Effectiveness and cost-effectiveness of employer-issued back belts in areas of high risk for back injury

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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
The use of back belts in the prevention of back injury amongst workers with lifting duties.

Type of intervention
Primary and secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
Male and female warehouse workers at an airforce base. All were workers with a high proportion (not defined) of lifting duties in their daily job description. The mean age was 41.3 years (sd = 9.7). Some workers had a previous history of back injury.

Setting
An airforce base with material storage, central receiving, air freight, packaging and preservation and engine areas. The base was located in Midwest City, Oklahoma, USA.

Dates to which data relate
The retrospective questionnaire survey on which the effectiveness analysis was based was for the period 1985-1991 inclusive. No dates were given for costs.

Source of effectiveness data
Single study.

Link between effectiveness and cost data
No information was given on how cost figures were derived for the effectiveness data other than that all costs were estimated.

Study sample
The sample was selected by reference to records at the safety office at the air base. The authors assert that the size and shape of the lifting requirements were consistent throughout the population. A response rate of 98% was achieved providing 1,316 completed questionnaires. No power calculations were undertaken in determining sample size.
Study design
Retrospective case-study.

Analysis of effectiveness
The primary health outcome was the occurrence of a first back injury during the study period. The basis of the analysis was not stated. Pertinent factors relating to back injury were recognised as possibly including: previous training in lifting techniques and belt use, previous back problems, kilograms lifted per day and belt use. A univariate analysis of factors related to first back injury during the study period was conducted. A multivariate logistic regression analysis of factors related to first back injury during the study period was conducted and a 95% confidence interval for the odds ratio was presented. These data came from a survey questionnaire.

Effectiveness results
At a 5% significance level, the univariate analysis of factors related to first back injury during the study period held history of previous back problems before the study (p=0.0001) and the kilograms lifted per day (p=0.0005) to be significant. In this analysis, 14.2% of belt users and 16.7% of non-belt users suffered a first injury in the study period (p=0.438). The multivariate analysis held previous training and belt use to be protective against first injury in the study period (p=0.019 and 0.508 respectively). The odds ratios were 0.65 (CI: 0.45 - 0.93) and 0.60 (CI: 0.36 - 1.0) respectively. A history of back problems and weight lifted per day increased the risk of first injury during the study period (p=0.0001 and p=0.0005 respectively). The odds ratios were 1.01 (CI:1.01-1.02) and 5.56 (CI:3.35 - 9.26) respectively. The rate of first back injury in the study period for workers with no history of back problems was estimated at 28.6 per 1,000 with belts and 26.9 per 1,000 without belts. The rates for all workers were 35.9 per 1,000 with belts and 29.4 per 1,000 without belts.

Clinical conclusions
Back belts for regular lifting in an 8 hour shift may be beneficial in the prevention of the initial injury. However, their effectiveness for all individual workers, regardless of history of injury, is not evident.

Measure of benefits used in the economic analysis
Occurrence of first back injury during the study period.

Direct costs
For each injury episode revealed by the survey, information was ascertained as to whether medication was taken, a roentgenogram was performed, physical therapy was obtained or referral to a specialist was made. Only employer costs were considered. Costs were not discounted. The method used for costing these items and the other costs of lost days and of limited days to the employer was not specified.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analysis was not carried out.

Estimated benefits used in the economic analysis
At a 5% significance level, the univariate analysis of factors related to first back injury during the study period held history of previous back problems before the study (p=0.0001) and the kilograms lifted per day (p=0.0005) to be significant. In this analysis, 14.2% of belt users and 16.7% of non-belt users suffered a first injury in the study period (p=0.438). The multivariate analysis held previous training and belt use to be protective against first injury in the
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Cost results
The total cost of first injury in the study period amongst the group of workers with no history of back problems was estimated at $373,250 per 1,000 belt wearers and $235,980 per 1,000 non belt wearers. The corresponding figures for all workers, regardless of back history, was $395,880 for belt wearers and $240,321 for non belt wearers.

Synthesis of costs and benefits
No summary measure was explicitly given. However, the results were combined in terms of total cost per back injuries associated with 1,000 workers (with and without belts).

Authors' conclusions
It appeared that belt use had some level of effectiveness in preventing injury amongst workers involved in heavy lifting during an 8 hour period. However, its effectiveness in prevention and cost containment was not evident in reviewing all individual workers regardless of their history of back injury.

CRD Commentary
The airforce base mandates the use of a belt if an employee lifts items weighing over 9.09 kg for more than 50% of a shift and has sustained a back injury or strain in the last 2 years. This is a confounding variable in the analysis other than that for workers with no history of back problems. The type of belt issued was changed two years into the study. This was also a confounding variable as to belt effectiveness. The method for determining the belt wearing and non belt wearing control groups as a result of the questionnaire responses is unclear. Details on the make up and size of each group are not given. The groups were not shown to be comparable in terms of weight lifted per day, age, or sex. The methods for costing all resource use and the cost of lost days and limited days to the employer were not specified.

Implications of the study
A prospective randomized study of back belts including an economic evaluation is required.

Source of funding
None stated.

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