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Review of childhood pneumonia research priorities to catalyse increased donor investment

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Infectious disease research funders must utilise the childhood pneumonia scorecards to prioritise new investments in pneumonia research.

Introduction

Pneumonia is the leading infectious cause of death in children under five, accounting for 14 percent of all child deaths.^[1] Despite the key role research can play in preventing childhood pneumonia deaths, it is estimated that less than three percent of infectious disease research funding is allocated to pneumonia.^[2] To increase and better target funding towards childhood pneumonia, the Child Pneumonia Research Investment Scorecard was developed with support from the Every Breath Counts Research Group.

Methods

- We conducted a desk-based review of the priorities published in the Every Breath Counts Research Group 2021 eDelphi study to understand the landscape of pneumonia research as of March 2023.^[3,4]
- Utilising the top 20 priorities that emerged from our survey of 108 experts, and the top 20 priorities identified by a subset of low- and middle-income country (LMIC) experts, we searched publicly available databases, such as ClinicalTrials.gov, for awarded grants and registered studies that addressed these topics.
- Each topic was categorised by the number of records found using a traffic light system (see key).

Results

- In total, 75 percent of the top 20 research priorities, as identified by all surveyed experts, had fewer than 10 registered studies or grants. For 47 percent of this 75 percent total, fewer than three registered studies or awarded grants were identified.
 - According to our traffic light system (Table 1), five (25 percent) of the topics prioritised by all surveyed experts are green, eight (40 percent) are amber, and seven (35 percent) are red.
- In total, 60 percent of the top 20 research priorities, as identified by experts in LMICs, had fewer than 10 registered studies or grants. For 58 percent of this 60 percent total, fewer than three registered studies or awarded grants were identified.
 - According to our traffic light system (Table 2), eight (40 percent) of the topics prioritised by the LMIC-based experts surveyed are green, five (25 percent) are amber, and seven (35 percent) are red.

Conclusion

Research identified in this review predominantly focused on new clinical tools and technologies, such as vaccines, novel diagnostics and innovative treatments. However, few major donors invested in understanding how those tools and technologies can be effectively implemented and how they might be used to sustainably strengthen health systems and address disease burdens in LMICs. Although this study is limited by the availability of data and the interpretation of the research priorities, it is an important overview of the current research landscape for childhood pneumonia. It is crucial for funders to consider these research priorities, particularly those identified by LMIC experts, and to channel investments into the most neglected topics.

Results

Key:
■ 0-2 *
■ 3-9 *
■ 10+ *
* Publicly available registered studies or grants based on desk research between January 2018 and March 2023

Table 1: Overall childhood pneumonia research priority scorecard

Overall priority rank	LMIC priority rank	Research topic	Research and investment gap
1	18	Explore interventions to prevent neonatal pneumonia	Amber
2	10	Study the capacity of health systems worldwide to correctly diagnose and manage childhood pneumonia and the obstacles to correct diagnosis and case management in low-resource settings	Red
3	8	Assess respiratory syncytial virus (RSV) vaccine efficacy, effectiveness, cost-effectiveness and proxy surrogates of protection	Green
4	15	Develop inexpensive and rapid point-of-care diagnostic and aetiological tests that differentiate bacterial, viral (including RSV) and malaria infections that are reliable in community settings and at facilities in children and young infants	Red
5	17	Implementation research to identify the best ways of integrating pulse oximetry and oxygen into integrated management of childhood illness (IMCI) and other existing protocols	Amber
6	6	Assess the efficacy and effectiveness of new vaccines in reducing childhood pneumonia morbidity and mortality in different populations, such as pregnant women	Red
7	5	Identify clinical signs, simple lab tests and biomarkers that predict poor treatment outcomes and need for further care	Green
8	28	Evaluate the effect of pulse oximetry introduction on care practices, referral uptake, time to treatment and outcomes in primary and secondary healthcare settings	Amber
9	2	Identify the health system's capacity and the main barriers to providing oxygen in health facilities	Amber
10	7	Develop improved oxygen concentrators. This could include a reduction in size, reliability, affordability, length of lifetime without maintenance, ability to run independently of electricity supply, accessibility and clinical practice	Amber
11	31	Evaluate situations where antibiotics may be appropriately withheld to avoid unnecessary antibiotic use, including for non-severe pneumonia	Red
12	12	Explore alternative antibiotic treatment regimens for pneumonia, including short-course once-daily regimens	Green
13	13	Assess the cost-effectiveness of oxygen, including different systems, at different levels of the health system	Red
14	33	Explore the impact of the COVID-19 pandemic on access to child health services, including for pneumonia in LMIC contexts	Red
15	56	Explore the use of medical oxygen for paediatric pneumonia cases (challenges, gaps, facilitators and uptake)	Amber
16	21	Assess the quality of care provided to children with pneumonia and/or hypoxaemia at community, primary and secondary levels of care (including integrated community case management [ICCM], IMCI, and emergency triage and treatment)	Amber
17	48	Develop validated risk prediction models across a range of resource settings	Amber
18	20	Investigate the long-term effects of COVID-19 pneumonia infections on child health and development	Green
19	40	Assess the role and challenges of using pulse oximetry at the community level, particularly in populations where there is severe anaemia	Red
20	21	Study the barriers to reducing indoor air pollution, including reducing smoking, increasing emission cleanliness of household fuel and reducing cost for complete combustion of biomass fuels	Green

Table 2: LMIC childhood pneumonia research priority scorecard

LMIC priority rank	Overall priority rank	Research topic	Research and investment gap
1	27	Develop low cost, conjugate/combination vaccines or multiple respiratory viral antigens (Human metapneumovirus, Influenza and Parainfluenza)	Red
2	9	Identify the health system's capacity and the main barriers to providing oxygen in health facilities	Amber
3	28	Develop strategies for differentiating bronchiolitis from bacterial pneumonia, and subsequent bronchiolitis care pathways for low and middle income settings	Red
4	33	Understand the epidemiology of pneumonia severity and mortality in children presenting with COVID-19 symptoms	Green
5	7	Identify clinical signs, simple lab tests and biomarkers that predict poor treatment outcomes and need for further care	Green
6	6	Assess the efficacy and effectiveness of new vaccines in reducing childhood pneumonia morbidity and mortality in different populations, such as in pregnant women	Red
7	10	Develop improved oxygen concentrators, e.g. in terms of a reduction in size, reliability, affordability, length of lifetime without maintenance, ability to run independently of electricity supply, accessibility/more easily deliverable in both community settings and clinical practice	Amber
8	3	Assess RSV vaccine efficacy, effectiveness, cost-effectiveness and proxy surrogates of protection	Green
9	51	Develop effective supportive treatment packages for viral respiratory infections (e.g. low cost monoclonal antibodies for RSV)	Green
10	2	Study the capacity of health systems worldwide to correctly diagnose and manage childhood pneumonia and the obstacles to correct diagnosis and case management in low-resource settings	Red
11	45	Develop an inexpensive and rapid point-of-care test to determine antibiotic sensitivity in bacterial pneumonia	Amber
12	12	Explore alternative antibiotic treatment regimens for pneumonia, including short-course once-daily regimens	Green
13	13	Assess the cost-effectiveness of oxygen, including different systems, at different levels of the health system	Red
14	21	Develop better models and tools to estimate burden of pneumonia disease and burden of pneumonia mortality	Red
15	4	Develop inexpensive and rapid point-of-care diagnostic and aetiological tests that differentiate bacterial, viral (incl. RSV) and malaria infections that are reliable in community settings and at facilities in children and young infants	Red
16	63	How has the incidence and diagnosis of pneumonia, including severe cases, changed for children during the COVID-19 pandemic?	Green
17	5	Implementation research to identify the best ways of integrating pulse oximetry and oxygen into IMCI and other existing protocols	Amber
18	1	Explore interventions to prevent neonatal pneumonia	Amber
19	34	Development of new antimicrobial agents that could overcome bacterial resistance	Green
20	18	Investigate the long-term effects of COVID-19 pneumonia infections on child health and development	Green



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