Pneumonia is a major killer of children under 5 years of age. According to the WHO guidelines for management of pneumonia, all children with severe pneumonia should be referred to hospital for treatment with parenteral antibiotics, after giving the first dose of oral co-trimoxazole. In low-resource settings, there is poor compliance to referral because of multiple factors. This study investigated whether community case management (CCM) by lady health workers with oral amoxicillin in children with severe pneumonia was equivalent to the present standard of care.

The study was a cluster randomized controlled trial conducted in a district of Pakistan. Children aged 2 to 59 months meeting the WHO definition of severe pneumonia were included. Oral amoxicillin was prescribed by community-based lady health workers to the intervention group, while the WHO standard of care for management of pneumonia was followed in the control group. The primary outcome was development of clinical treatment failure by day 6. The secondary outcome was clinical relapse on days 7–14, defined as reappearance on day 7–14 after a child was cured at day 6 of a fever (temperature ≥100 °F), indrawing of the lower chest, appearance of any danger sign, or fast breathing (respiratory rate ≥50 breaths per minute).

Baseline differences between the treatment groups were calculated as frequencies for categorical variables and medians with inter-quartile range for continuous variables. Crude and adjusted risk differences for treatment failure between the intervention and control groups were calculated with 95% confidence intervals. Analysis was per protocol with adjustment for clustering within groups by use of generalized estimating equations. Cluster-adjusted treatment failure rates by day 6 were significantly reduced in the intervention clusters (165 [9%] v. 241 [18%], risk difference –8·9%, 95% CI –12·4 to –5·4). Most of the risk reduction was in the occurrence of fever and indrawing of the lower chest on day 3 (–6·7%, –10·0 to –3·3).

SUMMARY
Pneumonia is a major killer of children under 5 years of age. According to the WHO guidelines for management of pneumonia, all children with severe pneumonia should be referred to hospital for treatment with parenteral antibiotics, after giving the first dose of oral co-trimoxazole. In low-resource settings, there is poor compliance to referral because of multiple factors. This study investigated whether community case management (CCM) by lady health workers with oral amoxicillin in children with severe pneumonia was equivalent to the present standard of care.

The study was a cluster randomized controlled trial conducted in a district of Pakistan. Children aged 2 to 59 months meeting the WHO definition of severe pneumonia were included. Oral amoxicillin was prescribed by community-based lady health workers to the intervention group, while the WHO standard of care for management of pneumonia was followed in the control group. The primary outcome was development of clinical treatment failure by day 6. The secondary outcome was clinical relapse on days 7–14, defined as reappearance on day 7–14 after a child was cured at day 6 of a fever (temperature ≥100 °F), indrawing of the lower chest, appearance of any danger sign, or fast breathing (respiratory rate ≥50 breaths per minute).

Baseline differences between the treatment groups were calculated as frequencies for categorical variables and medians with inter-quartile range for continuous variables. Crude and adjusted risk differences for treatment failure between the intervention and control groups were calculated with 95% confidence intervals. Analysis was per protocol with adjustment for clustering within groups by use of generalized estimating equations. Cluster-adjusted treatment failure rates by day 6 were significantly reduced in the intervention clusters (165 [9%] v. 241 [18%], risk difference –8·9%, 95% CI –12·4 to –5·4). Most of the risk reduction was in the occurrence of fever and indrawing of the lower chest on day 3 (–6·7%, –10·0 to –3·3).

COMMENT
Pneumonia kills more than 2 million children each year, accounting for almost one in five under-5 deaths worldwide. In India, pneumonia is one of the major reasons for which children are brought to hospitals and health facilities. According to the WHO-IMCI (Integrated Management of Childhood Illness) guidelines, all children with severe pneumonia should be urgently referred to hospital, after giving symptomatic treatment and first dose of oral antibiotic and they should be managed with parenteral antibiotics in the hospital till their condition improves.

A striking feature of the study population is that there was a very low proportion of severe under nutrition in under-5 children (1 in the intervention and 2 in the control clusters). Many more children in our communities would have been excluded than the study did, giving skewed results for our communities.

According to the authors, in developing countries, the compliance to referral is poor because of many barriers such as transportation, cost, distance from hospital and lack of adequate child care facilities. CCM of severe pneumonia by community health workers by use of oral amoxicillin can be an alternative to increase the number of children receiving effective care.

In this study, the authors have concluded that CCM could reduce delay in treatment initiation as well as its cost. This study is important as in many developing countries, including India, where the resources are limited and it is not possible for many to avail hospital-based care. CCM can be an effective strategy. It can save lives of many children, thus contributing significantly to reduction of infant mortality rate which will, in turn, help in progress towards attainment of Millennium Development Goal 4 by 2015.

Some evidence in this regard is available from other studies as well. The clinical equivalence of oral amoxicillin and injectable antibiotics has been reported by authors of the Amoxicillin Penicillin Pneumonia International Study (APPIS) and the New Outpatient Short-course Home Oral Therapy for Severe Pneumonia (NO SHOTS) study.

This is the first study where effectiveness of diagnosis and management of severe pneumonia by community health workers was studied. All the previous studies focused only on provision of care by qualified doctors. Grassroots-level workers are available for people and are more acceptable to them thereby increasing compliance. The ability of community health workers to recognize severe pneumonia and to detect clinical deterioration that requires referral may be questionable. This necessitates their regular training and proper supervision. The authors have reported a high concordance in diagnosis of severe pneumonia between the lady health worker and an independent assessor. Also, low treatment failure and very low death rate indicate that clinically meaningful deterioration was identified and referred appropriately by the lady health worker. The preliminary results of a cluster randomized controlled study from Zambia also show that the capacity of community health workers to use oral amoxicillin at the community level is encouraging.

This study has several strengths as compared to previous studies. It was a large study with a good sample size and a cluster randomized controlled design. Quality assurance was adequately taken care of. Data collection assistants verified and cross-checked each case enrolled by the lady health workers and each treatment failure was also verified by an independent assessor not involved in the treatment of the child. In addition, regular monthly visits
were made by study physicians and study coordinators. Double entry of data further assured quality and the lost to follow-up rates were low. This research was integrated into the existing community health delivery programme, thereby increasing the generalizability of the results.

The study used a higher dose of amoxicillin (80–90 mg/kg/day) as recommended by a recent WHO publication as well as by textbooks. This recommendation was perhaps made on the assumption of penicillin tolerance among pneumococci reported from the USA and some other countries. Most practitioners in India still use a dose of 30–40 mg/kg/day for amoxicillin, without observing any excessive treatment failures. We need to revise our dosage recommendations accordingly.

The limitations of the study include enrolment of more cases in the intervention than in the control clusters. No attempt was made to make sure that WHO’s standard management guidelines were followed for children who were referred and they were given many different antibiotics with some children being prescribed even more than three antibiotics. Some of the children in the control cluster might have resorted to self-treatment or no treatment rather than going to hospital but they were still included in the final analysis, thereby resulting in possibly incorrect adverse outcomes being attributed to the control group. For assessment and recording of clinical outcomes, follow-up visits were done by lady health workers either at the patient’s home or at the lady health worker’s health house. The authors have not mentioned the criteria for deciding the place of follow-up. Another potential limitation of this study was that the investigators were not blinded to treatment allocation when the study outcomes were determined. Also, the independent assessors were not masked to the cluster assignment of the child which is actually difficult in this type of study.

The agents that cause pneumonia in children in Pakistan do not differ from those in most other developing countries and hence the findings of this study have important public health policy and programmatic implications. The shorter and simpler oral antibiotic regimen used here has the potential to reduce referrals and hospitalizations in a large proportion of children with pneumonia currently requiring facility-based care. Unfortunately, the investigators did not include any programme-level operational analysis, which would have been useful. For example, the cases of treatment failure, in both intervention and control clusters, could have been investigated further in terms of demographic characteristics, signs and symptoms of illness, and care-seeking and treatment received, so that a programme based on revised treatment guidelines could benefit from better prediction of treatment failures and be better prepared to prevent or manage them.

The findings of this study suggest that the WHO recommendations for treatment of severe pneumonia need to be revised. WHO has also recently recommended that non-severe pneumonia without wheeze and severe pneumonia in children aged 2–59 months can be treated by oral amoxicillin. Now that non-severe pneumonia and severe pneumonia may have similar treatment, the WHO classification of pneumonia may be simplified into very severe pneumonia and all other pneumonias. We would benefit from considering severe pneumonia without any danger signs, complications or other severe conditions as a distinct category that could be safely and effectively treated with oral antibiotics outside hospitals, with the possible exception of patients <6 months of age, those with very fast breathing or those with severe undernutrition. A 2005 joint policy from WHO and UNICEF also recommended that well-trained and supervised community health workers can carry out community-level treatment of pneumonia. A reason for caution is the concern about the possible misuse of antimicrobials by the community health worker and increased drug resistance. However, strict adherence to the algorithms of Integrated Management of Neonatal and Childhood Illness (IMNCI) could address this issue provided that supervision reinforces the performance of the community health worker. In India, IMNCI focuses on improvements in the case-management skills of health staff through the provision of locally adapted guidelines on IMNCI and activities to promote their use. Where CCM of pneumonia is most needed, it is most difficult to implement—in countries with a high mortality with weak infrastructure, limited access to health services and dispersed rural populations. In these areas, the existing weak support for facility-based care renders supporting community health workers all the more challenging.

REFERENCES


PRIYANKA
ANITA S. ACHARYA
Department of Community Medicine
Lady Hardinge Medical College
New Delhi
priyankavirdi@yahoo.com