

# **Does modified vehicle seating (suspension seats/lumbar support) reduce low back pain for long distance drivers or drivers operating vehicles over rough terrain?**

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## **Clinical Question:**

What is the evidence that modified vehicle seating (suspension seats/lumbar support) reduces low back pain for workers operating vehicles over rough terrain.

## **Clinical Scenario**

Clients with back pain often complain of increased discomfort when driving, particularly when driving long distances over rough terrain. Epidemiological studies identify driving as a cause of low back pain due to vibration and postural factors. Seating modifications such as expensive air or sprung suspension seats, or simple measures such as lumbar supports may be prescribed. Does either of these interventions reduce symptoms of back pain when driving, and is one more effective than the other?

## **Summary of Key findings**

- 10 studies were identified that met the inclusion/exclusion criteria.
- Of these, 5 were level IV evidence and 5 were level V evidence.
- Studies were primarily literature reviews or testing of seating under laboratory conditions with mechanical testing apparatus or a small number of human testers.
- Because of the lower levels of evidence, no studies were critically appraised for the purpose of this summary of evidence.
- Articles set out some recommendations that may be of clinical interest, but should not be regarded as best evidence to support recommendations to clients. These recommendations are summarised under the results section.

## **Clinical bottom line**

Although all articles gave recommendations regarding seating, there is no higher level evidence that seating modifications reduce back pain when driving.

## **Limitation of Summary of Evidence**

This summary of evidence has been individually prepared and has not undergone a process of peer review.

## **Methodology**

### ***Search strategy***

Using the levels of evidence as defined by the NHMRC (2000), the search strategy aimed to locate the following study designs:

- Level I Systematic reviews and meta-analyses;
- Level II Randomised controlled trials
- Level III Controlled trials, cohort or case-control analytic studies;
- Level IV Case series: Post-test only, pre-test/post/test;
- Level V Expert opinion including literature/narrative reviews, consensus statements, descriptive studies and individual case studies.

A search was also conducted for clinical practice guidelines based on these levels of evidence.

### ***Search terms***

Client: back injury, lumbar pain, spinal pain, low back pain, long distance driv\* rough terrain, 4-wheel driv\*, driv\*.

Intervention seat\*, vehicle seat\*, suspension seating, lumbar support, lumbar cushion, back support

Comparison: nil

Outcome: injury prevention, pain reduction, pain improvement

### ***Sites resources searched***

- National Health and Research Council
- NZ Guidelines group
- Healthbase
- Monash School of Rural Health
- National Guidelines clearing house
- SIGN
- Motor Accidents Authority
- Australian Injury Prevention Database
- e-guidelines
- AGREE
- Agency for Health Care Research
- National Institute for Clinical Excellence
- Cochrane Abstracts
- Health Technology Assessments (HTA)
- DARE
- PEDro
- Injury Risk Management Research Centre
- PubMed
- CRS Australia library
- CINAHL
- WorkCover NSW

### ***Inclusion/exclusion criteria***

#### ***Inclusions:***

- Studies published in English
- Studies obtainable through CRS library
- Studies related to modified seating in vehicles and seating recommendations regarding driving. Vehicles included cars and industrial vehicles.

#### ***Exclusions:***

- Studies describing epidemiology of back pain and driving

- Studies relating to back pain and seating without reference to driving/vehicle use.
- One abstract appeared relevant but the full text article was not available in Australia.

## Results

### **Results of search**

10 relevant studies were sourced and categorised as follows:

Table 1. Study designs of articles retrieved by search.

<b>Methodology of studies retrieved</b>	<b>Number located</b>	<b>Source of evidence</b>
Clinical guidelines	0	
Systematic reviews	0	
Randomised controlled trials	0	
Comparative non-randomised studies (cohort, case-control or before and after )	0	
Non-experimental and descriptive studies (case series, case reports)	5	PubMed
Respected opinion, expert consensus, qualitative methods (eg interviews, focus groups, observation)	5	PubMed

Studies identified represented lower levels of evidence, and many described testing of equipment under experimental conditions in laboratories. From these articles and literature reviews, several recommendations were given about seating with regard to driving that may have some clinical relevance but require further research to establish the evidence for these. These include:

1. Adjustable seats are of no use if adjustments are difficult to make
2. Backrest inclination of 100-110 degrees was shown in some studies to result in reduced disc pressures as reported in literature reviews.
3. Vibration is said to lead to increased muscle fatigue, herniation of discs, softening of collateral ligaments and it was therefore recommended that drivers should:
  - Get out of vehicle slowly to avoid soft tissue damage as a result of rapid movement
  - Avoid bending, lifting and twisting immediately after prolonged driving
  - Walk around for 5-10 minutes before bending and lifting to allow lumbar segment to re-orient
4. Based on British vibration standards, operators shouldn't work for more than 2.5 hours when ploughing (very rough terrain) without a break.
5. Seating prototypes were proposed to reduce back pain with some testing under lab conditions. These included a pulsating lumbar support (continuous passive motion) and vertically moving backrest.

## **Bibliography:**

### **Level IV evidence:**

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5. Mehta CR; Shyam M; Singh, P; Verma, RN. Ride vibration on tractor-implementation system. *Applied Ergonomics* 31(2000) 323-328

### **Level V evidence**

6. Harrison DD; Harrison SO; Croft AC, Harrison DE; Troyanovich SJ. Sitting Biomechanics Part I: Review of the Literature. *J Manip Physio Ther* 1999; 22:594-609
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