Strong health systems save lives: Improving pneumonia case management at all levels

- Pneumonia — a preventable, treatable and curable disease — remains the leading infectious cause of death among children under five.
- A coordinated approach is needed to strengthen pneumonia case management at every level of the health system, both globally and nationally, especially in the highest burden countries.
- A holistic global effort to tackle pneumonia must be underpinned by rigorous implementation research that answers pressing questions about prevention, diagnosis and treatment.

Background

Pneumonia is an acute respiratory infection that limits oxygen intake and makes breathing painful. While incidence decreased by 30 percent between 2000 and 2015, pneumonia is still the biggest infectious killer in children under five globally, ending around two lives every minute — more than diarrhoea, malaria and measles combined. In 2019, it accounted for approximately 672,000 deaths over 80 percent of which occurred in south Asia and sub-Saharan Africa. COVID-19 could add a further 1.9 million to the 2020 death toll, increasing all-cause pneumonia fatalities by more than 75 percent. No other infection causes this burden of death.

Over the past 20 years, the development of a global road map and monitoring framework — the Global Action Plan for Pneumonia and Diarrhoea (GAPPD) — and the large-scale introduction of pneumonia vaccines improved the data available to track progress against core global/national targets and prevention of the disease. While improvements in vaccine availability and coverage continues, pneumonia case management lags behind. Early diagnosis and treatment at all levels of the health system could prevent more than two-thirds of pneumonia deaths but at least 40 percent of under-fives with pneumonia are currently incorrectly diagnosed and only 34 percent receive correct treatment.

Incorrect diagnosis can lead to over-prescription of antibiotics for children with non-severe respiratory infections and under-treatment of those with pneumonia. This is concerning, given the growing threat of antimicrobial resistance (AMR), which contributes to at least 700,000 deaths every year. Building capacity to correctly diagnose, refer and treat the disease at all health system levels therefore presents a huge opportunity to reduce childhood mortality.
Our view

Malaria Consortium believes that effectively combating pneumonia requires a health systems strengthening approach, modelled on the World Health Organization’s (WHO) Health Systems Framework (Figure 1). This entails improving prevention, diagnostic aids and health worker training, and guaranteeing access to treatment at the community, health facility and hospital levels. Referral of children diagnosed with pneumonia also needs to be improved with support for patient transport and sharing of health records between different health system levels.

These interventions should be affordable and integrated with horizontal child health programmes, including integrated community case management (iCCM) and integrated management of childhood illnesses (IMCI). It is also important to ensure that both private and public healthcare providers are targeted.

Pneumonia interventions need to be introduced at all levels of the health system to maximise impact; if hospitals cannot manage referred cases properly, the benefits of improved community-level diagnosis will not be felt. Unfortunately, hospitals in low-resource settings are often under-resourced and over-crowded. As a result, many acutely unwell children and newborns lack access to oxygen supplementation — an essential medical treatment, as low blood oxygen saturation increases the under-five mortality rate six-fold. Inadequate equipment, weak maintenance, high oxygen costs and poor clinical practices also need to be addressed.

Figure 1: Factors to consider when designing health system strengthening interventions for improved pneumonia case management

Our experience

Malaria Consortium has been at the forefront of pneumonia implementation research over the past 10 years. For example, through the Acute Respiratory Infection Diagnostic Aid project (2016–2019) we studied the usability and acceptability of two automated respiratory rate (RR) counting aids — the main diagnostic tool available to frontline health workers — to improve classification of fast breathing in Ethiopia and Nepal.

We have also contributed to the global AMR response. In Zambia we investigated the rational use of antibiotics for children with suspected pneumonia, and in Bangladesh we used community dialogues to address antibiotic resistance.

Over the coming few years, we will build on this work and our expertise in health systems strengthening to conduct research in some of the highest burden countries. Through the AIRR study (2020-2022), we are working with partners to develop an automated RR aid using artificial intelligence on mobile devices to improve the ease and reliability of paediatric pneumonia diagnoses in Cambodia, Ethiopia, Malawi and Nigeria.

We are also leading global efforts to close existing knowledge gaps. As chair of Every Breath Counts’ (EBC) research group — a coalition aiming to end preventable child pneumonia deaths by 2030 — we are overseeing an eDelphi process that is consulting 350 global experts to set key research priorities for the next decade.

Central to all our work are strong partnerships with national governments. Our country offices are supporting ministries of health across Africa and Asia to develop national pneumonia action plans that will strengthen their health system’s pneumonia responses.
Recommendations

We recommend improving pneumonia case management through a health systems strengthening approach, taking into account the recommendations below.

1. **Stakeholders need to work together to effectively document and address pneumonia.** Public private partnerships, such as the EBC coalition, are crucial to a coordinated, integrated response at the global and national levels. Such coordination should also support increased investment — which has been historically lacking — and attainment of the GAPPD indicators.

2. **National governments, with support from technical partners and donors, should adopt comprehensive health systems strengthening approaches to improve pneumonia case management at all levels.** These need to be coupled with strong repair and replacement mechanisms for diagnostic devices, innovations to ensure an uninterrupted power supply to oxygen management systems, and strengthened supply chains for commodities. Integration with existing national and local framework (e.g. national oxygen roadmaps) will also be key.

3. **Donors should fund implementation research in line with the priorities set by the EBC coalition.** For example, further evidence is needed on the accuracy and usability of new automated RR counters at the community level and multimodal devices at the health facility and hospital levels. Agreement from the global community on reference standards is also needed. The results of such activities should enable decision makers to improve pneumonia interventions in the most appropriate settings and levels.

4. **The global community should better support pneumonia case management at country level through providing improved guidelines.** For example, WHO could provide further guidance on the inclusion of pulse oximetry into the iCCM/IMCI algorithm, where appropriate. A technical consultation is needed to develop global and country-specific guidance for health workers on how to detect, classify and treat or refer children under five with hypoxemia.

5. **National governments should work with technical partners to strengthen the training and supervision of health workers to improve their ability to correctly diagnose, treat and refer children at each level of the health system.** Training should also help health workers appropriately counsel caregivers on preventive behaviours — such as pneumococcal vaccines, exclusive breastfeeding for infants under six months, improved water, sanitation and hygiene practices, and the use of clean cooking fuels — as well as advise on correct adherence to antibiotics and recommended follow-up visits.

6. **Programme implementers should actively engage communities in pneumonia prevention and control.** This will help ensure that interventions are locally accepted and meet communities’ needs. It will also increase communities’ knowledge of pneumonia and of when to seek appropriate care.

7. **Donors and the pharmaceutical industry must commit to research investments to prevent AMR.** The prevalence and severity of antibiotic resistant bacterial pneumonias needs to be assessed. This data should be fed into international AMR databases — including the Global Antimicrobial Resistance Surveillance System — to better inform clinical decisions, promote the rational use of antibiotics (including amoxicillin dispersible tablets) and improve international and national policies.
References


