Management of bronchiolitis in infants and children

CRD summary
This review assessed the management (diagnosis, treatment, prophylaxis) of bronchiolitis in infants and children. The authors concluded that there is insufficient evidence to recommend any of the treatment assessed over good supportive care. The authors’ conclusions are consistent with the evidence reviewed, and are likely to be robust.

Authors’ objectives
To assess the effectiveness of diagnostic tools, pharmaceutical therapies and prophylactic therapies, and the cost-effectiveness of prophylactic treatment, in the management of bronchiolitis in infants and children. This abstract focused upon the diagnosis and treatment of existing bronchiolitis in infants and children.

Searching
MEDLINE, the Cochrane Library and HEED were searched for articles published in English from 1980 to November 2002; the search terms were reported. In addition, the reference lists of relevant articles were checked and a Technical Expert Advisory Group was consulted.

Study selection
Study designs of evaluations included in the review
For the assessment of diagnosis, randomised controlled trials (RCTs) and prospective cohort studies were eligible for inclusion. For the assessment of prophylaxis, RCTs were eligible for inclusion. Single case reports and small case series were excluded. The studies had to have at least 10 participants.

Specific interventions included in the review
No inclusion criteria for the diagnostic tests were stated. The specific tests assessed were clinical diagnosis based on history and findings on physical examination, chest X-rays, complete blood counts and virologic tests (enzyme immunoassays, direct immunofluorescence assays and polymerase chain reaction assays).

No inclusion criteria for the treatment interventions were stated. The specific interventions assessed were nebulised epinephrine, nebulised bronchodilators, nebulised ipratropium bromide, oral inhaled or parenteral corticosteroids, aerosolised ribavirin, oral antibiotics, alpha-2A-interferon (IFN), helium-oxygen mixture, Shuang Huang Lian, surfactant, nebulised furosemide, recombinant human deoxyribonuclease (rhDNase) and respiratory syncytial virus (RSV) immunoglobulin.

Reference standard test against which the new test was compared
The review did not include any diagnostic accuracy studies that compared the performance of the index test with a reference standard of diagnosis.

Participants included in the review
Studies that included infants and children were eligible for inclusion.

Outcomes assessed in the review
No inclusion criteria for the outcomes were stated. Studies that assessed clinically relevant outcomes were eligible. The primary outcomes of interest were mortality, morbidities related to the acute episode and to possible long-term sequelae, and health service utilisation. The secondary outcomes were any reported physiological outcome measures.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed studies for inclusion, with any disagreements being resolved by consensus.
Assessment of study quality
The quality of the RCTs was assessed according to methods of randomisation, blinding, statistical analysis, funding or sponsorship, appropriateness of the population studied, and the clarity and relevance of the outcomes used. Each study was assigned an overall quality score which ranged from 1 (poor) to 4 (excellent). Two independent reviewers assessed the validity of the primary studies, with any disagreements being resolved by consensus.

Data extraction
Two independent reviewers abstracted the data, with any disagreements being resolved by consensus. For each outcome, the results for each study arm and P-values were recorded.

Methods of synthesis
How were the studies combined?
The studies were grouped primarily according to whether they assessed diagnosis, or treatment or prophylaxis, then further grouped by the type of test or treatment. The studies were then combined in a narrative.

How were differences between studies investigated?
Differences between the studies were discussed according to methodological quality, severity of illness, and differences in the test or treatment schedules.

Results of the review
Sixty-eight studies in total were included: 16 assessed diagnostic strategies and 52 prophylactic strategies.

This is a summary of the main findings of the review. For further detail on specific results, readers are referred to the relevant sections of the report.

Diagnosis.
The diagnosis of bronchiolitis is primarily one based on clinical signs and symptoms. Specific literature regarding the diagnosis was not found, but a reasonably large amount of literature on supportive laboratory tests (respiratory syncytial assays, complete blood counts and chest X-rays) was appraised. Only one study of 16 test supported the clinical usefulness of such information.

Treatment.
Treatments for which there was strong evidence of effectiveness were not identified. However, some interventions did show some potential for being effective. These included nebulised epinephrine, nebulised salbutamol plus ipratropium bromide, nebulised ipratropium bromide, oral parenteral corticosteroids (preferably dexamethasone) and inhaled corticosteroids (preferably budesonide). Two interventions that were classified as showing some potential of being effective (inhaled helium-oxygen and surfactant for ventilated children) were only applicable to the most severely ill children.

There were sufficient data to doubt the effectiveness of several commonly used treatments for bronchiolitis. These were aerosolised ribavirin, antibiotics, nebulised furosemide, intravenous RSV immunoglobulin (as a treatment rather than as a prophylactic agent), inhaled alpha-IFN and nebulised rhDNase. In addition a number of adverse events were associated with the use of budesonide and alpha-2-IFN.

Cost information
Yes. When all costs were adjusted to 2002 U.S. dollars, the results from the studies suggested that prophylactic therapy for infants of 32 to 35 weeks’ estimated gestational age ranged from cost-savings (the expected value of avoided health care utilisation is greater than the costs of prophylactic therapy) of US$46,400 to an upper bound of over US$500,000.
Authors' conclusions
There was insufficient evidence to recommend any of the treatments assessed over good supportive care of affected infants and children. However, several treatments did show some potential for being effective, and these should be subjected to rigorously designed, adequately sized trials.

CRD commentary
This was a broad review question that was only loosely defined in terms of the participants, outcomes and study designs. No inclusion criteria were stated for the interventions. A number of sources were searched for relevant studies, but these were restricted to those published in English and no unpublished studies were sought. Language and publication bias might therefore have been introduced into the review. Efforts were made to minimise reviewer bias and errors in the review process, and the quality of the primary studies was assessed. Adequate study details were provided to allow the reader to assess whether the authors' conclusions were consistent with the evidence base reviewed. The use of a narrative synthesis was appropriate given the differences between the included studies. Overall, the authors' conclusions are consistent with the evidence reviewed and are likely to be robust.

Implications of the review for practice and research
Practice: The authors stated that current evidence was insufficient to recommend any of the treatments studied over good supportive care of affected infants and children.

Research: The authors stated that although ancillary testing is common practice, no data demonstrate the utility of such testing. Therefore, prospective trials of the utility of ancillary testing (chest X-rays, complete blood tests, RSV testing) should be conducted. They also stated that nebulised epinephrine, nebulised salbutamol plus ipratropium bromide, nebulised ipratropium bromide, oral or parenteral corticosteroids and inhaled corticosteroids should be assessed in further rigorously designed, adequately powered trials. Research on the RSV vaccine should be encouraged.

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Other publications of related interest

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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.