Implementation of Lung Ultrasound in Low-to-Middle Income Countries: a new challenge global health?

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Abstract

Pneumonia remains the leading cause of death globally in children under the age of five. The poorest children are the ones most at risk of dying. In the recent years, Lung Ultrasound has been widely documented as a safe and easy tool for the diagnosis and monitoring of pneumonia and several other respiratory infections and diseases. During the pandemic, it played a primary role to achieve early suspicion and prediction of severe COVID-19, reducing the risk of exposure of healthcare workers to positive patients. However, innovations that can improve diagnosis and treatment allocation, saving hundreds of thousands of lives each year, are not reaching those who need them most. In this paper, we discuss advantages and limits of different tools for the diagnosis of pneumonia in low-to-middle income countries, highlighting potential benefits of a wider access to lung ultrasound in these settings and barriers to its implementation, calling international organizations to ensure the indiscriminate access, quality and sustainability of the provision of ultrasound services in every setting.

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Elements to achieve a diagnosis of PNUMONIA	Clinical Examination	Lung Ultrasound	Chest X-ray
Clinical Diagnosis	Clinical diagnosis is feasible but may not accurate	Almost 100% accurate	Accurate, but may miss retro-cardiac consolidations and exposes to radiations
Differential Diagnosis	Discriminating pneumonia from wheezing, bronchitis, effusion, asthma may require expertise and is not accurate	Easily detect effusions, ARDS, interstitial inflammatory patterns, lung embolism and cardiogenic edema	Detect effusions, ARDS, interstitial inflammatory patterns, lung embolism, edema, mediastinum or hearth enlargement
Etiological Diagnosis	Discriminating viral, bacterial and atypical pneumonia require high expertise and is not accurate	Growing evidences support a good accuracy in discriminating viral, bacterial and atypical pneumonia	Data showed that it is not accurate in discriminating viral, bacterial and atypical pneumonia
Monitoring and Follow-Up	Feasible and cheap	Feasible and cheap, allow also to monitor complete resolution	Feasible but expensive and unethical for radiation issues
Availability at bed-side	Yes	Yes; new pocket devices can be used with mobile phones	No
Costs	Cheap	New devices relatively cheap	Expensive
Facilities needed	Nothing	Bed side devices and wireless probe more diffused, easily available and cheaper, rechargeable with sunlight	Large dedicated rooms, trained technicians, large amount of energy, maintenance
Training	Differentiation of different type of lung murmurs (crackes, rales, wheezing), or reduction of sounds require training and experience	Studies demonstrated a few hours training is sufficient to learn to detect pneumonia	Distinction of different patterns require training and expertise