Prevention of relapsing backache - Preventive measures in the workplace surroundings

Lühmann D, Burkhardt-Hammer T, Stoll S, Raspe H

Policy background

Back pain is one of the major health problems which not only in Germany leads to severe socioeconomic consequences. Among the reasons for time lost from work, utilization of rehabilitation measures and preterm retirements back pain ranks at position one. Against this background a multitude of therapeutic and preventive measures have been developed whose effectiveness and cost-benefit ratio are controversially debated. There is a great need for sound scientific information regarding the effectiveness and cost-effectiveness of preventive measures against recurrent and chronic back pain especially among the statutory health insurance companies, whose responsibility for prevention and health promotion in the workplace setting has been strengthened by the German Health Care Reform 2000.

Scientific background

In the western industrialized countries back pain is one of the most frequent health complaints. In adults its lifetime prevalence amounts up to 60 to 90 %. While the first episodes are usually experienced during school age lifetime prevalence in late adolescence is almost equivalent to that in adulthood. About 80 % of all back pain cases are classified "non-specific" (ICD 10: M 54.9), which means that no explanatory diagnosis, no well-defined pathomechanism and no irritated structures can be identified. However, there are some well known risk factors that even in non-specific back pain may modify onset, recurrence and chronification condition.

In view of the high burden of illness, the severe socioeconomic consequences and the non-satisfactory therapeutic options prevention of non-specific back pain seems an attractive option to downsize the problem. Due to three characteristics of the condition the conceptual design of effective prevention schemes is difficult:

1. The aetiology of non-specific back pain is not clear – therefore a specific target for causative preventive interventions is lacking.
2. A number of risk factors and indicators in various dimensions have been identified that contribute to the onset and the course of non-specific back pain. Currently it is believed that non-specific back pain is not caused by a single agent but that recurrences and chronification may be explained by a bio psychosocial model.
3. A lifetime prevalence of 80% in young adulthood is extremely high. Therefore primary prevention in adulthood is not possible and secondary preventive measures to avoid recurrences, chronification and socioeconomic consequences will have to address almost the whole population.

These problems result in a wide variety of prevention schemes in use: Exercise programs, Education and Information interventions, ergonomic modifications, mechanical supports (e. g. back belts) and multidimensional programs. Applying preventive interventions in the workplace setting seems attractive for two reasons: first, a large proportion of the population can be
reached and secondly, many risk factors for back problems are associated with working conditions.

**Objectives**

Against this background the assessment at hand sets out to answer the following questions:

- What is the amount and methodological quality of the available scientific literature on the effectiveness of back pain prevention in the workplace environment?
- What are effective measures for the prevention of back pain and its consequences in the workplace environment and how effective are they?
- Is back pain prevention in the workplace environment cost-effective?
- Is there a need for more research?

As primary outcomes for effectiveness the assessment will focus on time lost from work and the frequency and duration of episodes with back pain. The preventive measures assessed belong to the following categories: exercise programs, educational and information measures, multidimensional interventions, back belts, lifting teams and ergonomic interventions.

**Methods**

Electronic literature searches were conducted by DAHTA, in consultation with the first author. Databases, time horizon of searches and search strategies are documented in the appendix. Additionally the complete Cochrane Library and reference lists of review articles were screened for relevant articles.

To be included in the assessment publications had to fulfil inclusion criteria related to the objective of the reported trials, the interventions studied and trial design.

Methodological quality of publications (systematic reviews, HTA reports) was assessed using the checklists developed by the German Scientific Working Group for Technology Assessment in Health Care (GSWGTAHC) or with the Jadad-Score (controlled trials) respectively.

Due to the large number of relevant publications the assessment is mainly based on data reported by systematic reviews and supplemented by the results of newer trials. Still, conclusions of systematic reviews could not be reported directly because of the heterogeneity of categorisation systems used to classify prevention schemes by the different authors. Therefore a new categorisation was generated on the basis of study details (evidence tables) reported in the reviews. Interpretation of results relates to these new categories. Results of systematic reviews that report no study details are presented in a table in the appendix.

Due to the low amount of economic data no separate economic assessment was performed. The available economic information is reported in the respective section of overall results. An assessment of ethical, legal and social impact was omitted due to resource constraints.

**Results**

Information on the effectiveness of the different categories of preventive interventions against back pain in the workplace environment may be summarized as follows:
Exercise programs
Searches retrieved three systematic reviews and six controlled trials reporting the effectiveness of exercise in the prevention of back pain. Most of the studies report some positive effects. Due to the heterogeneity of exercise programs evaluated in the studies it is impossible to state whether positive effects are related to a special type of exercise, its intensity or its duration. It seems that effectiveness of exercises rather depends on their regular and uninterrupted continuation. The most marked effects as well as financial advantages are noted in high risk groups (people with previous episodes of back pain and time lost from work). To date, there are no high-quality cost-effectiveness analyses available for this category of interventions.

Education and Information
Concerning education and information four systematic reviews (reporting on 18 controlled studies) and three individual trials were analysed. Their overall results suggest, that interventions that contain theoretical instructions only (e. g. proper gait, safer lifting, and ergonomic working techniques) are not effective in preventing back pain and its consequences.

Back school programs, which in addition to theoretical instructions offer intensive exercising may in the short term, be successful in reducing the incidence of new episodes of back pain. To date sustainability of these effects cannot be judged by the available data. Studies evaluating traditional back-school programs yield contradictory results. Against this background study results that report cost-savings by back-school programs are difficult to interpret.

Multidisciplinary Interventions
For this category of back pain prevention one systematic review and three individual trials were analysed. The results of two randomised controlled trials suggest that multidisciplinary interventions which besides education and exercise contain cognitive behavioural modification of pain perception are able to reduce future time lost from work due to back pain. However, to date these results refer to high risk groups (with current back problems or with recurrent episodes) only.

In addition, two further RCT suggest that back schools with components of intensive and regular exercising are capable of reducing the incidence of new back pain episodes as well as time lost from work. Taking into consideration the above reported results for exercise programs it has to be presumed that these effects may be due to the exercise component only. There are no results from methodologically sound economic studies that allow firm conclusions on cost-effectiveness.

Lumbar supports (back belts)
The assessment of the effectiveness of back belts in the prevention of back pain in the workplace environment is based on the results of five systematic reviews which report data from six RCT, two controlled trials and three observational studies. Their results imply no protective effect of back belts on time lost from work due to back pain, on the incidence of painful episodes or on days with impairment by back pain for the otherwise healthy working population. The hypothesis, that back belts are effective in high risk populations could not be tested on the basis of the available data. Also no firm conclusions can be drawn concerning unwanted effects of back belts (e. g. elevated intraabdominal pressure, loss of back muscle strength).

"Lifting Teams" in Nursing Care
So far there are no data from controlled trials that analyse the effectiveness of "lifting teams" in nursing care to prevent back pain or its consequences. The assessment is based on the results of one systematic review which reports results from eight non-controlled evaluation studies. The results from these pilot studies however indicate a potential for effectiveness. The plan-
ning of a lifting team intervention requires a thorough analysis of the context given in German hospitals. This would include analysing the type of work, processes and structure of care, patient-carer interaction as well as infrastructural conditions.

Ergonomic interventions
Assessment of the effectiveness of ergonomic interventions is based on three systematic reviews containing the results of controlled as well as non-controlled evaluation studies. Among "ergonomic interventions" three different approaches have to be distinguished: interventions addressing changes of the workplace setting, interventions addressing the individual's behaviour and combined interventions. Studies evaluating the effectiveness of setting interventions (modification of the physical workplace environment, changes of production processes, organisational changes) yield no dependable results. This conclusion is not based on indifferent trial results but rather on the lack of methodologically sound studies. Results from studies on ergonomic interventions addressing the individual confirm the conclusions drawn for exercise and educational measures. The most marked results are found in trials that examine the effectiveness of combined interventions in high risk groups and contain a strong participatory component. Hardly any of the trials studying the effects of ergonomic interventions satisfied methodological quality criteria that are accepted standard for clinical or public health intervention studies.

Discussion
The significance of the results of the assessment at hand is strongly limited by the comprehensiveness of the questions addressed. Reviewing the literature on the basis of (even systematic) review articles impairs the differentiated examination of the role of target groups, program contents, application and duration, effect sizes and context factors.

The methodological quality of the review articles analysed is quite high, still their conclusions could not be transferred directly due to differing categories for prevention schemes and differing inclusion and exclusion criteria used by the authors. The methodological quality of individual trials (even those included in the review papers) is highly variable. While most trials examining preventive interventions addressed at individuals satisfy at least some methodological requirements many studies dealing with setting interventions do not.

Conclusions
In conclusion, sound scientific evidence for the effectiveness and cost-effectiveness of back pain prevention in the workplace environment is still quite imprecise. Further research should include:

- The development of interventions guided by the bio psychosocial model of back pain aetiology that combine individual prevention as well as measures addressing the workplace environment.
- The integration of results from basic ergonomic research into prevention concepts and the conduct of trials focussing outcomes with relevance to health.
- The development and standardisation of methods for the evaluation of preventive measures that contain interventions targeted at the workplace setting.
• The conduct of qualitative studies to identify factors that impair the effectiveness of prevention programs (e.g. motivation, compliance, people skills).
• The integration of cost-effectiveness evaluations into all interventional studies.

Contact at DAHTA@DIMDI:
Head: Dr. Alric Rüther
E-Mail: dahta@dimdi.de