Paediatrics

Raised FeNO predicts asthma attacks in children

High FeNO levels were independently associated with an increased risk of future asthma attacks in children, in a prospective observational cohort study from the UK. Other risk factors identified included a recent history of asthma attacks, and a reduction in the asthma medication ratio (AMR).

Children, aged 5-16 years, were recruited to the CHAMPIONS study from ten general practices in the East Midlands. Children on practice asthma registers, as well as those with suspected asthma who had been prescribed inhaled corticosteroids (ICS) or at least 2 short acting beta-2 agonist (SABA) inhalers or oral corticosteroids for acute respiratory symptoms in the past 12 months, were included.

The CHAMPIONS study was designed to evaluate the implementation and clinical outcomes related to the delivery of spirometry and FeNO testing for children in primary care.

A total of 614 children (40%) attended reviews between June 2016 and August 2017, and 612 families consented to participate. Spirometry testing and FeNO estimation were performed at baseline. Other baseline characteristics recorded on the day of the asthma review included the asthma control test (ACT) and the childhood asthma control test (CACT) for younger children. Follow-up ACT/CACT questionnaires were posted 6 months after the review. Records were examined to determine the number of asthma attacks 6 months before and after the review.

Asthma medication ratios (AMR) were calculated for each patient, to compare the number of ICS vs SABA inhalers prescribed. Lower AMR scores suggest suboptimal treatment.

Spirometry and FeNO data were available for 465 children. The final analysis included 460 (99%) of these children who had follow-up data on the number of further asthma attacks.

Spirometry was abnormal in 25%, and the median FeNO was 23 ppb. Poor symptom control was reported in 41% of children at baseline, reducing to 25% at 6 months' follow-up.

Asthma attacks were documented in 22% of children in the 6 months preceding their review, reducing to 16% at follow-up.

High FeNO levels were independently associated with one or more asthma attacks during follow-up:

- Higher levels of FeNO: OR 1.02 (95% CI: 1.01-1.02; P < 0.001)
- FeNO ≥ 58 ppb as cut-off: OR 3.35 (95% CI: 1.83-6.15; P < 0.001)

In the 6 months following the review, 27 out of 97 children (28%) with FeNO ≥ 58 ppb had at least one asthma attack, compared with 48 out of 363 (13%) with FeNO < 58 ppb.

Having one or more asthma attacks in the past 6 months was also independently associated with one or more asthma attacks during follow-up:

- OR 2.03 (95% CI: 1.15-3.60; P = 0.02)

A decrease in the AMR was associated with an increased risk of an asthma attack during follow-up:

- OR 2.99 (95% CI: 1.44-6.21; P = 0.003).

Poor symptom control at baseline as evidenced by low ACT/CACT scores was associated with having poor symptom control at follow-up: OR 4.4 (95% CI: 1.9-10.2; P = 0.001).

The authors acknowledge that the study has several limitations. Less than half of eligible children were brought for review and these may have been the more symptomatic ones. ACT/CACTs were only returned by 175 families and the clinicians were not blinded to the results of the spirometry or FeNO results.

Nevertheless, FeNO does seem to be a useful adjunct in monitoring young patients with asthma and predicting the need for more intensive management. The study also flags the utility of the AMR and the need to ensure children are taking appropriate preventer therapy.

The study authors conclude: 'We have identified several risk factors for poor asthma-related outcomes in children managed in UK primary care. Any child with a history of a recent asthma attack, poor symptom control, raised FeNO or a decrease in their ICS to SABA use should prompt a structured review, with standardised assessments, to optimise asthma management.'

'Based on our findings, we feel that review of medication prescriptions, and the use of FeNO for monitoring, should be included as part of the asthma QOF,' they add

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Lo D, Beardsmore C, Roland D et al. Risk factors for asthma attacks and poor control in children: a prospective observational study in UK primary care. *Arch Dis Child* 2022;107:26-31