APPENDIX A. SEARCH STRATEGIES

1. SYSTEMATIC REVIEW SEARCH STRATEGIES

SEARCH STRATEGY FOR “CHIROPRACTIC” SYSTEMATIC REVIEWS
DATABASE SEARCHED:
Cochrane Database of Systematic Reviews and Other Reviews

NO DATE OR LANGUAGE LIMITATIONS

SEARCH STRATEGY:
'chiroprac* in Title, Abstract, Keywords
Cochrane Reviews (17)
Other Reviews (44)

SEARCH STRATEGY:
"Manipulation, Spinal"

Cochrane Database Search Strategy #2:
spine or spinal or neck or back or cervi*
and
(smt or manipulat* or chiropract*):ti,ab,kw

Dates:
2011-present,

Limit to the Cochrane Systematic Reviews, Other Reviews (DARE), Technology Assessments, and Economic Evaluations databases.

Forward search on:
Hurwitz EL, Aker PD, Adams AH, Meeker WC, Shekelle PG. Manipulation and mobilization of the cervical spine. A systematic review of the literature. Spine (Phila Pa 1976). Aug 1 1996;21(15):1746-1759; discussion 1759-1760.

2. UPDATE SEARCH STRATEGIES

SPINAL MANIPULATION THERAPY – 2015 UPDATE
SEARCH METHODOLOGY

DATABASE SEARCHED & TIME PERIOD COVERED:
COCHRANE CENTRAL – 1/1/2011-2/06/2017

SEARCH STRATEGY:

#1 MeSH descriptor: [Back] explode all trees

#2 MeSH descriptor: [Buttocks] this term only

#3 MeSH descriptor: [Leg] this term only

#4 MeSH descriptor: [Back Pain] explode all trees
#5 MeSH descriptor: [Back Pain] 1 tree(s) exploded
#6 MeSH descriptor: [Back Injuries] explode all trees
#7 MeSH descriptor: [Low Back Pain] this term only
#8 MeSH descriptor: [Sciatica] this term only
#9 low next back next pain
#10 lbp
#11 #1 or #2 or #3 or #5 or #6 or #7 or #8 or #9 or #10
#12 MeSH descriptor: [Musculoskeletal Manipulations] explode all trees
#13 MeSH descriptor: [Chiropractic] explode all trees
#14 manip*
#15 MeSH descriptor: [Osteopathic Medicine] explode all trees
#16 osteopath*
#17 chiropract*
#18 #12 or #13 or #14 or #15 or #16 or #17
#19 #11 and #18
= =

DATABASE SEARCHED & TIME PERIOD COVERED:
MEDLINE ON OVID – 1/1/2011-2/06/2017

SEARCH STRATEGY:
1 Clinical Trial.pt.
2 randomized.ab,ti.
3 placebo.ab,ti.
4 dt.fs.
5 randomly.ab,ti.
6 trial.ab,ti.
7 groups.ab,ti.
8
1 or 2 or 3 or 4 or 5 or 6 or 7
9 Animals/
10 Humans/
11
9 not (9 and 10) Including Related Terms
12
8 not 11

13 dorsalgia.ti,ab.

14 exp Back Pain/

15 backache.ti,ab.

16 (lumbar adj pain).ti,ab.

17 coccyx.ti,ab.

18 coccydynia.ti,ab.

19 sciatica.ti,ab.

20 sciatica/

21 spondylosis.ti,ab.

22 lumbago.ti,ab.

23 exp low back pain/

24

13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23

25 exp Manipulation, Chiropractic/

26 exp Manipulation, Orthopedic/

27 exp Manipulation, Osteopathic/

28 exp Manipulation, Spinal/

29 exp Musculoskeletal Manipulations/

30 exp Chiropractic/

31 manipulation.mp.

32 manipulate.mp.

33 exp Orthopedics/

34 exp Osteopathic Medicine/

35

25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34

36

12 and 24 and 35

37

36 and 2011:2015.(sa_year).

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DATABASE SEARCHED & TIME PERIOD COVERED:
EMBASE – 1/1/2011-2/06/2017

SEARCH STRATEGY:
#2 'clinical article'/exp OR 'clinical study'/exp OR 'clinical trial'/de OR 'controlled study'/de OR 'randomized controlled trial'/de OR 'major clinical study'/de OR 'double blind procedure'/de OR 'multicenter study'/de OR 'single blind procedure'/de OR 'phase 3 clinical trial'/de OR 'phase 4 clinical trial'/de OR 'crossover procedure'/de OR 'placebo'/de

#6 allocat*

#7 assign*

#8 blind*

#12 clinical NEAR/25 (study OR trial*)

#13 compar*

#14 control*

#17 'cross over'

#18 'cross-over'

#19 'crossover'

#20 factorial

#21 'follow up'

#22 follow* NEAR/3 up

#23 'follow up'

#24 placebo*

#25 prospectiv*

#26 random*

#27 (singl* OR doubl* OR trebl* OR tripl*) NEAR/25 (blind* OR mask*)

#28 trial

#29 versus OR vs

#30

#6 OR #7 OR #8 OR #12 OR #13 OR #14 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23

OR #24 OR #25 OR #26 OR #27 OR #28 OR #29

#31

#2 OR #30

#34 dorsalgia

#35 'back pain'

#36 lumbar NEAR/2 pain

#37 coccyx

#38 coccydynia

#39 sciatica

#40 spondylosis

#41 lumbago

#42 'backache'/exp OR 'ischialgia'/exp OR 'low back pain'/exp

#43

#34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42

#44 'chiropractic'/exp OR 'orthopedic manipulation'/exp OR 'manipulative medicine'/exp OR 'osteopathic medicine'/exp OR 'orthopedics'/exp

#45 manipulation

#46 manipulate

#47 osteopathy

#48

#44 OR #45 OR #46 OR #47

#49

#31 AND #43 AND #48

#50

#31 AND #43 AND #48 AND [humans]/lim

#51

#31 AND #43 AND #48 AND [humans]/lim AND [2011-2015]/py

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DATABASE SEARCHED & TIME PERIOD COVERED:
CINAHL – 1/1/2011-2/06/2017

SEARCH STRATEGY:

Search modes - Find all search terms (For all search statements)

S1 randomized controlled trials

S2 randomized controlled trials

S3 PT clinical trial

S4 (MH "Clinical Trials+")

S5 clin* n25 trial*

S6 (singl* or doubl* or trebl* or tripl*) n25 (blind* or mask*)

S7 (MH "Placebos")

S8 (MH "Study Design+")

S9 (MH "Comparative Studies")

S10 (MH "Evaluation Research+")

S11 (MH "Prospective Studies+")

S12 "follow up studies" OR "follow-up studies" OR "followup studies" OR "follow-up study" OR "follow up study" OR "followup study"

S13 control* or prospectiv* or volunteer*

S14 placebo* OR random* OR (latin n2 square*)

S15

S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14

S18 TI dorsalgia OR AB dorsalgia

S19 (MH "Back Pain+")

S20 TI backache OR AB backache

S21 TI lumbar n2 pain OR AB lumbar n2 pain

S22 TI coccyx pain OR AB lumbar n2 pain

S23 TI coccyx OR AB coccyx

S24 TI coccydynia OR AB coccydynia

S25 TI sciatica OR AB sciatica

S26 (MH "Sciatica")

S27 TI spondylosis OR AB spondylosis

S28 TI lumbago cronico OR AB spondylosis

S29 TI lumbago OR AB lumbago

S30 (MH "Low Back Pain")

S31

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

S32 (MH "Chiropractic+")

S33 (MH "Manipulation, Chiropractic")

S34 (MH "Manipulation, Orthopedic")

S35 (MH "Manipulation, Osteopathic")

S36 (MH "Manual Therapy+")

S37 (MH "Orthopedics")

S38 (MH "Osteopathy+")

S39 manipulation

S40 manipulate

S41

S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40

S42

S15 AND S31 AND S41

S43

S15 AND S31 AND S41

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DATABASE SEARCHED & TIME PERIOD COVERED:

PubMed – 1/1/2015-2/06/2017

SEARCH STRATEGY:
Manipulation, Chiropractic[mh] OR Manipulation, Orthopedic[mh] OR Manipulation, Osteopathic[mh] OR Manipulation, Spinal[mh] OR Musculoskeletal Manipulations[mh] OR Chiropractic[mh] OR Orthopedics OR Osteopathic Medicine
AND
"Low Back Pain"[Mesh] OR low back pain*[tiab] OR "Back"[Mesh] OR dorsalgia[tiab] OR Back Pain[mh] OR backache[tiab] OR “lumbar pain”[tiab] OR coccyx[tiab] OR coccydynia[tiab] OR sciatica[tiab] OR sciatica[mh] OR spondylosis[tiab] OR lumbago[tiab]
AND
Randomized Controlled Trial" [Publication Type] OR "Randomized Controlled Trials as Topic"[Mesh] OR random*[tiab] OR rct* OR systematic[tiab] OR systematic[sb] OR Clinical Trial[pt] OR randomized[tiab] OR placebo[tiab] OR randomly[tiab] OR trial[tiab] OR groups[tiab]

APPENDIX B. COCHRANE BACK GROUP RISK OF BIAS TOOL

COCHRANE BACK REVIEW GROUP (CBRG) CRITERIA

2003 Version[88]

Domain	Operationalization of the Criteria List	Reviewers' judgment
V1. Randomization	A random (unpredictable) assignment sequence. Examples of adequate methods are computer generated random number table and use of sealed opaque envelopes. Methods of allocation using date of birth, date of admission, hospital numbers, or alternation should not be regarded as appropriate.	Was the method of randomization adequate? Yes / No / Don't Know
V2. Concealment	Assignment generated by an independent person not responsible for determining the eligibility of the patients. This person has no information about the persons included in the trial and has no influence on the assignment sequence or on the decision about eligibility of the patient.	Was the treatment allocation concealed? Yes / No / Don't Know
V3. Baseline differences	In order to receive a yes, groups have to be similar at baseline regarding demographic factors, duration and severity of complaints, percentage of patients with neurologic symptoms, and value of main outcome measure(s). [adapt as required by topic]	Were the groups similar at baseline regarding the most important prognostic indicators? Yes / No / Don't Know
V4. Blinding - patient	The reviewer determines if enough information about blinding is given in order to score a yes.	Was the patient blinded to the intervention? Yes / No / Don't Know
V5. Blinding – care provider	The reviewer determines if enough information about blinding is given in order to score a yes.	Was the care provider blinded to the intervention? Yes / No / Don't Know
V6. Blinding - outcome	The reviewer determines if enough information about blinding is given in order to score a yes.	Was the outcome assessor blinded to the intervention? Yes / No / Don't Know
V7. Co-interventions	Co-interventions should either be avoided in the trial design or similar between the index and control groups.	Were co-interventions avoided or similar? Yes / No / Don't Know
V8.	The reviewer determines if the compliance to the interventions is	Was the compliance

Compliance	acceptable, based on the reported intensity, duration, number and frequency of sessions for both the index intervention and control intervention(s).	acceptable in all groups? Yes / No / Don't Know
V9. Dropouts	The number of participants who were included in the study but did not complete the observation period or were not included in the analysis must be described and reasons given. If the percentage of withdrawals and drop-outs does not exceed 20% for short-term follow-up and 30% for long-term follow-up and does not lead to substantial bias a yes is scored. (N.B. these percentages are arbitrary, not supported by literature)	Was the drop-out rate described and acceptable? Yes / No / Don't Know
V10. Timing	Timing of outcome assessment should be identical for all intervention groups and for all important outcome assessments.	Was the timing of the outcome assessment in all groups similar? Yes / No / Don't Know
V11. ITT	All randomized patients are reported/analyzed in the group they were allocated to by randomization for the most important moments of effect measurement (minus missing values) irrespective of noncompliance and co-interventions.	Did the analysis include an intention-to-treat analysis? Yes / No / Don't Know

APPENDIX C. PEER REVIEW COMMENTS/AUTHOR RESPONSES

Comment	Response
Recommend considering change to the time labels given to the outcome periods. Currently these labels are "short term" and "long term." Traditionally "long term" outcomes for low back pain would be considered to be 3-12 months rather than 3-6 weeks. To the casual reader, this may be misleading.	We have updated these time labels so that less than 2 weeks is now “immediate” instead of “short” and 3 to 6 weeks is “short” instead of “long” term. These labels were chosen to align with terms used by a previous publication: Chou et al. Epidural corticosteroid injections for radiculopathy and spinal stenosis. Ann Intern Med. 2015; 163 (5): 373-381.
I recommend considering addition of a measure of clinical importance to the outcomes. For example, use of the Minimum Clinically Important Difference (MCID) may help the reader to interpret the clinical significance of relatively small changes in pain and function.	We have now incorporated a discussion of MCID into the Data Synthesis section. Choosing an MCID for the Roland Scale proved challenging, and in the report we explain this in detail.
Also consider including a reference or explanation of what is statistically and clinically significant change in pain and function for the reader	
Consider including a reference for readers to refer to and learn about forest plots. Some readers may not be familiar with this idea. The extensive use of forest plots would support educating readers on this subject.	We have now incorporated a reference at our first mention of forest plots in the Data Synthesis section: Greenhalgh T. How to read a paper: Papers that summarise other papers (systematic reviews and meta-analyses). BMJ. 1997;315(7109):672-675.
Page 3, first paragraph - the sentence is confusing. “six studies each scored 3 points and 2 points.” Maybe change to “six studies scored 3 points and the other 6 studies scored 2 points”.	This change has been made.
Page 8, line 22 “ESP” is not defined. Consider including what this acronym is.	This change has been made.
Page 9, line 9 – Participants are defined as “Adults”. Consider defining what an adult is such as 18+ and children as less than 18 years of age.	This change has been made.
Page 9, line 16 – Spinal manipulation is not clearly defined. Consider adding the HVLA definition here or referring the reader to the second paragraph under data extraction on page 9.	We have added language that refers readers to the mentioned data abstraction section.
Page 9, line 30 – settings: Why were hospital settings excluded? The VA is a hospital-based setting. I suggest including the rationale for excluding these studies.	The decision to focus only on ambulatory patients was made at the outset by the topic nominators; this was specified in the Topic Nomination Brief.
Page 9, line 55 – was TEP defined earlier? If not define this acronym.	This change has been made

Comment	Response
Page 26, line 15 the word enrollment is misspelled.	This change has been made.
Published or unpublished studies that may have been overlooked: (1) Puentedura CPR for cervical manipulation versus non-thrust (validation pending), (2) Dunning CPR for cervical AND thoracic thrust versus cervical and thoracic non-thrust. (3) Cook 2012 Manual Therapy article also directly compares thrust to non-thrust manipulation for LBP.	(1 & 2) These articles did not meet inclusion criteria because the pain was not acute in their patient populations, and are now in the "exclude-background" group for their relevance to clinical prediction rules. They have been incorporated into the text. (3) This article was identified by our searches but excluded from our review because it did not focus on acute pain.
Other ESPs have included cohort studies in the analysis, particularly in the area of assessing harms. I realize that you have included some prospective cohort studies in the harms analysis. However I would suggest including some of the higher quality retrospective cohort studies that have looked at harms and opiate use. Understood that this would be lower level evidence, however even a sidebar discussion of this can help provide some better information, particularly in light of the current situation regarding opiate use for musculoskeletal pain.	We have now incorporated the 7 articles identified by the reviewer into either the Serious Adverse Events section (Cassidy, Kosloff, Whedon) or the Key Question 2 section (Rhee, Vogt, Franklin, Allen) with discussion where appropriate.
I understood (perhaps incorrectly) at the outset that this ESP would also include review / analysis of retrospective cohort studies of harms and opiate use? If this was accomplished, I may have overlooked this information given there are only a few - but important - such reports. Our office considers this information relevant and important, particularly given the increased scrutiny on use of opiates for pain management, and rehabilitative alternatives (such as chiropractic, CAM, and other various treatment modalities).	

APPENDIX D. EVIDENCE TABLE OF 26 RANDOMIZED CLINICAL TRIALS OF SPINAL MANIPULATIVE THERAPY FOR ACUTE LOW BACK PAIN

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Bergquist-Ullman, et al, 1977[25]	Industry	87% male	34 years	14% of patients had a straight leg raise test positive at less than 60 degrees	Pain index	43	back school (instruction and exercise)	N=44	10 day median: 20 3 week median: 19 6 week median: 22
						42	non-thrust manipulation	N=50	10 day median: 22 3 week median: 18 6 week median: 21
						42	diathermy according to Cyriax, Kaltenborn, Lewit, and Janda	N=56	10 day median: 28 3 week median: 25 6 week median: 17
Blomberg, et al, 1994[17-21]	Primary care	52% male	37 years	10% with “true radicular pain”	Disability Rating Score (function)	no baseline data	usual medical care	N=48	3 days mean: 4.6 1 week mean: 3.9 2 week mean: 3.2 3 week mean: 3
							mix of thrust and non-thrust manipulation, some patients also got steroid injections of the parasacrococcygeal structures as described by Cyriax	N=53	3 days mean: 3.5 1 week mean: 2.6 2 week mean: 1.8 3 week mean: 1.4
					Pain score		usual medical care	N=48	3 days mean: 4.8 1 week mean: 4.2 2 week mean: 3.4 3 week mean: 3.4
							mix of thrust and non-thrust manipulation, some patients also got steroid injections of the parasacrococcygeal structures as described by Cyriax	N=53	3 days mean: 3.8 1 week mean: 3.1 2 week mean: 2 3 week mean: 1.7

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Cherkin, et al, 1998[3]	Primary care patients from health maintenance organization	52% male	41 years	Sciatica excluded	Roland Morris Disability questionnaire (function)	12.1 (CI: 11.2-13.1)	thrust manipulation	N=122	4 week mean: 3.7 (2.9 SD)
						11.7 (CI: 10.4-13.0)	physical therapy according to McKenzie	N=136	4 week mean: 4.1 (3.3 SD)
						11.7 (CI: 10.4-13.0)	educational booklet	N=66	4 week mean: 4.9 (3.8 SD)
					Bothersomeness of symptoms (pain)	5.5 (CI: 5.1-5.8)	thrust manipulation	N=122	4 week mean: 1.9 (1.5 SD)
						6 (CI: 5.6-6.5)	physical therapy according to McKenzie	N=136	4 week mean: 2.3 (1.9 SD)
						5.3 (CI: 4.9-5.7)	educational booklet	N=66	4 week mean: 3.1 (2.4 SD)
Childs, et al, 2004[26]	8 physical therapy clinics in the United States	58% male	34 years	24% had "symptoms distal to knee"	Oswestry disability questionnaire (function)	41.4 (10.1 SD)	thrust manipulation	N=70	1 week mean: 14.6 4 week mean: 8.4
						40.9 (10.8 SD)	low stress aerobic exercise and lumbar spine strengthening program according to Agency for Health Care Policy and Research guidelines	N=61	1 week mean: 35 4 week mean: 23
Cramer, et al, 1993[27]	Clinical chiropractic college	57% male	Not reported	Patients with "compressive neuropathy" we excluded	Visual Analogue Scale (pain)	71.8 (14.8 SD)	non-thrust manipulation and electrical stimulation and cold pack	N=17	10 day mean: 38.6 (25.2 SD)
						72 (19.2 SD)	detuned ultrasound and cold pack	N=18	10 day mean: 42 (28.8 SD)
					Oswestry disability questionnaire (function)	17.6 (11.9 SD)	non-thrust manipulation and electrical stimulation and cold pack	N=17	10 day mean: 7.3 (6.8 SD)
						14.9 (5.0 SD)	detuned ultrasound and cold pack	N=18	10 day mean: 8.0 (7.6 SD)

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Cruser, et al, 2012[28]	United States military facility	55% male	27 years	Not reported	Visual Analogue Scale (pain)	5.2 (2.1 SD)	mix of thrust and non-thrust manipulation, soft tissue stretching, myofascial release, counterstrain muscle energy, sacroiliac articulation	N=30	4 week mean: 2.0 (1.5 SD)
						5.5 (2.2 SD)	usual medical care	N=30	4 week mean: 3.7 (2.4 SD)
					Roland Morris Disability questionnaire (function)	12.4 (5.3 SD)	mix of thrust and non-thrust manipulation, soft tissue stretching, myofascial release, counterstrain muscle energy, sacroiliac articulation	N=30	4 week mean: 4.4 (5.9 SD)
						12.5 (6.0 SD)	usual medical care	N=30	4 week mean: 7.31 (6.3 SD)
Delitto, et al, 1993[29]	Physiotherapy department	58% male	33 years	21% had “leg symptoms”	Oswestry disability questionnaire (function)	33 (5 SD)	thrust manipulation and extension exercises according to McKenzie and hand-heel rock exercise	N=14	3 day mean: 20 (5 SD) 5 day mean: 10 (5 SD)
						41 (5 SD)	flexion exercises according to Williams	N=10	3 day mean: 36 (5 SD) 5 day mean: 32 (4 SD)
Erhard, et al, 1994[30]	Physiotherapy department	62% male	44 years	8% had “leg symptoms”	Oswestry disability questionnaire (function)	45 (12 SD)	thrust manipulation and extension exercises according to McKenzie	N=12	3 day mean: 20 (8 SD) 5 day mean: 8 (8 SD)
						40 (12 SD)	extension exercises according to McKenzie	N=12	3 day mean: 35 (8 SD)5 day mean: 25 (14 SD)

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Farrell, et al, 1982[31]	Setting unclear	62% male	42 years	Not reported	Subjective pain rating	4.95	non-thrust manipulation according to Stoddart and Maitland	N=24	3 week mean: 0.3
						5.3	physical therapy and diathermy, isometric abdominal exercises and ergonomic instructions	N=24	3 week mean: 0.3
Fritz, et al, 2015[32]	Primary care	48% male	37 years	Patients with presence of pain or numbness distal to the knee were excluded	Numeric pain rating of low back pain severity	no baseline data	thrust manipulation and exercises	N=108	4 week mean: 1.7 (1.9 SD)
						no baseline data	standard medical care and self-help booklet	N=112	4 week mean: 2.1 (1.9 SD)
					Oswestry disability questionnaire (function)	no baseline data	thrust manipulation and exercises	N=108	4 week mean: 11.1 (12.5 SD)
						no baseline data	standard medical care and self-help booklet	N=112	4 week mean: 14.5 (13.2 SD)
Glover, et al, 1974[33]	Work medical center	89% male	39 years	Not reported	Percent pain relief	no baseline data	diathermy	N=41	3 day mean: 56 1 week mean: 80
						no baseline data	non-thrust manipulation	N=43	3 day mean: 50 1 week mean: 75
Godfrey, et al, 1984[12]	Patients referred from primary care	Not reported	42 years	Not reported	General symptomatology (number of patients with marked improvement) (pain)	no baseline data	thrust manipulation according to Maigne		2-3 week: 14/39 (35.9%)
						no baseline data	light effleurage and minimal electrostimulation		2-3 week: 7/33 (21.2%)
					Activities of Daily Living (number of	no baseline data	thrust manipulation according to Maigne		2-3 week: 7/24 (29.2%)

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
					patients with moderate improvement) (function)	no baseline data	light effleurage and minimal electrostimulation		2-3 week: 5/17 (29.4%)
Goertz, et al, 2013[34]	United States army medical center	86% male	26 years	43% had "radicular signs"	Numerical pain rating scale	5.8 (2.1 SD)	standard medical care and brief massage, ice or heat, McKenzie exercises, stretching exercises	N=46	2 week mean: 6.1 4 week mean: 5.2
						5.8 (1.5 SD)	thrust manipulation	N=45	2 week mean: 3.9 4 week mean: 3.9
					Roland Morris Disability questionnaire (function)	12.7 (5.1 SD)	standard medical care and brief massage, ice or heat, McKenzie exercises, strengthening exercises	N=46	2 week mean: 12.9 4 week mean: 12
						11 (4.2 SD)	thrust manipulation	N=45	2 week mean: 8.9 4 week mean: 8
Grunnesjö, et al, 2004[22-24]	Nine primary health care and one outpatient orthopedic hospital department	56% male	41 years	8% had "verified herniations"	Pain last 24 hours	52.2 (CI: 46.7-57.8)	stay active	N=71	5 week mean: 29.7 (25.8 SD)
						54.7 (CI: 49.8-59.6)	mix of thrust and non-thrust manipulation and stay active and in some patients a steroid injection in the parasacrococcygeal region	N=89	5 week mean: 20.8 (23.3 SD)
					All disability rating variables	52 (CI: 47.4-56.6)	stay active	N=71	5 week mean: 31.9 (21.9 SD)
						57.8 (CI: 53.7-61.8)	mix of thrust and non-thrust manipulation and stay active and in some patients a steroid injection in the parasacrococcygeal region	N=89	5 week mean: 25.8 (22.1 SD)

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Hadler, et al, 1987[35]	Primary care	57% male	Not reported	Not reported	Roland Morris Disability questionnaire (function)	no baseline data	mobilization	N=28	9 day mean: 4.5 12 day mean: 3.7
						no baseline data	thrust manipulation	N=26	9 day mean: 3.7 12 day mean: 3.4
Hallegraeff, et al, 2009[13]	Three physical therapy and manual therapy centers	55% male	39 years	Patients with symptoms distal to the knee were excluded	Oswestry disability questionnaire (function)	0.24 (0.18 SD)	thrust manipulation	N=31	2.5 week mean: 0.14 (0.17 SD)
						0.26 (0.12 SD)	physical therapy	N=33	2.5 week mean: 0.14 (0.12 SD)
					Visual Analogue Scale (pain)	42.7 (18.4 SD)	thrust manipulation	N=31	2.5 week mean: 19 (16.9 SD)
						54 (17.5 SD)	physical therapy	N=33	2.5 week mean: 24.8 (20.1 SD)
Hancock, et al, 2007[4]	Patients referred from primary care	56% male	41 years	Patients with "nerve root compromise" were excluded	Numerical pain rating scale negative effect size favors manipulation	no baseline data	non-thrust manipulation	N=59	1 week effect size: 0.2 (CI: -0.3-0.7) 2 week effect size: -0.4 (CI: -1.0, 0.1) 4 week effect size: -0.2 (CI: -0.7, 0.3)
						no baseline data	detuned pulsed ultrasound (sham)	N=60	
					Roland Morris Disability questionnaire (function) negative effect size favors manipulation	no baseline data	non-thrust manipulation	N=59	1 week effect size: -0.7 (CI: -2.1, 0.6) 2 week effect size: -1.4 (CI: -2.7, -0.1) 4 week effect size: -1 (CI: -2.1, 0.1)
						no baseline data	detuned pulsed ultrasound (sham)	N=60	

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Heymann, et al, 2013[36]	5 orthopedic or general practices	60% male	37 years	Not reported	Roland Morris Disability questionnaire (function)	13.5 (5.6 SD)	thrust manipulation	N=38	1 week mean: 5.8
						14.4 (4.8 SD)	analgesic (diclofenac)	N=37	1 week mean: 9.7
						15 (3.8 SD)	sham	N=25	no data provided
					Visual Analogue Scale (pain)	no baseline data	thrust manipulation	N=38	1 week mean: 10
						no baseline data	analgesic	N=37	1 week mean: 30
						no baseline data	sham	N=25	1 week mean: no data provided
Hoiriis, et al, 2004[37]	Patients recruited via advertisement	57% male	42 years	Patients with "known or suspected disk herniation" were excluded	Visual Analogue Scale (pain)	4.52 (1.82 SD)	thrust manipulation	N=34	2 week mean: 2.4 (2.2 SD) 4 week mean: 1.7 (1.9 SD)
						3.9 (2.0 SD)	muscle relaxants (cyclobenzaprine or carisoprodol or methocarbamol)	N=36	2 week mean: 2.7 (2.2 SD) 4 week mean: 2.2 (2.2 SD)
						3.8 (1.6 SD)	sham	N=40	2 week mean: 3.2 (2.4 SD) 4 week mean: 2.2 (2.0 SD)
					Oswestry disability questionnaire (function)	24.8 (11.5 SD)	thrust manipulation	N=46	2 week mean: 17.0 (13.8 SD) 4 week mean: 11.9 (11.9 SD)
						22.8 (12.9 SD)	muscle relaxants (cyclobenzaprine or carisoprodol or methocarbamol)	N=47	2 week mean: 17.0 (12.2 SD) 4 week mean:16.0 (16.1 SD)
						24.8 (11.7 SD)	sham	N=48	2 week mean: 19.3 (13.7 SD) 4 week mean: 16.3 (12.6 SD)

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Juni, et al, 2009[38]	Patients referred from emergency department or a general practice	64% male	35 years	Patients with "signs of nerve root irritation or compression" were excluded	Roland Morris Disability questionnaire (function)	12.8 (5.1 SD)	Mix of thrust and non-thrust manipulation	N=52 12.8 (5.1 SD)	2 week mean: 5.8 (5.7 SD)
						14.3 (4.9 SD)	analgesic (paracetamol, diclofenac, or dihydrocodeine)	N=52	2 week mean: 5.2 (7.0 SD)
					Pain intensity, BS-11 score positive favors manipulation	6.3 (2.2 SD)	mix of thrust and non-thrust manipulation	N=52	Difference of 0.5 (2.6 SD)
						6.8 (2.2 SD)	Analgesic (paracetamol, diclofenac, or dihydrocodeine)	N=52	
MacDonald, et al, 1990[39]	General practice	41% male	Not reported	Patients with "neurologic deficits" were excluded	Improvement in the disability index	6.4 (3 SD)	thrust manipulation and advice on posture, exercises and avoidance of occupational stress	N=36	2 week mean: 4.1 (3.5 SD)
						6.1 (2.5 SD)	advice on posture, exercise, and avoidance of occupational stress	N=30	2 week mean: 4.4 (3.5 SD)

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Morton, 1999[40]	Patients referred from primary care	34% male	44 years	Patients with "abnormalities on neurologic exam" were excluded	Roland Morris Disability questionnaire (function)	10.6 (5.2 SD)	thrust manipulation	N=15	1 week mean: 6.9 (4.1 SD) 2 week mean: 6.0 (2.3 SD) 3 week mean: 3.7 (3.7 SD) 4 week mean: 1.9 (2.5 SD)
						10.1 (6.4 SD)	spinal stabilizing exercises	N=14	1 week mean: 9.1 (5.9 SD) 2 week mean: 7.9 (6.3 SD) 3 week mean: 7 (6.1 SD) 4 week mean: 6 (5.2 SD)
					Visual Analogue Scale (pain)	49.7 (23.6 SD)	thrust manipulation	N=15	1 week mean: 27.6 (15.2 SD) 2 week mean: 17.4 (13.9 SD) 3 week mean: 7.5 (6.4 SD) 4 week mean: 2.4 (3 SD)
						46.6 (25.1 SD)	spinal stabilizing exercises	N=14	1 week mean: 46.4 (23.3 SD) 2 week mean: 36.6 (24.6 SD) 3 week mean: 34.5 (23 SD) 4 week mean: 25.4 (17.3 SD)

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Postacchini, et al, 1988[41]	Hospital outpatient department	51% male	38 years	Not reported	Improvement in low back pain from pre-treatment	no baseline data	thrust manipulation	N=53	3 week mean: 8.5
						no baseline data	back school	N=17	3 week mean: 10.4
						no baseline data	analgesics (diclofenac)	N=49	3 week mean: 9.4
						no baseline data	physiotherapy of light massage, analgesic currents, and diathermy	N=47	3 week mean: 8.1
						no baseline data	bed rest	N=29	3 week mean: 6.6
						no baseline data	topical gel	N=46	3 week mean: 5.8
Rasmussen, 1979[42]	Hospital department of physical medicine and rheumatology	Not reported	35 years	Patients with "signs of root pressure" were excluded	Number of patients with total restorement of all symptoms	no baseline data	non-thrust manipulation	N=12	11/12 (91.7%)
						no baseline data	diathermy	N=12	3/12 (25%)
Skargren, et al, 1998[43]	Primary care centers	38% male	41 years	Not reported	Visual Analogue Scale (pain) negative favors manipulation	56 (22 SD)	thrust manipulation	N=172	4-5 week difference: -0.16 (CI: -6.47, 6.15)
						61 (21 SD)	physiotherapy	N=144	
					Oswestry disability questionnaire (function) negative favors manipulation	35 (17 SD)	thrust manipulation	N=172	4-5 week difference: -1.49 (CI: -5.51, 2.54)
						37 (16 SD)	physiotherapy	N=144	

Author, Year	Setting	% Male	Mean Age	Presence of Leg Pain or Sciatica	Outcome	Baseline value	Treatment arms	Sample Size	Follow-up
Waterworth, et al, 1985[44]	General practice	62% male	36 years	Not reported	Score of lower back pain	2.1	non-thrust manipulation	N=38	12 day mean: 0.42
						2.1	analgesic (diflunisal)	N=36	12 day mean: 0.44
						2	physiotherapy including local heat, ultrasound, and flexion and extension exercises	N=34	12 day mean: 0.38
					Patient has overall improvement score of excellent	no baseline data	non-thrust manipulation	N=38	23/38 (60.5%)
						no baseline data	analgesic (diflunisal)	N=36	15/36 (41.7%)
						no baseline data	physiotherapy including local heat, ultrasound, and flexion and extension exercises	N=34	13/34 (38.2%)