Supplementary material

Appendix 1 - MEDLINE Search Strategy for RCTs:

1. EXP Transcutaneous Electric Nerve Stimulation/
2. TENS.ti,ab
3. TNS.ti,ab
4. ENS.ti,ab
5. transcutaneous electric* nerve stimulation.ti,ab.
6. transcutaneous nerve stimulation.ti,ab
7. electric* nerve stimulation.ti,ab
8. electrostimulation therap*.ti,ab
9. electro-stimulation therap*.ti,ab.
10. electric* nerve therap*.ti,ab
11. electroanalgesi*.ti,ab
12. transcutaneous electric* stimulation.ti,ab.
13. TES.ti,ab
14. or/1-13
15. Pain
16. Randomized controlled trial. pt.
17. Controlled clinical trial.pt.
18. 16 OR 17
19. 14 AND 15 AND 18
Appendix 2 - MEDLINE Search Strategy for systematic reviews:

1. EXP Transcutaneous Electric Nerve Stimulation/
2. TENS.ti,ab
3. TNS.ti,ab
4. ENS.ti,ab
5. transcutaneous electric* nerve stimulation.ti,ab.
6. transcutaneous nerve stimulation.ti,ab
7. electric* nerve stimulation.ti,ab
8. electrostimulation therap*.ti,ab
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10. electric* nerve therap*.ti,ab
11. electroanalgesi*.ti,ab
12. transcutaneous electric* stimulation.ti,ab.
13. TES.ti,ab
14. or/1-13
15. Pain
18. 16 OR 17
19. 14 AND 15 AND 18
Appendix 3 - Data extraction

- Study Design
  - Cross-over, parallel-group,
  - Setting
  - Study duration
  - Methods of sequence generation and allocation concealment, blinding, intention-to-treat or per protocol analysis

- Study Participants
  - Age, gender
  - Pain diagnosis, duration of pain and symptoms

- Sample size
  - Active and comparator groups

- Interventions used
  - TENS
    - Type of TENS device (e.g. standard or ‘TENS-like’)
    - Electrode placement
    - Electrical characteristics of TENS (pulse frequency, waveform, amplitude/intensity, duration)
    - Dosage (treatment time and frequency)
    - Setting (where TENS was applied and by whom)
    - Adverse effects
  - Comparison group(s)
    - Type
    - Method of delivery (e.g. if placebo TENS then details of electrode placement, characteristics of placebo TENS (pulse frequency, waveform, amplitude/intensity, duration)
    - Dosage (treatment time and frequency)
    - Setting (where it was applied and by whom)
    - Adverse effects
  - Concomitant treatments
    - Pharmacological and non-pharmacological

- Outcomes
  - Type
  - Time points used including follow-up
- Withdrawals
  - Adverse and serious adverse effects
  - Other

Sponsorship, country of origin, conflict of interest statements.
Appendix 4 - Assessment of risk of bias in included studies

- Random allocation sequence generation (checking for possible selection bias)
  - Low risk of bias - any truly random process, e.g. random number table; computer random number generator
  - Unclear risk of bias - method used to generate sequence not clearly stated
  - We will exclude studies using a non-random process such as odd or even date of birth; hospital or clinic record number

- Allocation concealment (checking for possible selection bias)
  - Low risk of bias - e.g. telephone or central randomization; consecutively numbered, sealed, opaque envelopes
  - Unclear risk of bias - method not clearly stated
  - High risk of bias - studies that do not conceal allocation (e.g. open list)

- Blinding of outcome assessment (checking for possible detection bias)
  - Blinding of participants
    - Low risk of bias - participants blinded to allocated intervention and unlikely that blinding broken
    - Unclear risk of bias - insufficient information to permit judgement of low/high risk of bias
    - High risk of bias - participants not blinded to allocated intervention OR participants blinded to allocated intervention but it was likely that blinding may have been broken
  - Blinding of care provider
    - Low risk of bias - care provider blinded to allocated intervention and unlikely that blinding broken
    - Unclear risk of bias - insufficient information to permit judgement of low/high risk of bias
    - High risk of bias - care provider not blinded to allocated intervention and the two interventions clearly identifiable to the care provider as experimental and control OR care provider blinded to allocated intervention but likely that blinding was broken
  - Blinding of assessor
    - Low risk of bias - outcome assessor (including 'participants' with respect to self-report outcomes) blinded to participants' allocated intervention and unlikely that blinding broken
Unclear risk of bias - insufficient information to permit judgement of low/high risk of bias

High risk of bias - outcome assessor (including 'participants' with respect to self-report outcomes) un-blinded to participants' allocated intervention OR outcome assessor blinded to allocated intervention but likely that blinding was broken

- Incomplete outcome data (drop-outs)
  - Low risk of bias < 20% drop-out and appears to be random with numbers per group provided along with reasons for drop-out
  - Unclear risk of bias < 20% and unclear if random with numbers per group and reasons for drop-out not described
  - High risk of bias ≥ 20% drop-out

- Incomplete outcome data (protocol violations)
  - Low risk of bias - if participants were analyzed in the group to which they were originally assigned
  - Unclear risk of bias - where insufficient information is provided to determine if analysis was per protocol or intention-to-treat
  - High risk of bias - where per protocol analysis was used, where available data were not analyzed or participants' data were included in the group to which they were not originally assigned

- Selective reporting
  - Low risk of bias - study protocol was available and all pre-specified outcomes were reported or study protocol was not available but all expected outcomes were reported
  - Unclear risk of bias - inadequate information to allow judgement of a study to be classified as 'low risk' or 'high risk'
  - High risk of bias - incomplete reporting of specified outcomes. One or more primary outcomes are reported using measurements or analysis that was not pre-specified. One or more of the primary outcomes was not pre-specified. One or more outcomes of interest were reported incompletely and could not be entered into meta-analysis. Results for a key outcome expected to be reported were excluded

- Size of study (checking for biases confounded by small size)
  - Low risk of bias ≥ 200 participants per treatment arm
  - Unclear risk of bias - 50 to 199 participants per treatment arm
• High risk of bias < 50 participants per treatment arm

• Other sources of bias
  o We will consider other factors including whether studies were stopped early, there were differences between groups at baseline, the timing of outcome measurement, co-intervention comparability, and funding declarations
Appendix 5- Grades of Recommendation, Assessment, Development and Evaluation (GRADE) system

- High: we are very confident that the true effect lies close to that of the estimate of the effect
- Moderate: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of effect, but there is a possibility that it is substantially different
- Low: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect
- Very low: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect

We will decrease the GRADE rating by one (-1) or two (-2) if we identify:

- Serious (-1) or very serious (-2) limitation to study quality
- Important inconsistency (-1)
- Some (-1) or major (-2) uncertainty about directness
- Imprecise or sparse data (-1)
- High probability of reporting bias (-1)
**Table S1 - Reporting checklist for protocol of a systematic review.**

<table>
<thead>
<tr>
<th>Reporting Item</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identification</strong></td>
<td></td>
</tr>
<tr>
<td>#1a Identify the report as a protocol of a systematic review</td>
<td>1</td>
</tr>
<tr>
<td><strong>Update</strong></td>
<td></td>
</tr>
<tr>
<td>#1b If the protocol is for an update of a previous systematic review, identify as such</td>
<td>N/A</td>
</tr>
<tr>
<td>#2 If registered, provide the name of the registry (such as PROSPERO) and registration number</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Contact</strong></td>
<td></td>
</tr>
<tr>
<td>#3a Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author</td>
<td>1</td>
</tr>
<tr>
<td><strong>Contribution</strong></td>
<td></td>
</tr>
<tr>
<td>#3b Describe contributions of protocol authors and identify the guarantor of the review</td>
<td>16</td>
</tr>
<tr>
<td>#4 If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Sources</strong></td>
<td></td>
</tr>
<tr>
<td>#5a Indicate sources of financial or other support for the review</td>
<td>16</td>
</tr>
<tr>
<td><strong>Sponsor</strong></td>
<td></td>
</tr>
<tr>
<td>#5b Provide name for the review funder and / or sponsor</td>
<td>16</td>
</tr>
<tr>
<td><strong>Role of sponsor or funder</strong></td>
<td></td>
</tr>
<tr>
<td>#5c Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol</td>
<td>16</td>
</tr>
<tr>
<td><strong>Rationale</strong></td>
<td></td>
</tr>
<tr>
<td>#6 Describe the rationale for the review in the context of what is already known</td>
<td>4-6</td>
</tr>
<tr>
<td><strong>Objectives</strong></td>
<td></td>
</tr>
<tr>
<td>#7 Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)</td>
<td>7</td>
</tr>
<tr>
<td><strong>Eligibility criteria</strong></td>
<td></td>
</tr>
<tr>
<td>#8 Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review</td>
<td>8-9</td>
</tr>
<tr>
<td><strong>Information sources</strong></td>
<td></td>
</tr>
<tr>
<td>#9 Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage</td>
<td>10-11</td>
</tr>
</tbody>
</table>

**Supplementary material BMJ Open**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Code</th>
<th>Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search strategy</td>
<td>#10</td>
<td>Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated</td>
<td></td>
</tr>
<tr>
<td>Study records - data management</td>
<td>#11a</td>
<td>Describe the mechanism(s) that will be used to manage records and data throughout the review</td>
<td>10-12</td>
</tr>
<tr>
<td>Study records - selection process</td>
<td>#11b</td>
<td>State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)</td>
<td>11</td>
</tr>
<tr>
<td>Study records - data collection process</td>
<td>#11c</td>
<td>Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators</td>
<td>11</td>
</tr>
<tr>
<td>Data items</td>
<td>#12</td>
<td>List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications</td>
<td>12-13</td>
</tr>
<tr>
<td>Outcomes and prioritization</td>
<td>#13</td>
<td>List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale</td>
<td>13</td>
</tr>
<tr>
<td>Risk of bias in individual studies</td>
<td>#14</td>
<td>Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis</td>
<td>12/14</td>
</tr>
<tr>
<td>Data synthesis</td>
<td>#15a</td>
<td>Describe criteria under which study data will be quantitatively synthesised</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>#15b</td>
<td>If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall’s τ)</td>
<td>12-14</td>
</tr>
<tr>
<td></td>
<td>#15c</td>
<td>Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)</td>
<td>15-16</td>
</tr>
<tr>
<td></td>
<td>#15d</td>
<td>If quantitative synthesis is not appropriate, describe the type of summary planned</td>
<td>15</td>
</tr>
<tr>
<td>Meta-bias(es)</td>
<td>#16</td>
<td>Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)</td>
<td>14</td>
</tr>
</tbody>
</table>
Confidence in cumulative evidence  

#17  Describe how the strength of the body of evidence will be assessed (such as GRADE)  

15