Patient positioning (mobilisation) and bracing for pain relief and spinal stability in metastatic spinal cord compression in adults
Lee, Siew Hwa; Cox, Katherine M.; Grant, Robin; Kennedy, Catriona M.; Kilbride, Lynn

Published in:
Cochrane Database of Systematic Reviews

Publication date:
2012

Document Version
Publisher's PDF, also known as Version of record

Link to publication in Discovery Research Portal

Citation for published version (APA):
Patient positioning (mobilisation) and bracing for pain relief and spinal stability in metastatic spinal cord compression in adults (Review)

Lee SH, Cox KM, Grant R, Kennedy C, Kilbride L

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in The Cochrane Library 2012, Issue 3

http://www.thecochranelibrary.com

WILEY
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Header</td>
<td>1</td>
</tr>
<tr>
<td>Abstract</td>
<td>1</td>
</tr>
<tr>
<td>Plain Language Summary</td>
<td>2</td>
</tr>
<tr>
<td>Background</td>
<td>2</td>
</tr>
<tr>
<td>Objectives</td>
<td>3</td>
</tr>
<tr>
<td>Methods</td>
<td>3</td>
</tr>
<tr>
<td>Results</td>
<td>5</td>
</tr>
<tr>
<td>Discussion</td>
<td>5</td>
</tr>
<tr>
<td>Authors’ Conclusions</td>
<td>6</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>6</td>
</tr>
<tr>
<td>References</td>
<td>7</td>
</tr>
<tr>
<td>Characteristics of Studies</td>
<td>8</td>
</tr>
<tr>
<td>Data and analyses</td>
<td>10</td>
</tr>
<tr>
<td>Appendices</td>
<td>10</td>
</tr>
<tr>
<td>History</td>
<td>13</td>
</tr>
<tr>
<td>Contributions of Authors</td>
<td>13</td>
</tr>
<tr>
<td>Declarations of Interest</td>
<td>13</td>
</tr>
<tr>
<td>Sources of Support</td>
<td>14</td>
</tr>
<tr>
<td>Index Terms</td>
<td>14</td>
</tr>
</tbody>
</table>
Patient positioning (mobilisation) and bracing for pain relief and spinal stability in metastatic spinal cord compression in adults

Siew Hwa Lee¹, Katherine M Cox², Robin Grant³, Catriona Kennedy¹, Lynn Kilbride¹

¹School of Nursing, Midwifery and Social Care, Faculty of Health, Life & Social Sciences, Edinburgh Napier University, Edinburgh, UK. ²College of Medicine, University of Edinburgh, Edinburgh, UK. ³Edinburgh Centre for Neuro-Oncology (ECNO), Western General Hospital, Edinburgh, UK

Contact address: Lynn Kilbride, School of Nursing, Midwifery and Social Care, Faculty of Health, Life & Social Sciences, Edinburgh Napier University, Edinburgh, UK. L.kilbride@napier.ac.uk.

ABSTRACT

Background

Many patients with metastatic spinal cord compression (MSCC) have spinal instability but are determined, by their clinician, to be unsuitable for surgical internal fixation due to their advanced disease. Mobilisation may be hazardous in the presence of spinal instability as further vertebral collapse can occur. Current guidance on positioning (or mobilisation) and spinal bracing is contradictory.

Objectives

To investigate the correct positioning (or mobilisation) and examine the effects of spinal bracing to relieve pain or to prevent further vertebral collapse in patients with MSCC.

Search methods

The Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, CANCERLIT, NICE, SIGN, AMED, TRIP, National Guideline Clearinghouse and PEDro database were searched; the last search was run in February 2012.

Selection criteria

We selected randomised controlled trials (RCTs) of adults with MSCC of interventions on positioning or mobilisation and bracing.

Data collection and analysis

Two review authors independently assessed each possible study for inclusion and quality.

Main results

One thousand, six hundred and eleven potentially relevant studies were screened. No studies met the inclusion criteria. Many papers identified the importance of mobilisation but no RCTs have been undertaken. No RCTs of bracing in MSCC were identified.
Authors’ conclusions

There is lack of evidence based guidance around how to correctly position and when to mobilise patients with MSCC or if spinal bracing is an effective technique for reducing pain or improving quality of life. RCTs are required in this important area.

Plain Language Summary

Patient positioning or mobilisation and bracing for pain relief and spinal stability in adults with metastatic spinal cord compression

People with advanced cancer may develop metastatic spinal cord compression (MSCC), a serious complication which can cause pain and mobility problems and possibly paralysis. MSCC is the spread of the cancer to the spinal column. A diagnosis of MSCC normally indicates advanced disease and for many patients the final stages of their illness. Knowing how to manage this condition is challenging for healthcare professionals who may need to decide what interventions are appropriate. Some existing guidelines suggest strategies such as bed rest, avoiding mobility and the use of braces as ways of managing this condition. However, this needs to be balanced against the wishes of the patient, ensuring their comfort and individual preferences. If life expectancy is short then a palliative care approach, which focuses on patient preferences and priorities, is appropriate. This review tried to establish what evidence exists to help healthcare professionals and patients decide what treatment (positioning or mobilisation, bracing) is best for them. Unfortunately little research exists which can tell us the best way to manage this condition. Therefore our suggestions are twofold. Firstly there needs to be more research undertaken to find out what treatment approaches can help. Secondly, in the absence of clear evidence, healthcare professionals and patients need to discuss the options and precedence be given to the expressed wishes of patients.

Background

Description of the condition

Metastatic Spinal Cord Compression (MSCC) is a serious complication of cancer disease. The symptoms of MSCC range from minor sensory disturbance and autonomic changes to severe pain and irreversible paralysis. MSCC is defined as “compression of the dural sac and its contents (spinal cord and/or cauda equina) by an extradural tumour mass. Clinical features include any or all of the following; pain (local or radicular), weakness, sensory disturbance and/or evidence of sphincter dysfunction” Loblow 1998. The onset of MSCC is a medical emergency and warrants immediate intervention to minimise damage to the spinal cord and preserve neurological function. Prognosis and the quality of life are related to the patient’s pre-treatment ambulatory status and rapid diagnosis and treatment is required (Levack 2002).

Controversy surrounds the care of patients with MSCC. Approximately 10 people per 100,000 a year suffer from this condition and their prognosis is known to be very poor (Levack 2002; Posner 1995). Current acceptable treatment approaches for MSCC include corticosteroids, radiotherapy and surgery (Loblow 1998). A course of the corticosteroid dexamethasone is prescribed to reduce the oedema and cord compression and thereby relieve pain. There is some controversy regarding the optimal dose of dexamethasone. The standard dose administered is 16 mg/d, in divided doses, over several days. Radiotherapy alone is the most common treatment for MSCC. Radiation therapy reduces the tumour mass thereby alleviating pain and relieving the spinal cord compression. There are different regimes of radiation therapy for spinal cord compression and the commonly prescribed regime is 3 Gy per fraction (Kwok 2005).

Surgery may be indicated, particularly for those with spinal instability or rapidly progressing loss of neurologic functions, but the number of these patients is small. Surgery is usually limited to patients with involvement of one or two vertebrae and those who have good performance status and an expected survival of more than three months (Rades 2006). The desirability of surgery plus radiotherapy as opposed to radiotherapy alone has been debated and two studies claim that where the overall condition of the patient merits intervention, a combination of surgery plus radiotherapy may provide the best outcomes (Patchell 2005; Thomas 2006). Tokuhashi 2005 developed a prognostic indicator as part of the assessment for surgery. This tool uses six parameters (performance status, extraspinal bone metastases, quantity of metastases in the vertebral body, metastases to internal organs, primary site, and the severity of neurological damage). Other tools to identify a patient’s suitability for surgery have been developed by Bilsky 2007.
Bracing and positioning or mobilisation are two non-invasive treatment options that clinicians sometimes prescribe for people with MSCC. The role of bracing as a treatment for MSCC is not well defined (Lewandrowski 2006). Braces can be used post-operatively to maintain the integrity of the spine, although anaesthetically this treatment is criticised as being pointless as this is the purpose of the surgery. Braces can also be used long term to treat spinal instability, however, as the life span of a patient with MSCC may be short their use in this context is limited (Lewandrowski 2006). Both the cervical and thoracic spine can be braced, however, cervical bracing is the most commonly used in MSCC (Lewandrowski 2006). Positioning (or mobilisation) is a treatment that is prescribed pre-operatively, post-operatively and long term for people with MSCC. The prescription is usually bed rest or to mobilise. Bed rest usually refers to the patient being nursed supine and to mobilise refers to allowing the patient to get out of bed and walk. Clinically the rationale for bed rest is usually related to the spinal stability status (NICE 2008). An audit conducted by McClinton and Hutchison highlighted a lack of guidance on how to correctly position patients or whether or not to use braces (McClinton 2006). More recently, the National Institute for Health and Clinical Excellence (NICE) developed recommendations for the diagnosis and management of adults with MSCC (NICE 2008) in response to a recommendation from the Department of Health. These represent the best available good practice guidelines for managing patients with MSCC and allude to the use of bracing and positioning. However, the evidence that supports these recommendations is not conclusive.

**Why it is important to do this review**

It was important that this review of positioning (or mobilisation) and bracing was undertaken to ensure patients are cared for effectively. It was also important to ensure that healthcare professionals could draw on evidence to inform the care and management of patients with MSCC in terms of pain and spinal stability through prevention of further vertebral collapse.

**O B J E C T I V E S**

To investigate the correct positioning (or mobilisation) and examine the effects of spinal bracing to relieve pain or to prevent further vertebral collapse in patients with MSCC.

**M E T H O D S**

To investigate the correct positioning (or mobilisation) and examine the effects of spinal bracing to relieve pain or to prevent further vertebral collapse in patients with MSCC.
Criteria for considering studies for this review

Types of studies
Randomised Controlled Trials (RCTs).

Types of participants
Participants of either gender with a confirmed diagnosis of MSCC.

Types of interventions
Interventions including spinal bracing and guidance for patients on positioning (or mobilisation), for example lying flat, sitting up, standing or mobilised, or both, versus patients who receive no therapy or no positioning guidance, or neither.

Types of outcome measures

Primary outcomes
- Radiologically confirmed effects of bracing on vertebral collapse under physiological load measured by vertebral column collapse rate, number of vertebrae involved in the problem area and bony impingement.
- Patient reported measures of pain relief, quality of life and satisfaction. Vertebral collapse will be measured by vertebral column collapse rate, number of vertebrae involved in the problem area and bony impingement.
- Reported adverse events.
- Primary outcome measures should be measured using valid and reliable assessment tools (visual analogue scores (VAS) and quality of life (QoL) scales e.g. European Organisation for Research and Treatment of Cancer (EORTC)).

Search methods for identification of studies

Electronic searches
The search strategy detailed in Appendix 1 was applied to the following databases (27th January 2012 and 13th February 2012). Individual search strategies for the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE and CINAHL are replicated and also detailed in Appendix 1.
- MEDLINE (Ovid) (1950 to week 4, January 2012).
- EBM Reviews - Cochrane Central Register of Controlled Trials (Ovid) (13th February 2012).
- The Cochrane Library (to Issue 1, January 2012).
- EMBASE (Ovid) (1980 to Week 4, January 2012).

Searching other resources
Searches of the following websites were also undertaken.
- SIGN (www.sign.ac.uk): no results, 10th February 2012.
- TRIP (www.tripdatabase.com): no results, 10th February 2012.
- NHS Clinical Knowledge Summaries (http://cks.library.nhs.uk) - information based on NICE 2008.
- PEDro - Physiotherapy Evidence Database (www.pedro.org.au): no results, 10th February 2012.

Data collection and analysis

Selection of studies
Two review authors independently assessed each potentially eligible study by reviewing the titles or abstracts for inclusion within the review. This search identified no further studies for inclusion.

Data extraction and management
We developed a data extraction form based on the Cochrane Pain, Palliative and Supportive Care Group template. We planned to extract the following main sets of data from each included study:
- lead author,
- date,
- study participant inclusion criteria,
- participants (diagnoses, demographics, primary cancer site, gender, age),
- interventions (spinal bracing, positioning, pain relief),
- intervention setting (hospital, hospice, home),
- outcome measures (quality of life, pain scores),
- timing of outcome measures (upon diagnosis, post surgery, post radiotherapy).
At least two review authors were identified to independently extract data into the data extraction form. One review author was to enter data into RevMan with the other checking the accuracy of this data input. Any discrepancies were to be referred to a third review author and any errors or inconsistencies resolved. We entered any details regarding the studies we excluded in to the 'Characteristics of excluded studies’ table; if any studies had been included they would have been entered in the 'Characteristics of included studies’ table. If necessary, additional information would have been sought from the principal investigator of a study for clarification of published data or missing data.

Assessment of risk of bias in included studies
We intended to assess any bias of included studies in accordance with guidelines in the Cochrane Handbook for Systematic Reviews of Interventions (Higgins 2011). Two review authors were to independently assess the risk of bias in included studies, with any disagreements to be resolved through discussion with a third review author as arbitrator if required. We were to contact study authors for additional information if required. We were to provide a written commentary of risk of bias within the review text. Assessment of methodological quality would have been assessed and graded using the 'Risk of bias’ table available within RevMan 5.

Risk of bias in included studies
As no studies met our inclusion criteria it was not possible to analyse the risk of bias.

Effects of interventions
Data would have been analysed using the Cochrane Collaboration's Review Manager 5 software. As no studies met our inclusion criteria it was not possible to measure the effects of intervention.

DISCUSSION
Positioning (or mobilisation) and bracing are interventions that are discussed and recommended within the literature to improve pain management and prevent further vertebral collapse amongst patients with MSCC (McClinton 2006; Mercadante 1997; NICE 2008; Pease 2004). However, as the evidence to support these recommendations is controversial this review aimed to investigate the correct positioning (or mobilisation) and examine the effects of spinal bracing to relieve pain or to prevent further vertebral collapse in patients with MSCC in order to assist healthcare professionals in their decision making.

There were no studies identified within this review that provided evidence to support the positioning (or mobilisation) or bracing techniques that should be used to manage pain or prevent further vertebral collapse, or both, amongst patients with MSCC. However, there were some studies identified that discussed these interventions and that may inform future studies or discussions. From the review of the literature, four studies (Bilsky 1999; Bilsky 2006; Bilsky 2007; Borm 2004) discussed the effect of positioning (mobilisation) on pain. Bilsky 1999; Bilsky 2006; and Bilsky 2007 suggest that when nursed in a supine position patients suffer an increased pressure or pain due to increased axial load on the spine and provide anecdotal evidence that patients request to sleep in an upright position to relieve pain. Borm 2004 found that diagnosis of spinal tumours can be difficult if there are concurrent signs of...
degenerative changes in the spine. Their study found no significant difference in the frequency of back pain either at rest or under loading for both spinal tumours and degenerative disease of the spine. It was observed that a combination of back pain at rest and without back pain under loading only occurred in patients with spinal tumours, but these results were not statistically significant.

Some studies suggested that other factors than pain should be considered in positioning (or mobilisation) (Bilsky 1999; Bilsky 2007; Pease 2004). Some patients have experienced a depressed mood when laying supine for extended periods of time (Pease 2004) and other complications such as DVT, chest infection, pressure sores and urinary tract infections can pose difficulties (Pease 2004). Jacobs 1999 suggest that in light of some of these findings patients with short life expectancy should be encouraged to sit upright or to mobilise themselves.

From this systematic review, the review authors conclude that clear guidelines are needed to inform how to correctly position patients in order to maintain spinal stability and relieve pain. It is also suggested that when considering certain positions, for example lying supine, any additional physical and psychological factors that could affect patients because of this recommendation should be investigated.

There is currently no evidence base for the use or functionality of bracing. Some authors advise that when there is suspicion of cervical lesions, patients should be fitted with a cervical collar to help stabilise the spine and reduce neck movement (Maher de Leon 1998; Pease 2004). However, none of these authors have cited any original research or studies to support this statement. In fact, Heary 2001 points out that there is a lack of evidence for the long-term benefit of bracing in the literature, and that the (cervical) collar’s effectiveness in preventing an impending pathological fracture is unknown.

In addition to potentially stabilising the spine, it is argued that a rigid spinal brace or orthosis may also help relieve pain and may be a conservative alternative to vertebroplasty (Galasko 1991; NICE 2008). Research studies are needed to clarify the role of bracing in MSSC and what effect bracing has on spine stabilisation, pain relief and quality of life, and whether there is any overall benefit of external braces or orthoses for MSCC patients.

There is a gap in the evidence base to inform positioning and bracing in individuals with MSCC. Despite published guidelines (NICE 2008), this review has demonstrated that evidence relating to spinal positioning and bracing is limited and inconclusive and therefore further research is required in this area.

Summary of main results
We intended to investigate the correct positions for patients with MSCC and examine the effects of spinal bracing to relieve pain or vertebral collapse, or both, under physiological load in this systematic review. The overall aim of the review was to provide evidence to assist healthcare professionals with their decision making in this area. Unfortunately the review process did not identify any studies that would guide healthcare professionals’ decision making in this area. Furthermore, existing literature offers conflicting advice in terms of mobilisation and stabilisation.

From this systematic review the review authors conclude that clear guidelines are needed to inform how to correctly position patients in order to maintain spinal stability and relieve pain. Guidelines recommend using a spinal orthosis to increase spinal stability and to relieve pain (NICE 2008; White 1978; White 1990), however, from this review it can be concluded that there is no evidence to support this recommendation.

Authors’ conclusions

Implications for practice
There is currently a lack of evidence regarding the effectiveness of spinal bracing for patients with MSCC. Further research and exploration of best practice in MSCC on positioning, bracing and spinal stability is required. Spinal bracing may improve comfort and quality of life for some patients but we are unable to make recommendations for practice based on this review.

Implications for research
Research to examine this topic needs to be undertaken to inform future practice. Randomised controlled trials to measure the efficacy of bracing would be possible. Descriptive and qualitative studies would be beneficial to clarify mobilisation and positioning from a physician, nursing and patient point of view.

Acknowledgements
We would like to thank Sheena Moffat, Information Services Advisor, Edinburgh Napier University, who refined and ran the search strategies for this review and the support of Jessica Thomas, Managing Editor, Cochrane Pain, Palliative and Supportive Care Review Group, UK.
Patient positioning (mobilisation) and bracing for pain relief and spinal stability in metastatic spinal cord compression in adults (Review)

Copyright © 2012 The Cochrane Collaboration. Published by John Wiley & Sons, Ltd.

References to studies excluded from this review

Chi 2009 [published data only]

Freundt 2010 [published data only]

Furstenberg 2009 [published data only]

Galasko 1991 [published data only (unpublished sought but not used)]

Ippolito 1998 [published data only (unpublished sought but not used)]

Rades 2010 [published data only (unpublished sought but not used)]

Sciubba 2010 [published data only (unpublished sought but not used)]

Spinazzé 2005 [published data only (unpublished sought but not used)]

Additional references

Benzel 2001

Bilsky 1999

Bilsky 2006

Bilsky 2007

Borm 2004

Bunting 2001

Gasbarrini 2010

Gilbert 1978

Heary 2001

Higgins 2011

Jacobs 1999

Kwok 2005

Levack 2002

Lewandrowski 2006

Mahe de Leon 1998

Makris 1995

McClinton 2006

Mercadante 1997

NICE 2008

Obbens 1987

Patchell 2005

Pease 2004

Posner 1995

Prasad 2005

Rades 2006

Schiff 2003

Thomas 2006

Tokuhashi 2005

Walji 2008

White 1978

White 1990

Yarbro 2005

* Indicates the major publication for the study
## Characteristics of excluded studies [ordered by study ID]

<table>
<thead>
<tr>
<th>Study</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi 2009</td>
<td>This RCT did not address the specific outcomes of bracing and positioning specified within this review</td>
</tr>
<tr>
<td>Freundt 2010</td>
<td>Retrospective study</td>
</tr>
<tr>
<td>Furstenberg 2009</td>
<td>Retrospective clinical trial</td>
</tr>
<tr>
<td>Galasko 1991</td>
<td>Retrospective paper</td>
</tr>
<tr>
<td>Ippolito 1998</td>
<td>Retrospective study</td>
</tr>
<tr>
<td>Rades 2010</td>
<td>Review paper</td>
</tr>
<tr>
<td>Sciubba 2010</td>
<td>Commentary letter</td>
</tr>
<tr>
<td>Spinazze 2005</td>
<td>Review paper</td>
</tr>
</tbody>
</table>
DATA AND ANALYSES

This review has no analyses.

APPENDICES

Appendix 1. Search strategy

Search details

Database: MEDLINE (Ovid) (1950 - Week 4, January 2012)
1 Spinal Cord Compression/ (8856)
2 Spinal Neoplasms/ (10049)
3 (cord adj6 compress$).mp. [mp=title, original title, abstract, name of substance word, subject heading word] (11700)
4 compress$.mp. [mp=title, original title, abstract, name of substance word, subject heading word] (92673)
5 (epidural or extradural or extra-dural or "spinal cord" or "dural sac" or "cauda equina" or "spinal column").mp. [mp=title, original title, abstract, name of substance word, subject heading word] (169137)
6 metast$.mp. [mp=title, original title, abstract, name of substance word, subject heading word] (309497)
7 4 and 6 (2802)
8 5 and 7 (1542)
9 3 and 6 (1440)
10 1 and 6 (1004)
11 4 or 6 (399368)
12 2 and 11 (4564)
13 8 or 9 or 10 or 12 (5459)
14 randomized controlled trial.pt. (317022)
15 controlled clinical trial.pt. (83278)
16 randomized controlled trials/ (317022)
17 random allocation/ (72791)
18 double-blind method/ (112236)
19 single-blind method/ (15567)
20 14 or 15 or 16 or 17 or 18 or 19 (466167)
21 limit 20 to animal (50437)
22 limit 20 to human (425291)
23 21 and 22 (10855)
24 21 not 22 (39582)
25 20 not 24 (426585)
26 clinical trial.pt. (465272)
27 exp clinical trials/ (658195)
28 clin$ with trial$.tw. (1)
29 placebos/ (30346)
30 placebo$.tw. (131982)
31 random$.tw. (536852)
32 exp research design/ (291693)
33 26 or 27 or 28 or 29 or 30 or 31 or 32 (1109414)
34 limit 33 to animal (137432)
35 limit 33 to human (969521)
36 34 and 35 (36247)
37 34 not 36 (101185)
38 33 not 37 (1008229)
39 comparative study/ (1549101)
40 exp evaluation studies/ (158314)
41 follow-up studies/ (433321)
42 prospective studies/ (307204)
43 (control$ or prospectiv$ or volunteer$).tw. (2410885)
44 39 or 40 or 41 or 42 or 43 (4045378)
45 limit 44 to animal (1185597)
46 limit 44 to human (2811222)
47 45 and 46 (268529)
48 45 not 47 (917068)
49 44 not 48 (3128310)
50 25 or 38 or 49 (3563872)
51 13 and 50 (1259)

**Database: EBM Reviews - Cochrane Central Register of Controlled Trials (Ovid) (13th February 2012)**

1 Spinal Cord Compression/ (176)
2 Spinal Neoplasms/ (53)
3 (cord adj6 compress$).mp. [mp=title, original title, abstract, mesh headings, heading words, keyword] (227)
4 compress$.$mp. [mp=title, original title, abstract, mesh headings, heading words, keyword] (4198)
5 (epidural or extradural or extra-dural or "spinal cord" or "dural sac" or "cauda equina" or "spinal column").mp. [mp=title, original title, abstract, mesh headings, heading words, keyword] (9043)
6 metast$.$mp. [mp=title, original title, abstract, mesh headings, heading words, keyword] (11966)
7 4 and 6 (137)
8 5 and 7 (94)
9 3 and 6 (90)
10 1 and 6 (85)
11 4 or 6 (16027)
12 2 and 11 (36)
13 8 or 9 or 10 or 12 (118)

**Database: EMBASE (Ovid) (1980 - Week 4, January 2012)**

1 Spinal Cord Compression/ (10115)
2 Spinal Neoplasms/ (10648)
3 (cord adj6 compress$).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name] (12916)
4 compress$.$mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name] (120236)
5 (epidural or extradural or extra-dural or "spinal cord" or "dural sac" or "cauda equina" or "spinal column").mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name] (204093)
6 metast$.$mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name] (410521)
7 4 and 6 (4386)
8 5 and 7 (2535)
9 3 and 6 (2282)
10 1 and 6 (1894)
11 4 or 6 (526371)
12 2 and 11 (3537)
13 8 or 9 or 10 or 12 (5610)
14 controlled-study.sh. (3681534)
15 crossover-procedure.sh. (31733)
16 double-blind-procedure.sh. (102763)
17 phase-3-clinical-trial.sh. (12924)
18 placebo$.tw. (164540)
19 randomized-controlled-trial.sh. (296357)
20 single-blind-procedure.sh. (14735)
21 blind$.tw. (215213)
22 comparative study.tw. (57320)
23 (control$ adj1 trial$).tw. (109556)
24 crossover$.tw. (40482)
25 factorial$.tw. (17764)
26 random$.tw. (679440)
27 or/14-26 (4206739)
28 human.sh. (12805189)
29 nonhuman.sh. (3780391)
30 28 and 29 (700996)
31 29 not 30 (3079395)
32 27 not 31 (2789445)
33 13 and 32 (489)

**Database: CINAHL (EBSCO) (1982 - January 2012)**
1 (MH "Spinal Cord Compression") (633)
2 (MH "Spinal Neoplasms") (797)
3 cord N6 compress* (0)
4 compress* (11478)
5 epidural or extradural or extra-dural or "spinal cord" or "dural sac" or "cauda equina" or "spinal column" (23972)
6 metast* (21071)
7 S4 and S6 (376)
8 S5 and S7 (285)
9 S3 and S6 (0)
10 S1 and S6 (133)
11 S4 or S6 (32173)
12 S2 and S11 (378)
13 S8 or S9 or S10 or S12 (577)
14 (MH "Random Assignment") (123)
15 (MH "Random Sample") (38)
16 (MH "Crossover Design") (34)
17 (MH "Clinical Trials") (9473)
18 (MH "Comparative Studies") (217)
19 (MH "Control (Research)+") (60)
20 (MH "Factorial Design") (10)
21 (MH "Quasi-Experimental Studies") (37)
22 (MH "Nonrandomized Trials") (5)
23 (MH "Placebos") (655)
24 (MH "Meta Analysis") (827)
25 (MH "Clinical Nursing Research") or (MH "Clinical Research") (3081)
26 (MH "Community Trials") (9)
27 (MH "Experimental Studies") (306)
(Continued)

28 (MH "One-Shot Case Study") (6)
29 (MH "Pretest-Posttest Design") (13)
30 (MH "Solomon Four-Group Design") (2)
31 (MH "Static Group Comparison") (0)
32 (MH "Study Design") (2795)
33 (MH "Clinical Trials") (9188)
34 (MH "Systematic Review") (748)
35 TI random* (752)
36 TI singl* or doubl* or tripl* or trebl* (51229)
37 TI blind* or mask* (14161)
38 S36 and S37 (5962)
39 TI cross?over* or placebo* or control* or factorial or sham (518186)
40 TI clin* or intervention* or compar* or experiment* or preventive or therapeutic (736416)
41 TI trial* (42588)
42 S40 and S41 (29996)
43 TI counterbalance* or multiple baseline* or ABAB design* (526)
44 TI meta?analy* or systematic review* (26808)
45 S14 or S15 or S16 or S17 or S18 or S19 or S20 or S21 or S22 or S23 or S24 or S25 or S26 or S27 or S28 or S29 or S30 or S31 or S32 or S33 or S34 or S35 or S38 or S39 or S42 or S43 or S44 (553687)
46 S13 and S45 (127)

HISTORY
Protocol first published: Issue 1, 2009

CONTRIBUTIONS OF AUTHORS
Draft the protocol: MC, LK, CK
Develop a search strategy: MC, LK, CK, SM
Search for trials: MC, LK, CK, SHL, RG
Obtain copies of studies and updated search strategy February 2012: SHL
Select which studies to include: LK, CK, SHL, RG
Draft the final review: LK, CK, SHL, RG
Update the review: LK, CK, SHL, RG
DECLARATIONS OF INTEREST
None known

SOURCES OF SUPPORT

Internal sources
• Edinburgh Napier University, UK.
• NHS Lothian, UK.

External sources
• No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)
*Braces; Joint Instability [*therapy]; Pain Management [*methods]; Patient Positioning [*methods]; Spinal Cord Compression [*complications]; Spinal Neoplasms [secondary]; Spine

MeSH check words
Humans