

# Revised WHO classification and treatment of childhood pneumonia at health facilities

## IMPLICATIONS FOR POLICY AND IMPLEMENTATION

### INTRODUCTION

Pneumonia continues to be the biggest killer worldwide of children under five years of age. Although the implementation of safe, effective and affordable interventions has reduced pneumonia mortality from 4 million in 1981 to just over one million in 2013, pneumonia still accounts for nearly one-fifth of childhood deaths worldwide.

Case management is a cornerstone of pneumonia control strategies. It consists of classifying the severity of illness using simple clinical signs such as fast breathing, chest indrawing and general danger signs, and then applying the appropriate treatment. Treatment includes home care advice, antibiotic prescription for home use, or referral to a higher-level health facility.

Original recommendations for pneumonia case management were based on data generated in the 1970s and early 1980s. These recommendations have recently been modified and published as a result of new evidence, reviewed and assessed in two consultations.<sup>1,2</sup>

A separate document<sup>3</sup> presents summaries of the studies reviewed, the main findings, and the subsequent revised recommendations for the management of childhood pneumonia. Oral amoxicillin was identified as the recommended first-line antibiotic. The number of categories of severity of pneumonia was reduced from three to two, and the treatment regimen was simplified to a three or five-day course of oral amoxicillin, depending on the prevalence of HIV. In countries with a high burden of pneumonia, implementation of the revised guidelines will increase the proportion of children receiving care at the outpatient or community levels, reduce the need for referrals, and improve treatment outcomes.

### REVISED CLASSIFICATION AND TREATMENT

Revised recommendations apply to the classification and treatment of childhood pneumonia at the health facility. At this level, all children with fast breathing and/or chest indrawing are classified as having “pneumonia” and treated with oral amoxicillin at home (**Figure**). The recommended dosage is 80 mg/kg/day for five days; however in settings of low HIV prevalence the duration of treatment for ‘fast breathing pneumonia’ can be reduced to three days.

Only those children who have general danger signs<sup>4</sup> are classified as having “severe pneumonia” and need to be referred to a higher level. A child who is HIV positive and has chest indrawing will also need to be referred for inpatient treatment.<sup>2</sup>

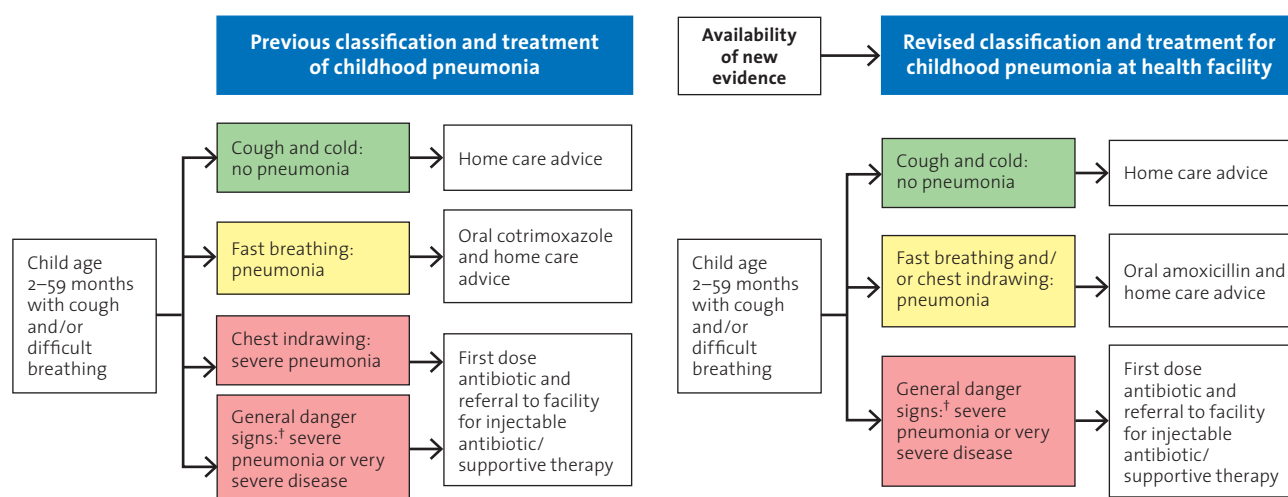
Dosages for pneumonia treatment at health facilities have been revised to reflect three age bands: 2 months up to 12 months (4–<10 kg); 12 months up to 3 years (10–<14 kg); 3 years up to 5 years (14–19 kg) (**Table**). Dosages and age bands for treatment of fast breathing pneumonia by community health workers have not changed.

### SUMMARY OF IMPLICATIONS

- National programmes will need to switch from oral cotrimoxazole to oral amoxicillin. Because of this:
  - ✓ *retraining of healthcare providers will be required (with training materials and job aids appropriately revised);*
  - ✓ *reduction in overall costs of pneumonia treatment by promoting outpatient/home therapy will help offset the additional costs of switching to oral amoxicillin from oral cotrimoxazole.*
- Combining the two previous categories of “pneumonia” (fast breathing) and “severe pneumonia” (chest indrawing) under a single classification of “pneumonia” simplifies classification. Because of this:
  - ✓ *training will be simplified;*
  - ✓ *the process of local adaptation of training materials and job aids will be easier.*

**NOTE:** This document is derived from previously published WHO guidelines on the management of childhood pneumonia. References for the guidelines are: [1] Integrated Management of Childhood Illness (IMCI). WHO recommendations on the management of diarrhoea and pneumonia in HIV-infected infants and children. Geneva: World Health Organization; 2010 ([http://www.who.int/maternal\\_child\\_adolescent/documents/9789241548083/en](http://www.who.int/maternal_child_adolescent/documents/9789241548083/en)) AND [2] Recommendations for management of common childhood conditions, Evidence for technical update of pocket book recommendations. Geneva: World Health Organization; 2012 ([http://www.who.int/maternal\\_child\\_adolescent/documents/management\\_childhood\\_conditions/en](http://www.who.int/maternal_child_adolescent/documents/management_childhood_conditions/en)).

**FIGURE.** Comparison of previous and revised classification and treatment of childhood pneumonia at health facility



† Not able to drink, persistent vomiting, convulsions, lethargic or unconscious, stridor in a calm child or severe malnutrition.

- It is crucial that the policy makers, administrators and officials of relevant programmes understand the significance of these modifications. Because of this:

- ✓ *widespread dissemination of these technical updates is of utmost importance to ensure adoption and adherence.*

- In order to pre-empt the possible over-use of antibiotics, programmes will need to invest in careful monitoring procedures. Because of this:

- ✓ *close monitoring will be essential in areas implementing the new guidelines at large scale.*

## SUMMARY OF RESEARCH FINDINGS

### ANTIBIOTIC FOR FIRST-LINE TREATMENT

Amoxicillin is the most effective first-line treatment for childhood fast breathing and chest indrawing pneumonia.

**For treatment of ambulatory patients with community-acquired fast breathing pneumonia, oral amoxicillin is more effective than oral cotrimoxazole. In addition, oral amoxicillin is as effective as injectable penicillin in the**

### treatment of chest indrawing pneumonia in children 3–59 months of age.

Oral administration of amoxicillin means that there is a reduced risk of injection-related morbidity and fewer needs for medical supplies such as syringes and needles. This finding has been confirmed in a range of regions and countries, in both developing and developed areas.

### It is safe to treat chest indrawing pneumonia at home with oral amoxicillin.

A comparison of the use of parenteral ampicillin in hospital to oral amoxicillin at home found that the two treatments were equivalent. In cases of chest indrawing pneumonia without underlying complications, home treatment with a five-day course of high-dose oral amoxicillin is preferable to parenteral treatment because of the associated reduction in referral, admission, and treatment costs as well as the reduced invasiveness of oral treatment. Results from a four-country study argued in favour of home-based therapy of chest indrawing pneumonia in a variety of geographic and cultural settings. A systematic review comparing oral and parenteral antibiotics for the treatment of community-acquired chest indrawing pneumonia concluded that failure rates between the two were not significantly different.

**TABLE.** Doses of amoxicillin for children 2–59 months of age with pneumonia

TOOLS	CATEGORY OF PNEUMONIA	AGE/WEIGHT OF CHILD	DOSAGE OF AMOXICILLIN DISPERSIBLE TABLETS (250 mg)
iCCM tool for community health workers: <b>no change</b>	Fast breathing pneumonia	2 months up to 12 months (4–<10 kg)	1 tab twice a day x 5 days (10 tabs)
		12 months up to 5 years (10–19 kg)	2 tabs twice a day x 5 days (20 tabs)
IMCI tool for professional health workers at health facilities: <b>revised</b>	Fast breathing and chest indrawing pneumonia	2 months up to 12 months (4–<10 kg)	1 tab twice a day x 5 days (10 tabs)
		12 months up to 3 years (10–<14 kg)	2 tabs twice a day x 5 days (20 tabs)
		3 years up to 5 years (14–19 kg)	3 tabs twice a day x 5 days (30 tabs)

**Community health workers (CHWs) can effectively diagnose and treat childhood fast breathing pneumonia.** The WHO/UNICEF joint statement *Management of pneumonia in community settings* recommends the training and deployment of CHWs as an important strategy to increase access to quality care for pneumonia. Research showed that educated community members could be trained to detect and manage fast breathing pneumonia in their communities, while large-scale studies showed that the sensitivity, specificity, and overall agreement rates in pneumonia diagnosis and treatment were high among CHWs who had intensive basic training and routine supervision.

Properly trained and supervised CHWs in limited controlled settings have managed chest indrawing pneumonia with oral amoxicillin appropriately at community level, resulting in an increase in access to treatment and reduced costs for families. Because evidence is not generalizable, the iCCM guidelines are not being updated to include management of chest indrawing pneumonia until more evidence becomes available. In situations where referral is not possible, CHWs may treat chest indrawing pneumonia with oral amoxicillin, if local health policy allows them to do so.

#### DURATION OF TREATMENT

Pneumonia treatment can be reduced to three days of amoxicillin instead of the previous five for children with fast breathing pneumonia in settings with low HIV prevalence.

**A three-day course of antibiotics is as effective as a five-day course in treating children with fast breathing pneumonia in settings with low HIV prevalence.** A systematic review of trials evaluating the efficacy of short-course versus long-course treatment of fast breathing pneumonia in children age 2 to 59 months recommended a shorter course of antibiotic therapy, keeping in mind the benefits to the individual as well as to the health system, especially in settings with limited resources.

#### COST OF TREATMENT

Treatment of pneumonia as outpatient or at home, as compared to in hospital, substantially reduces costs to the health system and to the household.

**Home treatment of pneumonia reduces costs substantially.** A comparison of household costs for chest indrawing pneumonia cases referred to a health facility with those cases managed directly by CHWs showed that, after excluding the cost of the antibiotic itself, the average household cost of each CHW-managed case was US\$ 0.25, while the average cost for a referred case was US\$ 7.51. This represents a 30-fold difference.

**Outpatient treatment costs less than inpatient treatment.** Data on annual economic and financial costs in urban health centres in a small number of low- and middle-income countries showed the average cost of providing outpatient services was US\$ 3 per visit, while the cost per outpatient visit for childhood pneumonia ranged from US \$13.44 to US\$48. The same studies found that the cost of inpatient treatment of childhood pneumonia ranged from US \$71 to US\$ 215 per bed day, while each in-patient case of severe pneumonia may cost US\$ 235. Outpatient costs averaged US\$ 13 and US\$ 86 respectively. When the provider costs (excluding inpatient care) and household costs were added together, the total societal average cost per episode was US\$ 22.62 for fast breathing pneumonia, and US\$ 142.90 for chest indrawing pneumonia. A recent cost minimization analysis in the UK concluded that treatment of community-acquired pneumonia with oral amoxicillin could result in savings of between £ 473 and £ 518 per case.

**Inpatient treatment costs less at secondary health facilities than at tertiary care facilities.** One study showed that the total cost to healthcare providers for one episode of hospitalized childhood pneumonia treated at secondary level was half of the cost of an episode treated at tertiary level. At both levels the greatest single cost was the hospital stay itself.

#### DOSAGE

Amoxicillin is effective in higher doses and reduced frequency.

**Amoxicillin is more effective when given in higher doses.** Increasing the concentration of antimicrobials improves their bactericidal activity. Reviews showed that, for community-acquired pneumonia, amoxicillin should be given in a regimen of 80mg/kg/day in two divided doses.

**Amoxicillin can be given twice instead of thrice daily for children.** Amoxicillin given in a twice-daily dosage regimen is as effective as regimens of three- or four-times daily, provided that the total daily dosage of amoxicillin is the same. A twice-daily schedule has advantages for caregivers and programmes as it may result in improved compliance.

#### TREATMENT OF *PNEUMOCYSTIS JIROVECI* PNEUMONIA (PCP)

In the empirical treatment of PCP, cotrimoxazole should only be used in children under one year of age.

**Empirical cotrimoxazole treatment for *Pneumocystis jirovecii* pneumonia (PCP) is only recommended for HIV-infected and – exposed children under 1 year of age**

**with chest indrawing pneumonia and pneumonia with general danger signs.** Two reviews led to this decision: the evidence on the management of diarrhoea and pneumonia in HIV-infected children, and a systematic review of studies on etiological agents for pneumonia.

#### PAEDIATRIC FORMULATION

The most suitable formulation for children is dispersible amoxicillin.

**Dispersible amoxicillin is the most suitable formulation for children.** Because the dosage of amoxicillin is based on the child's weight, and because of the risks associated with under- or over-dosing, it is crucial that the paediatric formulation have flexibility for dose adjustment. The use of solid preparations often involves breaking an adult tablet into smaller pieces, then crushing and adding it to food or liquid; this can lead to inaccuracies in dosing. Liquid formulations make weight-based dosing much easier, however measuring devices supplied with liquid medicines are not accurate and significant under- or over-dosing can occur. A multidisciplinary consensus supports the recommendation of 'Flexible Solid Oral Dosage' forms for children's oral medicines, as they are less costly than tablets, they have better stability and shelf life than liquids, and they are less bulky to ship and store.

In summary, these revised recommendations present a number of advantages compared to the previous ones.

- Oral amoxicillin can be used to treat both fast breathing pneumonia and chest indrawing pneumonia (see [Table](#)).
- Pneumonia classification and management are simplified to two categories (see [Figure](#)).
- Access to antibiotic treatment closer to home is increased.
- The need for referrals to higher-level facilities is decreased.
- The probability of hospitalization and thus the risk of nosocomial and injection-borne diseases is reduced.

- The probability of antimicrobial resistance is diminished, due to better adherence to the simplified treatment.
- Training of health workers is simplified.

## IMPLICATIONS FOR IMPLEMENTATION AT THE THREE LEVELS OF THE HEALTH SYSTEM

At **community level**, these new recommendations imply that:

- all children with fast breathing are classified as having "pneumonia" and treated with oral amoxicillin;
- children with "chest indrawing" pneumonia should be referred to a higher level. However, in situations where referral is not possible and if local health policy allows, CHWs may treat chest indrawing pneumonia with oral amoxicillin;
- dispersible amoxicillin is the preferred treatment for children.

At **health facility level**, these new recommendations imply that:

- all children with fast breathing and/or chest indrawing are classified as having "pneumonia" and treated with oral amoxicillin. The recommended dosage is 80 mg/kg for five days (40 mg/kg twice a day), however in settings of low HIV prevalence the duration of treatment for 'fast breathing pneumonia' can be reduced to three days;
- only those children who have either general danger signs or who are HIV positive and have chest indrawing need to be referred to higher level facility for inpatient treatment with injectable antibiotics;
- dispersible amoxicillin is the preferred treatment for children.

At **hospital level**, the main change is that in settings of low HIV prevalence, children with chest indrawing pneumonia will be treated at the health facility level and will no longer need to be referred for hospitalization.

<sup>1</sup> Evidence for technical update of pocket book recommendations for management of common childhood conditions. Geneva: World Health Organization; 2013. ([http://www.who.int/maternal\\_child\\_adolescent/documents/management\\_childhood\\_conditions/en](http://www.who.int/maternal_child_adolescent/documents/management_childhood_conditions/en)).

<sup>2</sup> Integrated Management of Childhood Illness (IMCI). WHO recommendations on the management of diarrhoea and pneumonia in HIV-infected infants and children. Geneva: World Health Organization; 2010. ([http://www.who.int/maternal\\_child\\_adolescent/documents/9789241548083/en](http://www.who.int/maternal_child_adolescent/documents/9789241548083/en))

<sup>3</sup> Revised WHO classification and treatment of childhood pneumonia at health facilities. Evidence summaries. Geneva: World Health Organization; 2014.

<sup>4</sup> Not able to drink, persistent vomiting, convulsions, lethargic or unconscious, stridor in a calm child or severe malnutrition.



**World Health Organization**

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