Artificial Intelligence versus conventional spirometry, to detect early asthma attacks in children.

An observational prospective study


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14% Of children affected by Asthma Worldwide.

Background

To gather a standardised dataset of digitally acquired lung auscultations, in children with suspected acute exacerbations of asthma.

Method

Study design & Population

- Observational prospective study.
- Paediatrics University Hospital of Geneva.
- During asthma follow-up consultation with spirometry testing.
- Children aged 5-18 y/o.

Data collection

- Deep learning algorithm trained on audio recordings (training set), to obtain an automated prediction of asthma exacerbation (healthy vs pathological).

Performance evaluation

- AI model performance evaluated on an held-out validation set.
- Comparison between performance of recordings from each stethoscope.

Results

- Necessity of new asthma management strategies/tools, including for diagnosis, in home care and where medical expertise is scarce.

Strengths

- First study to compare AI to spirometry in lung sounds analysis.
- Standardised lung sound dataset.
- Automatic interpretation of lungs sounds.
- Interpretation of large amounts of data.

Weaknesses

- Small dataset size.
- Model yet ineffective on validation set.
- Large volume of data needed to train the model.

Opportunities

- Fill the lack of resources for asthma diagnosis, in low and middle income countries.
- Home care and telemedicine possibilities.
- Empower caregivers.

Threats

- Unequal access to AI.

SWOT analysis for our study (blue) and for AI (red)

Conclusion

Necessity of new asthma managment strategies/tools, including for diagnosis, in home care and where medical expertise is scarce.

The algorithm is performant on the training set, not yet on the validation set. It can recognise asthma on data it has been trained on.

A Larger sample size is needed.