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MICROBIAL ETIOLOGY OF CHILDHOOD PNEUMONIA IN DEVELOPING COUNTRIES

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Childhood community acquired pneumonia (CCAP) is a significant public health challenge in developing countries. Determination of microbial etiology is critical to develop evidence-based treatment and vaccination policies. Due to paucity of well-designed studies, it is generally believed that bacterial etiology dominates in unvaccinated children. Our research group sought to address the following research gaps.

Etiology of Pneumonia: In the community acquired pneumonia etiology study (CAPES), 4045 children with pneumonia underwent blood and nasopharyngeal aspirate (NPA) culture, and NPA PCR for 26 species. Gram-negative bacilli predominated in blood, followed by *S. aureus*, pneumococcus and Hib. Blood and NPA cultures were discordant in most cases. Multiplex PCR revealed viruses in 46.5% children viz RSV, rhinovirus, PIV, HMPV, coronavirus, influenza virus, and combinations. This confirmed that viruses dominate in NPA and *S pneumoniae* is not as frequent as expected.

Reliability of NPA for etiology: In 222 children with severe pneumonia, we examined blood culture, NPA culture and NPA viral PCR in all. Additionally lung aspirate, BAL, pleural fluid, sputum, and induced sputum were processed where feasible. Etiology was assigned using a hierarchy of biological specimens and three distinct etiology assignment models. Irrespective of the model used, viral etiology dominated and RSV was the most frequent organism. Gram-negative bacteria outnumbered Gram-positive organisms and *S pneumoniae* was identified in very few children. This confirmed that RSV and not bacteria is the dominant pathogen in pneumonia, even in the lungs or lower airways.

Bacterial vs Viral Etiology: We did not find any differences in demographic characteristics, clinical features, and radiographic findings in children with bacterial vs viral pneumonia. Although CRP and Procalcitonin were higher in bacterial pneumonia, there was no clinically useful discriminatory level. However, IL-6>5000 pg/ml, IL-8>1000 pg/ml, and their combination could reliably distinguish bacterial from viral etiology. Thus, systemic biomarkers can help to establish etiology at the time of presentation itself.

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