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Age-related injury and compensation claim rates in heavy industry

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Background Although ageing workers face specific health and safety concerns, conflicting evidence exists regarding the effects of age on workplace injury rates and workers' compensation claims.

Aims To examine injury and workers' compensation claim rates by age and injury type in an aluminium smelter over a 9-year period.

Methods Routinely collected data for workplace injuries and workers' compensation claims were retrieved for the period from 1997 to 2005.

Results The study included a total of 709 workers who experienced 2281 at-work injuries and submitted 446 claims. In 1997, 16% of employees were aged 50 or over; by 2005 that proportion had more than doubled to 35%. Injury and claim rates in all age groups did not change significantly during this period. Workers younger than 30 years of age had the highest injury rates, with differences most significant for injuries other than sprains and strains. Claim rates were not significantly different across age groups.

Conclusions These findings do not provide evidence to support the notion that older workers sustain more injuries and are more likely to claim compensation for their injuries. Our findings demonstrate that in this workplace, older workers were able to maintain their ability to work safely. This contrasts with the finding that younger workers had the highest injury and claim rates. While adapting to the needs of an ageing workforce, employers should not lose sight of the need to nurture a strong culture of working safely among their youngest workers.

Key words Ageing; occupational health; occupational injuries; sprains and strains; workers' compensation.

Introduction

Industrially developed nations are experiencing ageing of their populations. In Australia, the workforce is rapidly ageing; the Australian Bureau of Statistics estimate that by 2016, 15% of the labour force will be over 54, compared with just 10% in 1998 [1]. In order to maintain economic growth and decrease retirement costs, the government is encouraging workers to stay in the workforce longer. Ageing workers face specific health and safety concerns due to their declining physical abilities and endurance. This includes physical capacity, visual and other perceptual problems, an increase in musculoskeletal disorders and an increasing incidence of systemic illness and disease [2–4]. By way of example, Savinainen *et al.* [5] followed Finnish municipal workers for 16 years, from a baseline mean age of 51 years, and demonstrated a 20% decline in mean physical capacity with the greatest changes occurring in trunk muscle strength and flexibility of the spine. Therefore, if the physical demands of work remain constant, the demands of the tasks may exceed an older workers' abilities [6]. A perception exists that this physical decline in older workers means they are more likely to sustain workplace injuries, in turn increasing workers' compensation claims. The history of workers' compensation claims has a direct effect on the workers' compensation policy premium, so companies with high claim numbers pay larger premiums. Therefore, some employers are concerned about retaining older workers and the potential financial impact of doing so. Since the global financial crisis of 2008, a substantial number of workers have lost work due to restructuring, downsizing and the moving of manufacturing operations offshore. In these circumstances, a common first step is to offer early retirement incentives to employees. The effect of this approach is often to coerce older workers, who are thought to be 'past their prime', to leave the organization [7]. Nevertheless, labour shortages mean that employers' reliance on older workers will continue into the future and so reforms may be necessary to accommodate an ageing workforce. There is conflicting evidence as to how economically productive older workers can remain. A recent review of 36 studies assessing the health and safety of the older worker found there was limited evidence concerning safety practices and health risks in workers over 60; rather, the findings were that these workers had fewer accidents and injuries although these were more likely to be serious when they occurred [4]. An analysis of over 1 million non-fatal workplace injuries in 2009 in the USA, involving loss of consciousness, medical treatment (MTI) or change of duties, revealed that workers over the age of 55 had lower rates of sprains and strains, but higher rates of falls and fractures [8]. An analysis of administrative data for injuries resulting in an absence of 28 days or more in the Canadian province of British Columbia identified similar trends in regard to claim rates for sprains, strains and fractures [9]. An Australian statewide study of workers' compensation claims requiring at least 10 days lost time found that the claim rates decreased after the age of 54, a finding echoed in their analysis of lost time [10]. With regard to relapse following initial return to work, they found the odds of chronic relapsing markedly reduced at age 60 and older. A 20-year study of 27 000 claims in the US state of Washington found that claim rates were lowest among workers aged 40 and over [11]. A more recent analysis of over 100 000 claims submitted in the US state of Colorado, examining severity as well as frequency, concluded however that older workers do file more costly claims [12].

With this level of ambiguity regarding at-work injury and workers' compensation claims for workers aged 55 and over further research is required. Pollack *et al.* [13] suggested that population databases, such as workers' compensation data, while valuable, lack vital information such as those injuries that do not result in lost work time. They suggested using company administrative files and live injury management system (IMS) information. This study sought to examine the effects of employee age and nature and type of injury on at-work injury and compensation claim rates at an Australian aluminium smelter using routinely collected data.

Methods

We undertook a longitudinal study using IMS data and workers' compensation claims over a 9-year period (1997–2005). Ethical approval to conduct the study was gained from the Human Research Ethics Committee of the University of Newcastle, Australia. The study population was all individuals who were employed at the smelter for some time between January 1997 and December 2005. As only 41 women were employed at some time during the study period, they were not included in the analysis. The smelter consisted of four areas: the three production departments (potroom, casting and carbon plant) and the supporting and maintenance departments. Anonymized routinely collected electronic injury and claims data were available from company databases. Data abstracted included demographics, employment information (start and termination dates and department), reported injuries and workers' compensation claims. Demographic information included gender and date of birth, and five age groups (<30 years, 30–39, 40–49, 50–59 and 60 and over) were used. Injury details were available for the entire study period and included injury date, type and nature. Injury type was classified as first aid only (FAI), MTI, lost time injury (LTI) or requiring restriction of duties with no lost time (RDI). Injuries were classified as sprains/strains, burns, contusions, foreign bodies, open wounds, fractures, superficial injuries, muscle/tendon injuries, dermatitis/eczema and others.

Claim details were available for January 2001 to December 2004 and were categorized by injury nature. As the aim was to establish whether or not acute workplace injuries increase with age, 23 hearing loss claims were removed from the analysis as indicative of cumulative injury. The number of employees at the start of each year and their department of employment were compared across age groups using Pearson's chi-squared test. The two outcomes of interest were annual injury rate and annual compensation claim rate. Annual rates were calculated by dividing the number of events each year by the amount of time at risk (i.e. employed) that year (total days/365.25) between the later of the start of employment and January 1st and the earlier of the end of employment and December 31st. The effects of department, year, age, nature and type on annual injury rates were tested using negative binomial and Poisson regression models. Likelihood ratios were used to test for over-dispersion in the Poisson models. Backward stepwise methods were used to identify parsimonious models. Exact confidence intervals were obtained using a Poisson distribution. Significance was determined at the 5% level. Statistical analyses were carried out in Stata MP 12.1 [14].

Results

In total, 709 workers were employed for some time between 1997 and 2005. On 1 January 1997, there were 493 male employees. By January 2005, this number had increased slightly to 541, with the greatest number being 558 on 1 January 2002. In 1997, 16% of employees were aged 50 and over and by 2005 this proportion had increased to 35%. This difference in age through the follow-up period was significant ($P < 0.01$, see Table 1).

A total of 2281 injuries were recorded between January 1997 and December 2005. Of these, 86% were FAIs and a further 8% MTIs. The remaining 6% were either RWIs or LTIs. The number and percentages of injuries by age group are shown in Table 2 along with type, nature and location of injury. There was a significant difference in worker age by nature of injury ($P < 0.01$, see Table 2).

A total of 446 workers' compensation claims were recorded for the 4-year period 2001–2004. The majority (73%) were made for sprains and strains, the next most common injury types being open wounds and burns at 5% each. The balance of claims was spread between contusions, foreign bodies in the eye, fractures, superficial injuries, muscles and tendons, dermatitis and eczema and other injuries (see Table 2). Annual workplace injury rates by age are shown in Table 3 and Figure 1. Negative binomial modelling found no significant evidence of a change in injury rates during the study period; therefore, the data were aggregated over the period. No significant differences were found between MTI, RWI and LTI rates, and these groups were therefore combined. The number of injuries for the 60 and over age group was small resulting in very wide confidence intervals, so the 50–60 and 60+ age groups were combined. Modelling found significant effects of age, nature and type of injury including significant interactions. With rates close to zero, asymptotic intervals provided by a negative binomial or Poisson model may include negative numbers. Thus, exact Poisson confidence intervals were calculated for each group. The overall annual at-work injury rate requiring only first aid was 6.82 per 100 person-years (95% CI: 6.52–7.12). The first notable feature on Figure 1 is the high rates of sprains and strains that do not differ significantly across age groups; the overall annual at-work injury rate for sprains and strains requiring only first aid was 17.23 per 100 person-years (95% CI: 16.13–18.36). Burns on the other hand did differ significantly between age groups, with workers under the age of 30 having a significantly higher burn injury rate than workers aged 40–50. The only type of FAI injury for which the 50+ age group had a significantly higher rate than another age groups was injury to muscles and tendons; again the 40–50 age group had the lowest rate and the <30 group had the highest rate. The overall annual at-work injury rate, for injuries requiring any type of MTI, was 2.66 per 100 person-years (95% CI: 2.37–2.98). Figure 2 differs from Figure 1 in that it provides data for injuries requiring any type of treatment (MTI, RDI and LTI). Figure 2 shows several important features. First, in contrast with Figure 1, there were no significant differences across the age groups. Second, the nature of injury with the highest annual

Table 1. Number and percentage of employees by age groups, year, department and pay/hours type

	Age group (years)					Total *n*	Chi-squared *P* value
	<30, *n* (%)	30–39, *n* (%)	40–49, *n* (%)	50–59, *n* (%)	60+, *n* (%)		
Year (number of employees on 1 January)							
1997	50 (10)	152 (31)	213 (43)	77 (16)	1 (0)	493	<0.01
1998	53 (10)	140 (27)	216 (42)	101 (20)	1 (0)	511	
1999	62 (12)	130 (24)	219 (41)	117 (22)	6 (1)	534	
2000	63 (12)	117 (22)	223 (41)	134 (25)	6 (1)	543	
2001	57 (10)	110 (20)	221 (40)	152 (28)	8 (1)	548	
2002	53 (9)	110 (20)	217 (39)	165 (30)	13 (2)	558	
2003	42 (8)	108 (20)	212 (39)	162 (30)	18 (3)	542	
2004	36 (7)	104 (19)	204 (38)	169 (31)	25 (5)	538	
2005	33 (6)	101 (19)	189 (35)	188 (35)	30 (6)	541	
Department (1 January 1997)							
Casting house	10 (8)	41 (33)	57 (45)	18 (14)	0 (0)	126	NS
Potroom	23 (12)	56 (29)	87 (46)	25 (13)	0 (0)	191	
Carbon plant	4 (6)	22 (31)	30 (42)	15 (21)	1 (1)	72	
Other	13 (13)	33 (32)	39 (38)	19 (18)	0 (0)	104	
Department (1 January 2005)							
Casting house	3 (2)	21 (15)	54 (39)	49 (36)	10 (7)	137	NS
Potroom	8 (4)	39 (20)	63 (33)	70 (37)	11 (6)	191	
Carbon plant	6 (6)	19 (20)	32 (34)	32 (34)	4 (4)	93	
Other	16 (13)	22 (18)	40 (33)	37 (31)	5 (4)	120	

Table 2. Number and percentage of at-work injuries and compensation claims by age group

At-work injuries (1997–2005)

	Age group (years), *n* (%)					Total	Chi-squared *P* value
	<30	30–39	40–49	50–59	60+		
Type of injury							
First aid only	148 (92)	461 (85)	839 (86)	497 (87)	28 (93)	1973 (86)	NS
MTI	8 (5)	56 (10)	79 (8)	33 (6)	1 (3)	177 (8)	
Restricted duties	3 (2)	15 (3)	30 (3)	23 (4)	0 (0)	71 (3)	
Lost time	2 (1)	11 (2)	27 (3)	19 (3)	1 (3)	60 (3)	
Total	161 (100)	543 (100)	975 (100)	572 (100)	30 (100)	2281 (100)	
Nature of injury							
Sprains and strains	61 (38)	279 (51)	514 (53)	275 (48)	9 (30)	1138 (50)	<0.001
Burns	25 (16)	72 (13)	104 (11)	62 (11)	3 (10)	266 (12)	
Contusions	23 (14)	78 (14)	125 (13)	64 (11)	4 (13)	294 (13)	
Foreign bodies	6 (4)	37 (7)	45 (5)	27 (5)	1 (3)	116 (5)	
Open wounds	24 (15)	34 (6)	57 (6)	42 (7)	4 (13)	161 (7)	
Fractures	2 (1)	1 (0)	5 (1)	5 (1)	0 (0)	13 (1)	
Superficial injuries	2 (1)	7 (1)	18 (2)	6 (1)	2 (7)	35 (2)	
Muscles/tendons	7 (4)	13 (2)	59 (6)	61 (11)	5 (17)	145 (6)	
Dermatitis/eczema	1 (1)	6 (1)	7 (1)	2 (0)	0 (0)	16 (1)	
Other	10 (6)	16 (3)	41 (4)	28 (5)	2 (7)	97 (4)	
Total	161 (100)	543 (100)	975 (100)	572 (100)	30 (100)	2281 (100)	
Location of injury							
Hands, fingers	43 (27)	80 (15)	146 (15)	77 (13)	5 (17)	351 (15)	0.001
Back, trunk	30 (19)	111 (20)	216 (22)	108 (19)	4 (13)	469 (21)	
Hip, leg, feet, toes	32 (20)	106 (20)	214 (22)	153 (27)	10 (33)	515 (23)	
Shoulder, arms	19 (12)	132 (24)	227 (23)	133 (23)	7 (23)	518 (23)	
Other	37 (23)	114 (21)	172 (18)	101 (18)	4 (13)	428 (19)	
Total	161 (100)	543 (100)	975 (100)	572 (100)	30 (100)	2281 (100)	
Claims (2001–04)							
Nature of injury							
Sprains and strains	12 (52)	65 (74)	136 (75)	109 (73)	3 (60)	325 (73)	<0.05
Burns	0 (0)	4 (5)	7 (4)	9 (6)	1 (20)	21 (5)	
Contusions	1 (4)	1 (1)	9 (5)	4 (3)	0 (0)	15 (3)	
Foreign bodies	0 (0)	3 (3)	3 (2)	3 (2)	0 (0)	9 (2)	
Open wounds	5 (22)	5 (6)	9 (5)	5 (3)	0 (0)	24 (5)	
Fractures	2 (9)	1 (1)	3 (2)	5 (3)	0 (0)	11 (2)	
Superficial injuries	1 (4)	4 (5)	2 (1)	3 (2)	0 (0)	10 (2)	
Muscles/tendons	0 (0)	0 (0)	3 (2)	2 (1)	0 (0)	5 (1)	
Dermatitis/eczema	2 (9)	1 (1)	0 (0)	1 (1)	0 (0)	4 (1)	
Other	0 (0)	4 (5)	9 (5)	8 (5)	1 (20)	22 (5)	
Total	23 (100)	88 (100)	181 (100)	149 (100)	5 (100)	446 (100)	

treated injury rate was sprains/strains and contusions with no differences between age groups. Finally, the youngest workers had elevated injury rates for injuries of all types. Aggregating all treated injury natures gives the following annual rates: for the under 30 age group, 4.37 (95% CI: 2.33–7.47); for the 30–40 age group, 3.38 (95% CI: 2.69–4.19); for the 40–50 age group, 2.36 (95% CI: 1.98–2.79); for the 50 and over age group, 2.49 (95% CI: 1.96–3.11). Thus, we conclude that the youngest age group had a significantly higher treated injury rate than all other age groups and that the two older age groups (40–50 and 50+) had rates significantly lower than the two younger age groups (<30 and 30–40).

Figure 3 shows workers' compensation claim rates for 2001–04. Negative binomial modelling found no significant evidence of a change in claim rates during the study period so the data were aggregated over the entire period. There was no significant evidence of over-dispersion so Poisson models were appropriate for claim rates. Again, confidence intervals for the 60 and over age group were extremely wide so the 50–60 and 60+ age groups were combined. The overall annual claim rate was 3.42 per 100 person-years

Table 3. Annual at-work injury and compensation claim rates per 100 person-years at risk by age group, nature and type of injury, with exact Poisson 95% confidence intervals

Annual at-work injury rates (1997–2005)				
Type and nature of injury	Age group (years)			
	<30	30–39	40–49	50+
First aid only				
Sprains and strains	14.6 (11.1, 19.0)	16.4 (14.3, 18.7)	18.2 (16.6, 20.1)	17.1 (15.0, 19.3)
Burns	9.6 (6.2, 14.2)	6.2 (4.8, 7.8)	4.9 (4.0, 5.9)	6.2 (4.7, 8.0)
Contusions	8.2 (5.0, 12.5)	5.4 (4.2, 6.8)	5.2 (4.3, 6.3)	4.6 (3.6, 5.9)
Foreign bodies	5.2 (1.9, 11.4)	3.5 (2.3, 4.9)	2.5 (1.8, 3.4)	3.6 (2.3, 5.3)
Open wounds	6.3 (3.9, 9.6)	3.6 (2.4, 5.2)	2.7 (2.0, 3.5)	4.2 (2.9, 5.9)
Fractures	0	0	0	0
Superficial injuries	10.0 (1.2, 36.1)	2.5 (0.9, 5.5)	2.0 (1.1, 3.4)	2.1 (0.9, 4.1)
Muscles/tendons	19.7 (7.2, 42.8)	5.7 (2.9, 9.9)	5.3 (3.9, 6.9)	9.6 (7.4, 12.3)
Dermatitis/eczema	12.5 (0.3, 69.6)	2.4 (0.8, 5.7)	1.9 (0.7, 4.1)	2.6 (0.3, 9.3)
Other	7.3 (3.4, 13.9)	2.3 (1.2, 3.9)	2.5 (1.7, 3.5)	2.8 (1.8, 4.2)
Total	9.6 (8.1, 11.3)	6.9 (6.2, 7.5)	6.3 (5.8, 6.7)	7.2 (6.6, 7.9)
Other: MTI, restricted duties or lost time				
Sprains and strains	3.7 (1.0, 9.5)	5.0 (3.8, 6.5)	3.6 (2.9, 4.5)	3.8 (2.7, 5.1)
Burns	0	2.9 (0.8, 7.4)	1.2 (0.4, 2.9)	2.8 (0.8, 7.1)
Contusions	3.9 (0.5, 14.2)	1.8 (0.7, 3.6)	1.4 (0.7, 2.5)	2.6 (0.3, 9.3)
Foreign bodies	0	1.8 (0.7, 4.0)	1.7 (0.5, 4.5)	1.7 (0.5, 4.3)
Open wounds	3.8 (0.8, 11.0)	2.3 (0.6, 6.0)	1.3 (0.5, 2.6)	1.6 (0.8, 2.8)
Fractures	5.4 (0.7, 19.5)	1.7 (0.0, 9.4)	1.8 (0.6, 4.3)	1.5 (0.5, 3.6)
Superficial injuries	0	1.9 (0.0, 10.8)	1.6 (0.3, 4.5)	0
Muscles/tendons	11.1 (0.3, 61.9)	5.6 (0.1, 31.0)	2.1 (0.9, 4.1)	2.3 (0.3, 8.4)
Dermatitis/eczema	0	4.4 (0.1, 24.6)	1.5 (0.0, 8.3)	0
Other	7.7 (0.2, 42.9)	1.8 (0.4, 5.3)	1.4 (0.6, 2.7)	1.8 (0.7, 3.7)
Total	4.4 (2.3, 7.5)	3.4 (2.7, 4.2)	2.4 (2.0, 2.8)	2.5 (2.0, 3.1)
Annual claim rates (2001–04)				
Nature of injury				
Sprains and strains	8.5 (4.4, 14.8)	14.1 (10.9, 18.0)	15.7 (13.2, 18.6)	16.2 (13.3, 19.5)
Burns	0	1.8 (0.5, 4.6)	1.1 (0.4, 2.2)	2.0 (1.0, 3.6)
Contusions	2.5 (0.1, 14.1)	0.8 (0.0, 4.7)	1.4 (0.6, 2.6)	0.6 (0.2, 1.6)
Foreign bodies	0	2.5 (0.5, 7.3)	0.5 (0.1, 1.4)	0.9 (0.2, 2.6)
Open wounds	3.9 (1.3, 9.0)	1.5 (0.5, 3.4)	1.0 (0.5, 2.0)	0.8 (0.2, 1.8)
Fractures	2.2 (0.3, 8.0)	0.9 (0.0, 4.8)	1.4 (0.3, 4.2)	1.0 (0.3, 2.4)
Superficial injuries	2.5 (0.1, 14.1)	1.8 (0.5, 4.5)	0.5 (0.1, 1.7)	0.9 (0.2, 2.8)
Muscles/tendons	0	0	0.5 (0.1, 1.4)	0.6 (0.1, 2.2)
Dermatitis/eczema	5.1 (0.6, 18.3)	0.8 (0.0, 4.7)	0	0.6 (0.0, 3.4)
Other	0	1.7 (0.5, 4.4)	1.0 (0.5, 2.0)	1.4 (0.6, 2.6)
Total	4.8 (3.0, 7.2)	4.5 (3.6, 5.5)	3.1 (2.7, 3.6)	3.2 (2.7, 3.8)

(95% CI: 3.10–3.75). Figure 3 shows a number of important features. First, the highest rate of claims was for sprains and strains with no significant differences between age groups: 15.01 (95% CI 13.46–16.78) overall. Second, there were no claims for burns, foreign bodies, muscle/tendon and other injuries in the youngest age group (under 30). Finally, there was no significant difference in the claim rates for these types of injuries across the remaining three age groups, with a rate of 1.11 (95% CI: 1.09–1.13) for the 30 and over age groups.

Discussion

Our study does not support the hypothesis that older workers sustain more injuries than younger workers. High rates of injury among workers under the age of 30 have previously been reported [4,10,11]; so why is there a perception that older workers are more likely to have accidents? There has been evidence published that older workers in some industries file more costly insurance claims [12], so while the claim rate may be the same, if the cost of claims is greater, the overall cost of claims

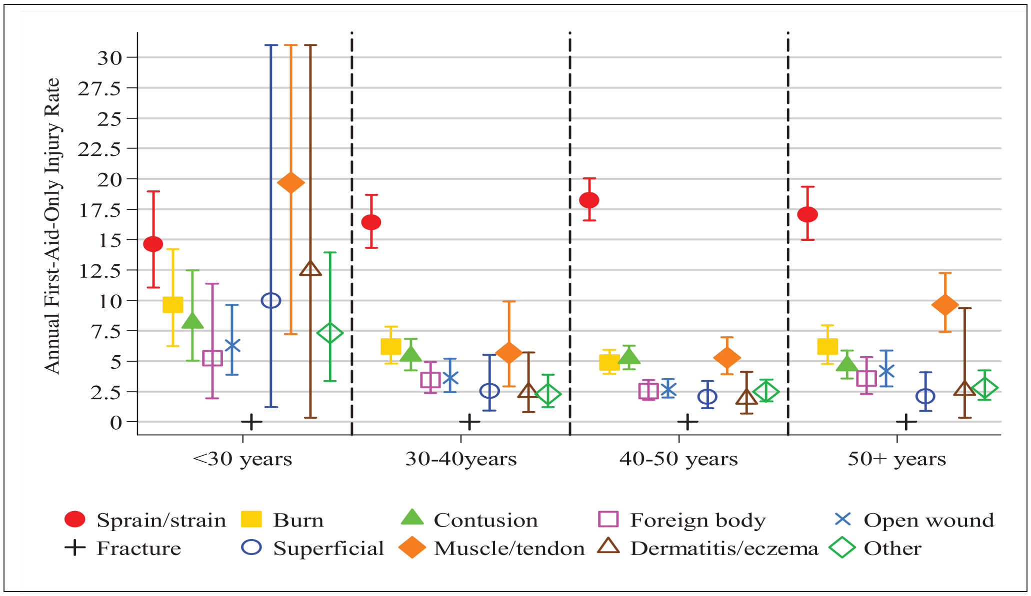

Figure 1. Annual at-work injury rates per 100 person-years at risk, for injuries between 1997 and 2005 requiring first aid treatment only (FAI), by nature of injury, with exact Poisson 95% confidence intervals.

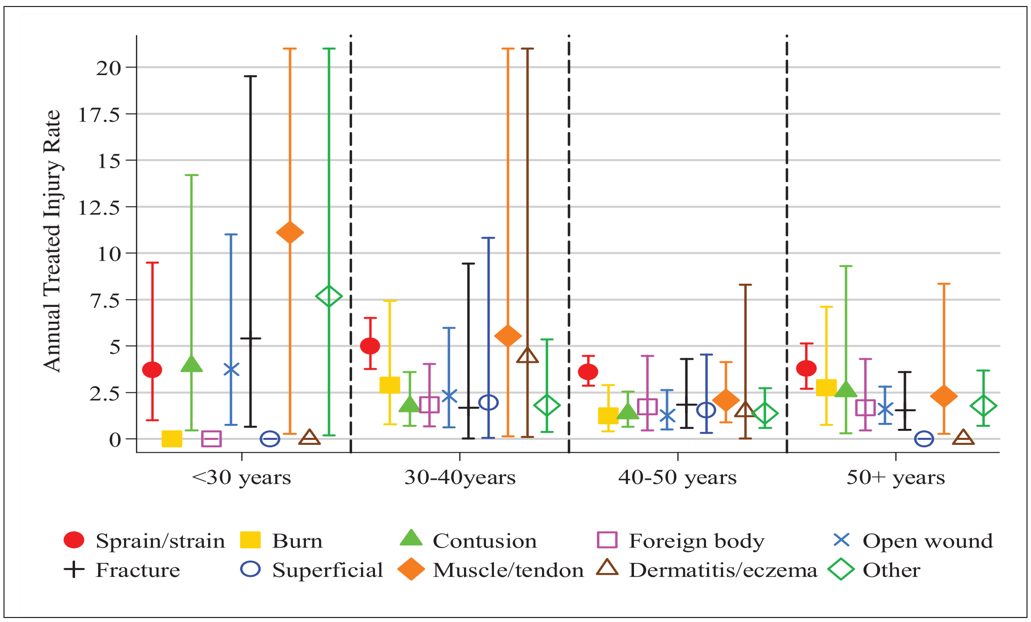

Figure 2. Annual at-work injury rates per 100 person-years at risk, for injuries between 1997 and 2005 requiring treatment (MTI, RDI and LTI), by nature of injury, with exact Poisson 95% confidence intervals.

for older age groups may be higher [15]. Some previous research has also found a higher injury recurrence rate [10] and a longer time to return to work among older workers [16]. In considering our findings, we suggest a number of reasons why this conflicting evidence exists. First, different workplaces have different policies regarding the provision of suitable duties. There has been a paradigm shift from rehabilitation time spent away from the workplace to workplace-based disability management by assigning alternative or suitably modified duties. This allows employers to assume greater control, responsibility and accountability for reducing workers' compensation costs. Suitable duties are identified, appropriate to the injured employee's capacities, skills and experience and taking medical limitations into account. Providing suitable duties may involve modification to duties, alternative duties or modified hours while on a return to work plan. An Australian national survey showed that injured employees who were given suitable duties enabling return to work reported a sustained return in 77% of cases [17].

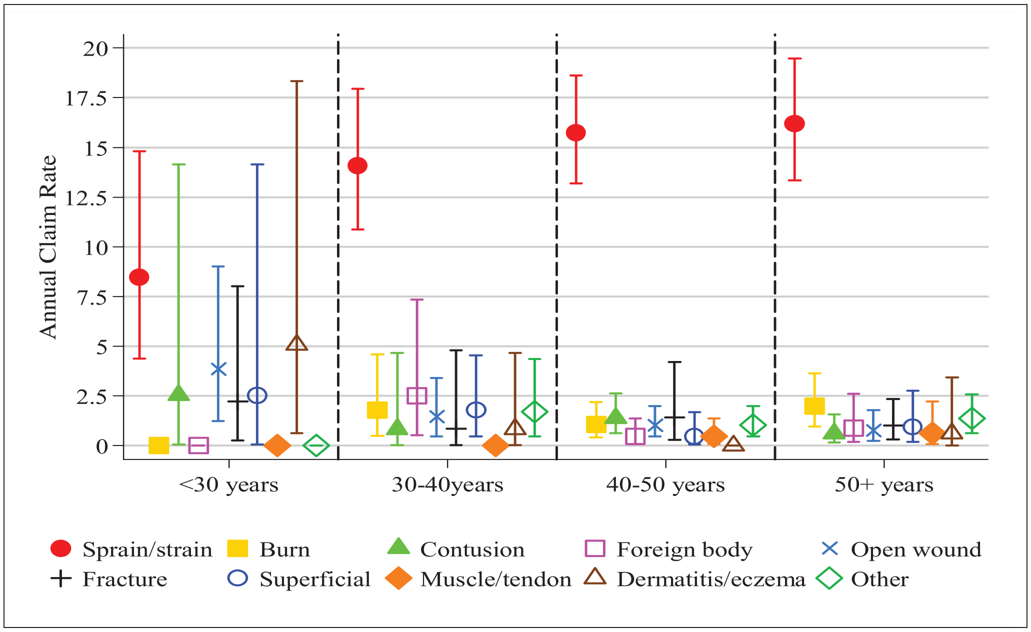

Figure 3. Annual claim rates per 100 person-years at risk, for claims between 2001 and 2004, by nature of injury, with exact Poisson 95% confidence intervals.

Therefore, the difference in uptake of such an injury management approach across workplaces may account for the differences in our injury rate findings to those of other researchers studying other workplaces. Second, a number of studies have been published reporting the benefits of multidisciplinary and active, as opposed to passive, approaches to rehabilitation [18–20]. The active participation of workers, together with their supervisors, in developing injury prevention measures [21] has been associated with both a decrease in the incidence of musculoskeletal symptoms and an earlier return to work for those with subacute musculoskeletal injuries [22]. The benefit of including management and injured workers in the development of injury management plans has also been demonstrated [23]. The ability of an injured worker to become involved in making informed choices during their rehabilitation increases their personal control and improves the rehabilitation outcome, with workers making a timely, safe and lasting return to pre-injury duties [24]. The varying degree to which workers take an active part in their rehabilitation may also lead to rates of recurrent injuries affecting injury rates differentially. Third, large population-based studies include a wide spectrum of occupations and industry settings, including industries with higher injury rates. The Australian key work, health and safety statistics for 2012 reported the transport industry as having the highest incidence rate of serious claims; 24 per 1000 employees per year [25]. The aluminium smelter used for this study may be better able than other workplaces and industries to develop safety practices that benefit all workers regardless of age. Lastly, studies that utilize only serious injury claims, that is, claims for more than 5–10 days' absence from work, may be vulnerable to bias. Langford *et al.* [26] discussed frailty bias in relation to assessing older drivers' involvement in motor vehicle crashes, arguing that once involved in a crash older drivers are more likely to experience adverse outcomes due to their greater frailty. This increased vulnerability to injury, as distinct from increased crash propensity, can be reflected in different age groups' relative likelihood of involvement in crashes of varying severity. The same may be true of older workers. Older adults' biomechanical tolerances to injury are lower than those of younger workers, primarily due to reductions in bone strength and fracture tolerance [27,28]. Therefore, the energy required to cause serious injury reduces with age. Similarly, Cunningham *et al.* [29] found that age-related declines in general health exacerbate the likelihood of serious injuries among older vehicle occupants involved in a crash and also inhibit recovery from the injuries sustained. Therefore, we suspect that studies that utilize only serious injury claims data are vulnerable to frailty bias, leading to an over-representation of older workers.

A strength of this study was the use of 9 years of data from a single workplace and the inclusion of all injury data, rather than just claims data for injuries requiring 5 or more days' lost time. As suggested by Pollack *et al.* [13], this approach provides an opportunity to draw conclusions from a more holistic perspective. A weakness of the study was that the size of the workforce did not allow for a sufficient number of injuries and claims to occur in the group of workers aged 60 years and over, and thus, wide confidence intervals prevented us identifying any significant differences between the oldest (60+) workers and their 50–60 year counterparts. Another potential threat to our conclusions may be a bias that occurs if older workers make fewer workers' compensation claims because they may have recourse to other funds such as retirement pension, or social security payments, which younger workers, who must support themselves and family with recourse to compensation payments, do not. However, unlike many Western countries, Australia has incorporated a provision for rehabilitation into legislation governing workers' compensation [17,30], which obviates a need to apply instead for retirement pension following disability from a specific job. There is, therefore, no reason or financial advantage to use funds other than workers' compensation, eliminating this possible source for bias in the results.

In conclusion, while it is important for employers to plan for and manage the possible challenges that an ageing workforce may present, this study found no evidence to support the notion that workers over the age of 50 years are more likely to have an at-work injury and has shown that an older workforce should not be assumed to be prone to increased injuries and compensation claims. In fact, at this heavy industry worksite, younger workers (aged 30 and under) had the highest injury rates. In their efforts to increase flexibility in the workplace by increased automation and job and workplace redesign, employers should not lose sight of the need to train and encourage younger workers to work safely. The nurturing of a strong culture of workplace safety should not only reduce injury and claim rates among younger workers today but also lead to a sustained lower level of injuries in future.

Key points

- At this heavy industry worksite, younger workers (aged 30 and under) had the highest injury rates.
- An older workforce does not necessarily equate with increased injuries and compensation claims.
- It is important for employers to plan for and manage the possible challenges that an ageing workforce may present.

Conflicts of interest

None declared.

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