Manual material handling advice and assistive devices for preventing and treating back pain in workers: a Cochrane Systematic Review

J Verbeek, K P Martimo, J Karppinen, P P Kuijer, E P Takala, E Viikari-Juntura

Finnish Institute of Occupational Health, Cochrane Occupational Safety and Health Review Group, Kuopio, Finland

Correspondence to
Dr J Verbeek, Finnish Institute of Occupational Health, Cochrane Occupational Safety and Health Review Group, PO Box 310, 70701 Kuopio, Finland; jos.verbeek@ttl.fi

This review was conducted under the auspices of the Cochrane Back Review Group.

Accepted 13 June 2011
Published Online First 17 August 2011

In many occupations, it is difficult to avoid imposing heavy loads on the back (eg, lifting and moving patients in healthcare). Therefore, it is not surprising that emphasis has been given to optimising lifting techniques and ways to manually handle patients and objects to prevent back pain and injuries. More skilled workers are supposed to cope better with adverse ergonomic conditions, resulting in less strain on the back, less back pain and consequently, less back pain-related disability. This has led to a strong belief that it is useful to advise employees or organise training for them on correct manual material handling (MMH) techniques and to provide them with assistive devices. Therefore, we wanted to determine the effectiveness of MMH advice and training and the provision of assistive devices in preventing and treating back pain. We have updated the previous version of the systematic review with a new search, new studies and improved methods.[1 2]

We searched CENTRAL (*The Cochrane Library* 2011, issue 1), MEDLINE, EMBASE, CINAHL, Nioshtic, CISdoc, Science Citation Index and PsychLIT to February 2011.

We included randomised controlled trials (RCT) and, because we thought it would be difficult to find RCTs, cohort studies with a concurrent control group that were aimed at changing human behaviour regarding MMH and measured back pain, back pain-related disability or sickness absence.

Two authors independently extracted the data and assessed the risk of bias using the criteria recommended by the Cochrane Back Review Group for RCTs and MINORS for the cohort studies. We combined the results of similar studies with a fixed-effect meta-analysis. We used the GRADE approach to rate the quality of the evidence.

We based the results and conclusions on the analysis of RCTs only. We compared these with the results from cohort studies.

We included nine RCTs (20 101 employees) and nine cohort studies (1280 employees) on the prevention of back pain in this updated review. We included an additional three RCTs and four more cohort studies compared with the previous version of the review. In seven of the RCTs, groups of participants rather than participants were randomised.

Studies compared training to no intervention (four), professional education (two), a video (three), use of a back belt (three) or exercise (two). Other studies compared training plus lifting aids to no intervention (three) and to training only (one).

Studies were conducted among the following occupations with exposure to back load: healthcare workers exposed to lifting and moving patients (four RCTs and eight cohort studies), baggage handlers (two RCTs), construction workers (one RCT and one cohort study), postal workers handling mail (one RCT) and workers in a distribution centre (one RCT). The number of participants varied from 131 to 12 772 in RCTs, and from 41 to 345 in cohort studies.

The interventions varied from one session of simple advice on lifting in four studies to training once a week for 2 years in one study. In four studies, traditional training was supported by

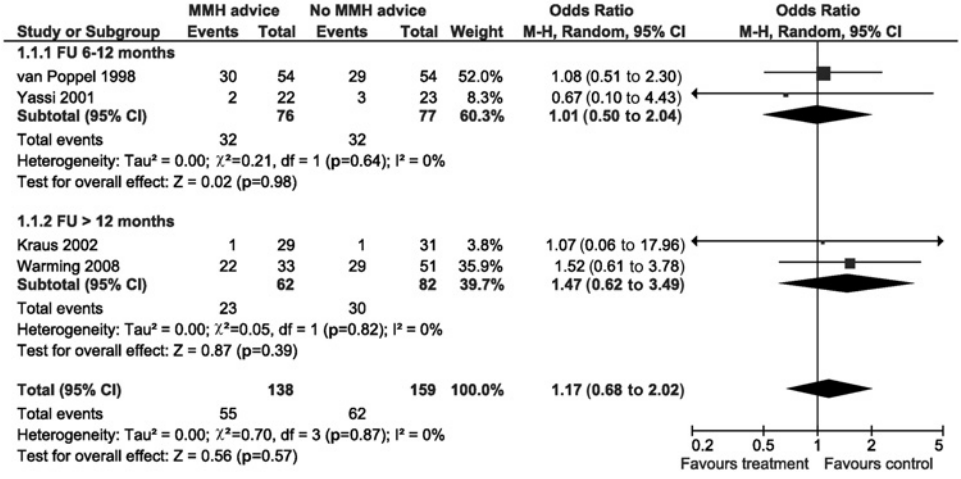

Figure 1 MMH advice versus no advice, meta-analysis of four studies. FU, follow-up; MMH, manual material handling; M-H, Mantel–Haenszel test.

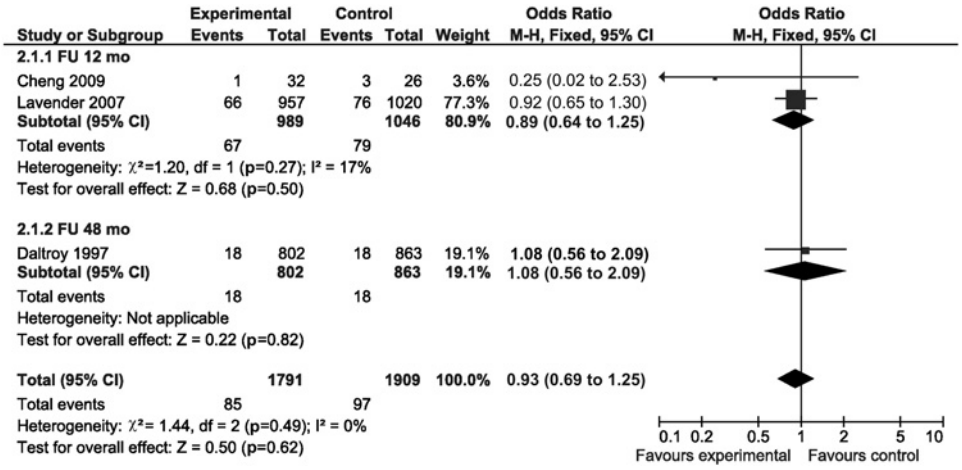

Figure 2 MMH advice versus minor advice, meta-analysis of three studies. FU, follow-up; MMH, manual material handling; M-H, Mantel–Haenszel test; mo, months.

follow-up and feedback at the workplace. The advocated lifting technique was usually not described in detail. One study, however, measured the load on the back in real time and fed this back to the participant via a high pitched tone if the back was assessed to be overloaded. Another study gave nurses specific instructions about patient transfer techniques. Involvement of supervisors in the intervention was clearly articulated in three studies, as was the encouragement to use available lifting aids in four studies. In four studies, the instructor was a trained colleague and in the other studies, the instructor was usually a professional in ergonomics. All interventions used an educational model that assumed that the information provided in the intervention would lead to a change in knowledge, attitude or skills. In addition to information, all interventions included the opportunity to practice the skills to some extent in either the educational setting or at follow-up in practice. None of the studies used a more elaborate model of change of health behaviour.

The quality of the included studies was on average not very high as only three RCTs had a low risk of bias. In their own category, most cohort studies scored fairly well on the MINORS quality checklist.

None of the included studies showed evidence of a preventive effect of training on back pain.

There was moderate quality evidence from seven RCTs (19 317 employees) that those who received training reported levels of back pain similar to those who received no intervention, with an OR of 1.17 (95% CI 0.68 to 2.02) and similar to those who received minor advice in the form of a video presentation, with an OR of 0.93 (95% CI 0.69 to 1.25) (figures 1 and 2). Confidence intervals around the effect estimates were still wide due to the adjustment for the design effect of clustered studies.

The results of the cohort studies were similar to those of the randomised studies.

We concluded that there is moderate quality evidence that MMH advice and training with or without assistive devices does not prevent back pain or back pain-related disability when compared to no intervention or alternative interventions. We could not explain these results with other arguments. There was no lack of power as the RCTs included thousands of participants. There was sufficient exposure to cause back pain in the participants and most of the studies used interventions of sufficient duration and intensity to elicit an effect.

We also concluded that there is no evidence available from RCTs for the effectiveness of MMH advice and training or MMH assistive devices for treating back pain. Since it has been shown to be feasible to randomise both participants and groups of participants, there is no need for further cohort studies. More high quality randomised studies could further reduce the remaining uncertainty.

Acknowledgements We thank Rachel Couban for her assistance with the searches and Victoria Pennick for editorial services.

Funding This study was funded by the Australian Safety and Compensation Council.

Competing interests None.

Contributors All authors contributed to data collection and commented on drafts of the manuscript.

Provenance and peer review Not commissioned; internally peer reviewed.

REFERENCES

1. **Martimo KP,** Verbeek J, Karppinen J, *et al*. Manual material handling advice and assistive devices for preventing and treating back pain in workers. *Cochrane Database Syst Rev* 2007;(3):CD005958.
2. **Martimo KP,** Verbeek J, Karppinen J, *et al*. Effect of training and lifting equipment for preventing back pain in lifting and handling: systematic review. *BMJ* 2008;**336**:429–31.
3. **Verbeek J,** Martimo KP, Karppinen J, *et al*. Manual material handling advice and assistive devices for preventing and treating back pain in workers. *Cochrane Database Syst Rev* 2011;(6):CD005958.