

Sleep-related breathing disorders

How much do your asthma patients really cough? - Evaluation of the LeoSound-monitor for standardized detection of nocturnal wheezing and cough in childhood.

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Background: A cardinal criterium for pediatric asthma management and for adjustment of pharmacotherapy are nocturnal symptoms, like wheezing and coughing. However, parents often underestimate nighttime symptoms.

Objective: To evaluate the applicability of the LeoSound-monitor for standardized detection and software-based quantification of nocturnal asthma symptoms in childhood.

Methods: Using bioacoustic sensors attached to chest and neck, the LeoSound-monitor works as a long-term stethoscope. Acoustic airway events are recorded over a period of 8 hours. After acquisition of sound data, the bioacoustic characteristics are analysed and assessed using a software-based spectral analysis (fast Fourier transformation). Primary outcome in the present study was the correlation between the automated assessment of breath sounds and the manual evaluation performed by an experienced specialist in pediatric pulmonology.

Results: We recruited 40 children (1 - 16 years) and performed nocturnal measurement with the LeoSound. In 33 children (83 %), we gained complete data sets with technically high quality. Sensors detached during the night in 4 children (10 %) and in 3 children (7 %) the measurement was terminated early due to rejection by the child. For "coughing", the manual reassessment showed a sensitivity of 80.1 % and a correlation with the software-based analysis of 0.637 (r^2). The main reason for false-positive classification were weeping and snoring. The sensitivity for "wheezing" was almost 100 % and the correlation between automated assessment and manual reassessment was 0.851 (r^2).

Conclusion: The LeoSound-monitor is an appropriate diagnostic tool for the systematic detection and quantification of nocturnal acoustic airway events in children. However, the currently used assessment algorithms have to be adjusted to children-specific sources of artefacts.