Need for routine pulse oximetry and oxygen delivery systems in low-income and middle-income countries

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The systematic review and meta-analysis of the prevalence of hypoxaemia among children with pneumonia in low-income and middle-income (LMIC) countries by Ahmed Ehsanur Rahman and colleagues is timely and emphasises some important current trends related to pulse oximetry and the identification of hypoxaemia in children with pneumonia.[1] Firstly, Rahman and colleagues report a high prevalence of hypoxaemia at 31% (95% CI 26–36; 101 775 children) among all children under 5 years with WHO-classified pneumonia. The prevalence was higher among patients with severe disease (41%, 95% CI 33–49; 30 483) and in emergency departments (47%, 30–64). Notably, hypoxaemia was identified in 8% (95% CI 3–16; 2395 children) of children with non-severe pneumonia.

These findings are important because they provide updates to the scientific literature on hypoxaemia in childhood pneumonia in LMIC settings after the introduction of the pneumococcal conjugate vaccine and the *Haemophilus influenzae* type b conjugate vaccine, incorporate data after the update to the WHO childhood pneumonia diagnostic guidelines in 2014, and emphasise that a considerable proportion of patients who are classified with non-severe pneumonia merely by clinical signs (ie, in the absence pulse oximetry) would be missed for referral for inpatient care. Rahman and colleagues report a higher prevalence of hypoxaemia than that of a meta-analysis performed in 2009,[2] possibly due to improved identification as a result of pulse oximetry measurement for the identification of hypoxaemia being explicitly listed in the updated WHO pneumonia diagnostic guidelines. Hypoxaemia is a well known risk factor for poor outcomes in patients with pneumonia, increasing the risk of death by approximately five times.[3] Pulse oximetry implementation in LMICs is a challenge due to factors related to cost, appropriateness of child-friendly probes, and training.[4,5] Many LMIC settings still do not have adequate systems for pulse oximetry identification on presentation to health facilities. Most global childhood deaths from pneumonia occur in LMICs,[6] the same setting that is burdened with barriers to management of patients with pneumonia, of which one limitation is insufficient availability of pulse oximetry. Notably, Rahman and colleagues were not able to incorporate the investigation of types of equipment, barriers to, or limitations of pulse oximetry in their analysis.

Patients with hypoxaemia require oxygen support to prevent respiratory and subsequently multiorgan failure. LMIC settings have insufficient oxygen support systems and these require strengthening in the health delivery system.[7] This is required in the health delivery system. Hopefully, the COVID-19 pandemic has emphasised the requirement for oxygen support systems, but investigation and support are needed in this area. Oxygen is listed as an essential medication by WHO.[8] It is crucial that the intervention of oxygen support is accepted by parents and caregivers of children, because community-based misconception of oxygen support can lead to poor adherence to treatment.[9] Further investigation of factors that might be barriers to or facilitators of the implementation of oxygen support is required, because this support is key to improving pneumonia outcomes.

Scientific literature on hypoxaemia has indicated the possible need to consider different cutoff points in the definition of hypoxaemia, including considering the altitude. Studies in Africa have reported that patients with pneumonia who have SpO_2 levels of 90–92% have similar risks of poor outcome to patients with SpO_2 levels of less than 90%.[10] Hence, further research is needed on cutoff points for hypoxaemia definitions and how different cutoff points can relate to poor outcomes of childhood pneumonia. A study in Bangladesh reported that younger children might require a different threshold of SpO_2 than will older children in defining hypoxaemia, emphasising another area that might require research.[11]

With the reported prevalence of hypoxaemia in children with pneumonia by Rahman and colleagues,[1] it is key for health-care providers, research experts, and policy makers to improve availability of pulse oximetry and oxygen support systems, training of clinical teams in the identification of hypoxaemia and use of oxygen support, and reliable identification of whether or which children with mild hypoxaemia (ie, SpO_2 90–92%) require oxygen supplementation.

I declare no competing interests.

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