

# Paediatric care in the time of COVID-19 in countries with under-resourced healthcare systems

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The pandemic that is sweeping the globe is extracting its greatest toll on the elderly, the chronically unwell, and the health care workers who bravely care for them. Children (0-19 years) have been largely spared; at the time of writing the deaths of only 10 children and adolescents have been reported due to COVID-19, compared to over 81,000 adults. Relatively spared too at this stage are low income settings. But the infection will reach to every corner of the globe, and leave no population unscathed. High income countries have prepared for COVID-19 in many ways - spending billions of dollars on fiscal stimulus, buying hundreds of thousands of mechanical ventilators, restrictive physical distancing and lock-downs, all aimed at prevention, flattening the curve and ensuring sufficient intensive care resources are available to address needs at their anticipated peak.

There is reason to believe that populations in low income countries including children will be hit hard by the pandemic, both indirectly and directly. Key reasons include: high burdens of HIV, tuberculosis, and malnutrition; poorly managed non-communicable diseases; overcrowded housing, inadequate sanitation and income insecurity associated with poverty; and health system weaknesses spanning such fundamental elements as water, sanitation and hygiene, major workforce deficits and open hospital wards with lack of isolation. These are compounded by lack of personal protective equipment and testing capacity.

Evidence from China suggests 5% of children with COVID-19 have pneumonia and hypoxaemia, and need hospital admission, but just 0.6% of children need intensive care.<sup>1</sup> In high-income countries one key element of the pandemic response, rapid scaling up of intensive care capacity, has received considerable media attention and government action. There is a danger that low-income country governments and their well-intentioned partners will feel the need to follow suit. For many low income countries, doubling or tripling intensive care capacity would still mean very few, largely urban residents, could access it. We believe that in addition to strong containment measures, health leaders in low income countries should focus their planning as they prepare for a surge in COVID-19 cases on 3 things: doing oxygen really well, protecting staff really well, and maintaining routine services.

It is likely that about 200,000 children have died from pneumonia in the 3 months that COVID-19 has emerged,<sup>2</sup> and in many low income settings, mortality in hospitals from severe childhood pneumonia already exceeds 10%.<sup>3</sup> In many countries oxygen supplies for children and adults are limited, especially in rural areas. Provision of oxygen alone, without CPAP or mechanical ventilation has been shown to reduce mortality in children with pneumonia by 35%.<sup>4</sup> Doing oxygen well is not just a matter of having an oxygen cylinder, it is complex. Cylinders run out after 2-3 days of use, or a day of use in a really sick adult, are expensive, and logistically difficult at the best of times in remote or rural health facilities, more so in times when travel is restricted. Oxygen concentrators are more efficient but require a power source, and maintenance. They can run more reliably off solar power.<sup>5</sup> Countries should urgently assess their capacity to provide oxygen therapy to children and adults, quantify gaps and procure additional oxygen sources and required equipment to treat all people in need of oxygen therapy due to COVID-19 and other causes.

Doing oxygen well also requires detecting every patient with hypoxaemia: pulse oximeters will identify 30% of children who are not detected as having hypoxaemia based on clinical signs.<sup>6</sup> But many hospitals and nearly all ambulatory care facilities lack pulse oximetry to detect hypoxaemia, which should be a key screening criterion to avoid risks of transmission through unnecessary referral. The World Health Organisation has guidelines for Oxygen therapy and Hospital Care for Children; these emphasise the importance of triage, emergency treatment, history and examination, diagnosis, treatment, monitoring and supportive care, discharge planning and follow up, all needed for any sick child, including those with COVID-19.<sup>6-8</sup> A focus on quality of care is needed in this time of COVID-19.

Protecting staff is also what hospitals must do very well, and most in low income settings are under-prepared and under-resourced. Many simple measures can be put in place, and infection control guidance is available.<sup>9</sup> The risk to staff caring for children with COVID-19 is not just from patients, but probably more from other staff and caregivers. Where testing is limited, allocating a separate ward for paediatric patients who fulfil the clinical criteria of severe pneumonia or fever and viral syndrome and their caregivers, and keeping all children with non-severe pneumonia out of hospital and advising self-quarantine with their family are needed. Major efforts will be required to scale up supply of soap and hand sanitiser, and strengthen supply chains for personal protective equipment (PPE). Deciding to do oxygen well, rather than to scale up mechanical ventilation is also a protective measure for staff. Emergency intubation is the highest risk of transmission to a health care worker. At present published reports suggest 66-97% of adults mechanically ventilated with COVID-19 have died.<sup>10-12</sup> If the virus spreads in poorer countries the death rate from ventilation will be higher. But doing oxygen well will save many lives.

For children in low-income countries, COVID-19 carries a big indirect risk: disruption to health services, social and economic disruption may kill more children than the virus. Therefore containment, and maintaining basic health and social services for children and families should be priorities. In many low income countries, the health system will be overwhelmed and all services may breakdown. As staff numbers are already critically low for seriously ill children, maintaining services also means not reallocating them to adult care.

In conclusion, hospitals should do what they can do, really well. They should do oxygen, infection control and protection of staff really well, maintain essential child health services and play an important role in containment. Agencies such as the World Bank, donor and United Nations partner agencies should support these measures, rather than focusing on buying mechanical ventilators.

This crisis has painfully shown that health systems across the world have been under-resourced for too long and are not fit for purpose, particularly the lack of well-trained nurses and doctors, a problem which not been addressed by responses to major health crises in the last 50 years, and which undermines all other technical advances or new interventions. In the long run serious and sustained efforts are required to value the commitment and sacrifice of health care workers, to train more and to support them properly. COVID-19 is helping the world understand this, let us hope that endures after all this is over.

#### Reference List

1. Dong Y, Mo X, Hu Y, et al. Epidemiological characteristics of 2143 pediatric patients with 2019 coronavirus disease in China. Pediatrics 2020.
2. World Health Organization. Pneumonia. <https://data.unicef.org/topic/child-health/pneumonia/2019> (accessed April 6, 2020)
3. Agweyu A, Lilford RJ, English M, et al. Appropriateness of clinical severity classification of new WHO childhood pneumonia guidance: a multi-hospital, retrospective, cohort study. The Lancet Global health 2018;6:e74-e83.
4. Duke T, Wandt F, Jonathan M, et al. Improved oxygen systems for childhood pneumonia: a multihospital effectiveness study in Papua New Guinea. Lancet 2008;372:1328-33.

5. Duke T, Hwaihwanje I, Kaupa M, et al. Solar powered oxygen systems in remote health centres in Papua New Guinea: a large scale implementation effectiveness trial. J Global Health 2017;7:doi: 10.7189/jogh.07.010411.
6. World Health Organization. Oxygen Therapy for Children. Geneva: WHO [http://www.who.int/maternal\\_child\\_adolescent/documents/child-oxygen-therapy/en/](http://www.who.int/maternal_child_adolescent/documents/child-oxygen-therapy/en/); 2016.
7. World Health Organization. Hospital Care for Children: guidelines for the management of common illnesses with limited resources. Geneva: WHO, ISBN 789241548373; [http://www.who.int/maternal\\_child\\_adolescent/documents/child\\_hospital\\_care/en/](http://www.who.int/maternal_child_adolescent/documents/child_hospital_care/en/); 2013.
8. World Health Organization. WHO-UNICEF technical specifications and guidance for oxygen therapy devices. 2019.
9. World Health Organization. Infection prevention and control during health care when COVID-19 is suspected. Geneva: World Health Organization; 2020:1-5.
10. Weiss P, Murdoch DR. Clinical course and mortality risk of severe COVID-19. The Lancet 2020.
11. Ñamendys-Silva SA. Respiratory support for patients with COVID-19 infection. The Lancet Respiratory Medicine 2020.
12. Wu C, Chen X, Cai Y, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. JAMA internal medicine 2020.

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