

Publication

Fluctuation-based clustering reveals phenotypes of patients with different asthma severity

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Serial peak expiratory flow (PEF) measurements can identify phenotypes in severe adult asthma, enabling more targeted treatment. The feasibility of this approach in children has not been investigated. Overall, 105 children (67% male, median age 12.4 years) with a range of asthma severities were recruited and followed up over a median of 92 days. PEF was measured twice daily. Fluctuation-based clustering (FBC) was used to identify clusters based on PEF fluctuations. The patients' clinical characteristics were compared between clusters. Three PEF clusters were identified in 44 children with sufficient measurements. Cluster 1 (27% of patients: n=12) had impaired spirometry (mean forced expiratory volume in 1 s (FEV₁; 1;) 71% predicted), significantly higher exhaled nitric oxide (≥ 35 ppb) and uncontrolled asthma (asthma control test (ACT) score <20 of 25). Cluster 2 (45%: n=20) had normal spirometry, the highest proportion of difficult asthma and significantly more patients on a high dose of inhaled corticosteroids (≥ 800 μ g budesonide). Cluster 3 (27%: n=12) had mean FEV₁; 1; 92% predicted, the highest proportion of patients with no bronchodilator reversibility, a low ICS dose (≤ 400 μ g budesonide), and controlled asthma (ACT scores ≥ 20 of 25). Three clinically relevant paediatric asthma clusters were identified using FBC analysis on PEF measurements, which could improve telemonitoring diagnostics. The method remains robust even when 80% of measurements were removed. Further research will determine clinical applicability.

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