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Recommended Citation

Taylor, Nigel A.S and Taylor, Elizabeth A.: An epidemiology of work-related injuries to Australian firefighters (1998-2007) 2011, 314-316.
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Keywords

firefighters, 1998, epidemiology, 2007, work, related, injuries, australian

Disciplines

Arts and Humanities | Life Sciences | Medicine and Health Sciences | Social and Behavioral Sciences

Publication Details

Taylor, N. A.S. & Taylor, E. A. 2011, 'An epidemiology of work-related injuries to Australian firefighters (1998-2007)', in S. Kounalakis & M. Koskolou (eds), Book of Abstracts: ICEE2011: XIV International Conference on Environmental Ergonomics, National and Kapodestrian University of Athens, University of Athens, pp. 314-316.

AN EPIDEMIOLOGY OF WORK-RELATED INJURIES TO AUSTRALIAN FIREFIGHTERS (1998-2007)

Nigel A.S. Taylor and Elizabeth A. Taylor

INTRODUCTION

Through a retrospective evaluation of injuries to firefighters from 1998 to 2007 (Taylor & Kerry, 2010), the authors have been able to describe both injury rates and age-related injury patterns within an Australian Fire and Rescue organisation. One focus of this work was the possibility that recent changes to individual items of personal protective equipment, resulting in an increase in the total load carried by firefighters, may have inadvertently increased the risk of work-related injuries.

METHODS

Firefighters who sustained an injury, or experienced a near-miss event during working hours, formally notified the Health and Safety Branch of this organisation. Each case is evaluated, and if it was associated with lost work time or medical treatment, then full injury details are forwarded to the Workers' Compensation insurer. This insurer maintains an electronic database of the details relevant to each injury, and details from this database were analysed for a ten-year period: 1998-2007. Data were extracted and reported first in absolute values, then normalised to the number of firefighters (per 1,000 full-time employees (FTE)), and finally evaluated under four general formats: total injuries, annual trends, gender differences and age-group differences.

The accuracy of this research was dictated by the decision-making processes that occurred with respect to each injury, and then by the precision of data entry. Calculations with respect to the number of full-time firefighters were based upon data provided by the Fire and Rescue organisation: 3,514 permanent and 3,390 retained (on-call) firefighters.

RESULTS

Within this decade, 7,215 injuries were recorded, of which 6,973 were to firefighters (96.6%), with 137 injuries (1.9%) occurring to senior firefighters. The remaining injuries (1.5%) did not involve employees, and were not included in these analyses. The annual claim finalisation rate for these injuries averaged 92%.

On average, 697 firefighters (17.1% of the full-time workforce) sustained an injury each year that necessitated a Workers' Compensation claim for medical treatment or lost work time, and this showed an annual increase of about 50 injuries over this decade. The vast majority of these injuries (98.2%) were reported to have occurred when performing work-related duties. The total lost working time was 3,116,473 hours (1,672 years), or 167.2 years *per annum*. Assuming an average working life of 20 years, then eight firefighters were lost annually from this job due to injuries. The mean lost time per injury was 446.9 hours (55.9 days). The total cost of Workers' Compensation claims for these

6,973 injuries was \$115,758,030, with the mean claim cost per injury being \$16,600. However, the true cost of these injuries to this organisation, as reflected within annual insurance premiums, can be several-fold larger, although this cost has not been included within this report.

In relative terms, there was an average of 170.5 injuries per 1,000 full-time firefighters *per annum*. This injury rate is almost 50% greater than is found in physically demanding trades within Australia (Australian Bureau of Statistics, 2008). These injuries resulted in 41.4 years of lost work time and cost \$2,829,682 *per annum* per 1,000 full-time firefighters.

Within this Fire and Rescue organisation, 37% of all firefighters are aged 40-50 years (1,478 males, 37 females), and these individuals accounted for 38.4% of all injuries. However, there was a significant injury under representation by firefighters <30 years, with 9.3% of the individuals suffering just 2.4% of all injuries. Conversely, the 50-60-year-olds (20.9% of firefighters) experienced 29.3% of these injuries. Indeed, the male injury data are skewed towards the older ages. Whilst the mean overall injury rate was 17.1%, the injury rate for males >40 years was 21.6% (40-50 years = 17.6%, 50-60 years = 23.9%, 60-70 years = 77.1%, >70 years = 40.1%). Therefore, if the injury rate of the 30-40-year-old males (11.7%) could be retained as firefighters aged, then 237 fewer injuries would occur each year within males >40-years old, and the age- and gender-specific Workers' Compensation cost saving would be \$5,687,934 *per annum*.

The single most common injury type was for joint and muscle strains, and sprains. These injuries alone accounted for 65.6% (4,573) of all injuries, and increased annually at a rate of 20.0 injuries.y⁻¹. The incurred net cost of these injuries was \$70,335,693 over this decade, with male firefighters accounting for \$69,290,798. When these male data were normalised to the number of full-time firefighters within each age division, the injury distribution was again skewed towards older individuals. This shift indicates a very strong age dependency for sprain and strain injuries, and this was linked very powerfully to the net costs of injuries.

Relative to the youngest age division (<30 years), firefighters >40 years of age had injury probabilities that ranged from 4-18 times higher. Male firefighters >40-years old represented 61% of the workforce, but suffered 75% of the sprain and strain injuries, and accounted for approximately 90% of the lost work time and Workers' Compensation costs.

Four body regions were injured >500 times between 1998-2007, and these accounted for 44.0% of all injuries and 50.3% of the total injury costs:

- lower back: 1,024 injuries (14.7% of all injuries); cost: \$18,164,164
- knee: 939 injuries (13.5% of all injuries); cost: \$23,123,949
- ankle: 562 injuries (8.1% of all injuries); cost: \$5,157,262
- shoulder: 540 injuries (7.7% of all injuries); cost: \$11,799,815.

Knee and shoulder injuries increased linearly over the decade, with respective annual increases of 6.6 and 6.5 injuries.y⁻¹. The average costs for these injuries were \$24,626 (knee) and \$21,852 (shoulder), with these two sites alone accounting for 30.2% (\$34,923,763) of the total injury costs, and 29.6% (480.9 years) of the total lost working time.

From these analyses, there was no evidence within firefighters <40 years of age, that personal protective equipment played a causal role with injuries over this decade. This is not to suggest that the burden of such equipment did

not significantly elevate physiological strain, just that the evidence was not consistent with a causal relationship. However, there was very clear evidence that older firefighters experienced greater injury rates, and these cost more in both time away from work and in Workers' Compensation costs. It is suggested that this trend resulted from a gradual decline in habitual exercise behaviours as most firefighters aged. Therefore, it is highly likely, at least within older firefighters, that the personal protective equipment might impose sufficient stress that it may predispose less fit and less strong individuals to greater injury risks within the workplace.

CONCLUSION

On the basis of these observations, two injury prevention and minimisation strategies are recommended. Firstly, there must be an attempt to halt and reverse the annual elevation in injuries, particularly the sprain and strain injuries. Secondly, preventing the 237 additional injuries each year within firefighters >40 years old, relative to their younger counterparts, must be targeted. It is possible that both recommendations can be addressed by implementing structured health, fitness and rehabilitation programmes that target older male firefighters, but with a specific emphasis upon job-related fitness and reversing the physiological changes evident in within ageing sedentary, but not necessarily observed within ageing and habitually active individuals.

REFERENCES

- Australian Bureau of Statistics (2008). *Year book Australia*. Australian Bureau of Statistics (catalogue number 1301.0). Canberra, Australia.
- Taylor, N.A.S., & Kerry, P. (2010). *An epidemiological evaluation of injuries to firefighters within the NSW Fire Brigades: 1998-2007*. UOW-CHAP-HPL-Report-038. Human Performance Laboratories, University of Wollongong, Australia. Pp. 1-47.

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