Unsupervised electronic stethoscope for childhood pneumonia diagnostic


Introduction: With 1.1 million deaths, pneumonia is the leading cause of child mortality under five years of age worldwide, particularly in Sub-Saharan Africa and South East Asia regions. WHO developed a case management algorithm for the diagnosis of pneumonia based on respiratory rate, shortness of breath and chest indrawing. Our objective was to compare the diagnostic performance of this algorithm and an electronic stethoscope.

M&M: An electronic stethoscope device was tested in an ongoing feasibility study at the paediatric emergency unit of the Geneva University Hospital (Ethics Committee number 15-217). This medical device records lung auscultation in 8 chest positions. Thus, the sound analysis has detected period for inspirationexpiration and then has identified auscultatory signs of pneumonia using the combination of Mel-frequency cepstral coefficients, Deep Neural Networks and Hidden Markov Models techniques.

Results: Preliminary results on 48 cases of pneumonia have shown a better sensitivity than the WHO algorithm. This method significantly differentiates bronchitis from consolidated pneumonia with an Area Under Curve (AUC) of 0.84.

Conclusion: The electronic stethoscope provides a good diagnostic performance. It could become an unsupervised diagnostic tool for pediatric pneumonia in low-resource settings, particularly for health workers in first level facilities.

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Conflict of interest: none