The effect of case management on childhood pneumonia mortality in developing countries


CRD summary
This review concluded that available evidence reinforced the effectiveness of community and hospital case management with antibiotics, but not the effectiveness of zinc and vitamin A supportive treatment for treating children with pneumonia as recommended by World Health Organisation. Given the poor quality of included studies and some concerns about the review methods, these conclusions should be interpreted cautiously.

Authors' objectives
To assess the effectiveness of case management on childhood pneumonia mortality.

Searching
MEDLINE, EMBASE and Web of Knowledge were searched from 1970 to August 2008 with no language restrictions. Search terms were reported. References lists of relevant publications were screened.

Study selection
Randomised controlled trials (RCTs), cluster RCTs, quasi-experimental studies and observational studies that compared community and hospital case management with placebo or no treatment in children (less than five years old) with a clear case definition of pneumonia were eligible for inclusion. For experimental studies, eligible participants had to be followed up until they were more than two years old. For hospital case management, observational studies had to be conducted in developing countries with a sample size of at least 100 and well-defined interventions (dose, administration and frequency of delivery). Studies of ambulatory treatment for non-severe pneumonia or of selective groups of pre-school children (details in the paper) were excluded. Eligible outcomes included all-cause mortality, pneumonia-specific mortality and other pneumonia-related outcomes (such as duration of hospitalisation, duration of severe illness, duration of hypoxia and duration of tachypnoea).

Case management interventions for childhood pneumonia varied between primary studies and included antibiotic treatment, oxygen treatment, zinc supplement treatment and vitamin A treatment. The included studies were mainly conducted in developing countries in Africa, Asia and South America.

The study selection was performed by independent reviewers.

Assessment of study quality
The quality of included studies was assessed using the Child Health Epidemiology Reference Group (CHERG) adaptation of the Grades of Recommendation Assessment, Development and Evaluation (GRADE) checklist. An overall quality grade of high, moderate, low or very low was assigned to each study.

The authors did not state how many reviewers performed validity assessment.

Data extraction
For dichotomous outcomes, numbers of events were extracted to enable the calculation of relative risks (RRs) and 95% confidence intervals (CIs). For continuous outcomes, mean differences and standard deviations were extracted to enable the calculation of mean differences (MDs) and 95% CIs.

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
The studies were combined in meta-analyses. A random-effects DerSimonian-Laird method was used in the presence of significant heterogeneity (p<0.1) and otherwise a fixed-effects Mantel-Haenszel method was employed. Pooled relative
risks and weighted mean differences (WMDs), with 95% CIs were calculated. Subgroup analyses were conducted by the age of children (up to one month old, up to one year old and one to four years old).

**Results of the review**
Thirty-nine studies (14 studies of community case management and 25 studies of hospital case management) were included in the review. The authors reported the number of villages or districted involved for primary studies, but did not report the details of number of participants. The methodological quality varied between included studies and the overall quality of studies ranged from very low, low to moderate.

**Community case management:** Community case management with antibiotic treatment significantly reduced the acute lower respiratory infection mortality (RR 0.65, 95% CI 0.52 to 0.82; nine studies) and all-cause mortality for children up to five years old (RR 0.79, 95% CI 0.70 to 0.88; 10 studies). Significant heterogeneity was observed for both outcomes (p=0.006 and p=0.001). Results were similar when children were grouped by age.

**Hospital case management:** When pooling studies of hospital case management of antibiotics on severe pneumonia, the case fatality rate was 0.6% (95% CI 0.4% to 0.9%; 3,945 treatment episodes, four studies). The heterogeneity assessment result was not reported.

When pooling studies of hospital case management of antibiotics on very severe pneumonia, the case fatality rate was 6.5% (95% CI 4.3% to 9.6%; 5,376 treatment episodes, four studies). Significant heterogeneity was observed for this outcome (p<0.0005).

One study reported that oxygen treatment significantly reduced mortality of children with pneumonia (RR 0.65, 95% CI 0.52 to 0.78). There were no significant treatment effects of zinc supplementation treatment on pneumonia-related outcomes (five studies). There were no significant treatment effects of vitamin A supplementation for the treatment of pneumonia on mortality and other pneumonia-related outcomes (nine studies).

**Authors’ conclusions**
The available evidence reinforced the effectiveness of community and hospital case management with antibiotics, but not the effectiveness of zinc and vitamin A supportive treatment for treatment for children with pneumonia as recommended by World Health Organisation.

**CRD commentary**
This review’s inclusion criteria were clear. Relevant databases were searched. The extent of the search for unpublished studies appeared to be limited, which increased potential for publication bias. No language restrictions were applied in the search, which minimised risk of language bias. The authors stated that independent reviewers performed the study selection, but it was unclear whether sufficient attempts were made to minimise the reviewer errors and biases in data extraction and validity assessment. Relevant criteria were used to assess the study quality. Given the diversity of included studies, pooling the results from studies with different types of study design might not have been appropriate. High levels of statistical heterogeneity between studies further indicated that the pooled results were of limited value. Given that the included studies were conducted in developing countries, the generalisability of findings from this review to developed countries was unclear.

A degree of caution might be required in interpreting the authors’ conclusions, given the poor quality of most of the included studies and other the concerns outlined.

**Implications of the review for practice and research**
**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that further high-quality research was required to investigate the effectiveness of oxygen therapy for treatment for children with pneumonia in developing countries.

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