Effects of a participatory ergonomics team among hospital orderlies
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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 health intervention examined in the study was a participatory ergonomics team among hospital orderlies, which aimed to reduce injury rates, lost time and musculoskeletal symptoms. The team consisted of three orderlies and one supervisor. They developed standardised lifting techniques and trained the orderlies in the use of these procedures. Special procedures were developed for very heavy patients.

Type of intervention
Health worker care management.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised health care workers, such as orderlies.

Setting
The setting was a hospital. The economic study was carried out in a large metropolitan medical centre in the USA.

Dates to which data relate
The effectiveness and resource use data were gathered from January 1993 to December 1995 for the pre-intervention period (PIP) and from January 1996 to December 1997 for the intervention period (IP). No price year was reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was performed on the same sample of patients as that used in the effectiveness study. However, it was unclear whether it was carried out prospectively during all the time of the trial.

Study sample
Power calculations do not appear to have been performed. However, a single group of orderlies was selected and used in the effectiveness analysis. The effect of the participatory ergonomics team was evaluated in the same sample of individuals before and after the implementation of the intervention. The sample size was 99 orderlies. The authors stated that during the study period (IP), there were about 100 to 110 orderlies employed. An external comparison was then made with all hospital workers, but details of the whole sample were not reported.
Study design
This was a within-group comparison study, because the same sample of patients was evaluated before and after the implementation of the study programme. The study was carried out in a single centre. It was unclear whether it was conducted prospectively or retrospectively. The participants’ data were available for two years in the IP. Some of the outcome measures were evaluated using a self-administered questionnaire, which was sent to all orderlies at 1, 7 and 15 months after the programme was implemented. The response rates for the questionnaire were 68% at 1 month, 66% at 7 months and 80% at 15 months. Due to employee turnover, 65 of the original group of 99 orderlies left their job before the end of the 15-month survey. The method of outcome assessment was not blind.

Analysis of effectiveness
All health workers included in the initial study sample were accounted for in the effectiveness analysis. The health outcomes were:

- the number of total injuries;
- the injury rate;
- the relative risks (RR) of having a lost-time injury and having an injury with 3 or more days of time lost;
- the total lost days;
- the number of modified duty days;
- the average number of days lost per reportable injury;
- the proportion of orderlies reporting symptoms of pain, pain interfering with work, or improvements in musculoskeletal comfort; and
- job satisfaction and psychosocial stressors, as measured using the Job Satisfaction Scale, the Work Apgar and the Psychosocial Stressors Scale.

To control for temporal trends in injury reporting and management that could have affected all hospital employees, the authors compared the injury rates among the orderlies with those observed among all workers at the hospital. Data on the number of injuries and lost-day rate were normalised using the number of productive hours worked for the hospital as a whole. The full-time equivalent (FTE) was defined as 2,000 productive hours per year.

Effectiveness results
The number of total injuries fell from 110 in the PIP to 39 in the IP.

The injury rate was 32.5 injuries annually per 100 FTE in the PIP, and 16.3 per 100 FTE in the IP.

Thus, the RR for reportable injury was 0.50 (95% confidence interval, CI: 0.35 - 0.72). The RR of having a lost-time injury was 0.26 (95% CI: 0.14 - 0.48).

The RR of having an injury with 3 or more days of time lost was 0.19 (95% CI: 0.07 - 0.53).

The total lost days were 136.2 per 100 FTE in the PIP, and 23 per 100 FTE in the IP.

The number of modified duty days fell from 107 days per 100 FTE to 14.6 days per FTE.

The average number of days lost per reportable injury declined from 4.45 to 1.58, (p<0.05).

After controlling for temporal trends, the favourable results observed in the IP were confirmed, although they were less substantial.
Symptoms of pain reduced statistically in the IP for shoulders/upper arm, upper back and lower back.

Pain interfering with work was lower in the IP for hips/buttocks.

Improvements in musculoskeletal comfort were observed in the neck, lower back, forearm and knee after the 15-month intervention.

The three psychosocial variables (Job Satisfaction Scale, the Work Apgar and the Psychosocial Stressors Scale) all improved significantly in the IP when compared with the baseline assessment.

Clinical conclusions
The effectiveness study showed that the participatory ergonomics team was effective in reducing pain symptoms and improving job satisfaction among orderlies.

Measure of benefits used in the economic analysis
The health outcomes were left disaggregated and no summary benefit measure was used in the economic study. A cost-consequences analysis was therefore performed.

Direct costs
It was not stated whether discounting was applied, but it was relevant because the costs were incurred for longer than two years. The unit costs were not analysed separately from the quantities of resources used. The cost/resource boundary adopted in the study was not stated. The health services included in the study were the resources used for implementing the two-year programme (including all equipment and wages for time spent on team activities) and the workers’ compensation costs, which were evaluated using insurance records. These provided information on medical treatment, payment for lost time and settlements for permanent disability resulting from work injuries. Insurance records data were available from January 1995 to December 1997. No price year was reported. The costs were normalised using the FTE definition.

Statistical analysis of costs
An unpaired t-test was performed to compare the workers’ compensation costs estimated in the two study groups.

Indirect Costs
The indirect costs were not included in the analysis.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not performed.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The total cost of the intervention (excluding the technical advisors) was less than $5,000 for the two-year period.
There were 9 reportable injuries in the PIP and 17 reportable injuries in the IP.

For the orderlies, the total costs were $24,443 in 1995 ($237/FTE) and $34,207 during 1996 to 1997 ($139/FTE).

Thus, there was a 41% decrease in the costs per worker, although the difference was not statistically significant, (p=0.67).

The authors stated that the decrease in costs among the orderlies could be comparable with the 5.6% decrease in costs per worker seen in the hospital as a whole, during the same period.

Finally, over the two-year period, the workers' compensation savings among the orderlies were estimated at $22,758.

**Synthesis of costs and benefits**
The costs and benefits were not combined because a cost-consequences analysis was carried out.

**Authors’ conclusions**
The introduction of a participatory ergonomics team reduced injury rates, lost time and musculoskeletal pain. It also increased job satisfaction among the orderlies while reducing compensation costs. Thus, the cost-savings far exceeded the costs of implementing the programme.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear. The authors compared the new programme with the usual practice before the participatory ergonomics team was introduced. You should decide whether it represents a valid comparator in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis of the effectiveness used a within-group comparison study. This approach was appropriate because the same sample of individuals was evaluated in both the pre- and post-intervention periods. However, such a design is associated with some limitations, which were highlighted by the authors. First, time-related factors may have affected the results of the study, although the authors attempted to take into account temporal trends. Second, the use of the questionnaire and the high turnover rate among the workers involved in the study may have resulted in selective under-reporting and biased results. Third, the authors acknowledged that, in some instances, workers may have been discouraged from reporting injuries. The authors stated that all these limitations may have played a minimal role, but their impact on the estimated outcomes is unclear. The authors also acknowledged that the institution of standardised lifting procedures and mandatory training were probably responsible for much of the observed reduction in injuries. Thus, it was not easy to isolate the true effect of the new programme. Details on the workers' demographics were not provided. It was therefore not possible to evaluate whether the study sample was representative of the overall study population. All of these issues tend to limit the internal validity of the analysis.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the economic analysis. The analysis was therefore categorised as a cost-consequences study.

**Validity of estimate of costs**
The perspective adopted in the study was not explicitly stated and only few details of the economic analysis were reported. The unit costs and the quantities of resources used were not analysed separately and the price year was not reported. Thus, it would be difficult to reproduce the study in other settings. The costs were specific to the study setting and sensitivity analyses were not performed. The use of a discount rate was not stated, although it may have been relevant. The source of the cost data was provided. The validity of the cost results would have been enhanced if a
societal perspective had been adopted (i.e. the inclusion of productivity losses).

**Other issues**
The authors compared their findings with those from another published study and found similar results. It was noted that the present study was unique in the literature because it assessed job satisfaction and the symptoms of health care workers. The issue of the generalisability of the study results to other settings was not addressed and no sensitivity analyses were conducted. Thus, the external validity of the analysis was limited. The authors noted several limitations of their study. The study referred to orderlies, but the authors stated that their conclusions could be valid for other groups of health care workers.

**Implications of the study**
The study results suggest that the introduction of a participatory ergonomics team may be beneficial for health care workers because it reduced work-related injuries and increased job satisfaction. The costs did not increase over time but potential cost-savings may occur. However, caution is required when interpreting the conclusions of the study due to several limitations of the analysis.

**Source of funding**
Supported by the National Institute for Occupational Safety and Health/Centers for Disease Control, grant number U60/CCU71209-01.

**Bibliographic details**

**PubMedID**
10086212

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Back Injuries /epidemiology /prevention & control; Human Engineering; Humans; Institutional Management Teams; Job Satisfaction; Knee Injuries /epidemiology /prevention & control; Lifting /adverse effects; Missouri /epidemiology; Musculoskeletal Diseases /epidemiology /prevention & control; Occupational Diseases /epidemiology /prevention & control; Outcome Assessment (Health Care); Personnel, Hospital; Prospective Studies; Risk; Shoulder /injuries; Sick Leave /statistics & numerical data; Statistics, Nonparametric; Workers' Compensation /economics

**AccessionNumber**
21999000525

**Date bibliographic record published**
31/01/2004

**Date abstract record published**
31/01/2004