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# Diagnosis and Treatment of Carpal Tunnel Syndrome

Progress Check

| | Search | Title/Abstract | Full Text | Risk of Bias | Meta-Analysis | GRADE | Double-Check |
|---|---|---|---|---|---|---|---|
| Q1 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Q2 | Yes | Yes | Yes | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Q3 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Q4 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Q5 | Yes | Yes | Yes | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Q6 | Yes | Yes | Yes | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Q7 | Yes | Yes | Yes | Not Applicable | Not Applicable | Not Applicable | Not Applicable |
| Q8 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

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# Questions

Chapter 9: Diagnostic imaging

| Question Q1 | |
|---|---|
| **Patients** | with typical CTS history |
| **Intervention/Diagnostics** | High-resolution sonography |
| **Control** | only history-taking and clinical examination |
| **Outcomes** | Sensitivity and specificity |

| Question Q2 | |
|---|---|
| **Patients** | with typical CTS history |
| **Intervention/Diagnostics** | Magnetic resonance imaging of the hand<br>If necessary, split according to MRI technique (MR neurography) |
| **Control** | only history taking and clinical examination |
| **Outcomes** | Sensitivity and specificity |

Chapter 11.1: Conservative therapy

| Question Q3 | |
|---|---|
| **Patients** | with confirmed CTS without neurological deficits (atrophy, numbness, paralysis) failure symptoms |
| **Intervention** | local infiltration of corticoid crystal suspension into the carpal tunnel under sonographic control |
| **Control** | local infiltration of corticoid crystal suspension into the carpal tunnel without sonographic control |
| **Outcomes** | Primary<br>• Any clinical improvement (in accordance to the Cochrane Reviews)<br>Secondary<br>• VAS<br>• BCTQ – SSS<br>• BCTQ – FSS<br>• Complications/adverse effects<br>• Time to return to work |

| Question Q4 | |
|---|---|
| **Patients** | with confirmed CTS without neurological deficits |
| **Intervention** | low-level laser therapy |
| **Control** | Follow-up |
| **Outcomes** | Primary<br>• Any clinical improvement (in accordance to the Cochrane Reviews)<br>Secondary<br>• VAS |

| | |
|---|---|
| | • BCTQ – SSS<br>• BCTQ – FSS<br>• Complications/adverse effects<br>• Time to return to work |

Chapter 11.2: Surgical treatment

| Question Q5 | |
|---|---|
| **Patients** | with confirmed CTS with neurological deficits with renal insufficiency requiring dialysis |
| **Intervention** | surgical treatment (all procedures) |
| **Control** | conservative treatment (all procedures) |
| **Outcomes** | Primary<br>• Any clinical improvement (in accordance to the Cochrane Reviews)<br>Secondary<br>• VAS<br>• BCTQ – SSS<br>• BCTQ – FSS<br>• Complications/adverse effects<br>• Time to return to work |

| Question Q6 | |
|---|---|
| **Patients** | with confirmed CTS with neurological deficits with breast cancer |
| **Intervention** | surgical treatment (all procedures) |
| **Control** | conservative treatment (all procedures) |
| **Outcomes** | Primary<br>• Any clinical improvement (in accordance to the Cochrane Reviews)<br>Secondary<br>• VAS<br>• BCTQ – SSS<br>• BCTQ – FSS<br>• Complications/adverse effects<br>• Time to return to work |

| Question Q7 | |
|---|---|
| **Patients** | with radius fracture requiring surgical treatment and suspicious episodes of a CTS |
| **Intervention** | surgical treatment (all procedures) |
| **Control** | Follow-up (wait and see) |
| **Outcomes** | Primary<br>• Any clinical improvement (in accordance to the Cochrane Reviews)<br>Secondary<br>• VAS |

| | |
|---|---|
| | • BCTQ – SSS<br>• BCTQ – FSS<br>• Complications/adverse effects<br>• Time to return to work |

| Question Q8 | |
|---|---|
| **Patients** | with confirmed CTS with neurological deficits |
| **Intervention** | surgical treatment (all procedures) with tourniquet |
| **Control** | surgical treatment (all procedures) in wide awake anesthesia |
| **Outcomes** | Primary<br>• Any clinical improvement (in accordance to the Cochrane Reviews)<br>Secondary<br>• VAS<br>• BCTQ – SSS<br>• BCTQ – FSS<br>• Complications/adverse effects<br>• Time to return to work |

# Methods

We followed the Cochrane Handbook for Systematic Reviews of Interventions and Cochrane Handbook for Systematic Reviews of Diagnostic Test Accuracy in designing and conducting the systematic reviews. We followed PRISMA reporting guidelines in reporting the final reviews.

## Eligibility Criteria

### Population

Although we considered patients with carpal tunnel syndrome with or without co-morbidities, sometimes the studies were including mixed population. If a study had mixed population and more than 50% of the participants had carpal tunnel syndrome, we included the study.

### Intervention

We included the interventions regardless of their dosage and variations in administration. For steroid injection question, there were 2 studies that had 3 arms: 2 interventions and 1 control. Lee 2014 used ultrasound with inplane injection, outplane injection, and without ultrasound. We used the data from the inplane group as the intervention because that was more common across studies (5 other studies used inplane, 2 used outplane, and 3 did not report the technique). Rayegani 2019 used ultrasound with an ulnar site, a midline site, and without ultrasound. We used the data from the ulnar group because 9 of the other 10 studies used an ulnar site (and 1 did not report.)

### Index Test

For index test (sonography) we included all CSA measures and sonography methods. We included Ultrasonography, Ultrasound, Sonography, High-Resolution Ultrasonography, High-Frequency Ultrasound, Power Doppler Ultrasonography, Color Doppler Sonography, Elastography, Shear Wave Elastography, and Superb Microvascular Imaging.

### Reference Standard

Based on our agreement with clinical experts, we included all clinical assessment types as the reference standards and excluded any other form of diagnosis. The clinical assessments included physical examination, history taking, CTS-6, Two-point discrimination (2PD), Phalen, Tinel, and diagnostic criteria by American Academy of Neurology and American Academy of Orthopedic Surgeons.

### Excluded Tests

We excluded Nerve Conduction, Electrodiagnostics, Electrophysiology, Electromyography, MRI, Diffusion Tensor Imaging, Electroneuromyography, Operations, VTIQ, Combination of any two tests, Neurography, Electromyelography, CT, and Ultrasomics.

### Outcomes

We agreed on one primary outcome and four secondary outcomes based on consensus among five clinical experts. Although return to work was one of the outcomes, none of the studies reported data on this outcome. For Question on Laser Therapy, three studies reported that no complications were observed, and all of the other studies did not even mention complications.

### Timepoints for Outcomes

For clinical outcomes of interventional systematic reviews, we considered these outcomes in a 3-month timepoint from the intervention. When a 3-month endpoint was not available, we used the nearest and longest available datapoint.

### Endpoint Measures

Since the outcomes may be reported as change from baseline or endpoints, we followed the methods from relevant Cochrane reviews depending on the availability of the data.

### Study Designs

We included randomised controlled trials for interventional questions and diagnostic test accuracy studies for diagnostic systematic review.

## Search Methods

We searched Embase, MEDLINE, and Cochrane Library for all questions. The search strategies were designed and tested by an information scientist and peer-reviewed by another information scientist based on PRESS and PRISMA-S. Two members of clinical team commented and approved the search strategies before running the searches.

The searches were run in different dates so the search dates for each question was reported separately. We did not limit the search to language and publication date.

If we found any systematic review, we checked the list of their included studies to find more relevant studies.

### Screening Methods

After de-duplication in EndNote X9, two members of team screened the titles and abstracts of search results using Rayyan.ai. We obtained the full texts for all the records that were included as relevant in title and abstract screening step. The full texts were screened by one reviewer and their decisions were shared with the clinicians for approval.

### Data Management Methods

The data were extracted by three members of team. The extracted data included, PICOS information, risk of bias information, and quantitative data.

#### Interventional Studies

For international questions, we used the default data extraction form embedded in Reviewer Manager 5.4 (RevMan), including Cochrane's Risk of Bias tool. The entered data were analysed by RevMan.

When all the studies used the same measurement tool and scale, we used Mean Difference (MD) as effect size measure, and when they used different tools or scales, we used Standardised Mean Difference (SMD) so the data from studies could be combined. In almost all the cases for the questions we analysed, SMD was used because of different visual analogue scales across studies. For binary (dichotomous) outcomes, we used Risk Ratios (RR).

All of the continuous variables were analysed by comparing the actual value of the 3-month (or closest timepoint) outcome between the intervention and control groups. We did not compare the change between baseline and 3 months across groups, because most of the studies did not report the 3-month change with a standard deviation.

For choosing fixed effect vs. random effects, we followed the methods used by the Cochrane reviews. After entering the study data, we assessed the statistical heterogeneity. If $I^2$>50%, we used a random effects model. If $I^2$<50% or if there was only a single study for that outcome (so heterogeneity did not apply), we used a fixed effect model. This approach is unrelated to the type of outcome (MD or SMD, dichotomous or continuous, same scale or different scale, etc.).

We used forest plots to visualise the meta-analysis results where intervention group was displayed in left and the control group at right side of the no-effect line. We used GRADE methodology for presenting the certainty of the evidence as explained by the Cochrane Handbook. Absolute effect estimates column in GRADE table displayed control group in right and the intervention group in left side of the column. We uploaded the RevMan files to MAGICapp and used MAGICapp for creating summary of findings table for interventional studies.

#### Diagnostic Test Accuracy Studies

We used Microsoft Access and Excel for data management. Sensitivities and specificities were abstracted as stated in the papers. Where available, 95% confidence intervals for the sensitivities and specificities were abstracted. Where not found, these were calculated manually using the figures in the papers. Data was imported into STATA 16. Using the meta-analysis window, forest plots and funnel plots were created. Random effects model was used because of heterogeneity in the studies. Sub-group analysis was also done by the type of test given.

The methodological quality of the included studies was assessed using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool (**Whiting 2011**). The QUADAS-2 checklist consists of four domains, each of which is further divided into sub-items. Each item was scored as 'yes' (positive assessment, high quality), 'no' (negative assessment, low quality), or 'unclear'.

The certainty of the evidence was rated using GRADE methodology for diagnostic tests (**GRADEpro 2015**; **Schünemann 2008**; **Singh 2012**). Since MAGICapp does not support the creation of summary of findings table from diagnostic review, we used GRADEpro to create this table for diagnostic question. The five domains (risk of bias, indirectness, inconsistency, imprecision, and publication bias) as without concerns, with serious concerns, or with very serious concerns were judged. The assessment of the certainty of the evidence as high when studies were cross-sectional. For each of the five domains, the reason was judged as not serious, serious (downgraded by one level), or very serious (downgraded by two levels). The risk of bias was assessed using the QUADAS-2 tool. The indirectness in patient selection, index test, and reference standard were assessed using QUADAS-2 for concerns of applicability. Unexplained inconsistency was assessed whether it was present or not in sensitivity and

specificity estimates. Imprecision based on the width of the confidence intervals was also assessed. Publication bias was also assessed from the funnel plots.

### Publication Bias

If the number of included studies in a meta-analysis was 10 or more, we used the funnel plot to assess the publication bias based on the plot's symmetry.

### Quality Check

Extracted and analysed data from 25% of studies were double-check by an independent reviewer. This check resulted in two sensitivity analyses. The suggestions were not major and did not change the conclusion of the review.

# Search Strategies

## Q1

Search Date: 13 October 2021

PubMed

(Carpal Tunnel Syndrome[MH] OR Carpal Tunnel Syndrome*[TIAB] OR Carpal Canal Syndrome*[TIAB] OR Thenar Amyotrophy of Carpal Origin[TIAB] OR Carpal Tunnel Median Neuropath*[TIAB] OR Carpal Tunnel Compression Neuropath*[TIAB] OR Carpal Tunnel Entrapment Neuropath*[TIAB] OR Brachialgia Paraesthetica Nocturna[TIAB] OR Brachialgia Paresthetica Nocturna[TIAB]) **AND** ("Ultrasonography"[MH:NoExp] OR "Ultrasonography, Doppler"[MH:NoExp] OR "Ultrasonography, Doppler, Duplex"[MH] OR "Ultrasonography, Doppler, Color"[MH] OR "Elasticity Imaging Techniques"[MH] OR Ultrasonogra*[TIAB] OR Ultrasound*[TIAB] OR Ultrasonic[TIAB] OR Sonogra*[TIAB] OR Echogra*[TIAB] OR Echoscop*[TIAB] OR Echosound[TIAB] OR Echotomogra*[TIAB] OR Elasticity Imaging*[TIAB] OR Elastogra*[TIAB] OR "Color Doppler"[TIAB] OR "Doppler Color"[TIAB] OR "Colour Doppler"[TIAB] OR "Doppler Colour"[TIAB] OR Vibro-Acoustograph*[TIAB] OR Sonoelastograph*[TIAB] OR Acoustic Radiation Force Impulse Imaging*[TIAB] OR ARFI[TIAB]) **AND** ("Sensitivity and Specificity"[MH] OR "Predictive Value of Tests"[MH] OR "ROC Curve"[MH] OR "False Negative Reactions"[MH] OR "False Positive Reactions"[MH] OR Sensitivity[TIAB] OR Specificity[TIAB] OR Diagnostic Accuracy[TIAB] OR Diagnostic Test Accuracy[TIAB] OR Diagnostic Performance[TIAB] OR ROC[TIAB] OR "Receiver Operating Characteristic"[TIAB] OR "Receiver Operating Characteristics"[TIAB] OR "Predictive Value"[TIAB] OR "Predictive Values"[TIAB] OR NPV[TIAB] OR NPVs[TIAB] OR PPV[TIAB] OR PPVs[TIAB] OR "False Positive"[TIAB] OR "False Negative"[TIAB] OR "True Positive"[TIAB] OR "True Negative"[TIAB]) 285

Embase via Ovid SP

Database: Embase <1974 to 2021 Week 40>

1 Carpal Tunnel Syndrome/ or (Carpal Tunnel Syndrome* or Carpal Canal Syndrome* or Thenar Amyotrophy of Carpal Origin or Carpal Tunnel Median Neuropath* or Carpal Tunnel Compression Neuropath* or Carpal Tunnel Entrapment Neuropath* or Brachialgia Par?esthetica Nocturna).ti,ab. (16995)

2 Echography/ or Doppler Ultrasonography/ or Duplex Doppler Ultrasonography/ or Color Doppler Flowmetry/ or exp Elastography/ or (Ultrasonogra* or Ultrasound* or Ultrasonic or Sonogra* or Echogra* or Echoscop* or Echosound or Echotomogra* or Elasticity Imaging* or Elastogra* or (Colo?r adj Doppler) or (Doppler adj Colo?r) or Vibro-Acoustograph* or Sonoelastograph* or Acoustic Radiation Force Impulse Imaging* or ARFI).ti,ab. (799933)

3 exp "Sensitivity and Specificity"/ or Predictive Value/ or Receiver Operating Characteristic/ or False Negative Result/ or False Positive Result/ or (Sensitivity or Specificity or (Diagnostic adj2 Accuracy) or (Diagnostic adj2 Performance) or ROC or Receiver Operating Characteristic? or Predictive Value? or NPV or NPVs or PPV or PPVs or False Positive or False Negative or True Positive or True Negative).ti,ab. (1905438)

4 and/1-3 (437)

5 Limit 4 to embase (289)

Cochrane Library (Cochrane Database of Systematic Reviews (CDSR) and Cochrane Central Register of Controlled Trials=CENTRAL)

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Q2

Search Date: 27 October 2021

PubMed

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Embase via Ovid SP

Database: Embase <1974 to 2021 Week 42>

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2 Nuclear Magnetic Resonance Imaging/ or Diffusion Weighted Imaging/ or Echo Planar Imaging/ or Diffusion Tensor Imaging/ or (Chemical Shift Imaging* or "Diffusion Tensor" or Diffusion Tractogra* or "Echo Planar" or Echoplanar or Magnetic Resonance or Magnetization Transfer Contrast Imaging* or MR Tomogra* or MRI or MRIs or NMR or Proton Spin Tomogra* or "Spin Echo" OR Spinecho OR Magnetization Transfer Imaging* or Magnetisation Transfer Imaging* or MR Imaging*).ti,ab. (1313828)

3 exp "Sensitivity and Specificity"/ or Predictive Value/ or Receiver Operating Characteristic/ or False Negative Result/ or False Positive Result/ or (Sensitivity or Specificity or (Diagnostic adj2 Accuracy) or (Diagnostic adj2 Performance) or ROC or Receiver Operating Characteristic? or Predictive Value? or NPV or NPVs or PPV or PPVs or False Positive or False Negative or True Positive or True Negative).ti,ab. (1909794)

4 and/1-3 (154)

5 Limit 4 to embase (119)

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Q3

Search Date: 21 November 2021

PubMed

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Database: Embase <1974 to 2021 Week 46>

1 Carpal Tunnel Syndrome/ or (Carpal Tunnel Syndrome* or Carpal Canal Syndrome* or Thenar Amyotrophy of Carpal Origin or Carpal Tunnel Median Neuropath* or Carpal Tunnel Compression Neuropath* or Carpal Tunnel Entrapment Neuropath* or Brachialgia Par?esthetica Nocturna).ti,ab. (17094)

2 Echography/ or Doppler Ultrasonography/ or Duplex Doppler Ultrasonography/ or Color Doppler Flowmetry/ or exp Elastography/ or (Ultrasonogra* or Ultrasound* or Ultrasonic or Sonogra* or Echogra* or Echoscop* or Echosound or Echotomogra* or Elasticity Imaging* or Elastogra* or (Colo?r adj Doppler) or (Doppler adj Colo?r) or Vibro-Acoustograph* or Sonoelastograph* or Acoustic Radiation Force Impulse Imaging* or ARFI).ti,ab. (806068)

3 exp Corticosteroid/ or Cortisone/ or exp Glucocorticoid/ or Hydroxycorticosteroid/ or Oxosteroid/ or exp Steroid/ or Triamcinolone/ OR Triamcinolone Acetonide/ or Methylprednisolone/ or Betamethasone/ or (Adrenal Cortex Hormone* OR Corticosteroid* OR Corticoid* OR Cortisone OR Cortone Acetate OR Adreson OR Glucocorticoid* OR Glucorticoid* OR Triamcinolone OR "Tricort 40" OR Tricort40 OR Aristocort OR Volon OR Cinonide OR Kenalog OR Azmacort OR "Kenacort A" OR Methylprednisolone OR Metipred OR Urbason OR Medrol OR Cortisol OR Epicortisol OR Cortril OR Fludrocortisone OR Fluorocortisol OR Fludrohydrocortisone OR Hydroxycorticosterone OR Hydroxycortisone OR Fluorohydrocortisone OR Astonin OR FCOL OR Betamethasone OR Flubenisolone OR Betadexamethasone OR Celestona OR Celeston OR Celestone OR Hydroxycorticosteroid* OR Ketosteroid* OR Oxosteroid* OR Steroid*).ti,ab. (1757261)

4 and/1-3 (312)

5 Limit 4 to embase (192)

Cochrane Library (Cochrane Database of Systematic Reviews (CDSR) and Cochrane Central Register of Controlled Trials=CENTRAL)

Date Run: 21/11/2021 13:50:42

#1 ([mh "Carpal Tunnel Syndrome"] OR (Carpal Tunnel Syndrome* OR Carpal Canal Syndrome* OR Thenar Amyotrophy of Carpal Origin OR Carpal Tunnel Median Neuropath* OR Carpal Tunnel Compression Neuropath*

OR Carpal Tunnel Entrapment Neuropath* OR Brachialgia Paraesthetica Nocturna OR Brachialgia Paresthetica Nocturna):ti,ab) AND ([mh ^Ultrasonography] OR [mh ^"Ultrasonography, Doppler"] OR [mh "Ultrasonography, Doppler, Duplex"] OR [mh "Ultrasonography, Doppler, Color"] OR [mh "Elasticity Imaging Techniques"] OR (Ultrasonogra* OR Ultrasound* OR Ultrasonic OR Sonogra* OR Echogra* OR Echoscop* OR Echosound OR Echotomogra* OR Elasticity Imaging* OR Elastogra* OR "Color Doppler" OR "Doppler Color" OR "Colour Doppler" OR "Doppler Colour" OR Vibro-Acoustograph* OR Sonoelastograph* OR Acoustic Radiation Force Impulse Imaging* OR ARFI):ti,ab) AND ([mh "Adrenal Cortex Hormones"] OR [mh Cortisone] OR [mh Glucocorticoids] OR [mh Hydroxycorticosteroids] OR [mh Ketosteroids] OR [mh Steroids] OR [mh Triamcinolone] OR [mh "Triamcinolone Acetonide"] OR [mh Methylprednisolone] OR [mh Betamethasone] OR (Adrenal Cortex Hormone* OR Corticosteroid* OR Corticoid* OR Cortisone OR Cortone Acetate OR Adreson OR Glucocorticoid* OR Glucorticoid* OR Triamcinolone OR "Tricort 40" OR Tricort40 OR Aristocort OR Volon OR Cinonide OR Kenalog OR Azmacort OR "Kenacort A" OR Methylprednisolone OR Metipred OR Urbason OR Medrol OR Cortisol OR Epicortisol OR Cortril OR Fludrocortisone OR Fluorocortisol OR Fludrohydrocortisone OR Hydroxycorticosterone OR Hydroxycortisone OR Fluorohydrocortisone OR Astonin OR FCOL OR Betamethasone OR Flubenisolone OR Betadexamethasone OR Celestona OR Celeston OR Celestone OR Hydroxycorticosteroid* OR Ketosteroid* OR Oxosteroid* OR Steroid*):ti,ab) 112

Q4

Search Date: 21 November 2021

PubMed

(Carpal Tunnel Syndrome[MH] OR Carpal Tunnel Syndrome*[TIAB] OR Carpal Canal Syndrome*[TIAB] OR Thenar Amyotrophy of Carpal Origin[TIAB] OR Carpal Tunnel Median Neuropath*[TIAB] OR Carpal Tunnel Compression Neuropath*[TIAB] OR Carpal Tunnel Entrapment Neuropath*[TIAB] OR Brachialgia Paraesthetica Nocturna[TIAB] OR Brachialgia Paresthetica Nocturna[TIAB]) AND (Lasers[MeSH] OR Laser Therapy[MeSH] OR Laser[TIAB] OR Lasers[TIAB] OR LLLT[TIAB] OR Photobiomodulation[TIAB] OR "Low-Level Light"[TIAB]) 113

Embase via Ovid SP

Database: Embase <1974 to 2021 Week 46>

1 Carpal Tunnel Syndrome/ or (Carpal Tunnel Syndrome* or Carpal Canal Syndrome* or Thenar Amyotrophy of Carpal Origin or Carpal Tunnel Median Neuropath* or Carpal Tunnel Compression Neuropath* or Carpal Tunnel Entrapment Neuropath* or Brachialgia Par?esthetica Nocturna).ti,ab. (17094)

2 exp Laser/ or exp Laser Therapy/ or (Laser OR Lasers OR LLLT OR Photobiomodulation OR "Low-Level Light").ti,ab. (335185)

3 and/1-2 (198)

4 Limit 3 to embase (157)

Cochrane Library (Cochrane Database of Systematic Reviews (CDSR) and Cochrane Central Register of Controlled Trials=CENTRAL)

Date Run: 21/11/2021 14:51:00

#1 ([mh "Carpal Tunnel Syndrome"] OR (Carpal Tunnel Syndrome* OR Carpal Canal Syndrome* OR Thenar Amyotrophy of Carpal Origin OR Carpal Tunnel Median Neuropath* OR Carpal Tunnel Compression Neuropath* OR Carpal Tunnel Entrapment Neuropath* OR Brachialgia Paraesthetica Nocturna OR Brachialgia Paresthetica Nocturna):ti,ab) AND ([mh Lasers] OR [mh "Laser Therapy"] OR (Laser OR Lasers OR LLLT OR Photobiomodulation OR "Low-Level Light"):ti,ab) 93

Q5

Search Date: 21 November 2021

PubMed

(Carpal Tunnel Syndrome[MH] OR Carpal Tunnel Syndrome*[TIAB] OR Carpal Canal Syndrome*[TIAB] OR Thenar Amyotrophy of Carpal Origin[TIAB] OR Carpal Tunnel Median Neuropath*[TIAB] OR Carpal Tunnel Compression Neuropath*[TIAB] OR Carpal Tunnel Entrapment Neuropath*[TIAB] OR Brachialgia Paraesthetica Nocturna[TIAB] OR Brachialgia Paresthetica Nocturna[TIAB]) AND (Renal Insufficiency[mh] OR Renal Dialysis[MeSH] OR "Hemodialysis Units, Hospital"[MeSH] OR Kidney Failure*[TIAB] OR Kidney Injur*[TIAB] OR Kidney Insufficienc*[TIAB] OR Renal Failure*[TIAB] OR Renal Injur*[TIAB] OR Renal Insufficienc*[TIAB] OR Chronic Kidney Disease*[TIAB] OR Chronic Renal Disease*[TIAB] OR End Stage Kidney Disease*[TIAB] OR End Stage Renal Disease*[TIAB] OR Dialysis[TIAB] OR Dialyses[TIAB] OR Hemodialysis[TIAB] OR Hemodialyses[TIAB] OR Haemodialysis[TIAB] OR Haemodialyses[TIAB] OR Hemodiafilteration*[TIAB] OR Haemodiafilteration*[TIAB] OR Acetate Free Biofiltration*[TIAB]) AND ((Randomized Controlled Trial[PT] OR Controlled Clinical Trial[PT] OR Pragmatic Clinical Trial[PT] OR Randomized[TIAB] OR Randomised[TIAB] OR Placebo[TIAB] OR Randomly[TIAB] OR Trial[TIAB] OR Groups[TIAB]) NOT (Animals[MH] NOT Humans[MH])) 64

Embase via Ovid SP

Database: Embase <1974 to 2021 Week 46>

1 Carpal Tunnel Syndrome/ or (Carpal Tunnel Syndrome* or Carpal Canal Syndrome* or Thenar Amyotrophy of Carpal Origin or Carpal Tunnel Median Neuropath* or Carpal Tunnel Compression Neuropath* or Carpal Tunnel Entrapment Neuropath* or Brachialgia Par?esthetica Nocturna).ti,ab. (17094)

2 exp Kidney Failure/ or exp Dialysis/ or (Kidney Failure* OR Kidney Injur* OR Kidney Insufficienc* OR Renal Failure* OR Renal Injur* OR Renal Insufficienc* OR Chronic Kidney Disease* OR Chronic Renal Disease* OR End Stage Kidney Disease* OR End Stage Renal Disease* OR Dialysis OR Dialyses OR Hemodialysis OR Hemodialyses OR Haemodialysis OR Haemodialyses OR Hemodiafilteration* OR Haemodiafilteration* OR Acetate Free Biofiltration*).ti,ab. (661116)

3 and/1-2 (835)

4 Limit 3 to embase (614)

5 Randomized controlled trial/ or Controlled clinical study/ or randomization/ or intermethod comparison/ or double blind procedure/ or human experiment/ or (random$ or placebo or (open adj label) or ((double or single or doubly or singly) adj (blind or blinded or blindly)) or parallel group$1 or crossover or cross over or ((assign$ or match or matched or allocation) adj5 (alternate or group$1 or intervention$1 or patient$1 or subject$1 or participant$1)) or assigned or allocated or (controlled adj7 (study or design or trial)) or volunteer or volunteers).ti,ab. or (compare or compared or comparison or trial).ti. or ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab. (5570346)

6 (random$ adj sampl$ adj7 ("cross section$" or questionnaire$1 or survey$ or database$1)).ti,ab. not (comparative study/ or controlled study/ or randomi?ed controlled.ti,ab. or randomly assigned.ti,ab.) (8758)

7 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or (randomi?ed controlled or control group$1).ti,ab.) (288287)

8 (((case adj control$) and random$) not randomi?ed controlled).ti,ab. (19113)

9 (Systematic review not (trial or study)).ti. (191167)

10 (nonrandom$ not random$).ti,ab. (17380)

11 ("Random field$" or (random cluster adj3 sampl$)).ti,ab. (3994)

12 (review.ab. and review.pt.) not trial.ti. (939739)

13 "we searched".ab. and (review.ti. or review.pt.) (38996)

14 ("update review" or (databases adj4 searched)).ab. (46509)

15 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/ (1128199)

16 Animal experiment/ not (human experiment/ or human/) (2368121)

17 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (3825742)

18 5 not 17 (4940930)

19 4 and 18 (64)

Cochrane Library (Cochrane Database of Systematic Reviews (CDSR) and Cochrane Central Register of Controlled Trials=CENTRAL)

Date Run: 21/11/2021 16:53:17

#1 ([mh "Carpal Tunnel Syndrome"] OR (Carpal Tunnel Syndrome* OR Carpal Canal Syndrome* OR Thenar Amyotrophy of Carpal Origin OR Carpal Tunnel Median Neuropath* OR Carpal Tunnel Compression Neuropath* OR Carpal Tunnel Entrapment Neuropath* OR Brachialgia Paraesthetica Nocturna OR Brachialgia Paresthetica Nocturna):ti,ab) AND ([mh "Renal Insufficiency"] OR [mh "Renal Dialysis"] OR [mh "Hemodialysis Units, Hospital"] OR (Kidney Failure* OR Kidney Injur* OR Kidney Insufficienc* OR Renal Failure* OR Renal Injur* OR Renal Insufficienc* OR Chronic Kidney Disease* OR Chronic Renal Disease* OR End Stage Kidney Disease* OR End Stage Renal Disease* OR Dialysis OR Dialyses OR Hemodialysis OR Hemodialyses OR Haemodialysis OR Haemodialyses OR Hemodiafilteration* OR Haemodiafilteration* OR Acetate Free Biofiltration*):ti,ab) 22

Q6

Search Date: 21 November 2021

PubMed

(Carpal Tunnel Syndrome[MH] OR Carpal Tunnel Syndrome*[TIAB] OR Carpal Canal Syndrome*[TIAB] OR Thenar Amyotrophy of Carpal Origin[TIAB] OR Carpal Tunnel Median Neuropath*[TIAB] OR Carpal Tunnel Compression Neuropath*[TIAB] OR Carpal Tunnel Entrapment Neuropath*[TIAB] OR Brachialgia Paraesthetica Nocturna[TIAB] OR Brachialgia Paresthetica Nocturna[TIAB]) AND (Breast Neoplasms[MeSH] OR Breast Cancer*[TIAB] OR Breast Neoplas*[TIAB] OR Breast Tumor*[TIAB] OR Breast Tumour*[TIAB] OR Breast Malignan*[TIAB] OR Mammary Cancer*[TIAB] OR Mammary Carcinoma*[TIAB] OR Mammary Neoplas*[TIAB] OR Breast Carcinoma*[TIAB]) AND ((Randomized Controlled Trial[PT] OR Controlled Clinical Trial[PT] OR Pragmatic Clinical Trial[PT] OR Randomized[TIAB] OR Randomised[TIAB] OR Placebo[TIAB] OR Randomly[TIAB] OR Trial[TIAB] OR Groups[TIAB]) NOT (Animals[MH] NOT Humans[MH])) 12

Embase via Ovid SP

Database: Embase <1974 to 2021 Week 46>

1 Carpal Tunnel Syndrome/ or (Carpal Tunnel Syndrome* or Carpal Canal Syndrome* or Thenar Amyotrophy of Carpal Origin or Carpal Tunnel Median Neuropath* or Carpal Tunnel Compression Neuropath* or Carpal Tunnel Entrapment Neuropath* or Brachialgia Par?esthetica Nocturna).ti,ab. (17094)

2 Breast Tumor/ or exp Breast Cancer/ or (Breast Cancer* OR Breast Neoplas* OR Breast Tumor* OR Breast Tumour* OR Breast Malignan* OR Mammary Cancer* OR Mammary Carcinoma* OR Mammary Neoplas* OR Breast Carcinoma*).ti,ab. (639046)

3 and/1-2 (217)

4 Limit 3 to embase (182)

5 Randomized controlled trial/ or Controlled clinical study/ or randomization/ or intermethod comparison/ or double blind procedure/ or human experiment/ or (random$ or placebo or (open adj label) or ((double or single or doubly or singly) adj (blind or blinded or blindly)) or parallel group$1 or crossover or cross over or ((assign$ or match or matched or allocation) adj5 (alternate or group$1 or intervention$1 or patient$1 or subject$1 or participant$1)) or assigned or allocated or (controlled adj7 (study or design or trial)) or volunteer or volunteers).ti,ab. or (compare or compared or comparison or trial).ti. or ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab. (5570346)

6 (random$ adj sampl$ adj7 ("cross section$" or questionnaire$1 or survey$ or database$1)).ti,ab. not (comparative study/ or controlled study/ or randomi?ed controlled.ti,ab. or randomly assigned.ti,ab.) (8758)

7 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or (randomi?ed controlled or control group$1).ti,ab.) (288287)

8 (((case adj control$) and random$) not randomi?ed controlled).ti,ab. (19113)

9 (Systematic review not (trial or study)).ti. (191167)

10 (nonrandom$ not random$).ti,ab. (17380)

11 ("Random field$" or (random cluster adj3 sampl$)).ti,ab. (3994)

12 (review.ab. and review.pt.) not trial.ti. (939739)

13 "we searched".ab. and (review.ti. or review.pt.) (38996)

14 ("update review" or (databases adj4 searched)).ab. (46509)

15 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/ (1128199)

16 Animal experiment/ not (human experiment/ or human/) (2368121)

17 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (3825742)

18 5 not 17 (4940930)

19 4 and 18 (48)

Cochrane Library (Cochrane Database of Systematic Reviews (CDSR) and Cochrane Central Register of Controlled Trials=CENTRAL)

Date Run: 21/11/2021 17:16:58

#1 ([mh "Carpal Tunnel Syndrome"] OR (Carpal Tunnel Syndrome* OR Carpal Canal Syndrome* OR Thenar Amyotrophy of Carpal Origin OR Carpal Tunnel Median Neuropath* OR Carpal Tunnel Compression Neuropath* OR Carpal Tunnel Entrapment Neuropath* OR Brachialgia Paraesthetica Nocturna OR Brachialgia Paresthetica Nocturna):ti,ab) AND ([mh "Breast Neoplasms"] OR (Breast Cancer* OR Breast Neoplas* OR Breast Tumor* OR Breast Tumour* OR Breast Malignan* OR Mammary Cancer* OR Mammary Carcinoma* OR Mammary Neoplas* OR Breast Carcinoma*):ti,ab) 12

Q7

Search Date: 21 November 2021

PubMed

(Carpal Tunnel Syndrome[MH] OR Carpal Tunnel Syndrome*[TIAB] OR Carpal Canal Syndrome*[TIAB] OR Thenar Amyotrophy of Carpal Origin[TIAB] OR Carpal Tunnel Median Neuropath*[TIAB] OR Carpal Tunnel Compression Neuropath*[TIAB] OR Carpal Tunnel Entrapment Neuropath*[TIAB] OR Brachialgia Paraesthetica Nocturna[TIAB] OR Brachialgia Paresthetica Nocturna[TIAB]) AND (Radius Fractures[MeSH] OR Hutchinson Fracture*[TIAB] OR Radius Distal Fracture*[TIAB] OR Radius Proximal Fracture*[TIAB] OR Radius Head Fracture*[TIAB] OR Radius Shaft Fracture*[TIAB] OR Chauffeur Fracture*[TIAB] OR Hutchinson Fracture*[TIAB] OR Radial Fracture*[TIAB] OR Colles Fracture*[TIAB] OR Colles' Fracture*[TIAB] OR Barton Fracture*[TIAB] OR Galeazzi Fracture*[TIAB] OR Smith Fracture*[TIAB]) AND ((Randomized Controlled Trial[PT] OR Controlled Clinical Trial[PT] OR Pragmatic Clinical Trial[PT] OR Randomized[TIAB] OR Randomised[TIAB] OR Placebo[TIAB] OR Randomly[TIAB] OR Trial[TIAB] OR Groups[TIAB]) NOT (Animals[MH] NOT Humans[MH])) 28

Embase via Ovid SP

Database: Embase <1974 to 2021 Week 46>

1 Carpal Tunnel Syndrome/ or (Carpal Tunnel Syndrome* or Carpal Canal Syndrome* or Thenar Amyotrophy of Carpal Origin or Carpal Tunnel Median Neuropath* or Carpal Tunnel Compression Neuropath* or Carpal Tunnel Entrapment Neuropath* or Brachialgia Par?esthetica Nocturna).ti,ab. (17094)

2 exp Radius Fracture/ or (Hutchinson Fracture* OR Radius Distal Fracture* OR Radius Proximal Fracture* OR Radius Head Fracture* OR Radius Shaft Fracture* OR Chauffeur Fracture* OR Hutchinson Fracture* OR Radial Fracture* OR Colles Fracture* OR Colles' Fracture* OR Barton Fracture* OR Galeazzi Fracture* OR Smith Fracture*).ti,ab. (12979)

3 and/1-2 (392)

4 Limit 3 to embase (316)

5 Randomized controlled trial/ or Controlled clinical study/ or randomization/ or intermethod comparison/ or double blind procedure/ or human experiment/ or (random$ or placebo or (open adj label) or ((double or single or doubly or singly) adj (blind or blinded or blindly)) or parallel group$1 or crossover or cross over or ((assign$ or match or matched or allocation) adj5 (alternate or group$1 or intervention$1 or patient$1 or subject$1 or participant$1)) or assigned or allocated or (controlled adj7 (study or design or trial)) or volunteer or volunteers).ti,ab. or (compare or compared or comparison or trial).ti. or ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab. (5570346)

6 (random$ adj sampl$ adj7 ("cross section$" or questionnaire$1 or survey$ or database$1)).ti,ab. not (comparative study/ or controlled study/ or randomi?ed controlled.ti,ab. or randomly assigned.ti,ab.) (8758)

7 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or (randomi?ed controlled or control group$1).ti,ab.) (288287)

8 (((case adj control$) and random$) not randomi?ed controlled).ti,ab. (19113)

9 (Systematic review not (trial or study)).ti. (191167)

10 (nonrandom$ not random$).ti,ab. (17380)

11 ("Random field$" or (random cluster adj3 sampl$)).ti,ab. (3994)

12 (review.ab. and review.pt.) not trial.ti. (939739)

13 "we searched".ab. and (review.ti. or review.pt.) (38996)

14 ("update review" or (databases adj4 searched)).ab. (46509)

15 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/ (1128199)

16 Animal experiment/ not (human experiment/ or human/) (2368121)

17 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (3825742)

18 5 not 17 (4940930)

19 4 and 18 (74)

Cochrane Library (Cochrane Database of Systematic Reviews (CDSR) and Cochrane Central Register of Controlled Trials=CENTRAL)

Date Run: 21/11/2021 18:35:02

#1 ([mh "Carpal Tunnel Syndrome"] OR (Carpal Tunnel Syndrome* OR Carpal Canal Syndrome* OR Thenar Amyotrophy of Carpal Origin OR Carpal Tunnel Median Neuropath* OR Carpal Tunnel Compression Neuropath* OR Carpal Tunnel Entrapment Neuropath* OR Brachialgia Paraesthetica Nocturna OR Brachialgia Paresthetica Nocturna):ti,ab) AND ([mh "Radius Fractures"] OR (Hutchinson Fracture* OR Radius Distal Fracture* OR Radius Proximal Fracture* OR Radius Head Fracture* OR Radius Shaft Fracture* OR Chauffeur Fracture* OR Hutchinson Fracture* OR Radial Fracture* OR Colles Fracture* OR Colles' Fracture* OR Barton Fracture* OR Galeazzi Fracture* OR Smith Fracture*):ti,ab) 13

Q8

Search Date: 21 November 2021

PubMed

(Carpal Tunnel Syndrome[MH] OR Carpal Tunnel Syndrome*[TIAB] OR Carpal Canal Syndrome*[TIAB] OR Thenar Amyotrophy of Carpal Origin[TIAB] OR Carpal Tunnel Median Neuropath*[TIAB] OR Carpal Tunnel Compression Neuropath*[TIAB] OR Carpal Tunnel Entrapment Neuropath*[TIAB] OR Brachialgia Paraesthetica Nocturna[TIAB] OR Brachialgia Paresthetica Nocturna[TIAB]) AND ("Tourniquets"[MH] OR Tourniquet*[TIAB] OR Artery Compression Device*[TIAB] OR External Fixator Vascular Compressor*[TIAB] OR External Vascular Compressor*[TIAB] OR Vascular Compression Device*[TIAB] OR Hysynal*[TIAB] OR ClampEase*[TIAB] OR ATS[TIAB] OR "A.T.S"[TIAB] OR "A.T.S."[TIAB] OR "Io RACT"[TIAB] OR RadiStop*[TIAB] OR "TR Band"[TIAB] OR TRAcelet*[TIAB] OR Zephyr Vascular Compression Device*[TIAB]) AND ((Randomized Controlled Trial[PT] OR Controlled Clinical Trial[PT] OR Pragmatic Clinical Trial[PT] OR Randomized[TIAB] OR Randomised[TIAB] OR Placebo[TIAB] OR Randomly[TIAB] OR Trial[TIAB] OR Groups[TIAB]) NOT (Animals[MH] NOT Humans[MH])) 38

Embase via Ovid SP

Database: Embase <1974 to 2021 Week 46>

1 Carpal Tunnel Syndrome/ or (Carpal Tunnel Syndrome* or Carpal Canal Syndrome* or Thenar Amyotrophy of Carpal Origin or Carpal Tunnel Median Neuropath* or Carpal Tunnel Compression Neuropath* or Carpal Tunnel Entrapment Neuropath* or Brachialgia Par?esthetica Nocturna).ti,ab. (17094)

2 exp Tourniquet/ OR (Tourniquet* OR Artery Compression Device* OR External Fixator Vascular Compressor* OR External Vascular Compressor* OR Vascular Compression Device* OR Hysynal* OR ClampEase* OR ATS OR "A.T.S" OR "A.T.S." OR "Io RACT" OR RadiStop* OR "TR Band" OR TRAcelet* OR Zephyr Vascular Compression Device*).ti,ab. (20289)

3 and/1-2 (194)

4 Limit 3 to embase (128)

5 Randomized controlled trial/ or Controlled clinical study/ or randomization/ or intermethod comparison/ or double blind procedure/ or human experiment/ or (random$ or placebo or (open adj label) or ((double or single or doubly or singly) adj (blind or blinded or blindly)) or parallel group$1 or crossover or cross over or ((assign$ or match or matched or allocation) adj5 (alternate or group$1 or intervention$1 or patient$1 or subject$1 or participant$1)) or assigned or allocated or (controlled adj7 (study or design or trial)) or volunteer or volunteers).ti,ab. or (compare or compared or comparison or trial).ti. or ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab. (5570346)

6 (random$ adj sampl$ adj7 ("cross section$" or questionnaire$1 or survey$ or database$1)).ti,ab. not (comparative study/ or controlled study/ or randomi?ed controlled.ti,ab. or randomly assigned.ti,ab.) (8758)

7 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or (randomi?ed controlled or control group$1).ti,ab.) (288287)

8 (((case adj control$) and random$) not randomi?ed controlled).ti,ab. (19113)

9 (Systematic review not (trial or study)).ti. (191167)

10 (nonrandom$ not random$).ti,ab. (17380)

11 ("Random field$" or (random cluster adj3 sampl$)).ti,ab. (3994)

12 (review.ab. and review.pt.) not trial.ti. (939739)

13 "we searched".ab. and (review.ti. or review.pt.) (38996)

14 ("update review" or (databases adj4 searched)).ab. (46509)

15 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/ (1128199)

16 Animal experiment/ not (human experiment/ or human/) (2368121)

17 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (3825742)

18 5 not 17 (4940930)

19 4 and 18 (41)

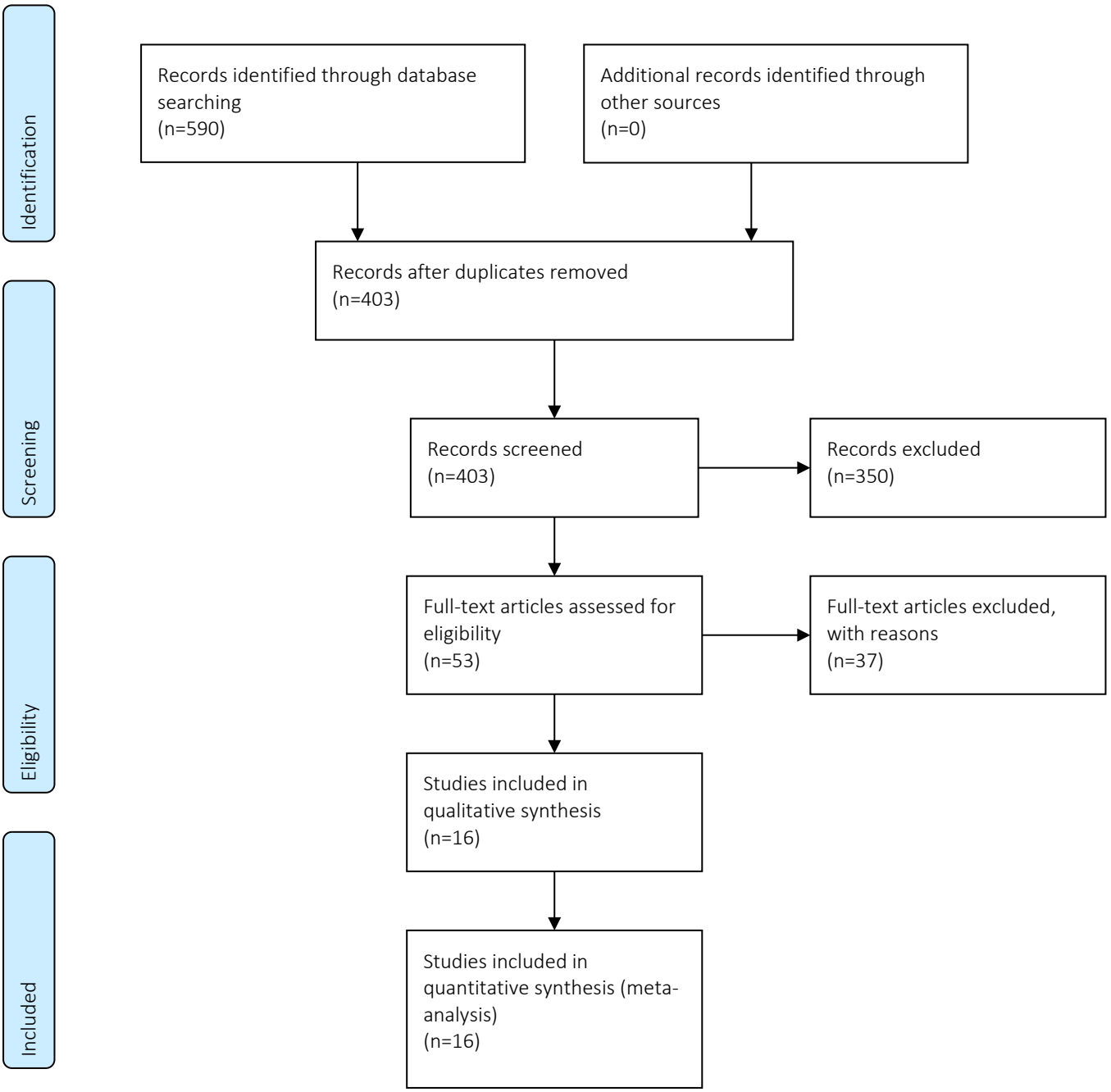
Cochrane Library (Cochrane Database of Systematic Reviews (CDSR) and Cochrane Central Register of Controlled Trials=CENTRAL)

Date Run: 21/11/2021 19:06:50

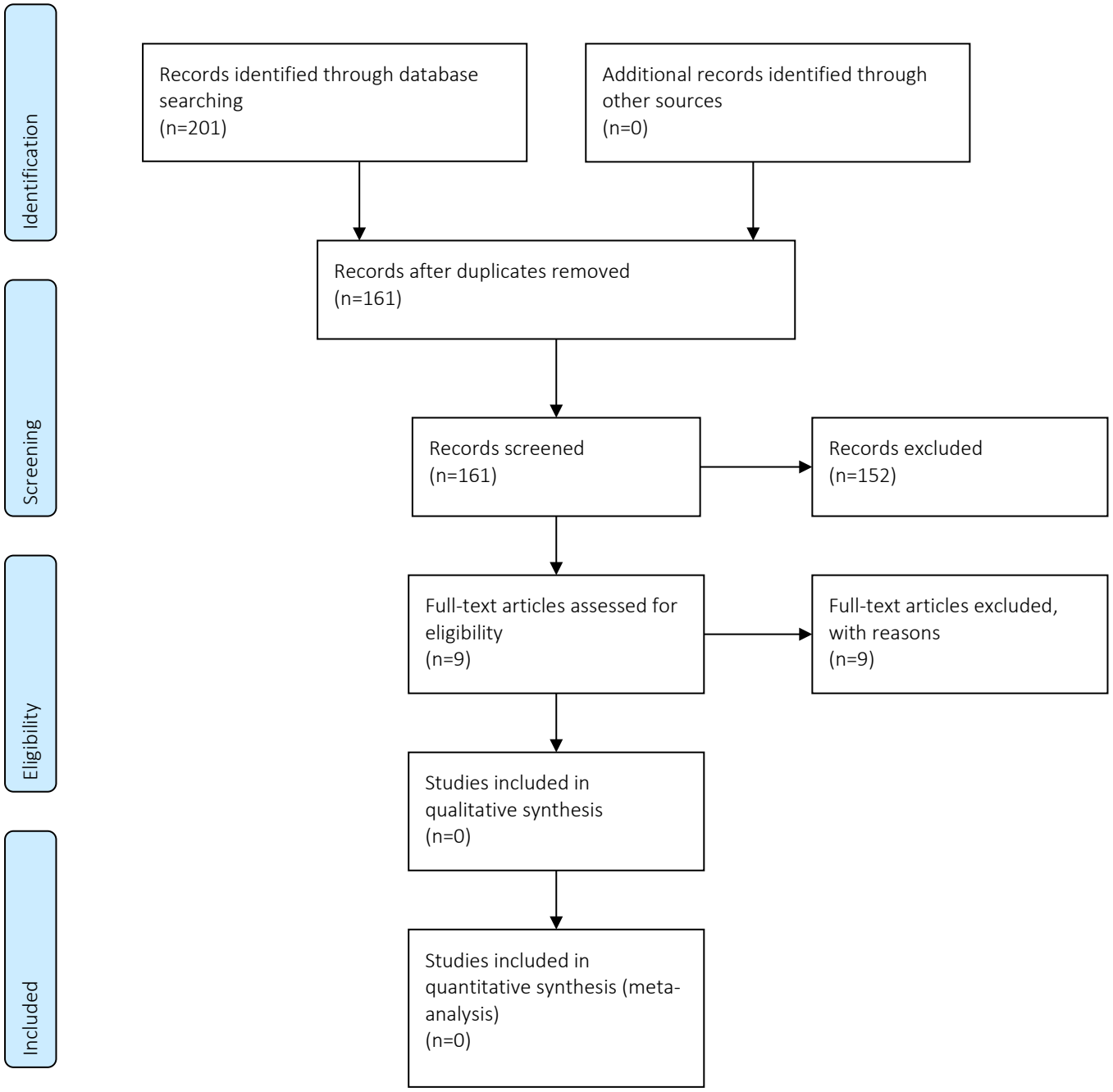
#1 ([mh "Carpal Tunnel Syndrome"] OR (Carpal Tunnel Syndrome* OR Carpal Canal Syndrome* OR Thenar Amyotrophy of Carpal Origin OR Carpal Tunnel Median Neuropath* OR Carpal Tunnel Compression Neuropath* OR Carpal Tunnel Entrapment Neuropath* OR Brachialgia Paraesthetica Nocturna OR Brachialgia Paresthetica Nocturna):ti,ab) AND ([mh Tourniquets] OR (Tourniquet* OR Artery Compression Device* OR External Fixator Vascular Compressor* OR External Vascular Compressor* OR Vascular Compression Device* OR Hysynal* OR ClampEase* OR ATS OR "A.T.S" OR "A.T.S." OR "Io RACT" OR RadiStop* OR "TR Band" OR TRAcelet* OR Zephyr Vascular Compression Device*):ti,ab) 37

## PRISMA Diagrams

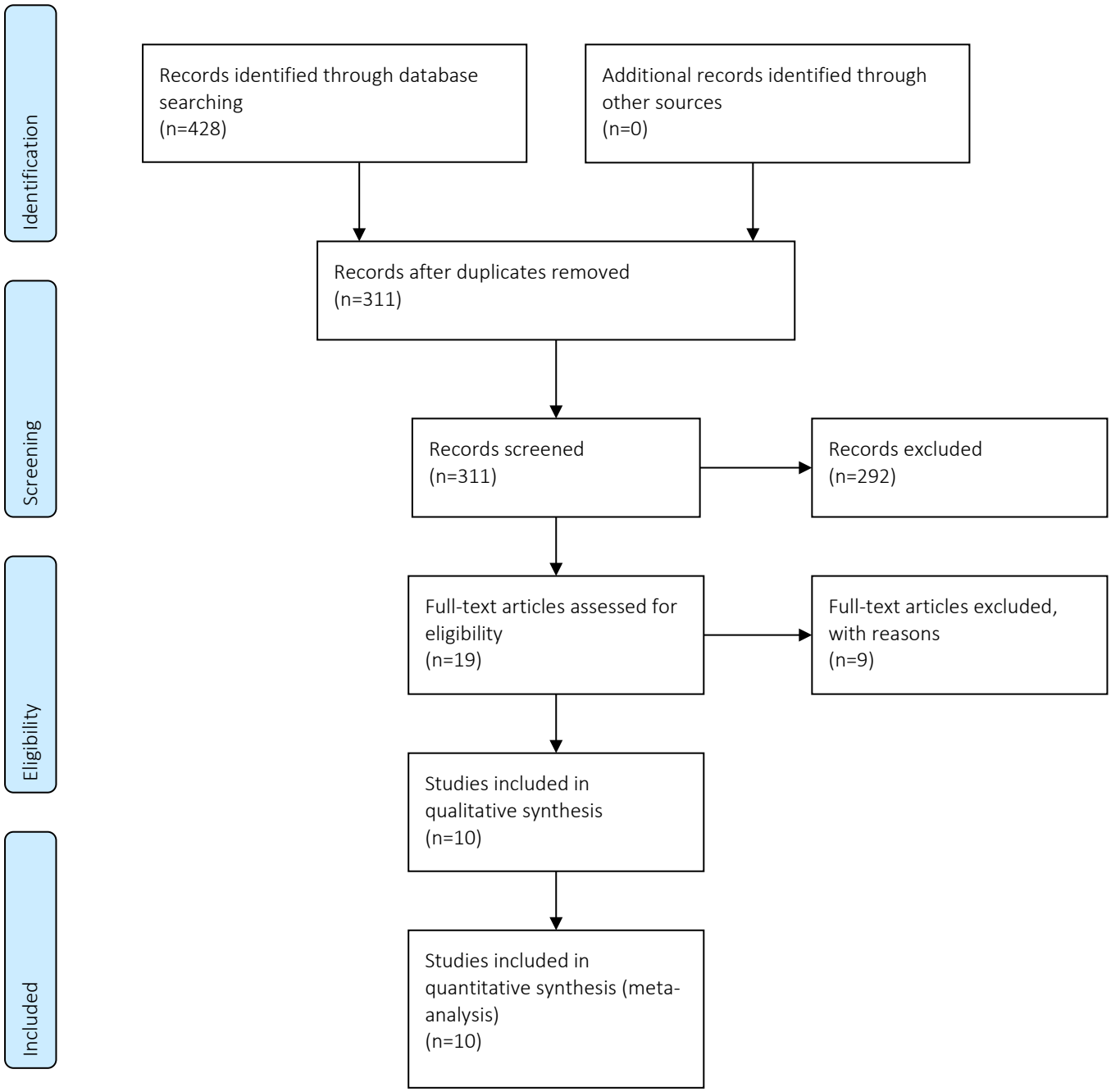
Q1



Q2


Identification
Screening
Eligibility
Included
Records identified through database searching (n=201)
Additional records identified through other sources (n=0)
Records after duplicates removed (n=161)
Records screened (n=161)
Records excluded (n=152)
Full-text articles assessed for eligibility (n=9)
Full-text articles excluded, with reasons (n=9)
Studies included in qualitative synthesis (n=0)
Studies included in quantitative synthesis (meta-analysis) (n=0)

Q3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Screening
Eligibility
Included
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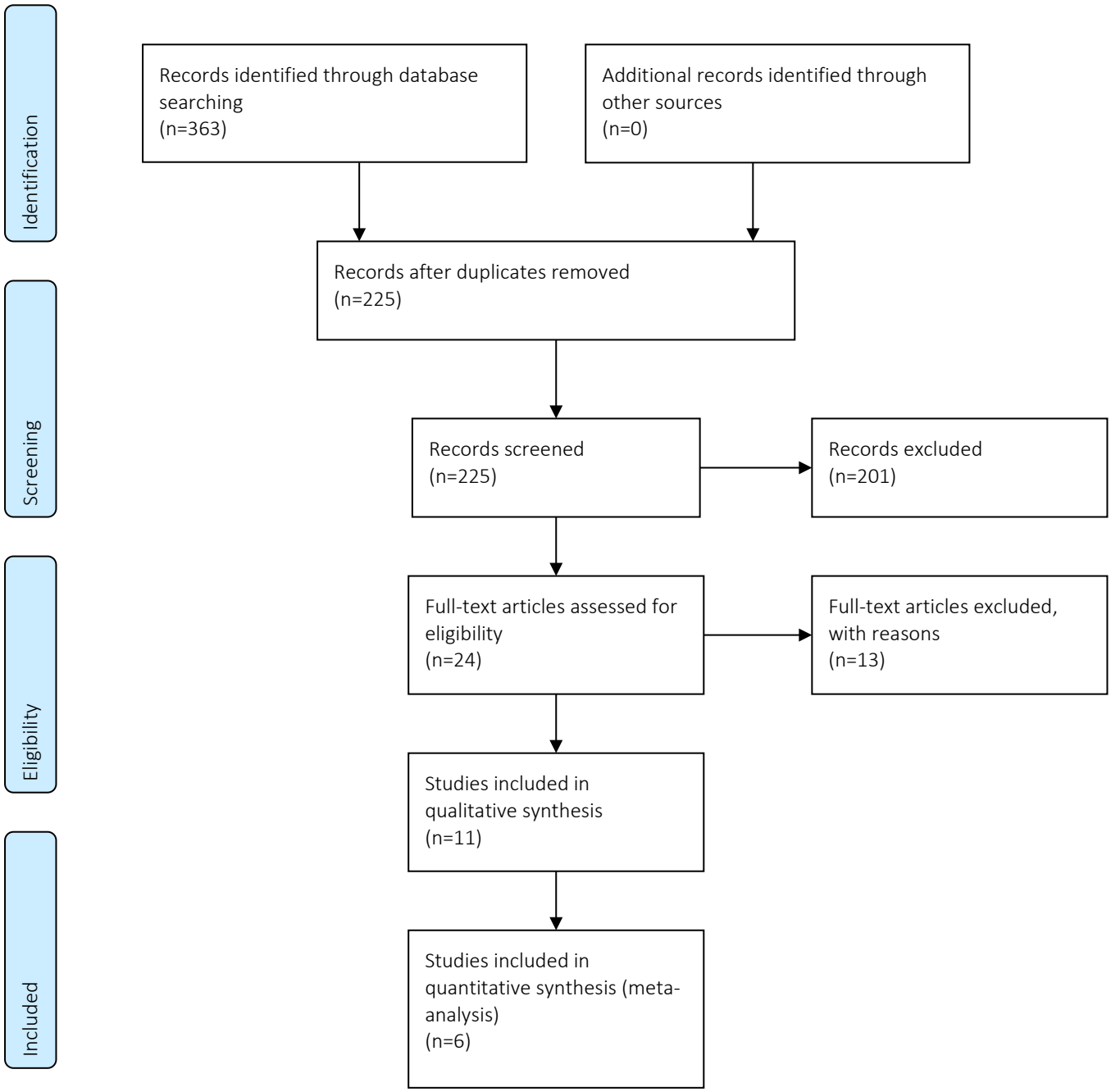
Q4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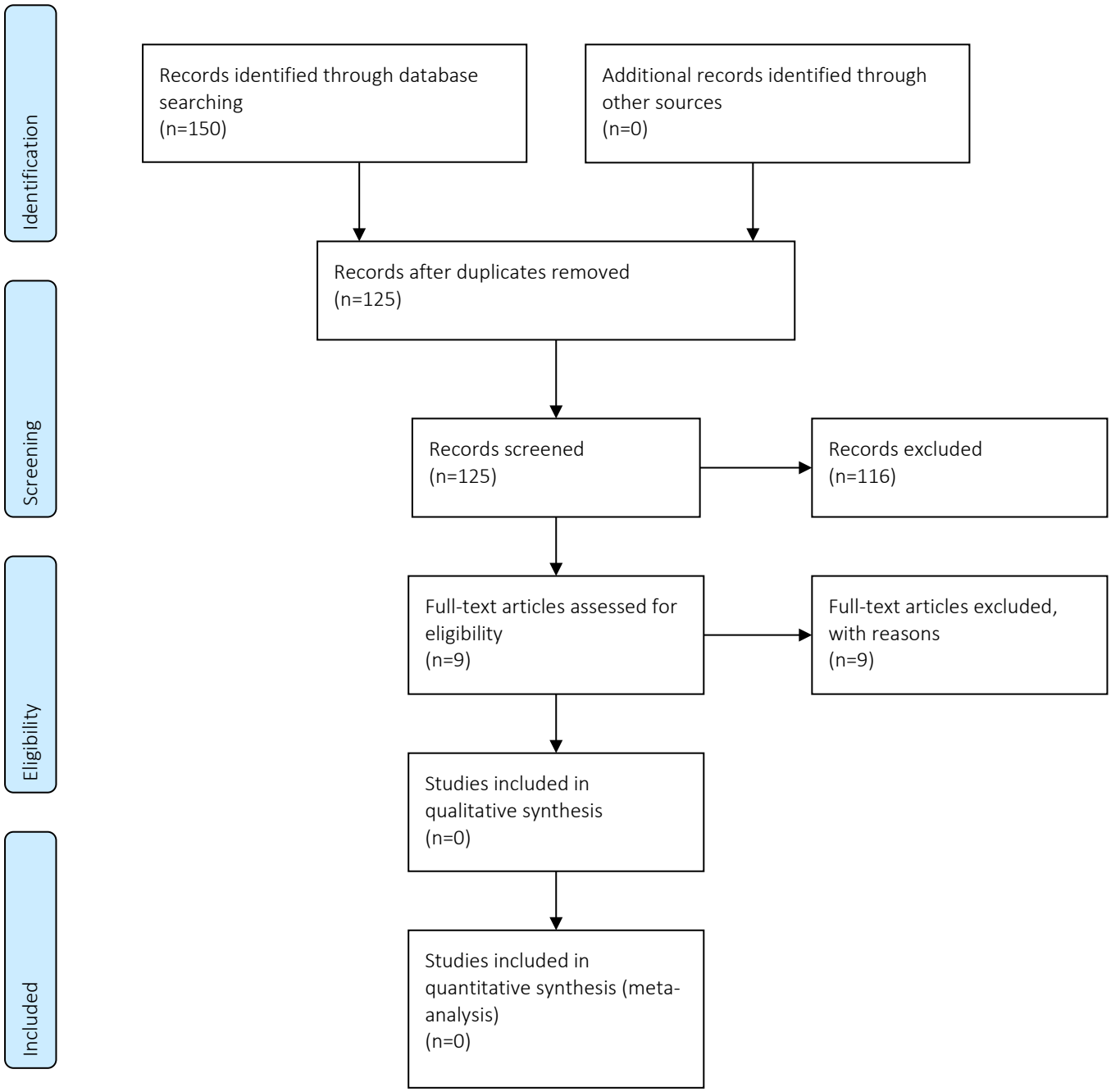
Q5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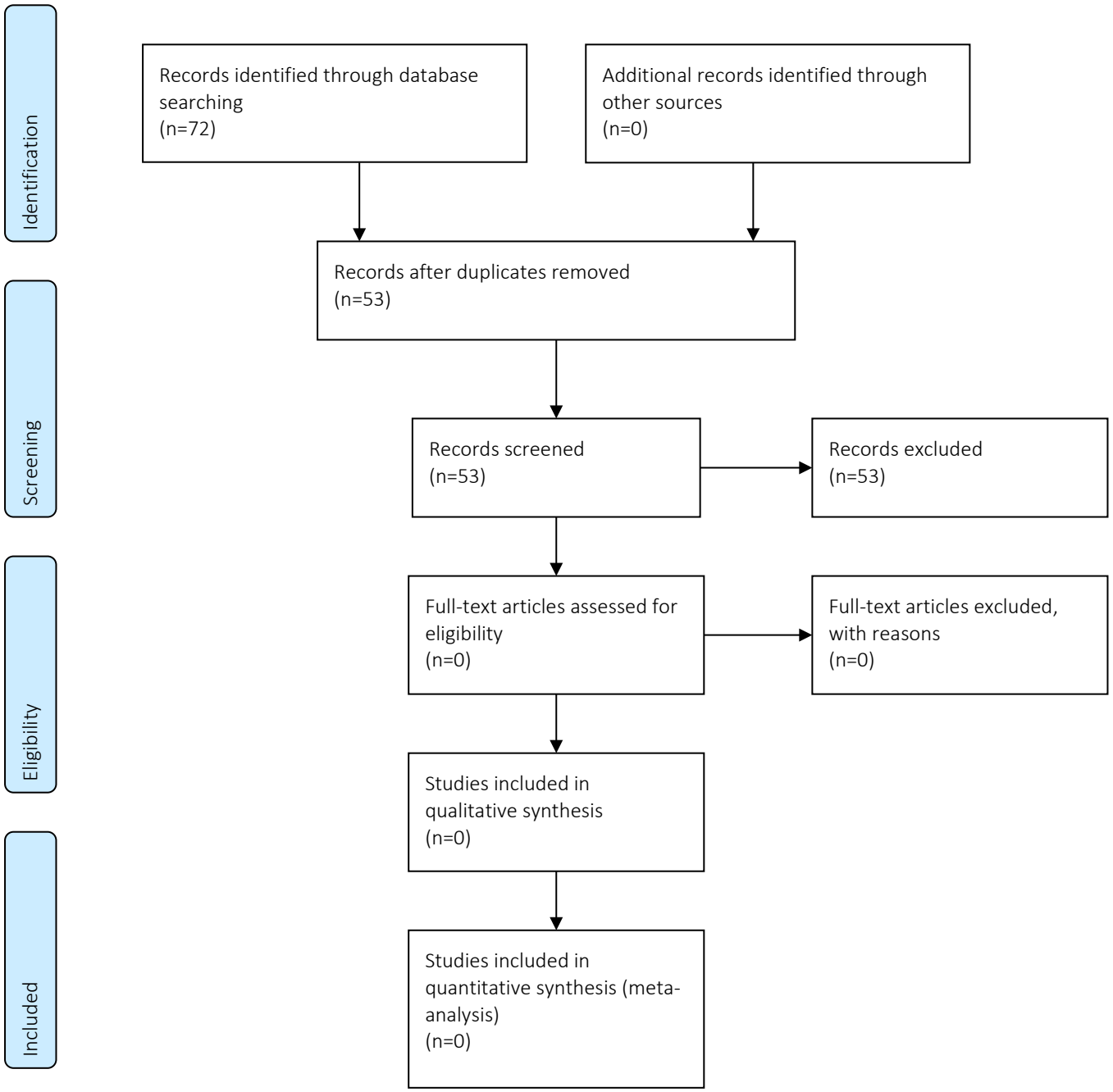
Studies included in qualitative synthesis (n=0)
Studies included in quantitative synthesis (meta-analysis) (n=0)

Q6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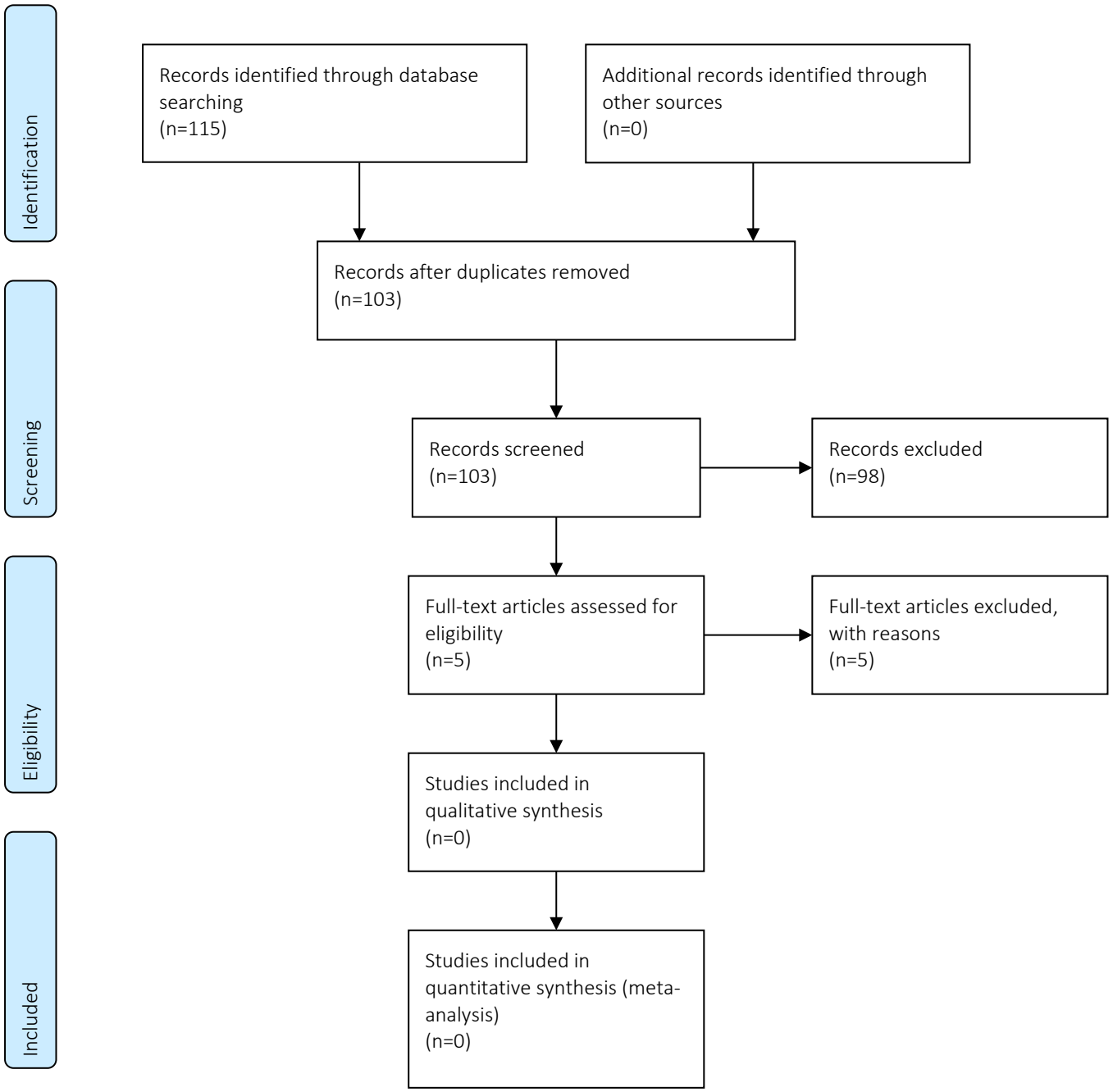
Full-text articles excluded, with reasons (n=0)
Studies included in qualitative synthesis (n=0)
Studies included in quantitative synthesis (meta-analysis) (n=0)

Q7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Screening
Eligibility
Included
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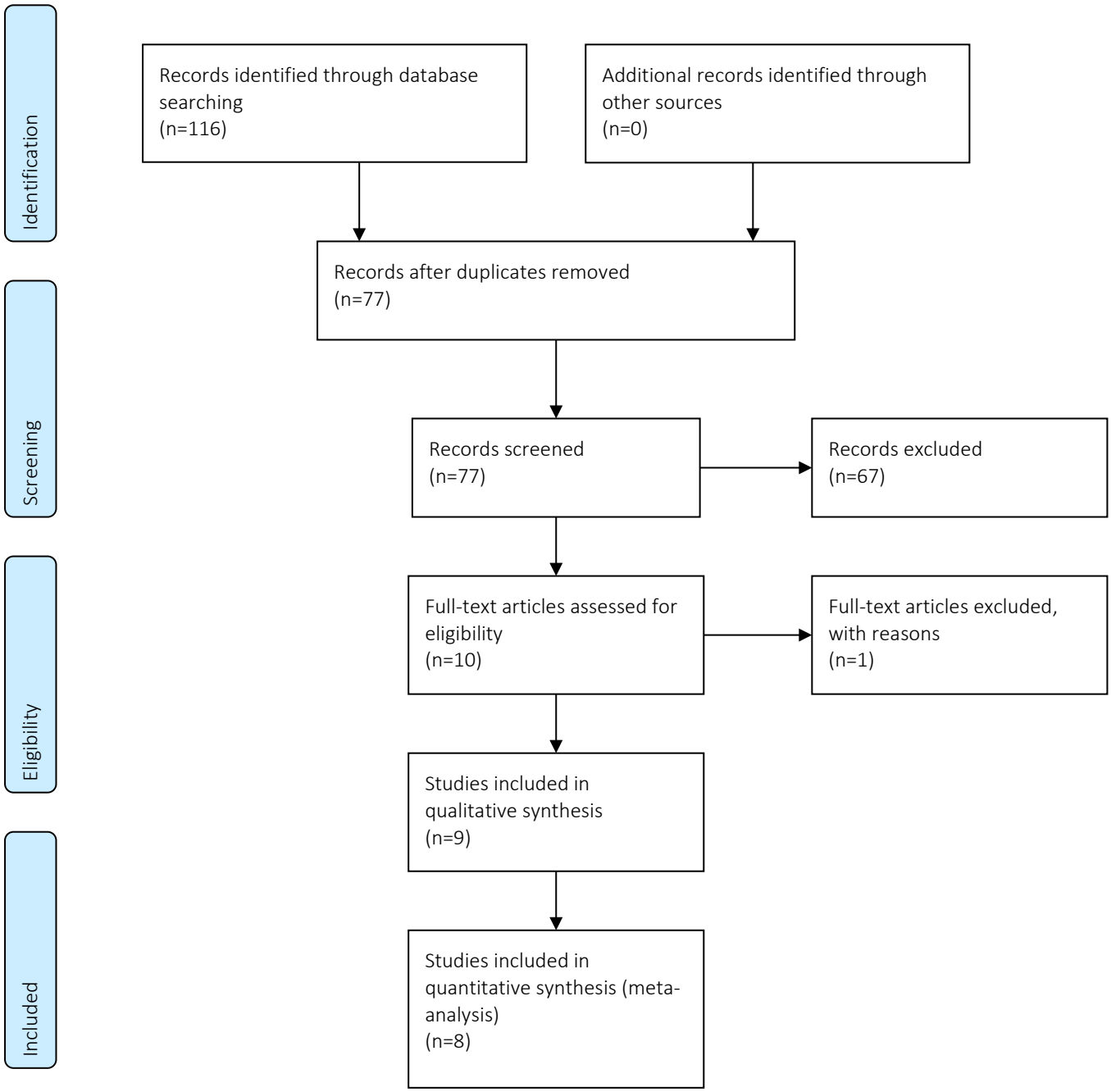
Studies included in qualitative synthesis (n=0)
Studies included in quantitative synthesis (meta-analysis) (n=0)

Q8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Screening
Eligibility
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Full-text articles excluded, with reasons (n=1)
Studies included in qualitative synthesis (n=9)
Studies included in quantitative synthesis (meta-analysis) (n=8)

# Meta-Analysis and Risk of Bias

Q1

Assessment of Risk of Bias for Diagnostic Studies

| | Risk of Bias | | | | Applicability Concerns | | |
|---|---|---|---|---|---|---|---|
| Study | Patient selection | Index test | Reference standard | Flow and timing | Patient selection | Index test | Reference standard |
| de Jesus Filho et al., 2014 | Low | Unclear | Low | Low | Low | Low | Low |
| Demiz et al., 2012 | Low | Low | Low | Low | Low | Low | Low |
| Emril et al., 2019 | Low | Low | Low | Low | Low | Low | Low |
| Kwon et al., 2008 | Low | Low | Low | Low | Low | Low | Low |
| Nkrumah et al., 2020 | High | Low | Low | Low | High | Low | Low |
| Pastare et al., 2009 | Low | Low | Low | Low | Low | Low | Low |
| Tharwat et al., 2020 | Low | Low | Low | Low | Low | Low | Low |
| Chen et al., 2021 | Unclear | Low | Low | Low | Unclear | Low | Low |
| Fowler et al, 2014 | Low | Low | Low | Low | Low | Low | Low |
| Pan et al., 2016 | Low | Unclear | Low | Low | Low | Unclear | Low |
| Tungoe et al., 2021 | Unclear | Unclear | Unclear | Unclear | Unclear | Unclear | Unclear |
| Kim et al., 2014 | Unclear | Unclear | Unclear | Low | Low | Unclear | Unclear |
| Mulroy et al., 2019 | Low | Low | Low | Low | Low | Low | Low |
| Padua et al., 2008 | Low | Low | Low | Low | Low | Low | Low |
| Panagopoulos et al., 2019 | Low | Low | Low | Low | Low | Low | Low |
| Salman Roghani et al., 2018 | Low | Low | Low | Low | Low | Low | High |

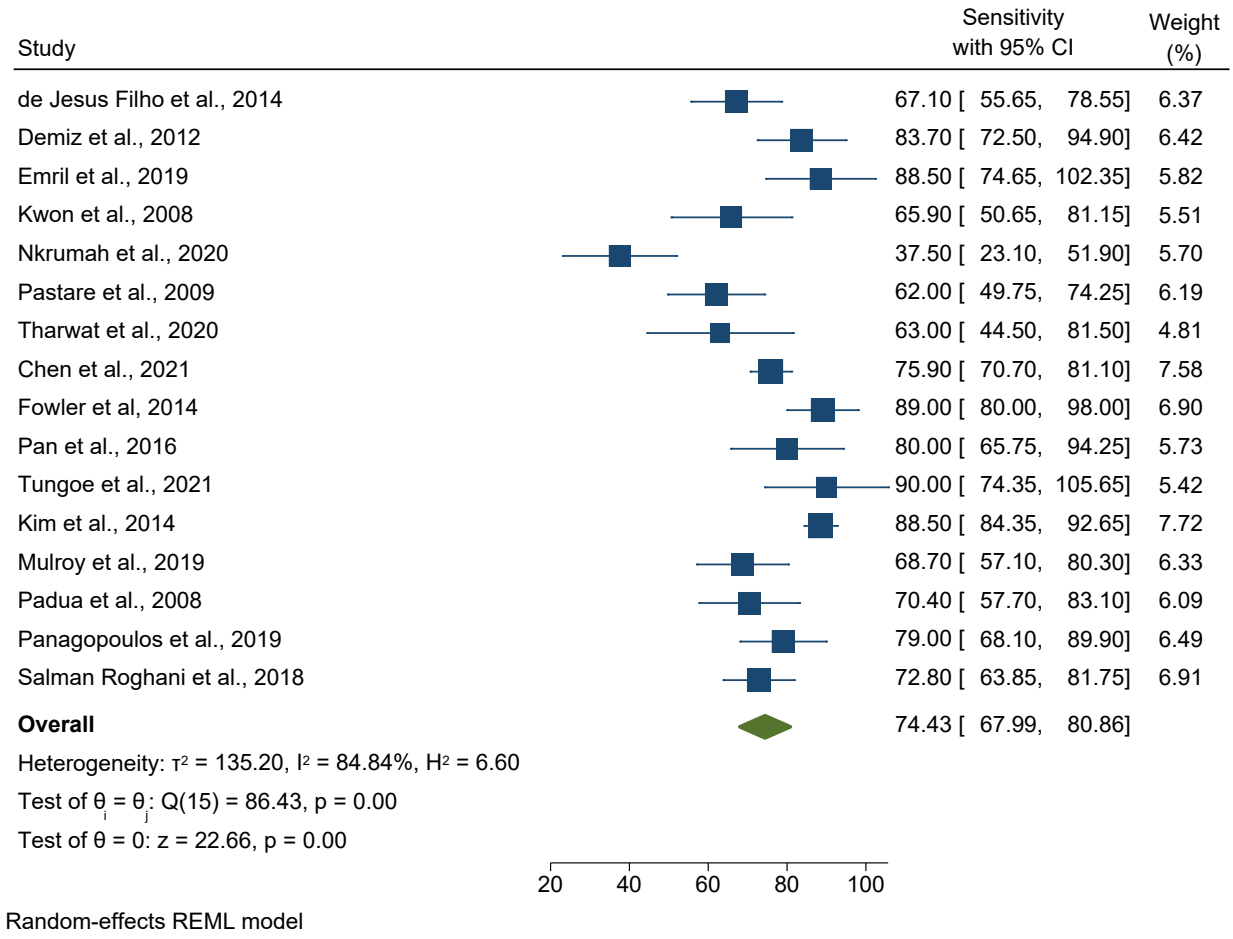



Figure Q1-1 Forest plot for sensitivities

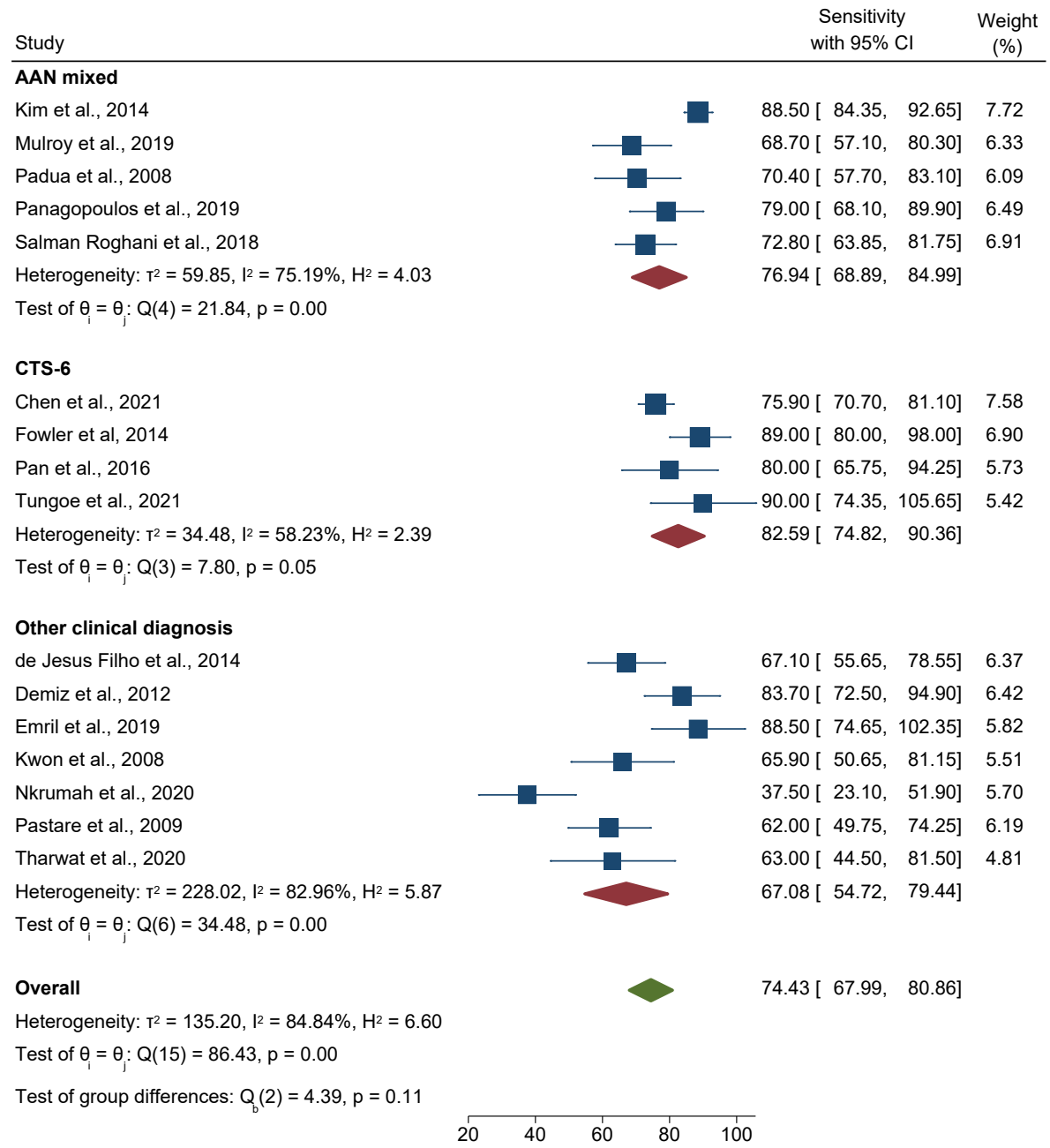



Figure Q1-2 Forest plot for sensitivities, stratified by type of diagnosis used

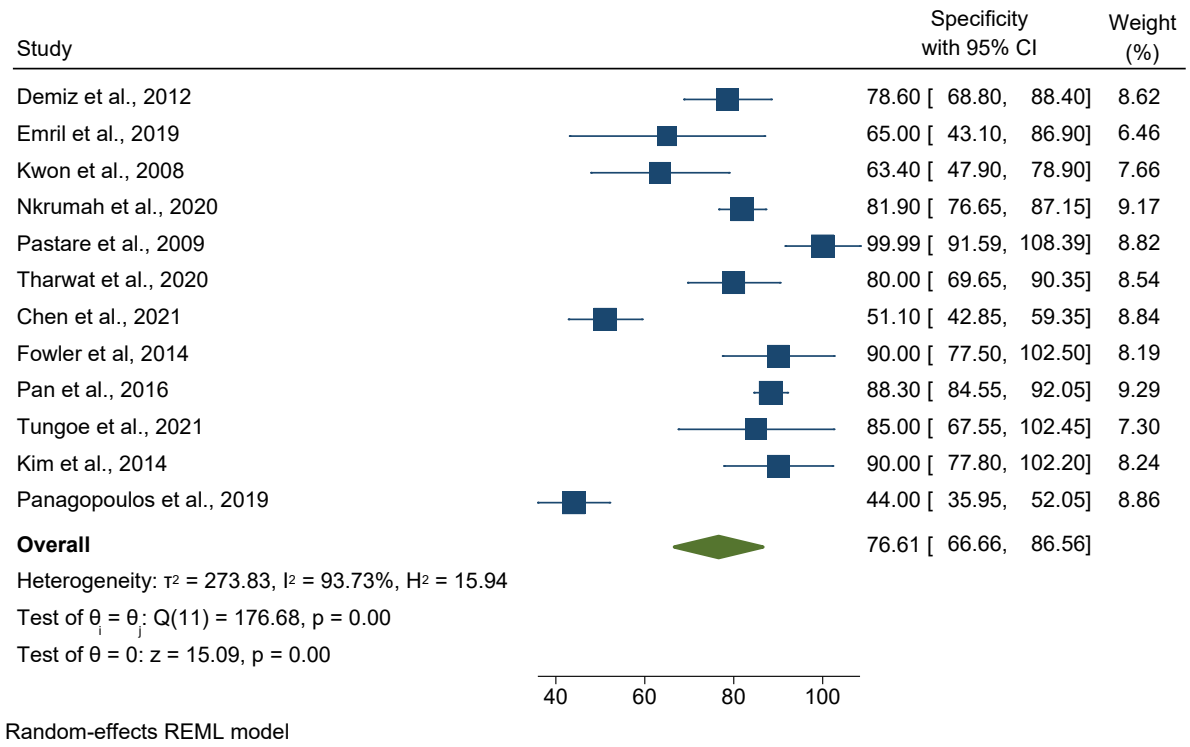



Figure Q1-3 Forest plot for specificities

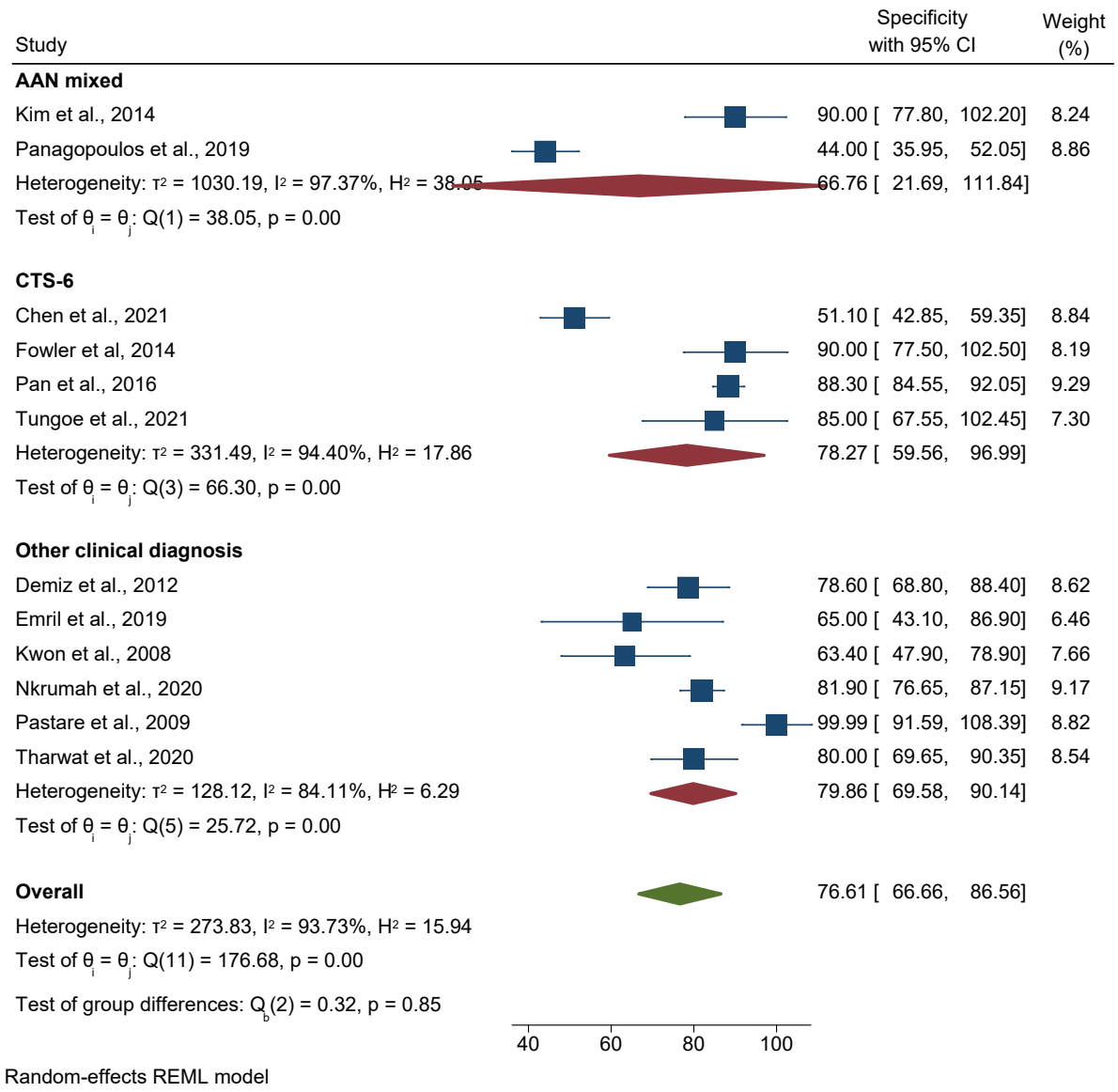



Figure Q1-4 Forest plot for specificities, stratified by type of diagnosis used

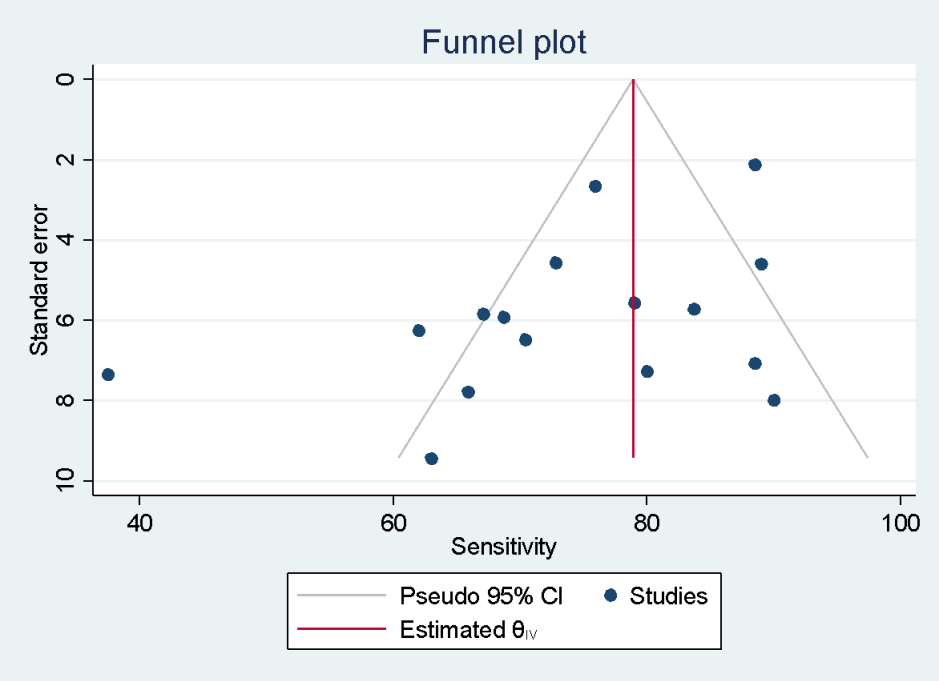



Figure Q1-5 Funnel plot for sensitivities to assess publication bias

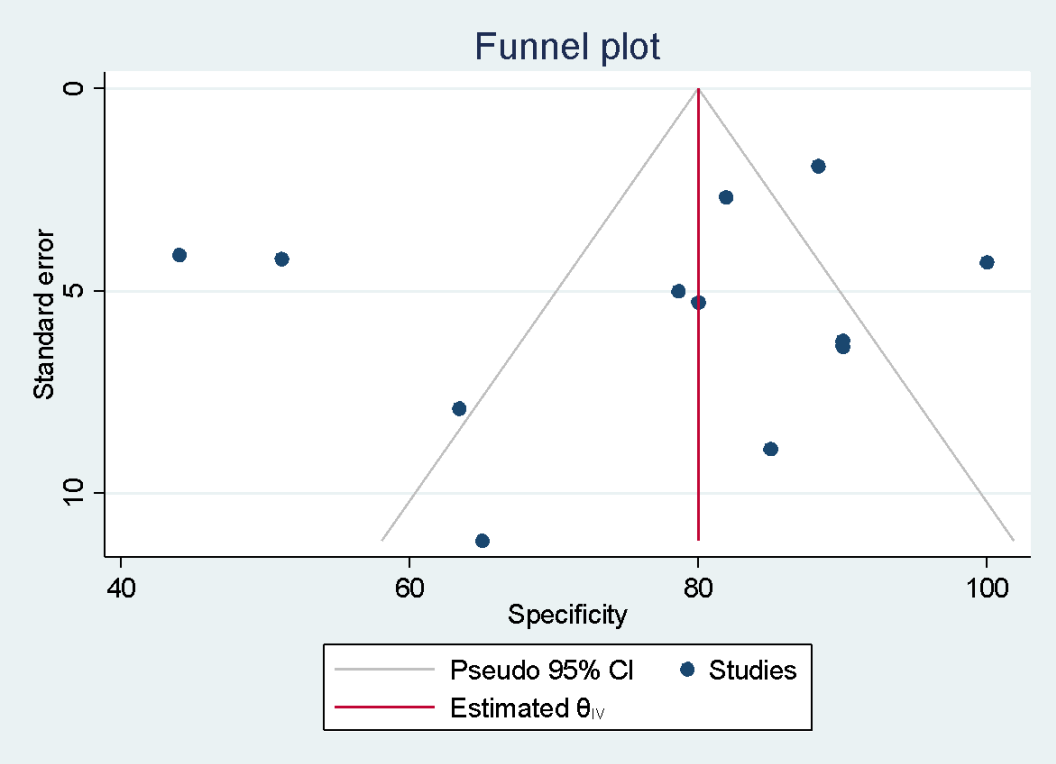



Figure Q1-6 Funnel plot for specificities to assess publication bias

Q1 Sensitivity analysis

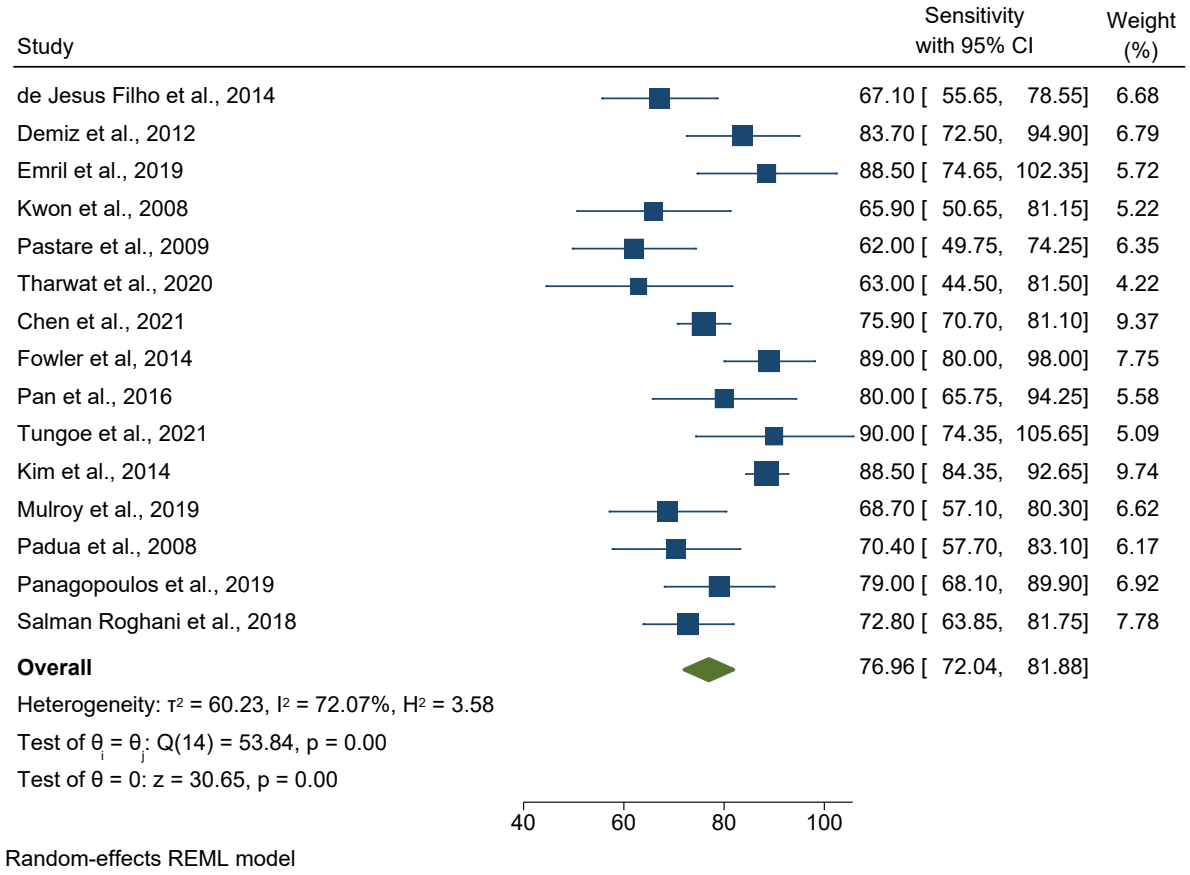



Figure Q1-7 Forest plot for sensitivity without Nkrumah 2020

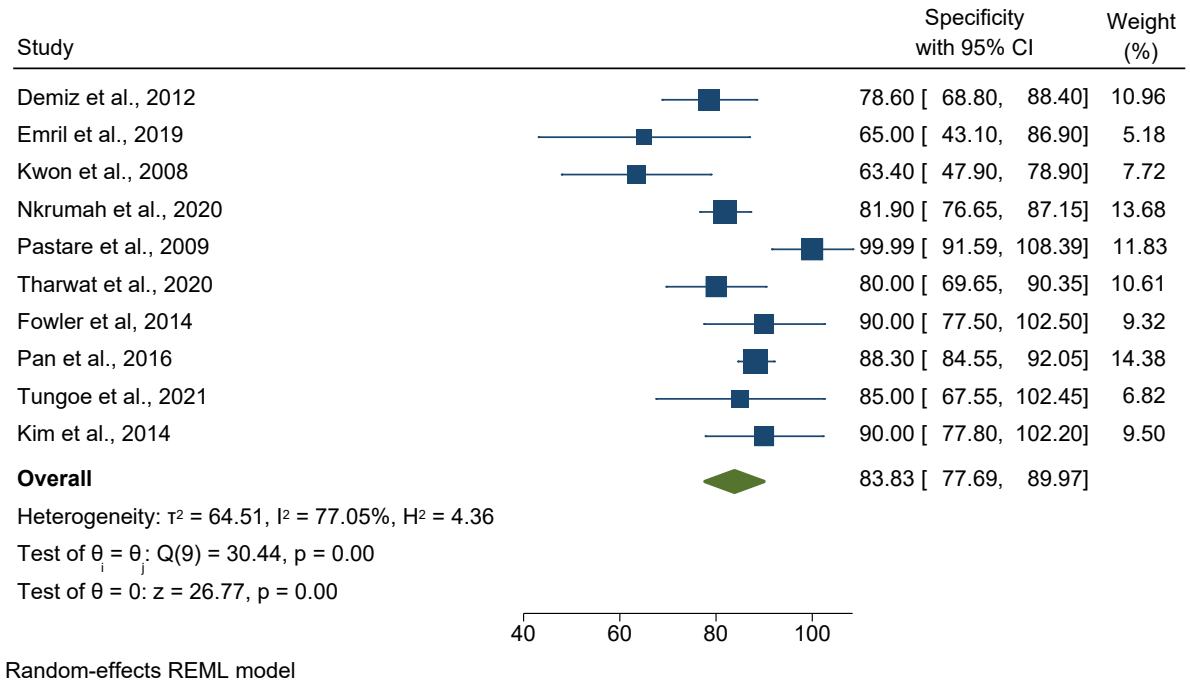



Figure Q1-8 Forest plot for specificity without Panagopoulos 2019 and Chen 2021

## Q3

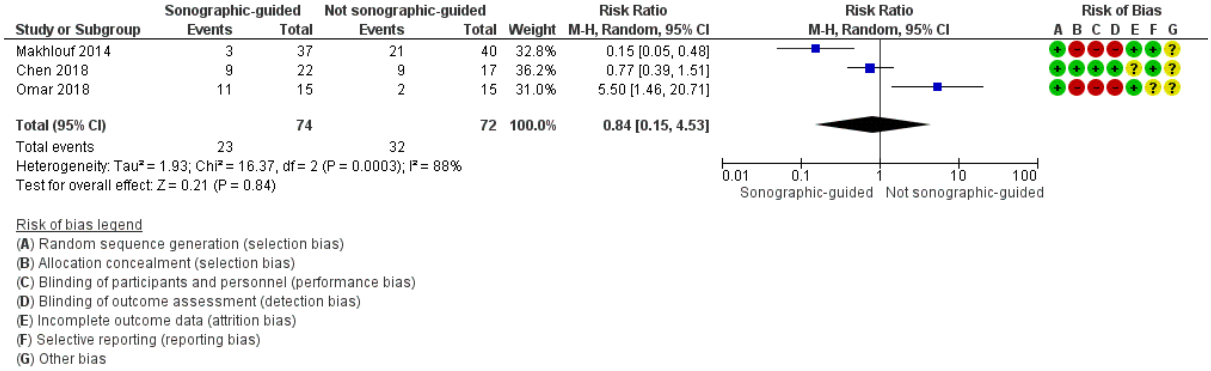



Figure Q3-1: Any clinical improvement

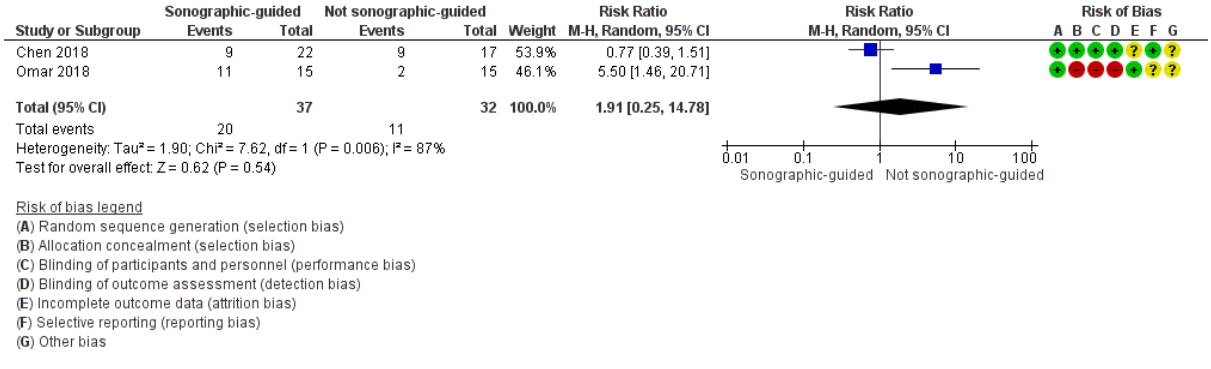



Figure Q3-2: Clinical improvement: Numbness

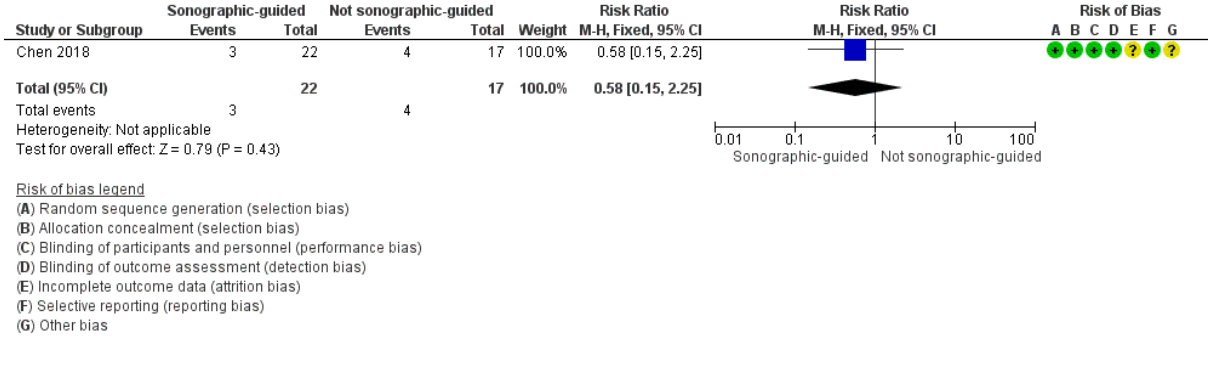



Figure Q3-3: Clinical improvement: Hand weakness

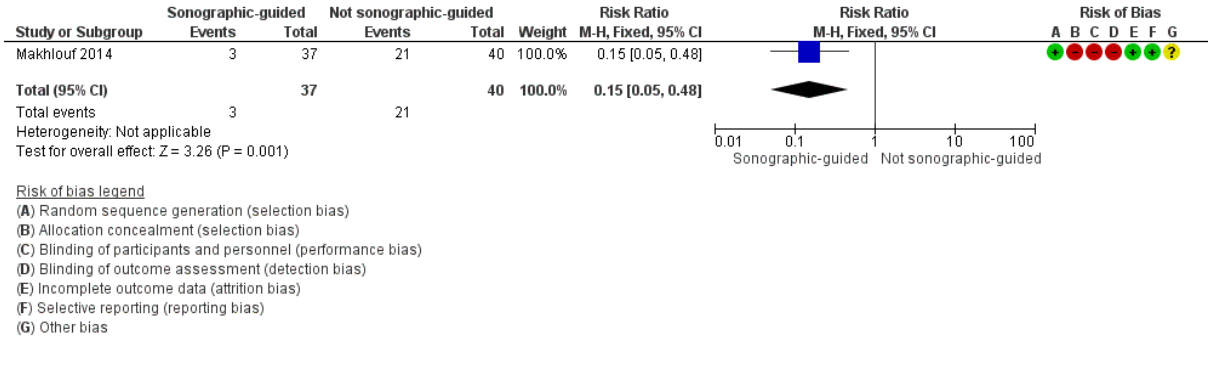


Figure Q3-4: Clinical improvement: non-responder (2 cm or greater on VAS)

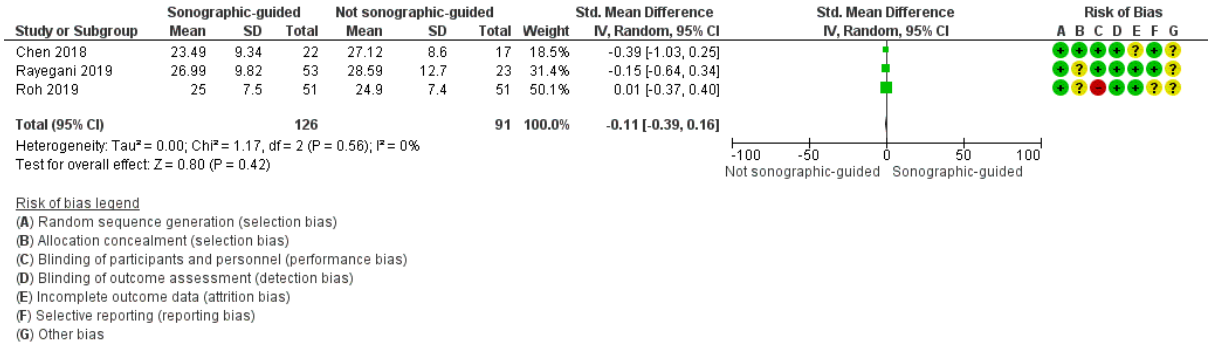



Figure Q3-5: Clinical improvement: Grip strength

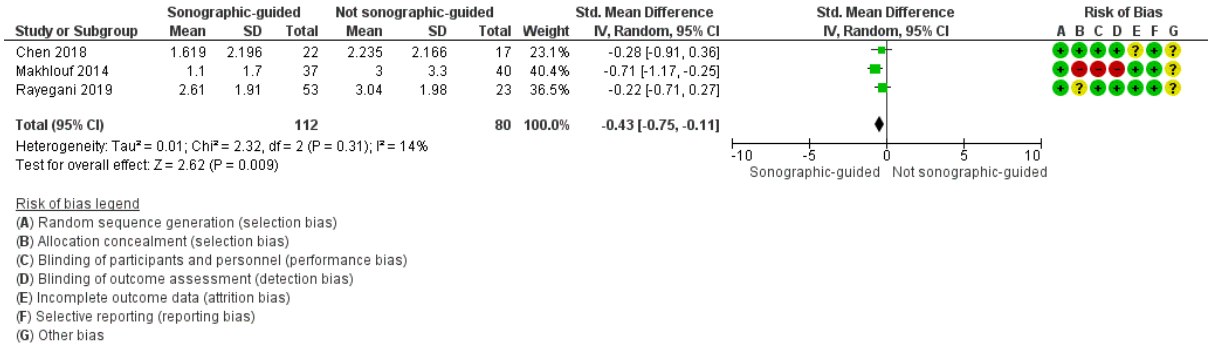



Figure Q3-6: Pain (VAS)

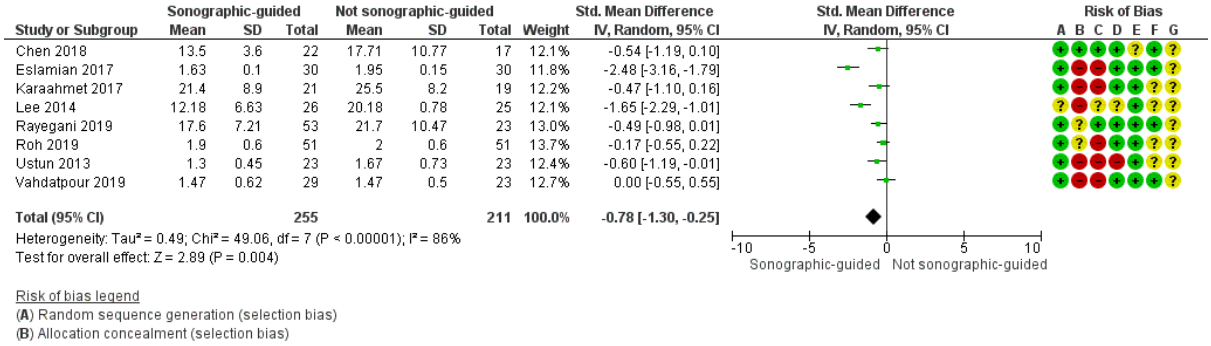



Figure Q3-7: BCTQ-SSS

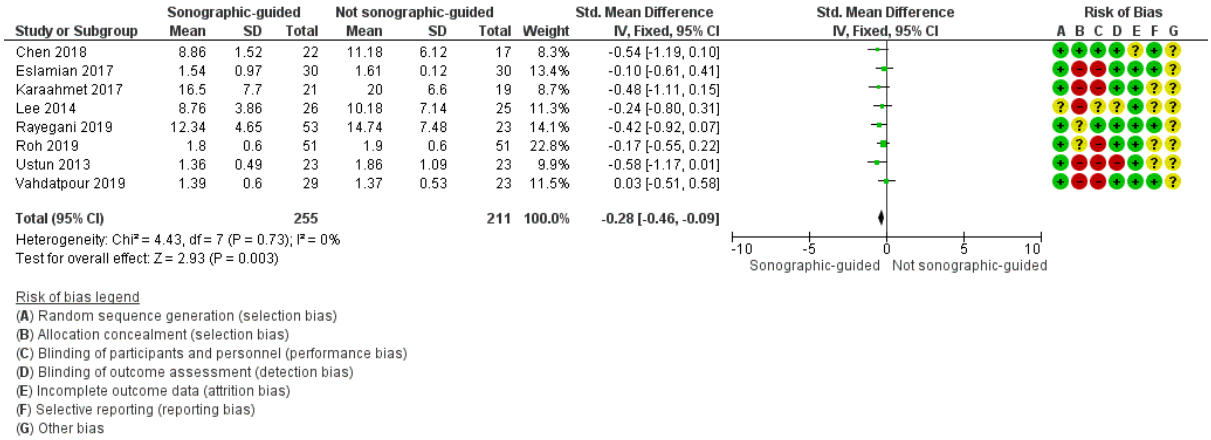



Figure Q3-8: BCTQ-FSS

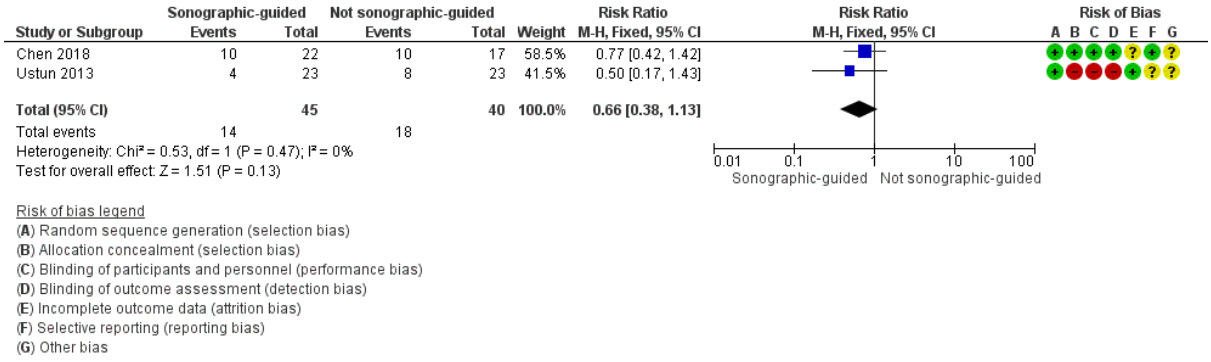



Figure Q3-9: Complications: Pain

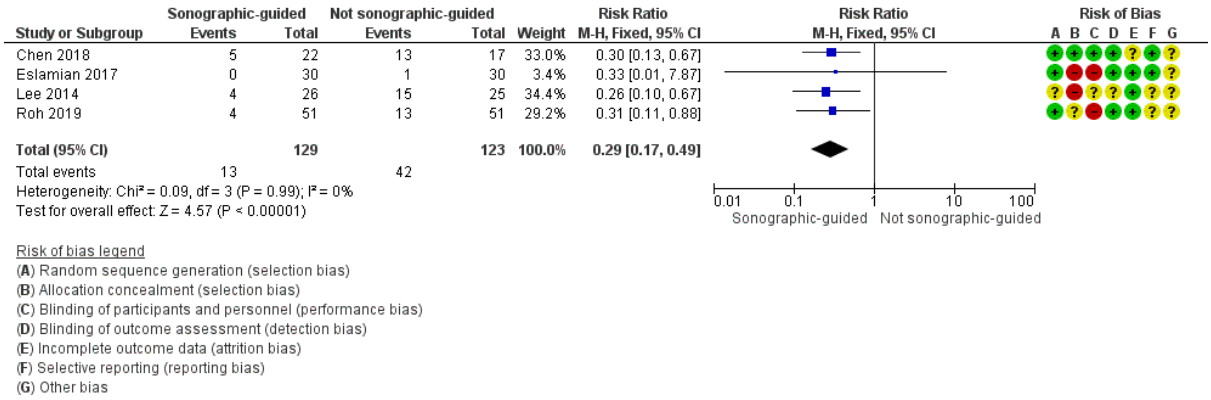
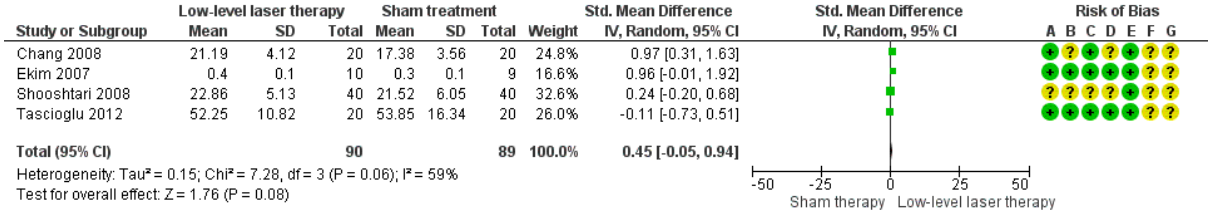


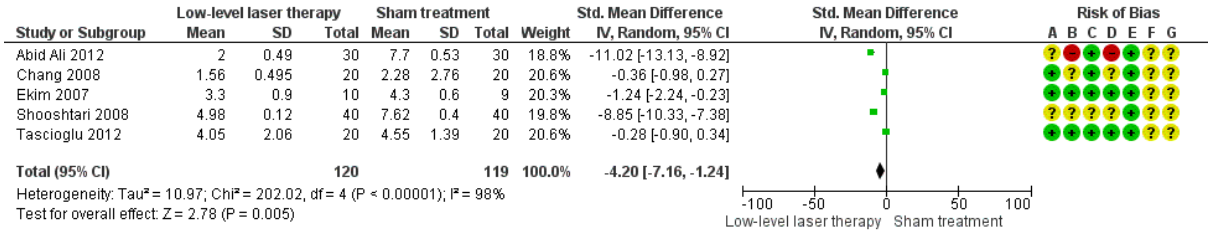

Figure Q3-10: Complications: Other

## Q4




Risk of bias legend
(**A**) Random sequence generation (selection bias)
(**B**) Allocation concealment (selection bias)
(**C**) Blinding of participants and personnel (performance bias)
(**D**) Blinding of outcome assessment (detection bias)
(**E**) Incomplete outcome data (attrition bias)
(**F**) Selective reporting (reporting bias)
(**G**) Other bias

Figure Q4-1. Clinical Improvement: Grip Strength

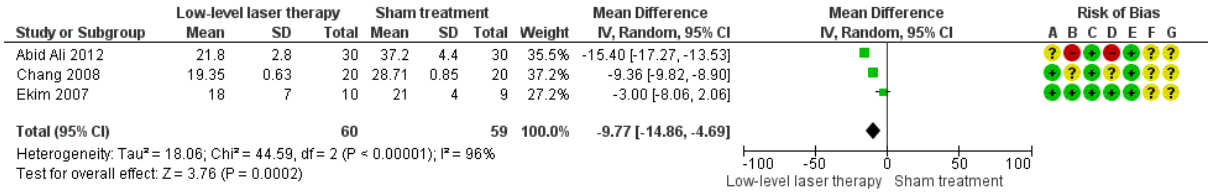



Risk of bias legend
(**A**) Random sequence generation (selection bias)
(**B**) Allocation concealment (selection bias)
(**C**) Blinding of participants and personnel (performance bias)
(**D**) Blinding of outcome assessment (detection bias)
(**E**) Incomplete outcome data (attrition bias)
(**F**) Selective reporting (reporting bias)
(**G**) Other bias

Figure Q4-2. Pain: Continuous

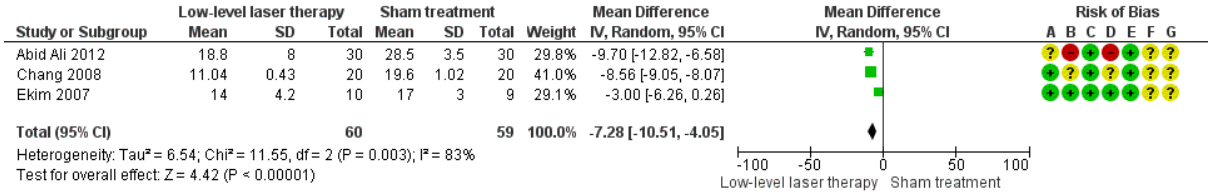

Risk of bias legend
(**A**) Random sequence generation (selection bias)
(**B**) Allocation concealment (selection bias)
(**C**) Blinding of participants and personnel (performance bias)
(**D**) Blinding of outcome assessment (detection bias)
(**E**) Incomplete outcome data (attrition bias)
(**F**) Selective reporting (reporting bias)
(**G**) Other bias

Figure Q4-3. Pain: Dichotomous




Risk of bias legend
(**A**) Random sequence generation (selection bias)
(**B**) Allocation concealment (selection bias)
(**C**) Blinding of participants and personnel (performance bias)
(**D**) Blinding of outcome assessment (detection bias)
(**E**) Incomplete outcome data (attrition bias)
(**F**) Selective reporting (reporting bias)
(**G**) Other bias

Figure Q4-4. BCTQ-SSS




Risk of bias legend
(**A**) Random sequence generation (selection bias)
(**B**) Allocation concealment (selection bias)
(**C**) Blinding of participants and personnel (performance bias)
(**D**) Blinding of outcome assessment (detection bias)
(**E**) Incomplete outcome data (attrition bias)
(**F**) Selective reporting (reporting bias)
(**G**) Other bias

Figure Q4-5. BCTQ-FSS

## Q8

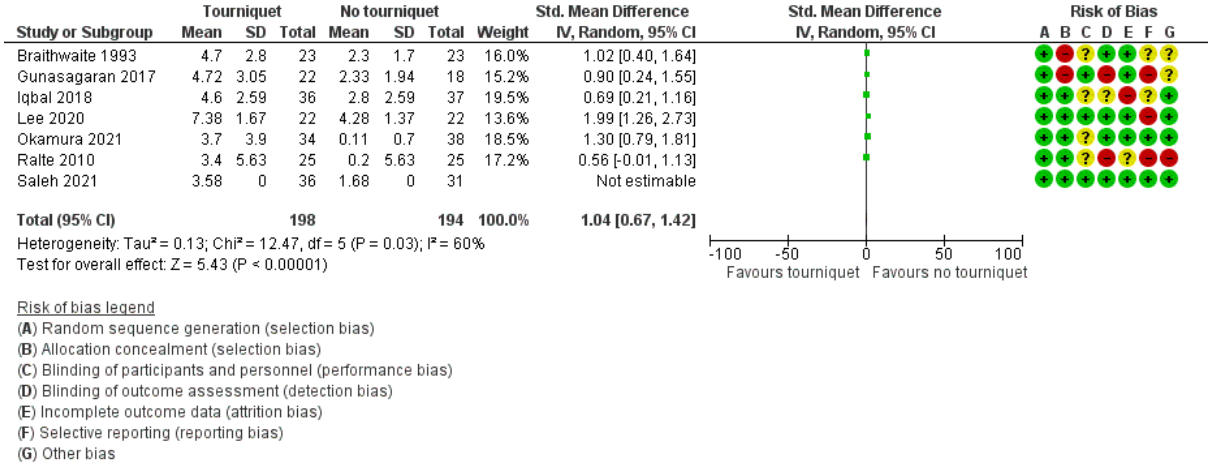



Figure Q8-1 Clinical improvement (Pain: Continuous)

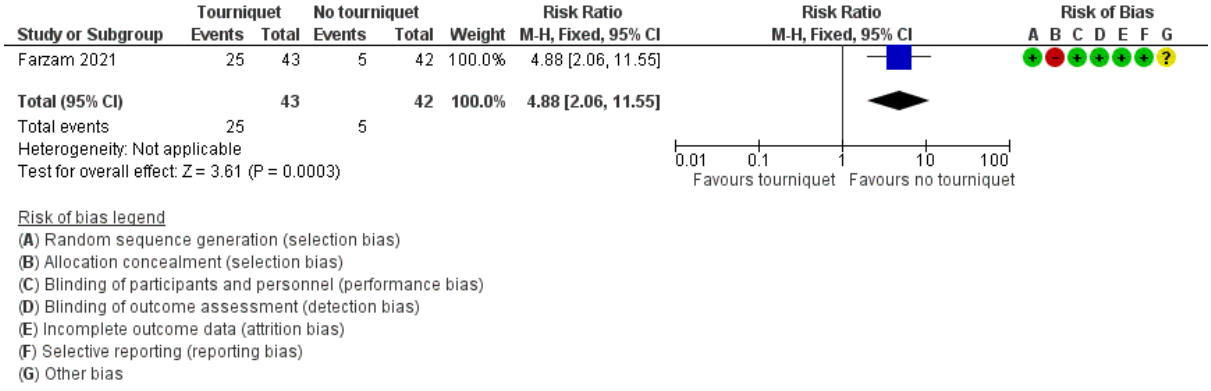



Figure Q8-2 Pain (dichotomous: VAS >4)

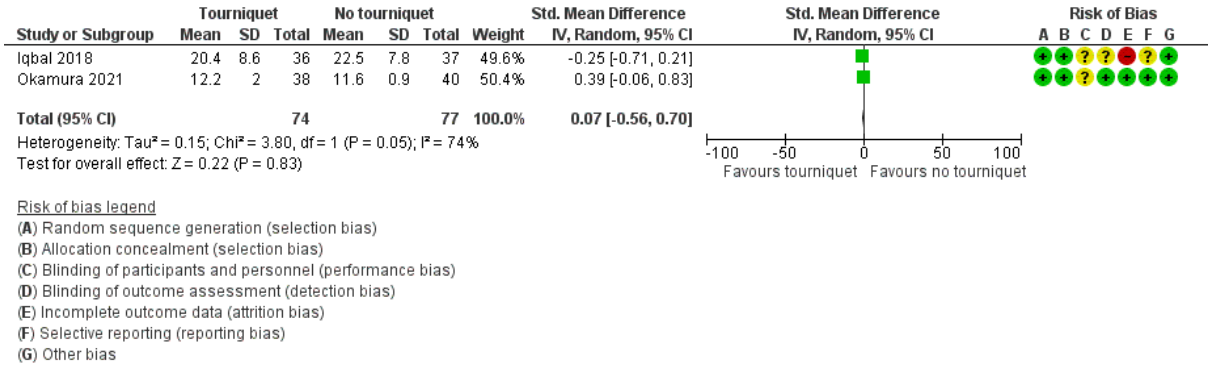



Figure Q8-3 BCTQ-SSS

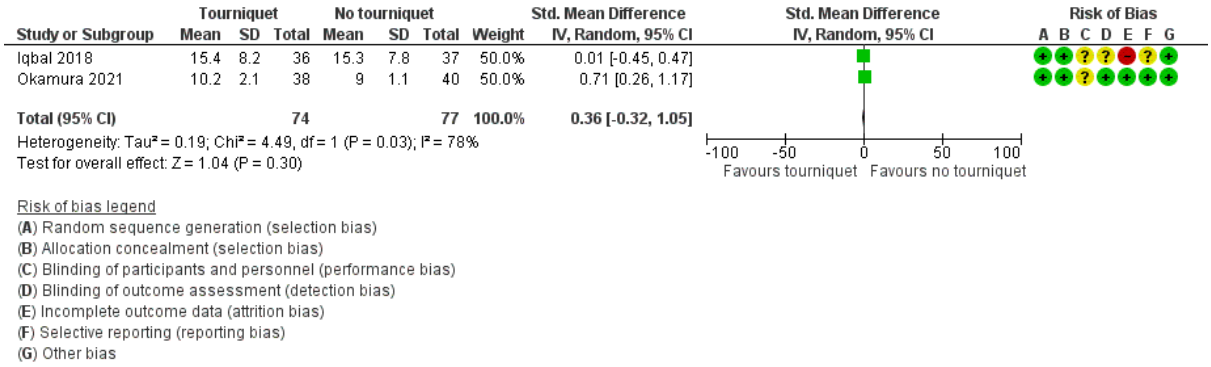



Figure Q8-4 BCTQ-FSS

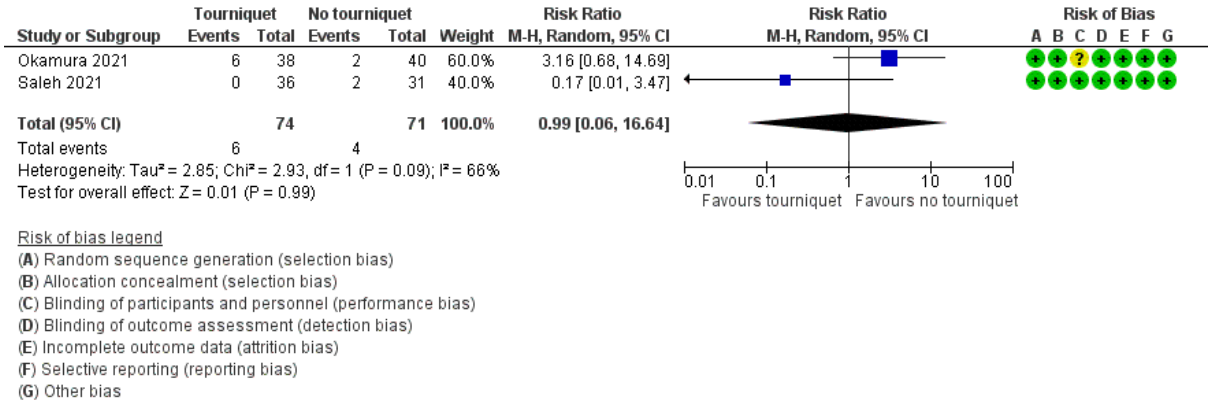



Figure Q8-5 Complications/adverse events

# GRADE (Summary of Findings Table)

Q1

**Question**: Should sonography be used to diagnose carpal tunnel syndrome?

| | |
|---|---|
| Sensitivity | 0.77 (95% CI: 0.72 to 0.82) |
| Specificity | 0.84 (95% CI: 0.78 to 0.90) |

| Outcome | № of studies (№ of patients) | Study design | Factors that may decrease certainty of evidence | | | | | Test accuracy CoE |
|---|---|---|---|---|---|---|---|---|
| | | | Risk of bias | Indirectness | Inconsistency | Imprecision | Publication bias | |
| **True positives** (patients with CTS) | 15 studies 2260 patients[a] | cohort & case-control type studies | not serious | not serious | not serious | not serious | strong association | ⨁⨁⨁⨁ High |
| **False negatives** (patients incorrectly classified as not having CTS) | | | | | | | | |
| **True negatives** (patients without CTS) | 10 studies 1481 patients[b] | cohort & case-control type studies | not serious | not serious | not serious | not serious | publication bias strongly suspected strong association[c] | ⨁⨁⨁⨁ High |
| **False positives** (patients incorrectly classified as having CTS) | | | | | | | | |

*Explanations*

a. Patients in this case mean 'Number of wrists'; based on a systematic review of 15 studies: de Jesus Filho 2014, Demiz 2012, Emril 2019, Kwon 2008, Pastare 2009, Tharwat 2020, Chen 2021, Fowler 2014, Pan 2016, Tungoe 2021, Kim 2014, Mulroy 2019, Padua 2008, Panagopoulos 2019, Salman Roghani 2018;

b. Patients in this case mean 'Number of wrists'; based on a systematic review of 10 studies for true negatives and false positives: Demiz 2012, Emril 2019, Kwon 2008, Nkrumah 2020, Pastare 2009, Tharwat 2020, Fowler 2014, Pan 2016, Tungoe 2021, Kim 2014.

c. The funnel plot is indicative of publication bias

Q3

Intervention: Local infiltration of corticoid crystal suspension into the carpal tunnel under sonographic control

Comparator: Local infiltration of corticoid crystal suspension into the carpal tunnel without sonographic control

| Outcome<br>Timeframe | Study results and measurements | Absolute effect estimates | | Certainty of the Evidence<br>(Quality of evidence) |
|---|---|---|---|---|
| | | Not sonographic-guided | Sonographic-guided | |
| Any clinical improvement | Relative risk: 0.79<br>(CI 95% 0.34 - 1.81)<br>Based on data from 146 participants in 3 studies[1] | 657<br>per 1000 | 519<br>per 1000 | Very low<br>Due to very serious inconsistency, Due to serious imprecision[2] |
| | | Difference: 138 fewer per 1000<br>(CI 95% 434 fewer - 532 more) | | |
| Clinical improvement: numbness | Relative risk: 1.91<br>(CI 95% 0.25 - 14.78)<br>Based on data from 69 participants in 2 studies[3] | 344<br>per 1000 | 657<br>per 1000 | Very low<br>Due to very serious inconsistency, Due to very serious imprecision[4] |
| | | Difference: 313 more per 1000<br>(CI 95% 258 fewer - 4740 more) | | |
| Clinical improvement: hand weakness | Relative risk: 0.58<br>(CI 95% 0.15 - 2.25)<br>Based on data from 39 participants in 1 studies[5] | 235<br>per 1000 | 136<br>per 1000 | Very low<br>Due to extremely serious imprecision[6] |
| | | Difference: 99 fewer per 1000<br>(CI 95% 200 fewer - 294 more) | | |
| Clinical improvement: non-responder (2 cm or greater on VAS) | Relative risk: 0.15<br>(CI 95% 0.05 - 0.48)<br>Based on data from 77 participants in 1 studies[7] | 525<br>per 1000 | 79<br>per 1000 | Low<br>Due to extremely serious imprecision, Upgraded due to Large magnitude of effect[8] |
| | | Difference: 446 fewer per 1000<br>(CI 95% 499 fewer - 273 fewer) | | |

| | | | | |
|---|---|---|---|---|
| Complications: pain | Relative risk: 0.66<br>(CI 95% 0.38 - 1.13)<br>Based on data from 85 participants in 2 studies[9] | 450<br>per 1000 | 297<br>per 1000 | Moderate<br>Due to serious imprecision[10] |
| | | Difference: 153 fewer per 1000<br>(CI 95% 279 fewer - 58 more) | | |
| Complications: other | Relative risk: 0.29<br>(CI 95% 0.17 - 0.49)<br>Based on data from 252 participants in 4 studies[11] | 341<br>per 1000 | 99<br>per 1000 | High<br>[12] |
| | | Difference: 242 fewer per 1000<br>(CI 95% 283 fewer - 174 fewer) | | |
| Clinical improvement: grip strength | Measured by:<br>Scale: -<br>Based on data from 190 participants in 3 studies[13] | Mean | Mean | Moderate<br>Due to serious imprecision[14] |
| | | Difference: MD 0.57 lower<br>(CI 95% 2.97 lower - 1.82 higher) | | |
| Pain (VAS) | Measured by:<br>Scale: -<br>Based on data from 165 participants in 3 studies[15] | Mean | Mean | High<br>[16] |
| | | Difference: SMD 0.49 lower<br>(CI 95% 0.80 lower - 0.18 lower) | | |
| BCTQ-SSS | Measured by:<br>Scale: -<br>Based on data from 439 participants in 8 studies[17] | Mean | Mean | Moderate<br>Due to serious inconsistency[18] |
| | | Difference: SMD 0.79 lower<br>(CI 95% 1.33 lower - 0.26 lower) | | |

| | | | | |
|---|---|---|---|---|
| BCTQ-FSS | Measured by:<br>Scale: -<br>Based on data from 439 participants in 8 studies[19] | Mean | Mean | High<br>[20] |
| | | Difference: SMD 0.27 lower<br>(CI 95% 0.46 lower - 0.08 lower) | | |
| Time to return to work | Measured by:<br>Scale: -<br>[21] | Mean | Mean | |
| | | Difference: null higher | | |

1. Systematic review with included studies: Makhlouf 2014, Omar 2018, Chen 2018 **Baseline/comparator** Control arm of reference used for intervention .
2. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias; **Inconsistency: very serious.** The magnitude of statistical heterogeneity was high, with I^2: 88%., Point estimates vary widely, The direction of the effect is not consistent between the included studies; **Imprecision: serious.** Wide confidence intervals, Low number of patients;
3. Systematic review with included studies: Omar 2018, Chen 2018 **Baseline/comparator** Control arm of reference used for intervention .
4. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias; **Inconsistency: very serious.** The magnitude of statistical heterogeneity was high, with I^2: 87%., Point estimates vary widely, The direction of the effect is not consistent between the included studies; **Imprecision: very serious.** Wide confidence intervals, Low number of patients;
5. Systematic review with included studies: Chen 2018 **Baseline/comparator** Control arm of reference used for intervention .
6. **Imprecision: ~extreme_serious.** Only data from one study, Low number of patients, Wide confidence intervals;
7. Systematic review with included studies: Makhlouf 2014 **Baseline/comparator** Control arm of reference used for intervention .
8. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias; **Imprecision: ~extreme_serious.** Low number of patients, Only data from one study; **Upgrade: large magnitude of effect.**
9. Systematic review with included studies: Chen 2018, Ustun 2013 **Baseline/comparator** Control arm of reference used for intervention .
10. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias; **Imprecision: serious.** Low number of patients;
11. Systematic review with included studies: Lee 2014, Roh 2019, Chen 2018, Eslamian 2017 **Baseline/comparator** Control arm of reference used for intervention .

12. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias;
13. Systematic review with included studies: Chen 2018, Roh 2019, Rayegani 2019 **Baseline/comparator** Primary study .
14. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias; **Imprecision: serious.** Wide confidence intervals;
15. Systematic review with included studies: Makhlouf 2014, Chen 2018, Rayegani 2019 **Baseline/comparator** Control arm of reference used for intervention .
16. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias;
17. Systematic review with included studies: Ustun 2013, Roh 2019, Vahdatpour 2019, Chen 2018, Karaahmet 2017, Eslamian 2017, Rayegani 2019, Lee 2014 **Baseline/comparator** Control arm of reference used for intervention .
18. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias; **Inconsistency: serious.** The magnitude of statistical heterogeneity was high, with I^2: 86%., Point estimates vary widely;
19. Systematic review with included studies: Chen 2018, Karaahmet 2017, Eslamian 2017, Rayegani 2019, Lee 2014, Ustun 2013, Roh 2019, Vahdatpour 2019 **Baseline/comparator** Control arm of reference used for intervention .
20. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias;
21. Systematic review. **Baseline/comparator** Control arm of reference used for intervention .

Q4

Intervention: Low-level laser therapy for carpal tunnel syndrome

Comparator: Sham therapy

| Outcome<br>Timeframe | Study results and measurements | Absolute effect estimates | | Certainty of the Evidence<br>(Quality of evidence) |
|---|---|---|---|---|
| | | Sham therapy | Low-level laser therapy for carpal tunnel syndrome | |
| Pain (dichotomous) | Relative risk: 0.46<br>(CI 95% 0.33 - 0.62)<br>Based on data from 120 participants in 1 studies[1] | 898<br>per 1000 | 413<br>per 1000 | Moderate<br>Due to serious imprecision[2] |
| | | Difference: 485 fewer per 1000<br>(CI 95% 602 fewer - 341 fewer) | | |
| Clinical improvement: grip strength | Measured by:<br>Scale: -<br>Based on data from 179 participants in 4 studies[3] | Mean | Mean | Moderate<br>Due to serious inconsistency[4] |
| | | Difference: SMD 0.45 higher<br>(CI 95% 0.05 lower - 0.94 higher) | | |
| Pain (continuous) | Measured by:<br>Scale: -<br>Based on data from 199 participants in 4 studies[5] | Mean | Mean | Low<br>Due to serious inconsistency, Due to very serious inconsistency[6] |
| | | Difference: SMD 5.24 lower<br>(CI 95% 9.64 lower - 0.84 lower) | | |
| BCTQ-SSS | Measured by:<br>Scale: -<br>Based on data from 119 participants in 3 studies[7] | Mean | Mean | Low<br>Due to serious risk of bias, Due to serious inconsistency[8] |
| | | Difference: MD 9.77 lower<br>(CI 95% 14.86 lower - 4.69 lower) | | |

| | | | | |
|---|---|---|---|---|
| BCTA-FSS | Measured by:<br>Scale: -<br>Based on data from 119 participants in 3 studies[9] | Mean | Mean | Moderate<br>Due to serious risk of bias[10] |
| | | Difference: MD 7.28 lower<br>(CI 95% 10.51 lower - 4.05 lower) | | |
| Time to return to work | | No studies reported this outcome. | | |
| Complications/adverse events | | No studies reported this outcome. | | |

1. Systematic review with included studies: Lazovic 2014 **Baseline/comparator** Control arm of reference used for intervention .
2. **Imprecision: serious.** Only data from one study, Low number of patients;
3. Systematic review with included studies: Tascioglu 2012, Shooshtari 2008, Ekim 2007, Chang 2008 **Baseline/comparator** Control arm of reference used for intervention .
4. **Risk of Bias: no serious.** Inadequate sequence generation/ generation of comparable groups, resulting in potential for selection bias, Inadequate concealment of allocation during randomization process, resulting in potential for selection bias; **Inconsistency: serious.** The magnitude of statistical heterogeneity was high, with I^2: 59%., Point estimates vary widely; **Imprecision: no serious.** Low number of patients;
5. Systematic review with included studies: Ekim 2007, Abid Ali 2012, Tascioglu 2012, Shooshtari 2008 **Baseline/comparator** Control arm of reference used for intervention .
6. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias; **Inconsistency: very serious.** Point estimates vary widely, The magnitude of statistical heterogeneity was high, with I^2: 98%.; **Indirectness: no serious.** The outcome time frame in studies were insufficient;
7. Systematic review with included studies: Chang 2008, Abid Ali 2012, Ekim 2007 **Baseline/comparator** Control arm of reference used for intervention .
8. **Risk of Bias: serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Selective outcome reporting; **Inconsistency: serious.** Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The magnitude of statistical heterogeneity was high, with I^2: 96%.; **Imprecision: no serious.** Low number of patients;
9. Systematic review with included studies: Abid Ali 2012, Ekim 2007, Chang 2008 **Baseline/comparator** Control arm of reference used for intervention .
10. **Risk of Bias: serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Selective outcome reporting; **Imprecision: no serious.** Low number of patients;

Q8

Intervention: Surgical treatment with tourniquet

Comparator: Surgical treatment without tourniquet

| Outcome<br>Timeframe | Study results and measurements | Absolute effect estimates | | Certainty of the Evidence<br>(Quality of evidence) |
|---|---|---|---|---|
| | | Surgical treatment without tourniquet | Surgical treatment with tourniquet | |
| Pain (dichotomous: VAS >4) | Relative risk: 4.88<br>(CI 95% 2.06 - 11.55)<br>Based on data from 85 participants in 1 studies[1] | 119<br>per 1000 | 581<br>per 1000 | Moderate<br>Due to serious indirectness, Due to serious imprecision, Upgraded due to Large magnitude of effect[2] |
| | | Difference: 462 more per 1000<br>(CI 95% 126 more - 1255 more) | | |
| Complications/adverse events | Relative risk: 0.99<br>(CI 95% 0.06 - 16.64)<br>Based on data from 145 participants in 2 studies[3] | 56<br>per 1000 | 55<br>per 1000 | Very low<br>Due to very serious inconsistency, Due to serious indirectness, Due to serious imprecision, Due to very serious imprecision[4] |
| | | Difference: 1 fewer per 1000<br>(CI 95% 53 fewer - 876 more) | | |
| Pain (continous) | Measured by:<br>Scale: -<br>Based on data from 392 participants in 7 studies[5] | Mean | Mean | Moderate<br>Due to serious indirectness[6] |
| | | Difference: MD 2.72 higher<br>(CI 95% 2.19 higher - 3.24 higher) | | |
| BCTQ-SSS | Measured by:<br>Scale: -<br>Based on data from 151 participants in 2 studies[7] | Mean | Mean | Moderate<br>Due to serious inconsistency[8] |
| | | Difference: SMD 0.07 higher | | |

| | | | | |
|---|---|---|---|---|
| | | (CI 95% 0.56 lower - 0.70 higher) | | |
| BCTQ-FSS | Measured by:<br>Scale: -<br>Based on data from 151 participants in 2 studies[9] | Mean | Mean | Moderate<br>Due to serious inconsistency[10] |
| | | Difference: SMD 0.36 higher<br>(CI 95% 0.32 lower - 1.05 higher) | | |
| Time to return to work | Measured by:<br>Scale: -<br>Based on data from 0 participants in 0 studies[11] | Mean | Mean | |
| | | Difference: **null higher** | | |

1. Systematic review with included studies: Farzam 2021 **Baseline/comparator** Control arm of reference used for intervention .
2. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias; **Indirectness: serious.** Differences between the outcomes of interest and those reported (e.g short-term/surrogate,not patient-important), The outcome time frame in studies were insufficient; **Imprecision: serious.** Only data from one study, Low number of patients; **Upgrade: large magnitude of effect.**
3. Systematic review with included studies: Okamura 2021, Saleh 2021 **Baseline/comparator** Control arm of reference used for intervention .
4. **Inconsistency: very serious.** Point estimates vary widely, The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2: 66%.; **Indirectness: serious.** Differences between the outcomes of interest and those reported (e.g short-term/surrogate,not patient-important), The outcome time frame in studies were insufficient, The outcome time frame in studies were insufficient, Differences between the outcomes of interest and those reported (e.g short-term/surrogate,not patient-important); **Imprecision: very serious.** Wide confidence intervals, Low number of patients;
5. Systematic review with included studies: Gunasagaran 2017, Braithwaite 1993, Lee 2020, Iqbal 2018, Ralte 2010, Okamura 2021, Saleh 2021 **Baseline/comparator** Control arm of reference used for intervention .
6. **Risk of Bias: no serious.** Inadequate concealment of allocation during randomization process, resulting in potential for selection bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Selective outcome reporting; **Indirectness: serious.** Differences between the outcomes of interest and those reported (e.g short-term/surrogate,not patient-important), The outcome time frame in studies were insufficient;
7. Systematic review with included studies: Iqbal 2018, Okamura 2021 **Baseline/comparator** Control arm of reference used for intervention .
8. **Risk of Bias: no serious.** Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Selective outcome reporting; **Inconsistency: serious.** The magnitude of statistical heterogeneity was high, with I^2: 74%.;
9. Systematic review with included studies: Okamura 2021, Iqbal 2018 **Baseline/comparator** Control arm of reference used for intervention .

10. **Risk of Bias: no serious.** Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Selective outcome reporting; **Inconsistency: serious.** The magnitude of statistical heterogeneity was high, with I^2: 78%.;
11. Systematic review. **Baseline/comparator** Control arm of reference used for intervention.

## Limitations

Comparing the difference from baseline required an ANOVA or ANCOVA analysis, which RevMan does not support. In some of the studies the intervention and control groups were different at baseline, so ideally an ANOVA be a suitable analysis. Because of the limited resources for this clinical practice guidelines, we did not perform such analyses.

We conducted these systematic reviews without having set protocols in the beginning. As a result, we followed the protocols sets in available Cochrane reviews and made pragmatic decisions as we made progress. However, we did not change the set outcomes at the beginning of the project.

Because of limited resources allocated to this project, we only analysed five outcomes. There might be other important outcomes to be considered for the treatment of carpal tunnel syndrome.

We have run double-checking as the good research practice only for 25% of included studies to detect major errors. Although this practice resulted in one sensitivity analysis, we could not find any major errors. However, since 75% percent of the included studies have not been double-checked, there is a possibility of error. Since the final results have been checked by the clinicians and they found the results compatible with the results in clinical practice, we assumed there is no major errors in the remaining studies.

For some of the studies and because of limited time for the evidence synthesis for guideline, we could not access the data from some of the studies; however, we tried to obtain data from Saleh 2021 and extracted more data from the figures to use in the peer-reviewed publications.

Since the primary studies did not report the prevalence of the disease, GRADEpro could not estimate the pre-test probability. This item usually is not being reported as part of GRADE tables.

Direct extraction of TN/FN/TP/FP was not possible via the studies and requires re-calculations; since this was not necessary at this stage, we will consider them for the future publication and present them in 2x2 table.

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## References

Abid Ali, S. J., Ja'afar, I. F., & Hasan, Z. N. (2012). EFFECTIVENESS OF LOW LEVEL LASER IN THE TREATMENT OF CARPAL TUNNEL SYNDROME. Fac Med Baghdad, 54(3), 1-6.

Braithwaite, B. D., Robinson, G. J., & Burge, P. D. (2016). Haemostasis During Carpal Tunnel Release Under Local Anaesthesia: A Controlled Comparison of a Tourniquet and Adrenaline Infiltration. Journal of Hand Surgery, 18(2), 184-186. doi:10.1016/0266-7681(93)90103-m

Chang, W. D., Wu, J. H., Jiang, J. A., Yeh, C. Y., & Tsai, C. T. (2008). Carpal tunnel syndrome treated with a diode laser: a controlled treatment of the transverse carpal ligament. Photomed Laser Surg, 26(6), 551-557. doi:10.1089/pho.2007.2234

Chen, J., & Fowler, J. R. (2021). Comparison of Diagnostic Accuracy of Electrodiagnostic Testing and Ultrasonography for Carpal Tunnel Syndrome. Hand (N Y), 15589447211038701. doi:10.1177/15589447211038701

Chen, P. C., Wang, L. Y., Pong, Y. P., Hsin, Y. J., Liaw, M. Y., & Chiang, C. W. (2018). Effectiveness of ultrasound-guided vs direct approach corticosteroid injections for carpal tunnel syndrome: A double-blind randomized controlled trial. J Rehabil Med, 50(2), 200-208. doi:10.2340/16501977-2308

de Jesus Filho, A. G., do Nascimento, B. F., Amorim Mde, C., Naus, R. A., Loures Ede, A., & Moratelli, L. (2014). Comparative study between physical examination, electroneuromyography and ultrasonography in diagnosing carpal tunnel syndrome. Rev Bras Ortop, 49(5), 446-451. doi:10.1016/j.rboe.2014.09.002

Deniz, F. E., Oksuz, E., Sarikaya, B., Kurt, S., Erkorkmaz, U., Ulusoy, H., & Arslan, S. (2012). Comparison of the diagnostic utility of electromyography, ultrasonography, computed tomography, and magnetic resonance imaging in idiopathic carpal tunnel syndrome determined by clinical findings. Neurosurgery, 70(3), 610-616. doi:10.1227/NEU.0b013e318233868f

Ekim, A., Armagan, O., Tascioglu, F., Oner, C., & Colak, M. (2007). Effect of low level laser therapy in rheumatoid arthritis patients with carpal tunnel syndrome. Swiss Med Wkly, 137(23-24), 347-352.

Emril, D. R., Zakaria, I., & Amrya, M. (2019). Agreement Between High-Resolution Ultrasound and Electro-Physiological Examinations for Diagnosis of Carpal Tunnel Syndrome in the Indonesian Population. Front Neurol, 10, 888. doi:10.3389/fneur.2019.00888

Eslamian, F., Eftekharsadat, B., Babaei-Ghazani, A., Jahanjoo, F., & Zeinali, M. (2017). A Randomized Prospective Comparison of Ultrasound-Guided and Landmark-Guided Steroid Injections for Carpal Tunnel Syndrome. J Clin Neurophysiol, 34(2), 107-113. doi:10.1097/WNP.0000000000000342

Farzam, R., Deilami, M., Jalili, S., & Kamali, K. (2021). Comparison of Anesthesia Results between Wide Awake Local Anesthesia no Tourniquet (WALANT) and Forearm Tourniquet Bier Block in Hand Surgeries: A Randomized Clinical Trial. Arch Bone Jt Surg, 9(1), 116-121. doi:10.22038/abjs.2020.49526.2487

Fowler, J. R., Munsch, M., Tosti, R., Hagberg, W. C., & Imbriglia, J. E. (2014). Comparison of ultrasound and electrodiagnostic testing for diagnosis of carpal tunnel syndrome: study using a validated clinical tool as the reference standard. J Bone Joint Surg Am, 96(17), e148. doi:10.2106/jbjs.M.01250

GRADEpro, G. (2015). GRADEpro GDT: GRADEpro Guideline Development Tool (Software). McMaster University, 2015 (developed by Evidence Prime, Inc.). In.

Gunasagaran, J., Sean, E. S., Shivdas, S., Amir, S., & Ahmad, T. S. (2017). Perceived comfort during minor hand surgeries with wide awake local anaesthesia no tourniquet (WALANT) versus local anaesthesia (LA)/tourniquet. J Orthop Surg (Hong Kong), 25(3), 2309499017739499. doi:10.1177/2309499017739499

Iqbal, H. J., Doorgakant, A., Rehmatullah, N. N. T., Ramavath, A. L., Pidikiti, P., & Lipscombe, S. (2018). Pain and outcomes of carpal tunnel release under local anaesthetic with or without a tourniquet: a randomized controlled trial. J Hand Surg Eur Vol, 43(8), 808-812. doi:10.1177/1753193418778999

Karaahmet, O. Z., Gurcay, E., Kara, M., Serce, A., Kirac Unal, Z., & Cakci, A. (2017). Comparing the effectiveness of ultrasound-guided versus blind steroid injection in the treatment of severe carpal tunnel syndrome. Turk J Med Sci, 47(6), 1785-1790. doi:10.3906/sag-1704-97

Ki Lee, S., Gul Kim, S., & Sik Choy, W. (2020). A randomized controlled trial of minor hand surgeries comparing wide awake local anesthesia no tourniquet and local anesthesia with tourniquet. Orthop Traumatol Surg Res, 106(8), 1645-1651. doi:10.1016/j.otsr.2020.03.013

Kim, M. K., Jeon, H. J., Park, S. H., Park, D. S., & Nam, H. S. (2014). Value of ultrasonography in the diagnosis of carpal tunnel syndrome: correlation with electrophysiological abnormalities and clinical severity. J Korean Neurosurg Soc, 55(2), 78-82. doi:10.3340/jkns.2014.55.2.78

Kwon, B. C., Jung, K. I., & Baek, G. H. (2008). Comparison of sonography and electrodiagnostic testing in the diagnosis of carpal tunnel syndrome. J Hand Surg Am, 33(1), 65-71. doi:10.1016/j.jhsa.2007.10.014

Lazovic, M., Ilic-Stojanovic, O., Kocic, M., Zivkovic, V., Hrkovic, M., & Radosavljevic, N. (2014). Placebo-controlled investigation of low-level laser therapy to treat carpal tunnel syndrome. Photomed Laser Surg, 32(6), 336-344. doi:10.1089/pho.2013.3563

Lee, J. Y., Park, Y., Park, K. D., Lee, J. K., & Lim, O. K. (2014). Effectiveness of ultrasound-guided carpal tunnel injection using in-plane ulnar approach: a prospective, randomized, single-blinded study. Medicine (Baltimore), 93(29), e350. doi:10.1097/MD.0000000000000350

Makhlouf, T., Emil, N. S., Sibbitt, W. L., Jr., Fields, R. A., & Bankhurst, A. D. (2014). Outcomes and cost-effectiveness of carpal tunnel injections using sonographic needle guidance. Clin Rheumatol, 33(6), 849-858. doi:10.1007/s10067-013-2438-5

Mulroy, E., & Pelosi, L. (2019). Carpal tunnel syndrome in advanced age: A sonographic and electrodiagnostic study. Muscle Nerve, 60(3), 236-241. doi:10.1002/mus.26496

Nkrumah, G., Blackburn, A. R., Goitz, R. J., & Fowler, J. R. (2020). Ultrasonography Findings in Severe Carpal Tunnel Syndrome. Hand (N Y), 15(1), 64-68. doi:10.1177/1558944718788642

Okamura, A., Moraes, V. Y., Fernandes, M., Raduan-Neto, J., & Belloti, J. C. (2021). WALANT versus intravenous regional anesthesia for carpal tunnel syndrome: a randomized clinical trial. Sao Paulo Med J, 139(6), 576-578. doi:10.1590/1516-3180.2020.0583.R2.0904221

Omar, G., Ali, F., Ragaee, A., & Darwiesh, A. (2018). Ultrasound-guided injection of carpal tunnel syndrome: A comparative study to blind injection. The Egyptian Rheumatologist, 40(2), 131-135. doi:10.1016/j.ejr.2017.09.001

Padua, L., Pazzaglia, C., Caliandro, P., Granata, G., Foschini, M., Briani, C., & Martinoli, C. (2008). Carpal tunnel syndrome: ultrasound, neurophysiology, clinical and patient-oriented assessment. Clin Neurophysiol, 119(9), 2064-2069. doi:10.1016/j.clinph.2008.05.004

Pan, T. J., White, R. J., Zhang, C., Hagberg, W. C., Imbriglia, J. E., & Fowler, J. R. (2016). Baseline Characteristics of the Median Nerve on Ultrasound Examination. Hand (N Y), 11(3), 353-356. doi:10.1177/1558944715620799

Panagopoulos, G. N., Wu, T., & Fowler, J. R. (2019). Correlation of ultrasound cross-sectional area of the median nerve, nerve conduction studies and 2-point discrimination. Muscle Nerve, 59(2), 236-239. doi:10.1002/mus.26374

Pastare, D., Therimadasamy, A. K., Lee, E., & Wilder-Smith, E. P. (2009). Sonography versus nerve conduction studies in patients referred with a clinical diagnosis of carpal tunnel syndrome. J Clin Ultrasound, 37(7), 389-393. doi:10.1002/jcu.20601

Ralte, P., Selvan, D., Morapudi, S., Kumar, G., & Waseem, M. (2010). Haemostasis in Open Carpal Tunnel Release: Tourniquet vs Local Anaesthetic and Adrenaline. Open Orthop J, 4, 234-236. doi:10.2174/1874325001004010234

Rayegani, S. M., Raeissadat, S. A., Ahmadi-Dastgerdi, M., Bavaghar, N., & Rahimi-Dehgolan, S. (2019). Comparing The Efficacy Of Local Triamcinolone Injection In Carpal Tunnel Syndrome Using Three Different Approaches with or without Ultrasound Guidance. J Pain Res, 12, 2951-2958. doi:10.2147/JPR.S212948

Roghani, R. S., Holisaz, M. T., Norouzi, A. A. S., Delbari, A., Gohari, F., Lokk, J., & Boon, A. J. (2018). Sensitivity of high-resolution ultrasonography in clinically diagnosed carpal tunnel syndrome patients with hand pain and normal nerve conduction studies. J Pain Res, 11, 1319-1325. doi:10.2147/jpr.S164004

Roh, Y. H., Hwangbo, K., Gong, H. S., & Baek, G. H. (2019). Comparison of Ultrasound-Guided Versus Landmark-Based Corticosteroid Injection for Carpal Tunnel Syndrome: A Prospective Randomized Trial. J Hand Surg Am, 44(4), 304-310. doi:10.1016/j.jhsa.2019.02.007

Saleh, E., Saleh, J., Govshievich, A., Ferland-Caron, G., Lin, J. C., & Tremblay, D. M. (2021). Comparing Minor Hand Procedures Performed with or without the Use of a Tourniquet: A Randomized Controlled Trial. Plast Reconstr Surg Glob Open, 9(4), e3513. doi:10.1097/GOX.0000000000003513

Schünemann, H. J., Oxman, A. D., Brozek, J., Glasziou, P., Jaeschke, R., Vist, G. E., . . . Montori, V. M. (2008). Grading quality of evidence and strength of recommendations for diagnostic tests and strategies. Bmj, 336(7653), 1106-1110.

Shooshtari, S. M., Badiee, V., Taghizadeh, S. H., Nematollahi, A. H., Amanollahi, A. H., & Grami, M. T. (2008). The effects of low level laser in clinical outcome and neurophysiological results of carpal tunnel syndrome. Electromyogr Clin Neurophysiol, 48(5), 229-231.

Singh, S., Chang, S. M., Matchar, D. B., & Bass, E. B. (2012). Grading a body of evidence on diagnostic tests. Journal of general internal medicine, 27(1), 47-55.

Tascioglu, F., Degirmenci, N. A., Ozkan, S., & Mehmetoglu, O. (2012). Low-level laser in the treatment of carpal tunnel syndrome: clinical, electrophysiological, and ultrasonographical evaluation. Rheumatol Int, 32(2), 409-415. doi:10.1007/s00296-010-1652-6

Tharwat, S., & Nassar, M. K. (2020). Clinical and ultrasonographic screening for carpal tunnel syndrome in hemodialysis patients. Kidney Res Clin Pract, 39(2), 213-220. doi:10.23876/j.krcp.20.011

Tungoe, B. N., Chopra, R. K., Agarwal, Y., & Jaiman, A. (2021). Role of ultrasound and electro-diagnostic studies in the diagnosis of carpal tunnel syndrome: A comparative study. Pediatric Traumatology, Orthopaedics and Reconstructive Surgery, 9(1), 29-39. doi:10.17816/ptors34866

Ustun, N., Tok, F., Yagz, A. E., Kizil, N., Korkmaz, I., Karazincir, S., . . . Turhanoglu, A. D. (2013). Ultrasound-guided vs. blind steroid injections in carpal tunnel syndrome: A single-blind randomized prospective study. Am J Phys Med Rehabil, 92(11), 999-1004. doi:10.1097/PHM.0b013e31829b4d72

Vahdatpour, B., Haghighat, S., Azimi, Z., & Ramezanian, H. (2019). Carpal Tunnel Syndrome Treatment Using Ultrasound-Guided Versus Landmark-Guided Corticosteroid Injection: A Randomized Prospective Trial. Shiraz E-Med J, 20(6), e83929. doi:http://dx.doi.org/10.5812/semj.83929

Whiting, P. F., Rutjes, A. W., Westwood, M. E., Mallett, S., Deeks, J. J., Reitsma, J. B., . . . Group*, Q.-. (2011). QUADAS-2: a revised tool for the quality assessment of diagnostic accuracy studies. Annals of internal medicine, 155(8), 529-536.

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