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Suicide following work related injury

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Accompanying documents to this research report	
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1. INTRODUCTION

1.1 Context

Suicide is a very large public health problem (greater than the road toll) which is linked directly and indirectly to work in a number of ways, one of which is the stress placed on the worker by the recovery process or otherwise of a non-fatal work related injury. Clearly primary injury prevention of the initial injury would be desirable and this is largely addressed elsewhere. Additionally, tertiary prevention, is highly relevant to reducing any related suicidal outcomes and WorkCover has often been involved post injury.

1.2 Aim of the research

The aims of this current study are:

To provide an overview of all Victorian suicides between July 2000 and December 2008 recorded on the Victorian Work Related Fatalities Database (VWRFD) that have an association with work related injury in the context of the literature.

To develop a model for pathways from injury to suicide and potential intervention points in the context of the scientific literature.

2. METHOD

2.1 Data sources

The VWRFD is a record of both intentional and unintentional injury deaths reported to the Victorian Coroner that have a work related component. Suicides are included on the basis of work agent, work stressor, commercial vehicle (train, truck) and work location associations. Where more than one work related criterion has been recorded the coding hierarchy applicable is as listed.

Where there are co-existing factors such as relationship problems or mental health issues, the suicide is still coded as work-related. However if there are many other stressors listed or the coroner named a particular other stressor **such as relationship** breakdown or terminal illness as the major stressor then the suicide has not been

classified as work-related. The presence of non work related factors have been noted in addition to those that are work-related (Bugeja et al. 2009).

2.2 Data selection and analyses

Work related suicides that had been closed by the Coroner as at the 10th December 2010 were extracted from the VWRFD for the most complete data collection period (July 2000-December 2008). The process of selection and filtering of suicides where work related injury has been a stressor is outlined in Appendix1. The injury was required to have occurred during paid work.

National Coronial Information System (NCIS) findings and police circumstances were reviewed to supplement the work relatedness text on the VWRFD for the selected cases in order to maximum information available on work relatedness.

Information on psychopathology, presence of chronic pain, time between injury event and suicide, return to work and WorkCover involvement was obtained from the expanded work relatedness text on the VWRFD, the NCIS and attached coroners' findings or the police description of circumstances.

The final subset was analysed for age group, gender, work only *vs* non-work stressors, occupation, suicide method, toxicology results, nature of injury and body part, psychopathology, presence of chronic pain, time between injury event and suicide, return to work and WorkCover involvement using Microsoft Excel 2007 and SPSS Statistics version 19.0. Suicide following work related injury (cases) were compared with other stressor suicides (controls) since a comparison with all work related suicides on the VWRFD would be confused by the definitional inclusion criteria of the suicide means commercial transport and work agent.

2.3 Literature

A thorough search for literature on suicide following work-related injury was undertaken. The *Scopus, Web of Knowledge, PubMED, EMBASE, PsycINFO* and *CCOHS* databases were searched using the following terms; *suicid*, work*, injury, pain, job, occupation*, employ*,* and *"industrial accident"* but located articles suggested pathways rather than a direct link. A search using the additional search terms "return to work" and "chronic pain" was then undertaken and a considerably greater number of sources were generated.

The literature review summarised and critically examined the literature on the acute and chronic post-injury factors associated with functional decline and eventual suicide following work-related injury to clarify pathways and intervention points for suicidal prevention.

3. RESULTS

3.1 Data analysis

3.1.1 Overview

There were 62 suicides which followed on from and were associated with a work related injury. Equal numbers of these suicides had the work injury as either the sole factor or one of several work and non-work factors (50% each).

The control group of the other stressor suicides (introduced in section 3.1.6) contained 314 cases.

3.1.2 Age group and gender

The majority of work-injury suicides were male (83.8%) and the modal peak was 40-44 years for males and 50-54 years for females (Figure 1).

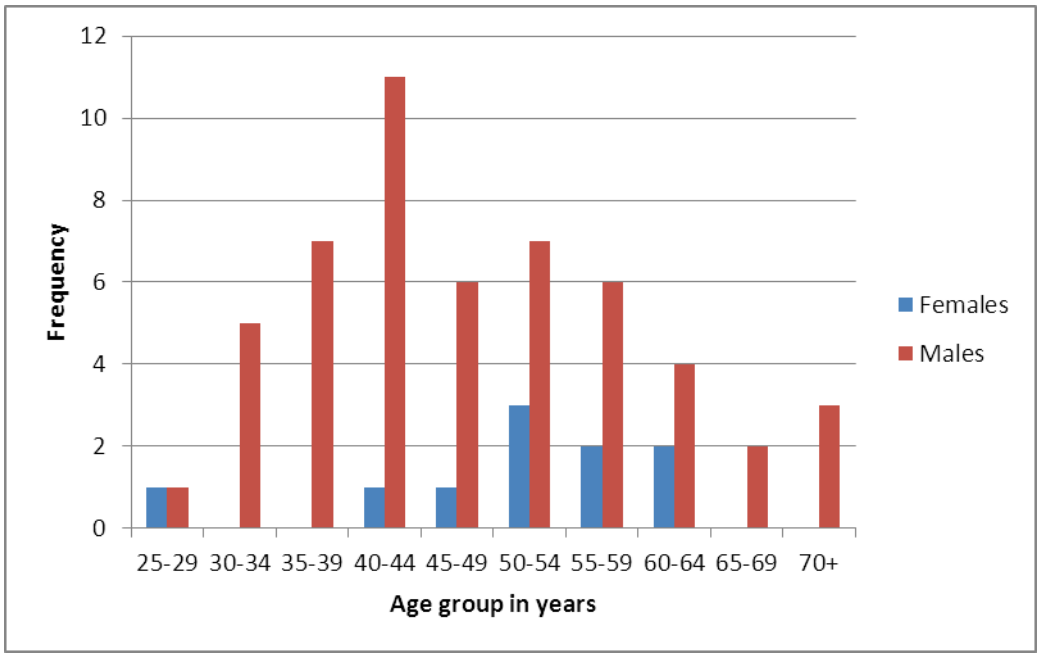

Figure 1 Age group by gender

3.1.3 Nature of injury and body part

The back, mostly not otherwise specified, was the most common body part injured (Table 1).

Table 1 Nature of injury/mechanism and body part

	Body part*					
Nature of injury/mechanism	**Back / neck**	**Upper limbs**	**Lower limbs**	**Other**	**Not specified**	**Total**
Sprain/strain	2		1		1	4
Fracture			1			1
Cut/laceration/amputation		1	1	1		3
Crushing		1				1
Road traffic accident (nature injury ns)					2	2
Fall (nature injury ns)	3		1		1	5
Not specified	25	6	7	2	12	52
Total	**30**	**8**	**11**	**3**	**16**	**68**

** Cell sizes sum to more than total suicides due to five individuals sustaining two injuries and one individual sustaining three injuries.*

3.1.4 Medical and psycho/social characteristics

Of the 62 suicides, chronic pain was reported in 27 cases (43.5%). Psychopathology (i.e., depression, anxiety, PTSD, psychoses, suicide attempts and substance abuse/dependence [both prescribed and non-prescribed]) was reported for 46 cases (74.2%). Of these 46 cases, 35 cases reported depression specifically, and only 10 were reported to have a psychiatric history pre-injury. Seventeen cases (27.4%) reported the development of both chronic pain and psychopathology *post*-injury. There were 45 suicides for which the duration between the injury event and suicide could be determined from the text description in the WRF dataset, findings or police reports. The mean and median times between the injury event and suicide were 7.1 and 5.0 years respectively. Of the 45 cases where duration could be established, a substantial proportion (25%) occurred within the first year (20% within the first six months), one half within 5 years and 75% within 12.5 years of the injury event. The minimum time was five weeks, the maximum 25 years (Figure 2).

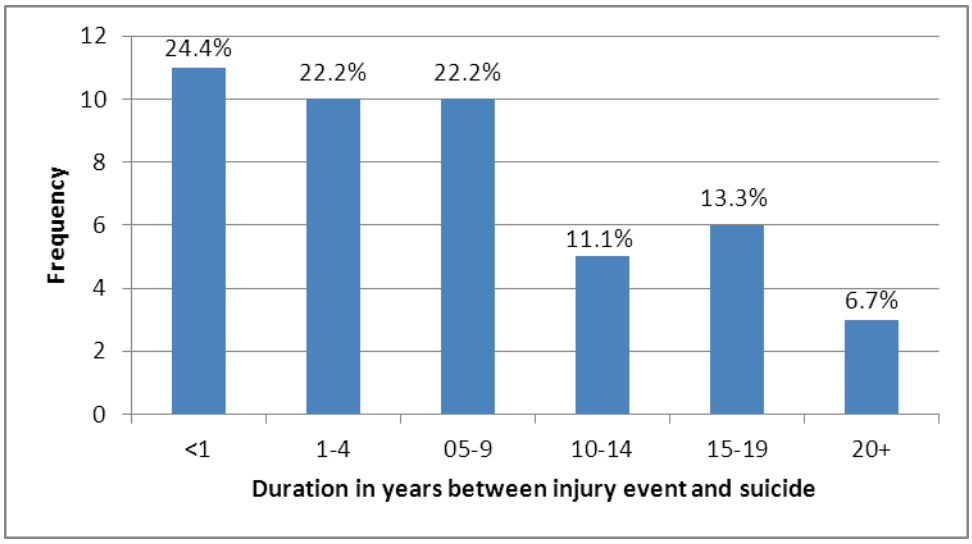

Figure 2 Duration between injury incident and suicide in years

In a comparison between sole and multiple factors using an independent samples t-test the mean duration was 8.2 years where the injury appeared to be the sole factor in the suicide and 5.5 years where one of multiple factors.

3.1.5 Employment and occupational grouping

Although half of the 62 work related suicides were in employment at the time of their suicide there were 33 for whom employment was no longer applicable and specific employment at the time of injury was mostly unknown. They were in this 'non-employment group' because they were pensioners (21.0%), unemployed (21%) or retired/home duties (11.3%). Former blue collar workers (technicians & trades workers, machinery operators and drivers and labourers) were the most frequent occupational grouping (32.3% all suicides, 71.4% of those employed) (Table 2).

Table 2 Occupation & major ANZSCO grouping at time of suicide

Occupation /major ANZSCO grouping	**N**	**%**
Employed	28	45.2
-Technicians & trades workers	*-8*	
-Machinery operators & drivers	*-7*	
- Labourers	*-5*	
-Other (managers/professionals/clerical admin workers)	*-8*	
Not applicable./Pensioner	13	21
Not applicable././Unemployed	13	21
Not applicable./Retired or home duties	7	11.3
Unknown	1	1.6
Total	**62**	**100**

Of the 31 cases where industry was currently applicable, there were seven (22.6%) in each of the *Manufacturing* and *Construction* industry groups, followed by *Transport, postal and warehousing (12.9%)*.

3.1.6 Method of suicide

Table 3 compares methods of suicide in the study group (n=62), versus the control group of work-related suicides associated with other work stressors (n=314).
Cases of poisoning by pharmaceuticals (17.7%), poisoning other (3.2%) and sharp objects (6.5%) were more common following work related injury than for suicides from other work stressors (7.3%, 0% and 1.9% respectively) (Table 3).

Of the eleven poisoning by pharmaceutical suicides, analgesics such as paracetamol, codeine, tramadol and oxycodone (particularly oxycontin dominated). They were followed by tranquilisers and sleeping medication such as benzodiazepines and

doxylamine. All of the overdose suicides, excluding one, were poly pharmaceutical overdoses.

Table 3 Method of suicide

	Suicide following work related injury (as a stressor) (Cases)		Suicide associated with work related stressors (excluding work related injury) (Controls)	
Method of suicide*	**N**	**%**	**N**	**%**
Hanging	28	45.2	162	51.6
Poisoning by pharmaceuticals	11	17.7	23	7.3
Poisoning by motor vehicle exhaust gas	9	14.5	62	19.7
Cutting from sharp objects	4	6.5	6	1.9
Firearm	3	4.8	24	7.6
Rail	3	4.8	13	4.1
Poisoning other	2	3.2	0	0
Jumping from high places	0	0	14	4.5
Drowning	0	0	4	1.3
Other	2	3.2	6	1.9
Total	**62**	**100**	**314**	**100**

*Variable = ICD10_level 1 text

3.1.7 Toxicology

The proportion of the suicides following work related injury for *drugs only* or *both drugs and alcohol* was higher than for the other work stressor suicides overall. The proportion of suicides following work injury for *neither alcohol nor drugs* nor *alcohol only* detected was less for suicides following work related injury (Table 4).

Table 4. Toxicology results for suicides following work related injury compared with those associated with work related stressors overall

	Suicide following work related injury (Cases)		Suicide associated with work related stressor (excluding work related injury) (Controls)	
	N	**%**	**N**	**%**
Alcohol only	5	8.1	46	14.6
Both drugs &	11	17.7	41	13.1

alcohol				
Drugs only	33	53.2	102	32.5
Neither alcohol nor drugs	9	14.5	102	32.5
NA/ Still enquiring	4	6.4	18	5.7
Total	**62**	**100**	**309***	**100**

**Excludes 5 cases where not specified*

3.1.8 Return to work following injury

Reports for 12 suicides in the study group (19.3%) indicated an inability to return to work as a significant stressor, while reports for a further nine suicides (14.5%) indicated unsuccessful attempts to return to work or pressure from employers/colleagues upon return to work as being significant stressors at the time of suicide.

3.1.9 WorkCover involvement

Eighteen study decedents (29%) were reported to be involved with WorkCover, and four decedents (6.4%) were reported to be receiving a “disability pension” at the time of their suicide. Of these decedents, eight (12.9%) were reported to be having their WorkCover benefits challenged or investigated, and one (1.6%) was reported to be having their disability pension reviewed at the time of their suicide. One decedent was reported to be involved in ongoing claims with both WorkCover and the Traffic Accident Authority at the time of death.

3.2 Literature Review

3.2.1 Introduction

Current research has focused on critical periods along the pathway from work-related injury to suicide rather than a direct link from work-related injury to suicide. Much research has been devoted to understanding the factors associated with:

- failure to successfully return to work following injury
- the transition from acute pain to chronic pain and associated disability
- the development of psychopathology (particularly depression and substance misuse) in the context of chronic pain and disability

- the transition from chronic pain, disability and psychopathology to suicide attempts and completed suicide.

This approach to the topic makes intuitive sense given that, in the majority of reported cases, failure to successfully return to work and the development of chronic pain, disability and psychopathology appear to mediate the relationship between work-related injury and suicide.

The available literature suggests that workers are propelled along the pathway from work-related injury to suicide by factors that emerge in what we have conceptualised as either the acute or chronic post-injury phases. The acute post-injury phase broadly coincides with the period of physiological healing of the injury, while the chronic post-injury phase refers to the period between physiological healing and suicide. The duration of these phases varies greatly between individuals depending on the type, severity and prognoses of their injury/ies.

Many researchers have investigated samples which have *included* individuals who sustained their injury at work as part of larger, heterogeneous samples of injured individuals, or they have failed to describe injury aetiology (Smith et al. 2004; Edwards et al. 2006; Fishbain et al. 2009; Franche et al. 2009; e.g., Clay et al. 2010b; Clay et al. 2010c; Clay et al. 2010d; Hepburn et al. 2010). Therefore, it is assumed that the acute and chronic post-injury factors identified are generalisable to samples comprised only of injured workers. Appendix 2 comprises a schema outlining the pathways of work related injury and suicide including points of intervention.

3.2.2 The acute post-injury phase

Physical, workplace, legal and psychological factors, as well as factors related to medical care that emerge within the acute post-injury phase have been associated with poorer outcomes following work-related injury. These factors preclude the injured worker from a timely and successful return to work and exacerbate the acute physical and psychological distress associated with the injury.

Physical factors

Physical factors such as injury severity, duration and pain intensity are the most obvious obstacles for workers during the acute post-injury phase.

In their six month prospective study of 168 patients who had sustained orthopaedic injuries, (of whom two thirds were injured while working), Clay and colleagues found

that patients were more likely to report a continued inability to return to work if; a) they sustained more than one injury, b) their injuries were more severe, c) they reported higher initial pain intensity, d) they had an initial need for surgery, e) they reported initial co-morbid health conditions, and f) they were older (Clay et al. 2010b; Clay et al. 2010d). Despite 68% of the sample returning to work within 6 months of being injured, Clay and colleagues found that 54% continued to experience pain at 6 months post-injury, and that the majority (87.6%) indicated that the pain interfered with their ability to work (Clay et al. 2010c).

Delays in successfully returning to work have been found to significantly increase the likelihood of continued disability and unemployment, and the deleterious effect of unemployment on mental and physical well-being is well-known (Waddell 1987; Mathers and Schofield 1998).

Workplace factors

Workplace factors associated with poorer outcomes in the acute post-injury phase include early negative responses from supervisors (Hepburn et al. 2010), the physical demands of the job (i.e., blue collar work/manual labour) (Clay et al. 2010b; Clay et al. 2010d), not being given a suitably graduated return to work or appropriate accommodations within the workplace (Foreman et al. 2006), delay in accessing occupational rehabilitation due to administrative delays (Sinnott 2009), and inadequate communication between employers and rehabilitation providers (Foreman et al. 2006).

Legal factors

Should the patient seek compensation or claim insurance, factors associated with these legal processes also contribute to poorer outcomes in the acute phase (Mason et al. 2002; Mackenzie et al. 2006; Clay et al. 2010b; Clay et al. 2010d). For example, the numerous medical examinations required by various stakeholders, and the encouragement of inactivity and maintenance of the injury in order to support the patient's claim both serve to "entrench illness behaviours" and delay rehabilitation (Royal Australasian College of Physicians 2001). The protracted nature of legal processes also delays rehabilitation and return to work, increasing the likelihood of continued disability and unemployment (Royal Australasian College of Physicians 2001).

Factors related to medical care

Potential factors related to medical care during the acute post-injury phase include failing to attend to the psychosocial factors (so called “yellow flags”) that are likely to be undermine the patient’s recovery, and providing excessive or inappropriate investigations and treatment (Royal Australasian College of Physicians 2001; Main and Williams 2002).

The aforementioned physical, workplace, legal and iatrogenic factors are interdependent and interact with numerous psychological factors to exacerbate the patient’s functional disability during the acute post-injury phase, decreasing their likelihood of recovery and successful return to work.

Psychological factors

Psychological factors such as lower self-efficacy (Mackenzie et al. 2006; Clay, et al. 2010a; Clay et al. 2010b), attributing blame to others for the injury (Hickling et al. 1999; Mason et al. 2002; Hart et al. 2007), perceptions of being treated unfairly by employers (Hepburn et al. 2010), fear of movement/re-injury, perceived disability, and pain-related catastrophizing (i.e., an exaggeratedly negative response to pain) (Sullivan and Stanish 2003; Sullivan, et al. 2005; Sullivan, et al. 2006) have all been associated with poorer outcomes following injury.

If not extant prior to the injury, psychopathology begins to develop during the acute post-injury phase, particularly symptoms of post-traumatic stress in relation to traumatic injuries (Zatzick, et al. 2008), and depression in relation to persistent pain (Franche et al. 2009; Stice and Dik 2009). Many of these psychological factors also appear to play a crucial role in the patient’s transition from the self-limiting state of acute pain and temporary disability, to the self-sustaining state of chronic pain, disability and unemployment (Waddell 1992; Main and Williams 2002; Sullivan et al. 2005).

3.2.3 The chronic post-injury phase

Many of the physical, psychological, legal and medical care factors present in the acute post-injury phase continue to adversely affect the patient during the chronic post-injury phase (Waddell 1987; Waddell 1992; Dersh et al. 2002; Main and Williams 2002; Edwards et al. 2006; Tang and Crane 2006). The factors discussed in the next section are those that are more likely to emerge during the chronic post-injury phase

to further amplify the patient's difficulties, increasing the likelihood of suicidal behaviour.

Physical factors

Sleep onset insomnia (Smith al. 2004; Tang and Crane 2006), substance abuse and dependence (both prescribed and non-prescribed) (Tang and Crane 2006; Ilgen et al. 2010) appear to figure more prominently as the patient enters the state of chronic pain and disability (Dersh et al. 2002).

Medical care factors

Clinicians dismissing their patient's complaints as purely psychogenic once all treatment options have been exhausted, and the patient's exaggeration of their complaints in order to continue to "be heard" adversely affects doctor-patient communication (Kenny 2004) and magnifies the patient's feelings of hopelessness and despair (Tang and Crane 2006).

Psychological factors

Psychopathology is exacerbated by relationship dysfunction and breakdown. For example, the patient's family and friends may be driven away by their ongoing "pain/illness behaviours" (i.e., frequent grimacing, verbal pain complaints, distorted ambulation, avoidance), or reinforce these behaviours with increased attention, creating secondary gain contingencies (Schwartz et al. 1996; Cano 2004).

As the patient's psychopathology intensifies (particularly depression and substance misuse), the patient is then more likely to consider suicide as an "escape" from their predicament (Tang and Crane 2006).

In their review of the literature, Tang and Crane (2006) found suicidal ideation to be 2-3 times more prevalent among chronic pain patients compared to the general population. In a sample of 1512 chronic pain patients, Edwards and colleagues (2006) found 16.8% engaged in "active" suicidal ideation (i.e., thinking about taking their own life). The seriousness of such a high prevalence of suicidal ideation within the chronic pain population becomes apparent when it is considered that within the general population, most suicide attempts occur within 12 months of the commencement of suicidal ideation (Kessler et al. 1999).

Chronic pain patients also have greater access to lethal means of suicide (i.e., prescription medications such as analgesics and antidepressants), which further increases their risk of successfully completing suicide (Tang and Crane 2006).

3.3 The proposed prevention model

A model was developed which explains the sequence of stages leading from a workplace injury to completed suicide, as well as indicating opportunities for successful intervention. Such opportunities exist within the acute and chronic post-injury phases, as well as primary prevention of work injury and possibly targeted primary prevention.

4. DISCUSSION

4.1 Consistency of results and literature

Decedents tended to be older, blue collar workers, experiencing chronic pain, findings consistent with the literature reviewed in the introductory section (e.g., Clay et al. 2010a; Clay et al. 2010c; Edwards et al. 2006; Henschke et al. 2008; Tang and Crane 2006).

The majority of decedents were male (83.8%) (ABS, 2008) and suffered from psychopathology (74%), particularly depression (56.4%), which is consistent with the general suicide literature (Cavanagh et al, 2003). Only a minority of decedents with psychopathology (10) were reported to have a psychiatric history *pre*-injury, while a considerable number of cases reported the development of both chronic pain and psychopathology *post*-injury (17 cases, 27.4%). This finding is consistent with the literature on the chronic post-injury phase, which notes the high incidence of psychopathology following the development of chronic pain, even in the absence of obvious vulnerabilities such as a previous psychiatric history (Banks and Kerns 1996; Dersh et al. 2002; Wurzman et al. 2008). A high prevalence of suicidal ideation and suicidal behaviour among chronic pain patients is also reported in the literature (Edwards et al. 2006; Tang and Crane 2006).

The high proportion of poisoning by pharmaceuticals as the chosen method of suicide is consistent with the chronic post-injury phase literature (Smith et al. 2004; Tang and Crane 2006). In their investigation of suicidal ideation and behaviour among chronic pain patients, Smith and colleagues found that among those individuals who had

previously planned to commit suicide or had actually attempted suicide, overdose was by far the most common method (Smith et al. 2004).
The finding that only a minority of cases had *neither drugs nor alcohol* detected by toxicology analysis is consistent with the high prevalence of substance misuse among sufferers of chronic pain (Dersh et al. 2002; Ilgen et al. 2010) and psychopathology (e.g., Burns and Teesson 2002).

An inability to successfully return to work significantly increases the likelihood of long-term disability and unemployment, which has negative ramifications for mental and physical well-being (Waddell 1987; Mathers and Schofield 1998). Reasons for unsuccessful attempts to return to work sighted in a small number of case reports included failure by employers to provide a modified return to work program, or provision of a modified return to work program, but with accompanying pressure to prematurely return to their previous role. Failure to provide a modified return to work program, or inadequate execution of such a program is cited in the literature as a factor influencing unsuccessful return to work (Foreman et al. 2006). A small number of cases also reported negative reactions from colleagues or employers as being a significant stressor upon their return to work, which again, is reflected within the literature (Hepburn et al. 2010).
At least 22 of the decedents were in receipt of benefits from, or under investigation by WorkCover or another source of compensation at the time of their suicide, and this was frequently implicated within case reports as being a significant source of stress for decedents. Stress attributable to involvement in legal processes is also indicated in the literature as being a contributory factor in both the acute and chronic post-injury phases (Royal Australasian College of Physicians 2001; Mason et al. 2002; Mackenzie et al. 2006; Clay et al. 2010b; Clay et al. 2010d).

4.2 Primary prevention

While there is an important role for primary prevention of injury, the mechanisms of the initial injuries in this study were diverse or unknown and hence the major focus here is on tertiary prevention (i.e. limiting the harm post-injury).

4.3 Secondary prevention

Acute post-injury phase

Given the importance of psychological factors in the development and exacerbation of post-injury chronic pain, disability and psychopathology, support for the efficacy of

psychologically-based rehabilitation programs is rapidly accumulating (Sullivan and Stanish 2003; McCracken et al. 2005; de Roos, et al. 2010; Glombiewski et al. 2010). One such program, the Pain-Disability Prevention program (Sullivan and Stanish 2003; Sullivan et al. 2005; Sullivan et al. 2006) is a 10-week (1 session per week) intervention designed to prevent injured workers from entering the chronic pain and disability state.

The first phase of the program takes a behavioural approach, systematically increasing the worker's physical and social activity, then, during the second phase, focusing on psychological obstacles to recovery, namely, fear of movement/re-injury, catastrophizing, perceived disability and depressive symptoms (Sullivan and Stanish 2003). Of 181 Canadian Workers Compensation Board claimants who completed the 10 sessions, 114 (63%) had returned to work within four weeks of completing the program, and the psychological factors of catastrophizing, depression, perceived disability, and fear of movement/re-injury were reduced by 32%, 26%, 26% and 11% respectively within the sample as a whole (Sullivan et al. 2005). Patients also experienced a 10% reduction in pain severity (Sullivan et al. 2005).

Chronic post-injury phase

Successful adjustment and coping, and subsequently improved functioning are still realistic outcomes for patients who have already entered a state of chronic pain and disability. Rehabilitation programs which incorporate forms of Cognitive Behaviour Therapy are proving beneficial (McCracken et al. 2005; Vowles and McCracken 2008; Eccleston et al. 2009; Glombiewski et al. 2010). For example, Vowles and McCracken (2008) engaged 171 patients with complex chronic pain conditions in a 3-4 week interdisciplinary treatment program which included an acceptance-based approach to chronic pain. Acceptance-based psychological interventions aim to assist the patient to accept the presence of their pain and continue participating in daily activities regardless of pain, thereby reducing the secondary distress associated with attempts to control and avoid pain (McCracken et al. 2005; Vowles and McCracken 2008). Both immediately and by 3-months post-treatment, patients had experienced clinically significant reductions in pain, depression, pain-related anxiety, physical disability, psychosocial disability, and medical visits, as well as significant increases in acceptance, values-based action, walking distance, and ease in moving from a sitting to a standing position (Vowles and McCracken 2008).

4.4 Strengths and limitations

Strengths

A novel approach to a prevention model for work-related suicide has been developed. The model is firmly based in the scientific literature and is consistent with the suicide following work injury data identified for the Victorian population.

Limitations

A limitation of this study is dependency on the NCIS circumstances and findings attachments which are variable in the information they provide. Any case series extracted from this database may misrepresent the size and nature of the problem to an extent that cannot be estimated, though underestimation is more likely since information on which cases rely for extraction may be missing and coroners tend to be highly conservative in their determination of suicide as the intent.

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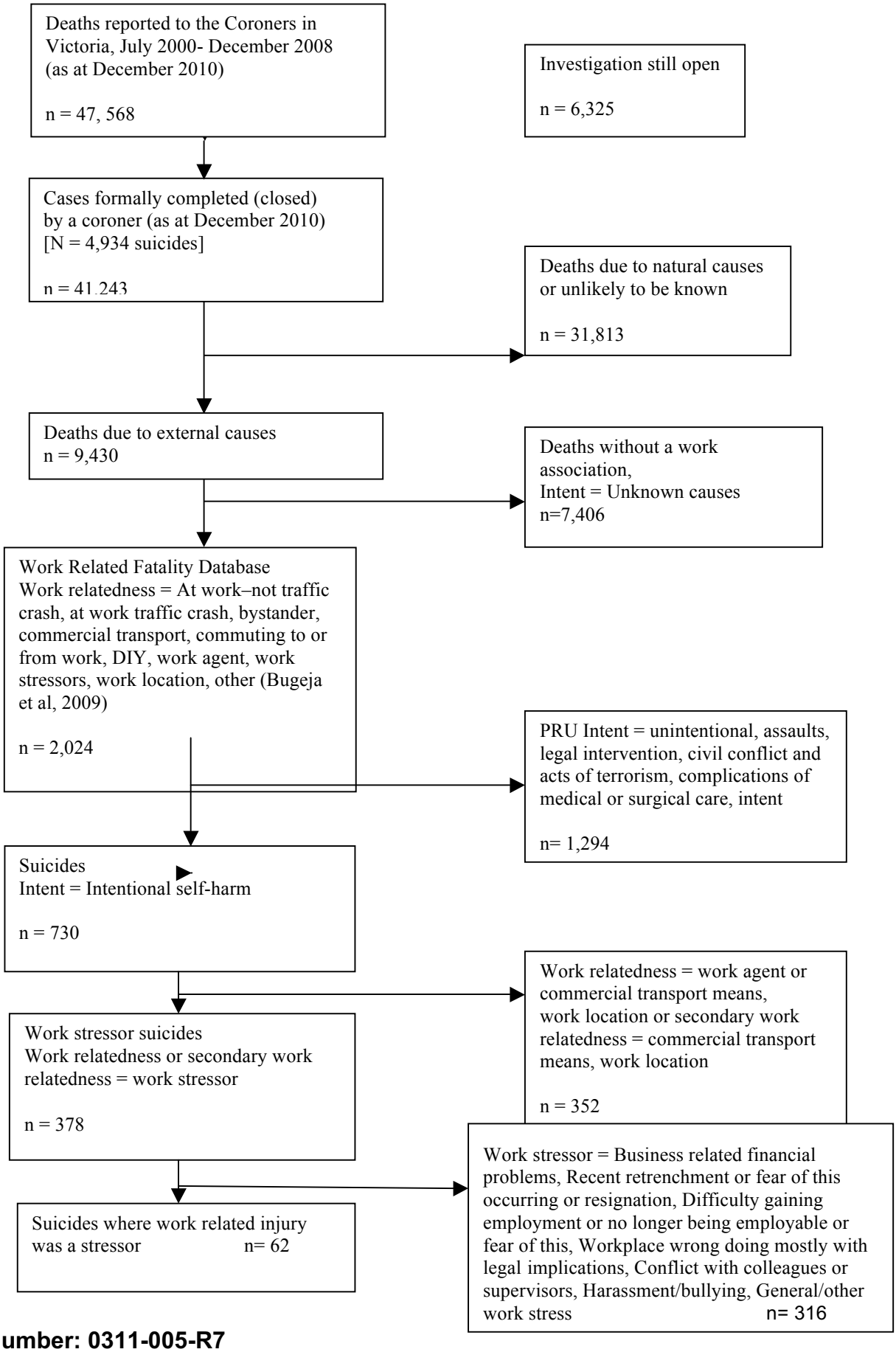
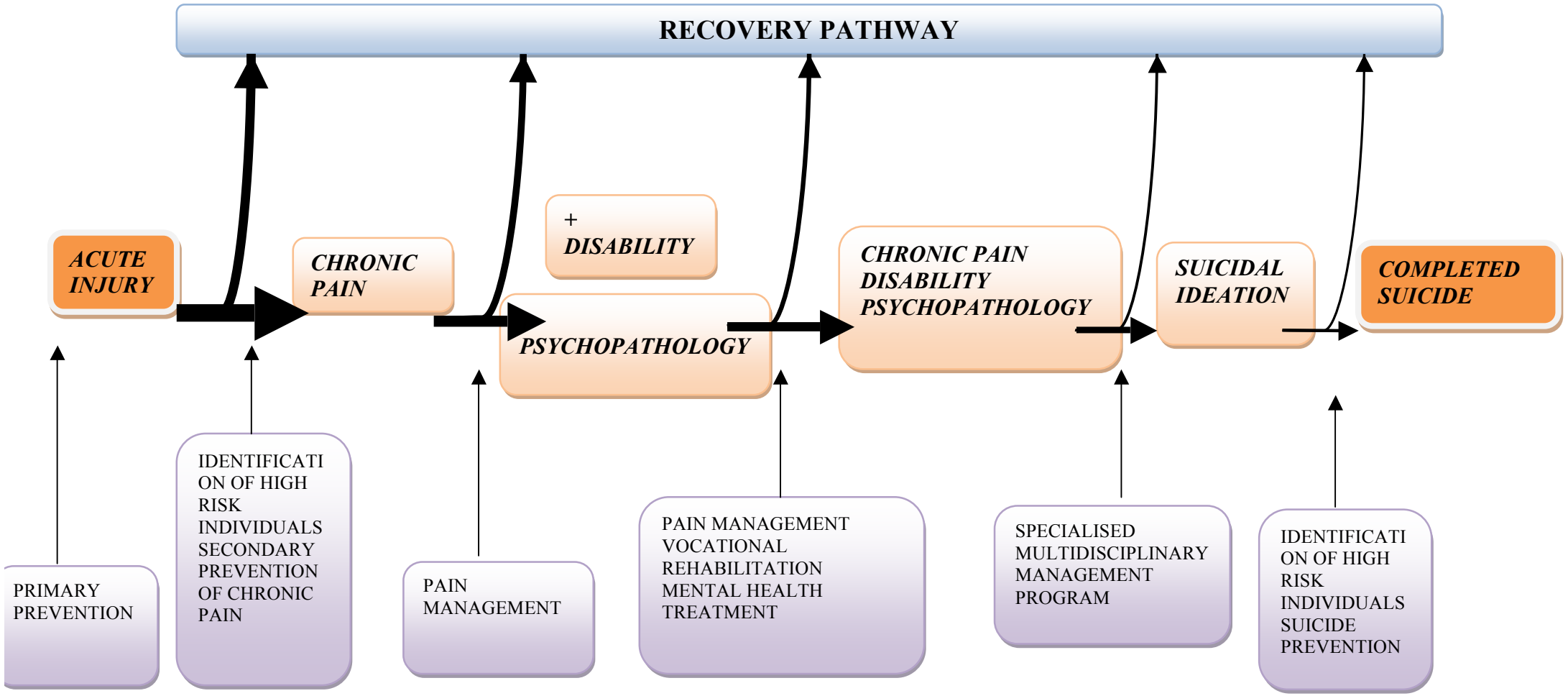
APPENDIX 1: CASE IDENTIFICATION FOR WORK RELATED SUICIDES WHERE WORK RELATED INJURY WAS A STRESSOR



Appendix 2

PATHWAYS WORK RELATED INJURY TO SUICIDE



INTERVENTION OPPORTUNITIES

Source: Prevention Research Unit,
Department Forensic Medicine, Monash University

Report Number: 0311-005-R7