

# Clinical Risk Factors for Death in Children with Pneumonia

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The World Health Organization has produced guidelines for the management of common illnesses in hospitals with limited resources. This series reviews the scientific evidence behind WHO's recommendations. The WHO guidelines, and more reviews are available at:

[http://www.who.int/child-adolescent-health/publications/CHILD\\_HEALTH/PB.htm](http://www.who.int/child-adolescent-health/publications/CHILD_HEALTH/PB.htm)

**This review addresses the question:** *In children with pneumonia, which clinical risk factors best predict death?*

The WHO Pocketbook of Hospital Care for Children that very severe pneumonia is defined as cough or difficulty breathing and at least one of: central cyanosis, severe respiratory distress, inability to drink or vomiting everything or lethargy/unconsciousness/convulsions and that severe pneumonia is defined as cough or difficulty breathing plus one of: lower chest indrawing, nasal flaring, grunting. This can be found in section 4.2.1 on page 73.

## INTRODUCTION

One in five of childhood deaths in developing countries have been ascribed to acute respiratory tract infections (ARI) and 90% of these deaths are due to pneumonia. The WHO-ARI control program has helped decrease this figure in the countries where implemented. The thrust of the program centres around efficient screening of children with high risk of death and referring them to hospital. This review tries to synthesize the findings from a number of studies conducted in the past 25 years.

## METHODOLOGY

Using the search query: Risk Factors AND Death AND Pneumonia, Pubmed Clinical Queries returned 186 results. The results were limited to studies in humans and in the age group "All Child 0-18 years". All the abstracts were read and studies involving adult patients or non-clinical parameters were excluded.

Nine studies were included. There were no systematic reviews. All articles were prospective cohort studies (Evidence type 1b).

## RESULTS

One of the earliest studies from PNG in 1979 listed age < 1 year, malnutrition and long duration of illness as risk factors for

mortality. [1] Two large studies published in 1989 listed cyanosis, hepatomegaly, inability to feed, malnutrition and prolonged illness as risk factors for death. Malnourished children have increased susceptibility to infections, decreased immune responses and may not present with fever, thereby delaying diagnosis of pneumonia. [2][3]

Studies in other developing countries in the 1990's and during the present decade reiterated the above risk factors. The study by Spooner et al from Papua New Guinea (PNG) identified firstborn children and female children to have increased mortality risk. [3] Alteration of mental status was identified as an additional risk factor by Demers et al in their study from the Central African Republic. [7]

Underlying heart disease and chronic disease were associated with increased risk of dying in the studies from Brazil (Nascimento-Carvalho) and Thailand (Suwanjutha). [4][8]

The study by Banajeh and others from Yemen reported rickets as an independent risk factor for death. [6] The authors mentioned that muscle weakness, soft ribs, chest wall deformities and impaired immune function may all contribute to increased severity of pneumonia. Sehgal et al found increased mortality if the children had loose stools in addition to features of pneumonia in their study from India. [5]

## DISCUSSION

Presence of cyanosis, hepatomegaly and inability to feed indicate severe pneumonia or exacerbation of symptoms of underlying heart disease. Malnutrition has been seen in almost all studies to be a risk factor for death in children with pneumonia. Mortality was increased in infants less than 1 year of age in most studies.

## SUMMARY

In young children with pneumonia, cyanosis, hepatomegaly, inability to feed, malnutrition, prolonged duration of illness, altered mental state and presence of underlying chronic illness including heart disease are associated with increased mortality. In formulating guidelines for treatment of pneumonia in the community, these risk factors need to be recognised and provisions for timely referral to a higher centre. Interventions may also need to be stepped up in the presence of these risk factors.

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