Interventions to influence consulting and antibiotic use for acute respiratory tract infections in children: a systematic review and meta-analysis


CRD summary
This review found a reliable reduction in antibiotic use following delayed prescribing strategies for children with respiratory tract infections. However, the reliability of the authors’ conclusion about reduced rates of parent/caregiver consultations is uncertain due to the limited quality of some of the evidence. Also, there was insufficient evidence to conclude that parent satisfaction is unaffected by the interventions.

Authors’ objectives
To assess the effectiveness of interventions directed towards parents or caregivers to promote more appropriate consulting and antibiotic use for children with acute respiratory tract infections in primary care.

Searching
PubMed, EMBASE, CINAHL, PsycINFO and The Cochrane Library were searched (up to March/November 2011) with no language restrictions. Search terms were reported. References and related citations were also checked.

Study selection
Eligible study designs included randomised controlled trials (RCTs), controlled studies and single group pre/post-test studies. Studies were required to evaluate any educational or behavioural intervention directed at caregivers to influence consulting or antibiotic use for acute respiratory tract infections in children (from birth to 18 years) in primary care in developed countries (defined according to Organisation for Economic Cooperation and Development membership). Eligible comparators were no treatment or alternate treatment controls.

Studies that focused on influencing parental consultation were delivered by written materials at home, in general practitioner surgeries, or in emergency departments. Some studies also included brief verbal education in addition to booklets. The studies measured changes in the rate or number of consultations for respiratory tract infections, or change in knowledge about the reasons for consultation.

Studies that focused on influencing parents’ decisions about the use of antibiotics implemented the intervention during the consultation; only a few interventions were pre-emptive. Intervention materials included videos and hand-outs. Studies reported changes in parental knowledge of appropriate antibiotic use. Some studies included materials to engage the children directly.

Most of the included studies took place in the USA, with some based in the UK and Israel.

Two reviewers independently assessed full papers for inclusions with any disagreements referred to a third reviewer.

Assessment of study quality
Study quality was independently assessed by two reviewers using criteria adapted from the Cochrane risk of bias tool. RCTs were assessed based on randomisation, blinding, description of the intervention, exposure to the intervention, and generalisability. Non-randomised studies were assessed based on comparability of the groups, intervention description, exposure to intervention, and generalisability. Each item was judged as low, high or unclear risk of bias. Studies were given an overall label of minimum, likely or high risk of bias.

Data extraction
For each study outcome, data were extracted to calculate overall mean differences with associated 95% confidence intervals. Changes in rates were calculated as odds ratios and 95% confidence intervals (using Yates's correction and Fishers exact test where expected cell count was less than five). Where raw data were not available, proportional or mean differences were used. Authors were contacted to request any missing data.

Data were extracted by two reviewers working independently, with any disagreements resolved by discussion with a
third reviewer.

**Methods of synthesis**
A random-effects model was used to pool individual study outcome data and calculate risk ratios and odds ratios. Heterogeneity was assessed using $I^2$, where a score of over 50% was rated as important with clinical or statistical causes evaluated. Numbers needed to treat were calculated.

Sensitivity analyses were conducted by removing studies contributing to apparent statistical heterogeneity when meta-analysis was possible.

Where statistical pooling was inappropriate due to heterogeneity, a narrative synthesis was presented.

**Results of the review**
The review included 20 studies (based on supplementary online table S3) comprising 14 RCTs, two cluster randomised trials, three pre/post-test studies and one non randomised controlled trial.

**Interventions to influence parental consulting**
Eight studies reported on interventions aimed to influence parental consulting (1,488 parents, 1,580 families, 558 children) with follow-up that ranged from three days to 17 months. There was likely to be risk of bias for all but two of the studies, which were judged to be at minimal risk.

Five studies assessed change in parent knowledge relating to consulting. All five studies reported significant increases in knowledge about respiratory tract infections or appropriate reasons to consult in the intervention groups compared with control groups. None of studies measured the impact on the actual number of consultations.

Six studies reported on change in consultation rates. Three studies found providing booklets before the children became ill reduced the number of consultations, but two of these studies were published over 20 years ago. Two studies assessed interventions delivered at the point of consultation which aimed to reduce re-consultations; neither of the studies found any difference in consultation rate, although one study reported that the intervention group was more likely to receive antibiotics.

**Interventions to influence parents’ decisions in antibiotic use for respiratory tract infections in children**
Nine studies focused on this topic (2,916 participants) with follow-up that ranged from one day to 36 weeks. Most interventions took place during the consultation.

Four out of five studies measuring parental knowledge of appropriate antibiotic use found a significant increase following the intervention compared to the control group. Three studies were rated as likely to be at risk of bias, one study was rated as minimal and one study was highly likely to be biased.

Two studies measured parental attitudes towards antibiotic use and reported mixed results. Neither of the studies found any change in antibiotic prescribing rates over six to 12 months. One study was judged to be at minimal risk of bias; the other study was given a high rating.

Two studies assessed parent satisfaction with a watchful-waiting approach but no differences were found between intervention and control groups. Both studies were rated at minimal risk of bias.

**Interventions to influence antibiotic use in children with respiratory tract infections**
Five studies reported this outcome. All but one study assessed the effect of delayed prescribing or watchful waiting; the other study used a book-based intervention. Meta-analysis of five studies (all rated minimal risk of bias) found a significant reduction in numbers of children taking or parents filling antibiotic prescriptions (RR 0.39, 95% CI 0.29 to 0.53), but significant heterogeneity was observed ($I^2=77\%$). Analysis with one study (where all parents used antibiotics) removed still found a significant effect of the intervention (RR 0.46 95% CI: 0.40 to 0.54).
Authors’ conclusions
Interventions such as written materials could reduce the number of consultations by 10 to 40% and the use of antibiotics could be reduced by up to half through delayed prescribing for children with respiratory tract infections. Reductions in antibiotic use did not seem to occur at the expense of parent satisfaction.

CRD commentary
This review addressed a clear clinical question with appropriate inclusion criteria. Adequate literature searches were made with no language limitations, although unpublished data were not sought. Review processes were carried out in duplicate, which reduced the chance of reviewer error or bias influencing the review.

The included studies were assessed for quality, but the modification of a validated tool, the application of an RCT tool to other study designs, and the unclear justification for assigning summary risk of bias judgements meant the reliability of the evidence was unclear at times. The number of included studies and interventions was not consistent between text and tables (this abstract used data from the tables).

The narrative synthesis and limited meta-analysis appeared to be broadly appropriate. However, the conclusions drawn from the mixed evidence may be somewhat stronger than could be justified and appear to be based on limited, poor quality evidence in some cases. Two of the studies were over 20 years old, some of the studies relied on self-report questionnaires, and there was little reporting of harm. The findings were limited in their applicability to other countries/settings and to children with more severe illness.

There did appear to be a reliable reduction in antibiotic use following delayed prescribing strategies for children with respiratory tract infections, but the reliability of the conclusion about reduced rates of consultations is uncertain due to the quality of the evidence, and there is insufficient evidence to conclude that parent satisfaction is unaffected by the interventions.

Implications of the review for practice and research
Practice: The authors stated that interventions such as written materials could reduce the number of consultations by 10 to 40% (although some of the evidence was dated), and use of antibiotics could be reduced by up to half through delayed prescribing for children with respiratory tract infections. Such interventions should be more widely implemented. The authors stated that this review provided policy makers with evidence to implement effective interventions in community settings to reduce consultations and antibiotic use.

Research: The authors stated that more detailed reporting of the intervention components were required, with longer follow-up periods. Potential outcomes should include number of symptomatic days, hospitalisations, school days missed and adverse outcomes. Head-to-head trials that compare the effectiveness of several delivery formats including electronic were required. Interventions should be developed together to influence consulting and antibiotic use for respiratory tract infections in children rather than in isolation.

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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.