Recognition of pneumonia by primary health care workers in Swaziland with a simple clinical algorithm

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In developing countries primary health care workers are being trained to manage and treat acute respiratory infections with a protocol developed by the WHO. We tested the ability of nurses and nursing assistants in Swaziland to recognise the signs and symptoms of pneumonia; with the results of a paediatrician’s examination as “gold standard”, sensitivities and specificities were calculated. Danger signs of stridor and abnormal sleepiness were poorly recognised (sensitivity 0–50%) by the health care workers, as was audible wheeze. Severe undernutrition, tachypnoea, and chest wall indrawing were well recognised. Overall, the recognition of pneumonia was good (sensitivity 71–83%, specificity 84–85%). These findings highlight topics for emphasis in training.


Acute infections of the lower respiratory tract are the single most important cause of death in children under 5 years old in developing countries, accounting for over 4 million deaths each year worldwide; most deaths are due to bacterial pneumonia.1 80% of such deaths occur in rural areas where medical care is not readily available. In an attempt to reduce the morbidity and mortality from bacterial pneumonia, the WHO Programme for Control of Acute Respiratory Infections has attempted to define simple clinical signs for recognition of severe pneumonia.2 Primary health care workers with no formal medical training are trained in the clinical recognition and management of pneumonia.3 The management of children with acute respiratory-tract infections depends on the ability of health care workers to recognise the characteristic signs; that ability has not previously been tested formally.

This study was undertaken in Mbabane, Swaziland, in July and August, 1989, to compare the recognition of clinical signs of pneumonia by primary health care workers and by a paediatrician. Eligible children were aged 2–59 months and presented to the Mbabane Government Hospital and the Salvation Army Clinic with a history of cough or difficult breathing. Each child was weighed and the temperature was measured; he or she was then assessed by two primary health care workers and a paediatrician with the WHO case-management protocol. Under the protocol, a short history is obtained about the ability to drink and feed well and whether convulsions have occurred during the illness. The child is examined for abnormal sleepiness, stridor when the child is calm and has clear nostrils, and severe undernutrition requiring hospital admission (signs of very severe disease). The examiner must also seek lower chest wall indrawing (severe disease), tachypnoea (respiratory rate > 50 per min in children younger than 12 months and > 40 per min in older children = moderate disease), and fever (warmness to touch). Children with severe disease are referred to hospital after a first dose of antibiotics and treatment of fever and wheezing. Children with moderate disease are treated with antibiotics at home. Two types of health care workers assessed the patients—three nursing assistants and four paediatric nurses. They were trained under the WHO acute respiratory infections control programme training module,4 and taught individually to recognise signs with standard definitions.5,6 The health workers’ observations were compared with those of the paediatrician. With the paediatrician’s assessment as the “gold standard” (except for fever, for which the gold standard was the thermometer measurement) sensitivity, specificity, and 95% CI were calculated by standard methods.7

362 children were recruited. The nursing assistants examined 331 children and the nurses 304. Cough was a presenting complaint in all but 1% of the children, and 29% had difficulty breathing. 230 (64%) patients gave a history of fever but only 45 (12%) had temperatures above 38.3°C. 4 children had a history of convulsions (3 were well at the time of examination); this history was elicited by both nurses and nursing assistants.

The recognition of danger signs (abnormal sleepiness, stridor, and severe undernutrition) was variable (table); the diagnosis was missed in some cases and wrongly found in others. Severe undernutrition was the most consistently well observed sign. The majority of children with true fever (temperature > 38.3°C) were identified by the health care workers’ examination (sensitivity 73–76%) but they recorded fever for many children who had normal body

*The standard definitions are available from The Lancet.
well as constant feedback on what was and what was not audible wheeze. This finding justifies the use of antibiotics for children with tachypnoea or lower chest wall indrawing, irrespective of the presence of wheezing. Furthermore, other studies have shown that up to 30% of children with bronchiolitis in developing countries have pneumonia on radiography.7 Fever assessed by touch was overdiagnosed; perhaps treatment based on a history of fever obtained from the child's carer is more appropriate than that based on one assessment of the child's temperature.

The variability of the respiratory rate over 1 h of observation6 may account for some of the false-positive and false-negative diagnoses of rapid respiratory rate. Chest wall indrawing was taken as a sign of severe pneumonia in infants and young children,8,9 and this was the most difficult sign to teach nursing assistants. Overall, they tended to have a lower index of suspicion than the nurses; although they had fewer true-positive diagnoses they also had fewer false positives. Nurses and nursing assistants were equally good at diagnosing pneumonia.

This study shows that unskilled health workers can be effectively taught to recognise clinical signs of pneumonia. There was some difficulty in recognition of danger signs and it is important to concentrate on recognition of these signs in training programmes.

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