Job-specific pre-employment functional capacity assessments predict musculoskeletal injury risk and ‘window for opportunity’ in healthy male coal mine workers

Legge J\textsuperscript{a,b}, Burgess-Limerick R\textsuperscript{b,c}, Peeters G\textsuperscript{b,d}

\textsuperscript{a}JobFit Systems International, Mackay, Queensland, AUSTRALIA; \textsuperscript{b}School of Human Movement Studies, The University of Queensland, Brisbane, Queensland, AUSTRALIA; \textsuperscript{c}Minerals Industry Safety and Health Centre, The University of Queensland, Brisbane, Queensland, AUSTRALIA; \textsuperscript{d}School of Population Health, The University of Queensland, Brisbane, Queensland, AUSTRALIA

Corresponding author: jenny.legge@jobfitsystem.com
Presenter: Jennifer Legge

Introduction

Musculoskeletal injuries in the workplace are a significant economic and social problem in industrial nations worldwide. Pre-employment screening endeavours to identify individuals who are at greater risk of sustaining an injury so that those risks may be managed. Traditional methods of screening, including back x-rays and medical screening are not valid predictors, nor meet current anti-discrimination legislation requirements. Short-form functional capacity evaluations are increasing in popularity despite limited evidence of their ability to predict future risk of injury in healthy workers. The purpose of this study was to determine if job-specific pre-employment functional assessments predict musculoskeletal injury risk in healthy male mine workers and to determine if the injury risk differs for different injury types or over time.

Method

This was a prospective observational study involving 600 healthy male coal mine workers who participated in a job-specific pre-employment functional assessment (PEFA) as part of the hiring process of an Australian coal mine. At baseline, participants were screened with a job-specific JobFit System PEFA consisting of a musculoskeletal screen, aerobic fitness test and job specific postural tolerance and material handling activities. PEFA scores were dichotomized into PEFA 1 if they met the job demands and PEFA>1 if they did not. Injury data was obtained from the company’s database and injuries were classified according to body location, severity and mechanism.

Results

Of the 600 participants (median age 37 years, range 17.0 to 62.6 years), 427 (71%) met job demands (PEFA 1). The median follow-up time was 2 years (IQR 1.2 to 4.0). A total of 121 workers (20.2%) reported an injury and 29 workers (4.8%) reported a back injury associated with manual handling. Statistically significant differences were found between PEFA groups in time to injury over the longer term (>1.3 years) for all injury types: any injury (Hazard Ratio [HR]=2.3, 95% confidence interval [CI] 1.4 to 3.9), manual handing injury (HR=3.3, CI 1.6 to 7.2), any back injury (HR=3.3, CI 1.6 to 6.6), back injuries from (HR=5.8, CI 2.0 to 16.7). These relationships remained significant after adjustment for confounders.

Discussion

The JobFit System PEFA used in this study predicted musculoskeletal injury risk over the longer term. The association between PEFA score and injury risk was strongest for the risk of back injury associated with manual handling. This is the first study to identify a change in risk profile over time. Further research is needed to identify why risk changes over time, however possible hypotheses...
include increased rate of musculoskeletal deterioration as a result of working at maximum or as a result of inactivity, decreased worker / employer compliance with recommended modifications of work practices, and other behavioural changes associated with a possible 'survivor effect'. Until such evidence is available, ergonomists are well placed to maximise this 'window of opportunity' and work with both employers and workers in identifying and implementing workplace modifications as part of a holistic workplace injury risk management program.

**Keywords**

Musculoskeletal injury; Functional capacity evaluation; Pre-employment screening; Mining