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Severe Pneumonia Can be Safely Treated at Home: Revisions in WHO/UNICEF Integrated Management of Childhood Illnesses (IMCI) Pneumonia Management Guidelines

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Pneumonia continues to be the biggest killer of under 5 children in the world today [1-5]. The global burden of childhood pneumonia mortality led WHO in early eighties to develop pneumonia control strategies for developing countries having limited resources and inadequate health infrastructures. Case management was identified as one of the major components of pneumonia control strategy [6]. Simple clinical signs which could be recognised by healthcare providers having little or no formal medical education were identified and then used for classification of varying severity of pneumonia within the settings where there was limited or no access to technology. These guidelines classified children 2 to 59 months of age with respiratory symptoms into four broad categories. Children with only cough and cold who did not have fast breathing were classified as "no pneumonia" and were sent home with no antibiotics. Children who had fast breathing only were classified as "non-severe pneumonia" and were sent home with an oral antibiotic for 5 days. Children who had lower chest in drawing with or without fast breathing were classified as "severe pneumonia" and were referred to a nearby health facility for treatment with injectible penicillin. Children who had any of the general danger signs were classified as "very severe pneumonia/disease" and were given the first dose of oral antibiotic and then immediately referred to a health facility for further evaluation and treatment with parenteral antibiotics. These guidelines have shown to reduce pneumonia mortality significantly in developing communities when they have been implemented effectively [7].

Any strategy which aims at reducing childhood deaths due to pneumonia must take into consideration the fact that majority of deaths due to pneumonia in under five year old children occur due to severe disease, which is why there has been a great emphasis on identification of these cases at an early stage of the disease so that timely referral can take place to a higher level of care. However, compliance with referral has been one of the major issues in many low resource settings. Data shows us that although health worker may have identified a case of severe pneumonia in time and had advised referral; in reality this "referral" never takes place for various reasons [8-12] and these children end up getting either little or no treatment at all. This is borne by the fact that majority of deaths due to pneumonia take place at home. Death burden due to pneumonia can be reduced significantly, if these children can be treated at home. Hence it becomes imperative for any pneumonia control program to literally take treatment to the doorstep of these high risk children.

In the last decade high quality scientific evidence has been generated which clearly shows us that ambulatory treatment of severe pneumonia is possible at home with oral antibiotics. This body of evidence was reviewed during two consultations of a panel of experts on the basis of 'grading of recommendations assessment, development and evaluation' (GRADE). The objectives were to summarize WHO recommendations for policy and practice, prepare GRADE 'evidence profiles' and discuss the factors taken into account in deciding on the strength of recommendations. Based on these recommendations WHO/UNICEF IMCI case management guidelines for pneumonia have been recently revised [13]. In this editorial we look at this long and arduous journey where research has actually translated into a policy.

Children with Severe Pneumonia (Chest Indrawing) can be Treated Safely at Home with Oral Amoxicillin

In the mid-1990s Straus et al. conducted a study to determine antimicrobial resistance and clinical effectiveness of oral cotrimoxazole vs oral amoxicillin in childhood pneumonia [14]. They found out that compared to oral cotrimoxazole treatment failure rate was significantly low with oral amoxicillin in children with chest indrawing pneumonia. This finding had important implications for program but since it was not designed to answer this question it did not have the required strength due to its small sample size. Experts in childhood respiratory illnesses at WHO and elsewhere then designed a series of multi-country level randomized controlled trials in various settings of developing world with proper sample size needed to show equivalence between two treatment regimens.

Addo-Yobo et al. (APPIS Group) [15] conducted an RCT at nine tertiary health facilities in eight developing countries and enrolled 1702 children with chest indrawing pneumonia aged 3-59 months. Children were randomly assigned to either receive a 5-day course of oral amoxicillin or parenteral penicillin. The results showed equal failure rates in both treatment groups. The study described several advantages of oral treatment over parenteral treatment (e.g. lower morbidity risk due to injection, less requirement for medical supplies such as needles) and concluded with the suggestion that oral treatment be considered as an equally effective alternative to parenteral treatment. Although this study proved the effectiveness of oral amoxicillin, it did not fully address the issue of safety as all enrolled children were hospitalized for 48 hours and kept under close supervision. Therefore, more research was needed to test the robustness of this hypothesis under wider range of pneumonia circumstances.

Hazir et al. [16] (NO-SHOTS Group) carried out a randomized, open-label equivalency trial at seven sites in Pakistan and compared treatment of hospitalization and parenteral ampicillin with home-treatment with oral amoxicillin. In addition to finding equivalence

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between the two treatments, the authors suggested that in cases of chest indrawing pneumonia without underlying complications, home-treatment with short-course high-dose oral amoxicillin is preferable because of the associated reduction in referral, admission, and treatment costs as well as the reduced invasiveness of oral treatment when compared with parenteral treatment.

To see whether this inference that chest indrawing pneumonia can be treated safely and effectively at home is generalizable in different communities and geographical regions this hypothesis was assessed in four countries of

Asia and Africa [17]. The authors concluded that clinical treatment failure and adverse event rates among children with chest indrawing pneumonia when treated at home with oral amoxicillin did not differ across geographic areas, thus, providing option for home based therapy of chest indrawing pneumonia in a wide variety of settings. In these studies children with chest indrawing pneumonia were identified and treated on outpatient basis by qualified doctors with either outpatient or home follow-up thereby, making it difficult for across the board generalizability specially, in situations where pneumonia is treated within the community by the CHWs having little formal medical education. More data was needed for the effectiveness of community case management of childhood lower chest indrawing pneumonia.

Severe Pneumonia (Chest Indrawing) can be Treated at Home with Oral Antibiotics by Community Health Workers

One of the three strategies to reduce pneumonia mortality as spelt out in "WHO/UNICEF joint statement on management of pneumonia in the community setting"[18] is to increase access to quality care by training CHWs to assess and treat children with pneumonia. Bari et al. [19] assessed community case management of severe pneumonia by lady health workers (LHWs) with oral amoxicillin in children as compared to referral, which was the standard of care in Haripur district of Pakistan. In the intervention clusters, LHWs were trained to correctly classify pneumonia within communities and provided mothers with oral amoxicillin for 5 days with specific guidance on its use. Treatment failure rates were significantly reduced in the intervention clusters and it was concluded that community case management by LHWs could result in a standardized treatment for children with severe pneumonia, reduce delay in treatment initiation, and reduce the costs for families and health-care systems. Similar evidence on the management of severe pneumonia by LHWs was generated by another study by Soofi et al. in a cluster-randomized controlled trial in Matiari district of rural Sindh, Pakistan [20].

There is strong scientific and programmatic evidence to support the effectiveness of this approach. A meta-analysis of community based pneumonia case management studies estimated a 20% reduction in all cause under 1 year old child mortality and 24% reduction in all cause under 5 year old child mortality (7).The Gambia has a nationwide programme addressing pneumonia in the community. In Siaya district of Kenya, a non-governmental organization lead programme includes the treatment of pneumonia by CHWs and operates effectively. Likewise in Honduras pneumonia treatment has been incorporated into the national integrated community child care programme where community volunteers in addition to health and growth monitoring also provide treatment for pneumonia and diarrhoea in more than 1800 communities. The government of Malawi initiated activities to deliver treatment of common childhood illnesses including suspected pneumonia, in the community and assessment has shown that HSAs are able to treat sick children with quality similar to the quality provided in fixed facilities. Monitoring data also showed that communities were utilising the sick child services [21].

Home Treatment for Severe Pneumonia (Chest Indrawing) with Oral Antibiotic is Cost Effective as Compared to Hospitalization

Several studies from developing countries having high burden of pneumonia have reported the cost of pneumonia therapy at household level, outpatient and hospital level in children with pneumonia [22-27]. Similarly, a cost minimization analysis done from 8 paediatric centers in England [28] concluded that treatment of community acquired pneumonia with oral amoxicillin would result in savings of between £ 473 and £ 518 per child admitted. The results of these studies demonstrate that outpatient treatment for childhood pneumonia is far more economical than all levels of facility based care. One of the major barriers for accessing healthcare is the cost of treatment. By up scaling severe pneumonia treatment with oral amoxicillin at community level could significantly reduce household costs and improve access to treatment in the underprivileged populations, preventing many deaths.

Regional and Country Programs must Start the Process of Revisions to their IMCI Pneumonia Case Management Guidelines

The results of these research studies have provided robust scientific evidence which has been used for the revision of IMCI pneumonia management guidelines. There are many advantages of these revisions. These revisions when implemented in countries with high pneumonia burden would result in higher percentage of children being given ambulatory care at the level of outpatient and also improve access to care by providing pneumonia treatment at the level of doorstep in the communities thereby significantly reducing pneumonia deaths. On the other hand the new guidelines will decrease the referrals by providing evidence based home therapy to many children who were referred according to earlier IMCI guidelines. These revisions simplify pneumonia classification by categorizing pneumonia in two categories instead of three: "Pneumonia" with fast breathing and lower chest indrawing which can be treated with amoxicillin at home and "Severe pneumonia" with general danger signs needing referral and injectable antibiotic therapy. This new pneumonia classification will make easier the training of health workers and also result in better case management by them. There are major cost benefits at individual, household, community and country level. Home treatment with oral amoxicillin places less burden on families leading to less household costs. By lowering burden on health facilities it decreases overall burden on health systems. The relevant programmes with meagre resource allocation can divert these resources to other high priority child health issues. The new IMCI guidelines by decreasing the chance of hospitalization and the use of broad spectrum antibiotics would also decrease the incidence of nosocomial and injection borne diseases at the level of the hospital in addition to lowering pressure on antimicrobial resistance. It is important to ensure that all national and regional programmes recognize the importance of these revisions. Local adaptations must be carried out and health workers need to be re-trained according to the new guidelines in order to reap full benefits of the new scientific evidence.

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