The future of Neonatal Lung Ultrasound: validation of an Artificial Intelligence model for interpreting lung scans. A multicentre prospective diagnostic study.

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Abstract

Background Artificial intelligence (AI) is a promising field in the neonatal field. We focused on lung ultrasound (LUS), a useful tool for the neonatologist. Our aim was to train a neural network to create a model able to interpret LUS. **Methods** Our multicentric, prospective study included newborns with gestational age (GA) [?] 33+0 weeks with early tachypnea/dyspnea/oxygen requirements. For each baby, three LUS were performed: within 3 hours of life (T0), at 4–6 hours of life (T1) and in the absence of respiratory support (T2). Each scan was processed to extract ROI used to train a neural network to classify it according to the LUS score. We assessed sensitivity, specificity, positive and negative predictive value of the AI model's scores in predicting the need for respiratory assistance with nasal Continuous Positive Airway Pressure (nCPAP) and for surfactant, compared to the "classical" scores. **Results** We enrolled 62 newborns (GA=36±2 weeks). In the prediction of the need for CPAP, we found a cut-off of 6 (at T0) and 5 (at T1) for both the classical nLUS and AI score. In the prediction of surfactant therapy we found a cut-off of 9 for both scores at T0, at T1 the nLUS cut-off was 6, while the AI's one was 5. Classification accuracy was good both at the image and classes level. **Conclusions** This is, to our knowledge, the first attempt to use an AI model to interpret early neonatal LUS and can be extremely useful for neonatologist in the clinical setting.

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