Interventions for the prevention and management of neck/upper extremity musculoskeletal conditions: a systematic review

CRD summary
The authors concluded that there is some evidence to support the use of mechanical and tailored modifier interventions, but not those targeting production systems or organisational culture. The conclusions reflect the evidence presented, but methodological limitations in the review process mean that the extent to which these conclusions are reliable is unclear.

Authors’ objectives
To evaluate the effectiveness of interventions for neck and upper extremity musculoskeletal conditions.

Searching
Articles published in English between 1999 and 2004 were sought from CINAHL (including Cochrane Reviews), EBSCO MegaFile Premier (including MEDLINE, Health Source: Consumer and Nursing/Academic Edition), EMBASE, Ergonomics Abstracts, Index NZ, AMED, Annual reviews, PsycINFO, ProQuest 5000, Expanded Academic ASAP, SPORTDiscus, Science Direct, Blackwell Synergy, Lippincott 100 and the OSH References Collection; the search terms were reported. In addition, review articles and the personal libraries of contributing authors were checked, and personal communication was undertaken with field experts.

Study selection
Study designs of evaluations included in the review
Non-laboratory-based studies with a participation rate of at least 70% and follow-up for at least 2 months were eligible for inclusion, but no other specific inclusion criteria for study design were reported.

Specific interventions included in the review
Studies of any primary, secondary and/or tertiary intervention for neck and upper extremity musculoskeletal condition were eligible for inclusion. Studies of clinical treatment or clinically based modifier interventions (e.g. pharmacological treatment, splinting, physiotherapy or chiropractic treatment) were excluded. The included interventions focused on mechanical exposure (e.g. changes to the design of tools and equipment), production systems (e.g. changes to the organisational culture and working practices) and modifier interventions (e.g. exercise programmes or ergonomic education).

Participants included in the review
Studies of participants with musculoskeletal conditions of the neck, shoulder, elbow, and hand or wrist were eligible for inclusion. Studies of participants with back pain or lower extremity injuries were excluded. The included studies comprised men and women who were mainly employed as visual display unit (VDU) or keyboard users, or in various manufacturing or construction jobs, or as symphony orchestra musicians. A variety of diagnoses and conditions were present, including various components of pain, carpal tunnel syndrome, repetitive strain injuries and fibromyalgia.

Outcomes assessed in the review
Studies examining health outcomes defined by symptoms and/or well-documented questionnaires, and/or physical examination were eligible for inclusion. Outcomes connected with neck and upper extremity symptoms were reported, such as function, pain, work posture, sick leave and productivity, and psychosocial and mental health. A variety of outcome measures were used.

How were decisions on the relevance of primary studies made?
Four reviewers conducted the searches, but the authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Two independent reviewers assessed the quality of the included studies. Two established assessment tools were used to provide an overall grade for each study (generic appraisal tool for epidemiology and a modified version of the Cochrane Musculoskeletal Injuries Group's scoring system). The studies were classified according to their quality scores as low, medium or high quality.

**Data extraction**
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

**Methods of synthesis**
How were the studies combined?
The studies were grouped by type of intervention and combined in a narrative. The level of evidence for each intervention was graded as strong, moderate, some, or insufficient, based on the number and quality of studies.

How were differences between studies investigated?
Differences between the studies were explored in the tables and text according to mechanical exposure interventions, those targeting production systems or organisational culture, and modifier interventions.

**Results of the review**
Thirty-one studies (n=3,407) were included in the review. These comprised randomised controlled trials (RCTs), quasi-experimental studies and observational studies.

Seventeen studies were considered to be of a medium quality, 12 studies were ranked as low, and 2 studies were ranked as high.

Mechanical exposure interventions (10 studies).
Four studies (n=364; including one medium-quality RCT) that focused on new lighting and other workstation adjustments showed some evidence in terms of improved pain and discomfort and ergonomic ratings. Three other studies (n=171) (including 2 RCTs of medium and high quality) suggested moderate evidence in favour of specific workstation adjustments for VDU operators in terms of pain and tenderness, functionality and sick leave. A further 3 ergonomic-based studies with manufacturing workers were ranked as low quality and were considered to provide insufficient evidence of effectiveness.

Modifier interventions (19 studies).
Three medium-quality studies (n=287; one was an RCT) showed some evidence in favour of strength, coordination and flexibility training on improved mobility and pain. Four studies rated medium or high quality (n=401; one was an RCT) reported some positive evidence of improvements in disease severity, pain and tenderness, and mental health outcomes in patients with fibromyalgia from interventions that involved aerobic and/or flexibility activities, as well as biofeedback for relaxation. Various other studies of medium and low quality suggested that multiple modifier interventions (comprising exercise and/or educational components) provided mixed evidence of effectiveness in patients with or without fibromyalgia.

Production systems or organisational culture (2 low-quality studies).
There was insufficient evidence to support interventions targeting organisational modifications and work tasks.

**Authors' conclusions**
There is some evidence to support the use of mechanical and tailored modifier interventions (but not for those targeting production systems or organisational culture) in the prevention and management of neck/upper extremity musculoskeletal conditions and fibromyalgia.

**CRD commentary**
This review addressed a broad question and was supported by similarly broad inclusion criteria for the participants, interventions and outcomes. The search strategy covered a wide range of sources, but the restriction to articles published in English means that language and publication bias cannot be ruled out. An appropriate validity assessment was carried out with steps taken to minimise reviewer bias, and these results were used to highlight the better quality studies in the discussion of findings. Other parts of the review process do not appear to have been conducted with transparency, meaning that selection and reporting biases are possible. Adequate details of the primary studies were provided, although it was not possible to verify the authors’ interpretation of the raw data. The method of synthesising highly heterogeneous studies seems appropriate, and the authors drew attention to the difficulties in capturing differential effects across population and industry subgroups. The authors’ conclusions reflect the evidence presented but, given some methodological limitations in the review process, the extent to which these conclusions are reliable is unclear.

**Implications of the review for practice and research**

**Practice:** The authors stated that there was no single intervention strategy that could be considered effective for all industrial settings. Until further evidence is available, multifactorial interventions should be used.

**Research:** The authors stated that future studies should concentrate on targeting specific participant groups and/or industries.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract
contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.