Is Antibiotic Prophylaxis Effective in Preventing Lower Respiratory Tract Infections in High-Risk Children?

REVIEW QUESTION
Is antibiotic prophylaxis effective in preventing bacterial lower respiratory tract infections (LRTIs) in high-risk children ages 12 years and younger?

TYPE OF REVIEW
This is a Cochrane intervention review of 10 randomized controlled trials comparing oral or iv antibiotics used for prophylaxis to prevent LRTIs in high-risk children ages 12 and younger with placebo or no treatment.

RELEVANCE FOR NURSING
LRTIs in children are characterized by symptoms such as cough, fever, and breathlessness, and include tuberculosis, pneumonia, bronchitis, bronchiolitis, and influenza. They account for approximately 1.4 million child deaths worldwide per year—20% of which occur in children younger than five years of age. Children at high risk include those with modifiable risk factors such as poor nutrition and inadequate immunization; those with chronic conditions such as HIV, cancer, or cystic fibrosis; and those born prematurely. Children who are prone to developing LRTIs are often prescribed antibiotic prophylaxis to prevent the morbidity and mortality associated with the infection. Although studies show that the efficacy of antibiotic prophylaxis to prevent LRTIs decreases over time, the evidence has not been synthesized to assess the effectiveness of antibiotic prophylaxis in children ages 12 years and younger.

CHARACTERISTICS OF THE EVIDENCE
Ten randomized controlled trials compared oral or iv antibiotics with placebo or no treatment in children defined as high risk according to established guidelines. The primary outcome was the incidence of LRTIs as confirmed by blood tests, X-ray, or both. The results were stratified into five high-risk groups.

In HIV-infected children (two studies, 810 children, moderate quality of evidence) there was no significant difference in the incidence of Pseudomonas infections between intervention and controls. In children with sickle cell disease, one study reported limited data; no child in the intervention group contracted pneumonia compared with five children in the control group. There was not enough data to rate the quality of the study. In children with cancer, one study was rated as moderate quality of evidence. This study found a significant decrease in the incidence of Pneumocystis carinii pneumonia in favor of the intervention group. In low-birthweight neonates with underlying respiratory disorders, one study reported one case of pulmonary infection in the intervention group compared with five in the control group (not statistically significant, insufficient data to rate quality of evidence).

BEST PRACTICE RECOMMENDATIONS
Nurses caring for children should take each child’s situation into consideration concerning the use of antibiotic prophylaxis. While the evidence is inconclusive for some high-risk conditions, in others, such as cancer, antibiotics may reduce the risk of contracting P. carinii pneumonia infections. Nurses should be aware of the higher risk of LRTIs in children with chronic, complex disease and illnesses.

RESEARCH RECOMMENDATIONS
Because of limitations with the quality of the evidence, more trials are needed to assess the evidence of antibiotics for preventing LRTIs in high-risk children. In particular, little is known about the effectiveness of antibiotic prophylaxis in children with congenital heart disease; metabolic, endocrine, renal, or neurological disorders; and prematurity.

Natalie Bradford is on the staff of the Queensland Youth Cancer Service, Children’s Health Queensland, Queensland, Australia, and a member of the Cochrane Nursing Care Field.

SOURCE DOCUMENT