradeoff between accuracy and practicality. We mentioned in Section 5.2 that we propose to postpone the incorporation of medical and psychosocial factors into our standardised TTSH measure until later, when the feasibility of implementing a standardised measure has been recognised. The reason for this postponement is for reasons of practicality, as medical and psychosocial factors have been recognised as being difficult factors to tackle in practice. Pransky et al (2002b) recognised that DOWD or functional capacity limitations cannot be used solely to assess the claimant's success in achieving stable recovery. Other outcome variables such as their post-injury satisfaction, motivation and functional capacity need to be considered. In Section 4, we outlined some of the studies that measured these outcome variables. We note that these studies all acknowledge the complications associated with collecting and verifying the accuracy of the extra data. The extra time and resources employed may well exceed the benefits that is brought by the inclusion of these variables.

9 Conclusion

Our paper introduces a new standardised measure for RTW, the time to stable health (TTSH). Past RTW measures have been shown to be insufficient in meeting the needs of different stakeholders in the workers' compensation industry as they do not satisfactorily account for the medical and psychosocial aspects of recovery. Our measure extends beyond simply looking at whether the claimant is currently at work or not by measuring the claimant's health and lifestyle factors. Survey data will be used in conjunction with claims data to increase the reliability of our measures. To account for differences across schemes, industries and occupations, we propose to standardise the outcome variables within each group and take the ranked outcome before combining it to our final index measure that is an indicator of the claimant's level of recovery relative to full recovery. We calculate TTSH based on the time it takes to the claimant to reach their optimal level of work, health and psychosocial condition.

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As we currently do not have any claims data, our paper is aimed at discussing the problem in broad terms as well as outlining our planned approaches. We appreciate any advice and feedback regarding our proposed methodology, approaches to the data analysis and any practical issues that need to be brought to our attention before we proceed further.

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