The effects of prework functional screening on lowering an employer's injury rate, medical costs, and lost work days
Nassau D W

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Prework functional screening for low back injury in physically demanding jobs. Demanding jobs were those requiring an employee to exert at least a minimum of 20 to 50 pounds of force occasionally and/or 10-25 pounds of force frequently and/or more than 10 pounds of force constantly to move objects.

Type of intervention
Primary prevention and screening.

Economic study type
Cost-effectiveness analysis.

Study population
Applicants and employees for jobs involving physical labour.

Setting
Secondary care. The economic study was conducted on the employees of an acute 250-bed metropolitan hospital and medical centre in Baltimore, Maryland, USA.

Dates to which data relate
Effectiveness and resource use data were collected between January 1986 and June 1996. The price year was not reported.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
Costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
No power calculations related to the sample size were performed. In stage 1 of the study (Jan. 1986 to Dec. 1987), in which no case management, no early return to work policies and no prework functional screen were conducted, the estimated cumulative number of employees (including hired and terminated) was 2,821 (1986) and 2,637 (1987). None of these were screened. In stage 2 of the study (the next four and a half years) case management of all work-related injuries was instituted, early return to work policies were started for injured employees, and a medical and health screen (including an evaluation of posture, flexibility, strength, and range of motion) was initiated by a physical therapist.
The sample sizes for stage 2 were:

1988, 3 screened (one department) versus 2,378 unscreened;
1989, 90 screened (10 departments) versus 2,128 unscreened;
1990, 258 screened versus 1,818 unscreened;
1991, 400 screened versus 1,522 unscreened;
and Jan-Jun 1992, 425 screened versus 1,401 unscreened.

In stage 3 (the last 4 years) the prevention programme, involving a multidisciplinary approach to test the essential demands of the jobs for which the applicant was being hired, was fully in place and the sample sizes were as follows:

Jul-Dec 1992, 498 screened versus 1,273 unscreened;
1993, 652 screened versus 1,100 unscreened;
1994, 706 screened versus 975 unscreened;
1995, 845 screened versus 848 unscreened;
Jan-July 1996, 905 screened versus 978 unscreened.

16 departments were involved in stage 3 of the study.

Study design
This was a retrospective cohort study, carried out in a single centre. The duration of the study was 10.5 years, and the rate of injury was reported annually. Loss to follow-up was not reported. It was reported that since 1989, 38 of the 1,457 individuals failed the prework screen.

Analysis of effectiveness
The analysis was based on intention to treat. The main health outcome used in the analysis was the annual rate of back sprains and strains. The number of lost work days per 100 FTEs was also reported.

Effectiveness results
Over the 10.5 years of the study, 177 back sprain or strain injuries occurred, ranging from 2 to 22 per year. In Stage 1, the mean frequency of injuries per 100 FTEs (full-time employees) was 0.60 injuries. The frequency in stage 2 was 1.11 for the screened population and 0.65 for the unscreened and in stage 3 it was 0.58 (screened) and 0.97 (unscreened). Overall, the rate of injury per 100 FTEs over the 10.5 years was 0.71 for the screened group versus 0.72 for the unscreened group, (p=0.97). The number of lost work days per 100 FTEs was 4.49 for stage I (consisting of only unscreened applicants). In stage 2, there were 0 lost work days for the screened group versus 4.73 per 100 FTEs for the unscreened group. In stage 3, there were 0.83 lost work days per 100 screened FTEs versus 3.83 for the unscreened group. The corresponding overall value was 0.63 for the screened group versus 4.43 for the unscreened group.

Clinical conclusions
These findings suggest that even though the rate of back sprain or strain injuries do not decrease, the severity of those injuries do decrease significantly over time.

Measure of benefits used in the economic analysis

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The benefit measure was rate of back injury.

**Direct costs**
Costs were not discounted. Quantities of lost work days were reported separately from the costs. Direct health service costs were considered, namely medical costs incurred for each back-related injury for which data were received from the Third Party Administrator. The perspective adopted in the cost analysis was that of the employer. The indemnity costs (the hidden costs related to each claim) were also discussed. The price year was not stated.

**Statistical analysis of costs**
Wilcoxon Rank Sum Test scores were used to compare the cost per injury between screened and unscreened employees by year.

**Indirect Costs**
Not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was performed.

**Estimated benefits used in the economic analysis**
The reader is referred to the effectiveness results reported earlier.

**Cost results**
The mean rate of lost work days per 100 FTEs were:

- Stage 1, 4.49 days;
- Stage 2, 4.73 days (unscreened), 0 (screened);
- Stage 3, 3.88 days (unscreened), 0.83 (screened).

The mean rate of incurred medical costs per 100 FTEs was:

- Stage 1, $3,491.03;
- Stage 2, $1,287.01 (unscreened), 0 (screened);
- Stage 3, $1,432.57 (unscreened), $311.15 (screened).

The screened group incurred considerably lower medical costs by year and by stage, (p<0.001).

**Synthesis of costs and benefits**
The incurred medical cost per injury was calculated and ranged from $0 to $6,626 for the screened group versus $3 to $13,253 for the unscreened group. In comparisons of the incurred medical cost per injury, the screened employee population demonstrated significantly lower medical costs than the unscreened population, (p=0.006).
Authors' conclusions
The study offers employers a proven effective tool that can be used to help lower the severity of on-the-job back sprains or strains, and resulting medical costs, and lost work days in their organisation.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of benefit
The internal validity of the estimate of benefit cannot be guaranteed given the lack of a randomized design which would have helped to ensure the comparability of the study groups, (as the author acknowledged).

Validity of estimate of costs
Some quantities were reported separately from the costs. Insufficient details of the methods of cost estimation were given. The retrospective nature of the cost analysis may have adversely affected the internal validity of the cost results. Cost results may not be generalisable to other settings or countries.

Other issues
In view of the lack of a randomized design, and absence of a sensitivity analysis, the study results may need to be treated with some caution. The issue of generalisability to other settings or countries was not addressed. Appropriate comparisons were not made with other studies.

Implications of the study
In this study, the employer realised that 'lost claims' if not managed, could significantly influence the level of overall operation expense to the institution. Analysis of data shows that this type of intervention, although it does not lower the number of injuries, is effective in helping to lower the number of lost work days and incurred medical costs related to those injuries.

Source of funding
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