Moxifloxacin monotherapy versus beta-lactam-based standard therapy for community-acquired pneumonia: a meta-analysis of randomised controlled trials

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CRD summary
This well-conducted review found that moxifloxacin could be used as effectively and safely as beta-lactam-based standard therapy for community acquired pneumonia and showed a favourable pathogen eradication rate. These conclusions are likely to be reliable.

Authors’ objectives
To compare the efficacy and safety of moxifloxacin with beta-lactam-based regimens for the treatment of community-acquired pneumonia.

Searching
PubMed, Cochrane Central Register of Controlled Trials (CENTRAL) and EMBASE were searched to December 2009. Search terms were reported. No language restrictions were applied. Reference lists from relevant studies and reviews were screened. Studies reported only as abstracts were excluded.

Study selection
Randomised controlled trials (RCTs) that compared moxifloxacin with beta-lactam-based standard therapy in patients with community-acquired pneumonia were eligible for inclusion. Trials had to report data on clinical treatment success, microbiological treatment success, mortality, and adverse events.

All included trials were multi-centre and conducted in adults; most trials were conducted in hospitalised patients. All trials administered oral moxifloxacin at a dosage of 400mg, in some trials this followed intravenous moxifloxacin. Beta-lactam-based regimens varied and included combinations of amoxicillin, clavulanic acid, roxithromycin, ceftriaxon, erythromycin, cefuroxime, azithromycin and levofloxacine, which were administered orally or intravenously at various dosages.

Two reviewers independently selected studies for inclusion.

Assessment of study quality
Two reviewers independently assessed trial quality using the Jadad criteria which assign trials a score out of 5 points based on randomisation, blinding and withdrawals. Trials that scored more than 2 were considered to be of good quality. Trials were also assessed for allocation concealment and intention-to-treat analysis.

Data extraction
Two reviewers independently extracted data to calculate odds ratios (ORs) together with 95% confidence intervals (CIs). Where necessary, authors were contacted for additional information. Disagreements were resolved by a third reviewer.

Methods of synthesis
Summary odds ratios, together with 95% confidence intervals, were estimated using DerSimonian and Laird random-effects models. Heterogeneity was assessed using the $X^2$ and $I^2$ statistics.

Sensitivity analysis was conducted by excluding one trial at a time to investigate the effect on summary odds ratios and by restricting the analysis to trials fulfilling certain methodological criteria.

Publication bias was assessed using funnel plots.
Results of the review

Seven RCTs (n=3,903 patients) were included in the review. Six trials scored at least 3 points on the Jadad scale; one trial scored only 1 point. Allocation concealment was adequate in four trials; it was unclear in the other three. Six trials provided an adequate description of follow-up. Two trials reported adequate blinding. Six trials conducted analysis on an intention-to-treat basis. Five of the trials were industry funded.

There were no significant differences between moxifloxacin and beta-lactam-based regimens in the treatment of community-acquired pneumonia for clinical treatment success (seven RCTs) or mortality (six RCTs). Moxifloxacin was associated with a significant improvement in microbiological treatment success of community-acquired pneumonia (OR 1.69, 95% CI 1.02 to 2.80; five RCTs). The incidence of adverse events and serious adverse events was similar between treatment groups. There was no evidence of statistical heterogeneity for any of the analyses (p<0.10, I²=0 to 43%). Restricting the analysis to trials judged to be of higher quality did not alter the findings.

The funnel plot showed no evidence of publication bias.

Authors' conclusions

Moxifloxacin could be used as effectively and safely as beta-lactam-based standard therapy for community-acquired pneumonia and showed a favourable pathogen eradication rate.

CRD commentary

The review addressed a focused question. The inclusion criteria were clearly defined. The literature search was adequate for published studies and no language restrictions were applied. However, no specific attempts were made to locate unpublished data and studies available only as abstracts were excluded. Therefore, publication bias was possible; this was assessed in the review and no evidence was found. Appropriate steps were taken to minimise bias and errors at all stages of the review.

Trial quality was assessed using relevant criteria; the results of this assessment were clearly presented. Appropriate methods were used to pool data. Results were clearly presented with the aid of forest plots.

This was generally a well conducted review and the authors’ conclusions are likely to be reliable.

Implications of the review for practice and research

Practice: The authors stated that once-daily dosing of moxifloxacin monotherapy may be a useful alternative to beta-lactam-based standard therapy.

Research: The authors stated that well designed head-to-head RCTs focusing on moxifloxacin monotherapy compared with beta-lactam-based standard therapy for community-acquired pneumonia are warranted.

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