Is automatic CPAP titration as effective as manual CPAP titration in OSAHS patients? A meta-analysis

CRD summary
The authors concluded that automatic titration was as effective as manual titration in the treatment of continuous positive airway pressure in patients with obstructive sleep apnoea. This was a generally well-conducted review, but given the heterogeneity among trials and level of quality, the authors’ conclusions should be interpreted with some caution as their reliability is unclear.

Authors’ objectives
To compare the effectiveness of automatic versus manual titration for continuous positive airway pressure in the treatment of obstructive sleep apnoea.

Searching
Eight databases (including PubMed, EMBASE and the Cochrane Library) were searched from inception to July 2010; key search terms were reported. Searches were restricted to articles in English and Chinese. Grey literature was screened using the System for Information on Grey Literature. In addition, reference lists of relevant reviews and randomised trials were manually searched.

Study selection
Eligible for inclusion were randomised controlled trials (RCTs) that compared automatic versus manual titration for continuous positive airways pressure in previously untreated patients with obstructive sleep apnoea. Outcomes of interest were apnoea/hypopnoea index, Epworth sleepiness scale, the acceptance of or compliance with continuous positive airway pressure.

Included trials were conducted in Europe, China, Australia and the USA. Inclusion and exclusion criteria varied across trials. Automatic and manual titration used various models. Most trials conducted automatic titration within sleep laboratories; others conducted titration within the patient’s home. With the exception of one trial, patients were sent home with the continuous positive airways pressure set to the prescribed titration.

Two reviewers independently screened studies for inclusion; disagreements were resolved by discussion or referral to a third reviewer.

Assessment of study quality
Two reviewers independently assessed trial validity according to the Cochrane Handbook for Systematic Reviews of Interventions. Criteria included randomisation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting, intention-to-treat analysis, and other bias. Any disagreements were resolved through consensus.

Data extraction
Two reviewers independently extracted dichotomous outcome data to calculate odds ratios with 95% confidence intervals. Continuous data were extracted to calculate mean differences, with 95% confidence intervals.

Methods of synthesis
A fixed-effect model was used to combine odds ratios (OR) or mean differences (to calculate standardised mean differences - SMD) and 95% confidence intervals (CI) unless there was evidence of significant statistical heterogeneity ($I^2$ over 50%), in which case a random-effects model was used or a narrative synthesis was presented. Statistical heterogeneity was assessed using $I^2$ and the $X^2$ test.

Results of the review
Ten RCTs (849 patients) were included in the review. Methodological quality was not satisfactory. All trials were randomised but randomisation methods were not clearly stated. Three RCTs were single blinded, but blinding was
unclear for other trials. Only one trial used intention-to-treat analysis. Trials either had no follow-up or follow-up that ranged from four to 12 weeks.

Findings on pressure were inconsistent across the trials, showing high statistical heterogeneity (nine RCTs; $I^2=92\%$).

Changes between the two titration methods were similar for apnoea/hypopnoea index (six RCTs), Epworth sleepiness scale (five RCTs), and sleep quality based on change of sleep stage 1, rapid eye movement, and total sleep time (two RCTs). Significant statistical heterogeneity was identified for apnoea/hypopnoea index ($I^2=57\%$) and Epworth sleepiness scale ($I^2=64\%$).

There were no statistically significant differences in levels of patient acceptance of automatic versus manual titration (six RCTs; $I^2=0\%$), or for levels of compliance in use of the two different methods (five RCTs; $I^2=0\%$).

**Authors’ conclusions**
Automatic titration was as effective as manual titration in identifying a proper pressure, reducing apnoea/hypopnoea index, and Epworth sleepiness scale, while maintaining sleep quality and compliance of continuous positive airway pressure treatment.

**CRD commentary**
The review question and supporting criteria were clearly stated. A number of relevant sources were searched for relevant literature, but as the search was restricted by language, language bias could not be ruled out. Each stage of the review process was performed in duplicate, which reduced the potential for reviewer error and bias.

Appropriate criteria were used to assess trial quality, but quality was not high, as acknowledged by the authors. Patient characteristics were lacking, and some outcomes appeared to have been assessed using self-report measures. The authors acknowledged the heterogeneity across trials, but it was unclear how appropriate it was to statistically combine data; the authors did try to use appropriate methods to account for this, including the presentation of qualitative synthesis.

This was a generally well-conducted review and the authors’ conclusions reflected the evidence. However, given the heterogeneity among trials and level of quality, the authors’ conclusions should be interpreted with some caution as their reliability is unclear.

**Implications of the review for practice and research**
*Practice*: The authors stated that automatic positive airway pressure could be used to titrate an appropriate pressure for continuous positive airway pressure treatment, especially under the condition of manual device shortage and long waiting lists.

*Research*: The authors stated that large RCTs were needed to verify the findings and verify the potential time and cost savings of automatic titration methods, particularly in developing countries.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.