What does SARS-CoV-2 mean for global pneumonia prevention, diagnosis and treatment?

Shally Awasthi¹, Harry Campbell², Charles S. Dela Cruz³, Hamish R. Graham⁴,⁵, Leith Greenslade⁶*, Fyezah Jehan⁷, Heather J. Zar⁸,⁹

¹ Department of Pediatrics, King George's Medical University, Lucknow, Uttar Pradesh, India.
² Centre for Global Health, Usher Institute, The University of Edinburgh, Edinburgh, Scotland, United Kingdom.
³ Department of Internal Medicine, Center for Pulmonary Infection Research and Treatment, Yale University School of Medicine, New Haven, CT, USA.
⁴ Centre for International Child Health, MCRI, University of Melbourne, Melbourne, Victoria, Australia.
⁵ Department of Paediatrics, University College Hospital Ibadan, Ibadan, Nigeria.
⁶ JustActions, Every Breath Counts Coalition, New York, NY, USA.
⁷ Department of Pediatrics, Aga Khan University, Karachi, Pakistan.
⁸ SA-MRC Unit On Child and Adolescent Lung Health, University of Cape Town, Cape Town, South Africa.
⁹ Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town, Cape Town, South Africa.

*corresponding author
Leith Greenslade
JustActions, Every Breath Counts Coalition
New York, NY, USA.
leith@justactions.org

This year, for the first time, World Pneumonia Day will be held during a global pneumonia pandemic. By 12 November, SARS-CoV-2 is expected to cause 1.3 million deaths and by 31 December, 1.9 million deaths (1). If these deaths are counted as lower respiratory infection (pneumonia) by the Global Burden of Disease, SARS-CoV-2 could increase pneumonia mortality by more than 70% in 2020, bringing the annual death toll to 4.5 million. No other infection causes this burden of death.

The pandemic has alerted the world to the dangers of pneumonia and the threat to population health, economic progress and the achievement of the Sustainable Development Goals (SDGs) set by the United Nations (2). It has severely strained national health systems, exacerbated poverty and existing inequities and threatened broader social assets - including peace and security.
Pneumonia deaths, unlike deaths from other leading infectious killers, generally follow a "U" shape across the lifecourse and are highest in children under five years and adults over 70 years of age. While SARS-CoV-2 has not affected children severely, the indirect effects on child health from reduced access to basic health services, diversion of resources, poverty and lockdowns have been substantial. Recent models estimate up to 2.3 million additional children could die this year due to COVID-19-related health service disruptions, 35% from pneumonia and newborn sepsis alone (3).

SARS-CoV-2 has already caused a significant increase in adult deaths from pneumonia, especially the elderly. Further, the role of SARS-CoV-2 infection as an additional future cause of chronic lung diseases is unknown. Together, the direct and indirect effects of the pandemic will substantially increase pneumonia deaths with pneumonia remaining the leading cause of infectious death for many years to come.

The pandemic has revealed just how unprepared most countries have been to deal with wide-scale, rapidly increasing outbreaks of viral pneumonia. Decades of underinvestment in preventing, diagnosing and treating pneumonia has left most countries with health systems that are not equipped or trained to effectively diagnose and treat respiratory infections. To date, no national government has implemented a specific strategy to control respiratory infections, and global support for pneumonia is limited. Pneumonia attracts just 6% of international development assistance for infectious diseases, of which more than 90% is for vaccines (4), and pneumonia research accounts for just 3% of infectious disease research spending, despite causing more than 25% of all infectious disease deaths (5).

This sustained lack of investment has left huge deficiencies in community awareness, prevention, diagnosis and management of pneumonia. Communities are largely unaware of the dangers of pneumonia, how to recognize the signs and when and where to seek appropriate treatment (6). Globally, almost one in three children with suspected pneumonia are not receiving care. Many more develop pneumonia due to low vaccination coverage, high rates of malnutrition and exposure to air pollution. More than half of children under five years of age are not protected with the pneumococcal conjugate vaccine (PCV), 47 million children are nutritionally wasted, and almost all are exposed to unsafe levels of air pollution. There is no rapid diagnostic test for pneumonia and the most effective tool to identify patients with severe pneumonia (pulse oximetry) is absent in most low resource facilities (7). Studies have shown that access to pulse oximetry, oxygen and antibiotics is alarmingly low (8-9).

However, SARS-Cov2 has created the conditions to address some of these glaring gaps. National governments have developed plans to control the virus, and are identifying at-risk populations, educating communities, equipping health facilities and training staff. International health agencies, including the World Health Organization (WHO), UNICEF, the World Bank, the European Commission and others are providing personal protective equipment, diagnostic tests and respiratory care equipment and training. If done properly, this massive effort to control the pandemic should contribute to improved case finding and diagnosis of all-cause respiratory infections, reducing deaths among children and adults over the long term.

But governments will need to make sure that COVID-19 technologies, including diagnostic tools and therapies for respiratory care are fully integrated into health systems and an item in national health budgets, along with vaccines, HIV/AIDS, malaria and other national health priorities. Global health donors will need to support national governments by financing multilateral health agencies (e.g., Global Fund, Gavi, Unitaid, etc) to help fill the gaps in pneumonia control, with a
special focus on vulnerable populations - the very young and the very old, and those with underlying conditions.

The next decade is critical. Countries should emerge from the pandemic with specific national strategies to control pneumonia that improve vaccination and child nutrition, reduce smoking and exposure to second-hand smoke and indoor and outdoor air pollution. Closing the gaps in diagnosis and treatment with pulse oximetry, oxygen and antibiotics must become health priorities. Other priorities include the development of rapid diagnostic tests for pneumonia, including point-of-care tests and innovative financing to ensure affordable, energy-efficient supply of medical oxygen to health facilities everywhere.

Sustained roll-out of affordable new conjugate vaccines especially PCV is needed, as well as new vaccines against the common viral causes of childhood pneumonia such as Respiratory Syncytial Virus, which are under development. Several candidate vaccines against SARS-CoV-2 are under evaluation and it is crucial that an affordable, effective vaccine be available and equitably distributed to all populations. Such strategies will not only reduce pneumonia deaths, but also prevent the development of chronic respiratory disease, as pneumonia early in childhood leads to reduced lung function setting the path to development of chronic illnesses.

With these approaches, every country will be in a stronger position to reduce vulnerability to another respiratory pandemic and to make rapid progress to achieving most of the SDGs for health they promised to achieve by 2030. Investment in pneumonia control is effectively an investment in pandemic preparedness against future emerging respiratory viral threats.

Word count - 966

References:
Abbreviation List

COVID-19 - coronavirus disease 2019
HIV/AIDS - human immunodeficiency virus/ acquired immunodeficiency syndrome
PCV - pneumococcal conjugate vaccine
SARS-CoV-2 - severe acute respiratory syndrome coronavirus 2
SDGs - Sustainable Development Goals
UNICEF - United Nations International Children's Emergency Fund
WHO - World Health Organization