



Use of Fractional Exhaled Nitric Oxide to Guide the Treatment of Asthma: An Official American Thoracic Society Clinical Practice Guideline

Authors: Sumita B. Khatri, Jonathan M. Iaccarino, Amisha Barochia, Israa Soghier, Praveen Akuthota, Anna Brady, Ronina A. Covar, Jason S. Debley, Zuzana Diamant, Anne M. Fitzpatrick, David A. Kaminsky, Nicholas J. Kenyon, Sandhya Khurana, Brian J. Lipworth, Kevin McCarthy, Michael Peters, Loretta G. Que, Kristie R. Ross, Elena K. Schneider-Futschik, Christine A. Sorkness, and Teal S. Hallstrand.

On behalf of the American Thoracic Society Assembly on Allergy, Immunology, and Inflammation.

Background

Asthma therapy is typically adjusted based on the level of asthma control achieved. However, the response to therapy is heterogeneous. There are complementary tools to aid in making decisions regarding treatment and daily controller medicines. Biomarkers of inflammation such as nitric oxide (NO) can be measured directly to guide therapy. NO is a gas that can be measured in the exhaled breath. Measuring the fraction of this gas during a steady-state exhalation, called the fractional exhaled NO (FeNO), is a standardized and quantitative method for assessing the levels of this gas in exhaled breath. There is strong evidence that FeNO correlates with eosinophilic activity and inflammation, and measurement of FeNO may allow more accurate titration of controller medicines in asthma.

For interpretation, cut points for FeNO are below 25 ppb for normal and over 50 ppb for elevated levels for adults; those values in children are 20 and 35 ppb, respectively.

Development of the Guideline

The committee met and reviewed available literature in combination with expert opinion. A single question was addressed: Should patients with asthma in whom treatment is being contemplated undergo FeNO testing? The Committee emphasized that they were not evaluating the utility of FeNO as a diagnostic test, but rather were evaluating its use as a guide to therapy in people with known asthma. The study sought evidence about cost-effectiveness and patient-oriented outcomes related to the use of this diagnostic test.

Outcomes

In patients with asthma in whom treatment is being contemplated, the panel believed that the evidence favored the assessment of FeNO during evaluation of an individual with asthma in addition to usual care. The outcome measurements for FeNO-based care included a reduced exacerbation frequency (28.9% vs. 39.7%; RR, 0.73 [95% CI, 0.62–0.86]) and oral

corticosteroid use (26.0% vs. 32.8%; RR, 0.79 [95% CI, 0.65–0.95]), two critical outcomes of asthma management. The results favoring FeNO testing were generally stronger in pediatric patients.

Factors considered as negatives were considered trivial and included test availability, operator training, and cost. However, the cost savings by reducing exacerbations and hospitalizations more than offset the cost.

ATS Recommendation:

"In patients with asthma in whom treatment is being considered, we suggest the use of FeNO testing in addition to usual care over usual care alone (conditional recommendation, low confidence in estimates of effect)."



Figure 1 Fenom Pro® is an example of a FeNO measuring device*

Take home message

- FeNO is a measure of nitric oxide, a biomarker that correlates with inflammation in asthma.
- The American Thoracic Society Committee reviewed the available literature on the risks and benefits of FeNO-based care.
- FeNO-based care was shown to be associated with fewer hospitalizations, fewer exacerbations, and lower use of corticosteroids.
- The cut-off points for normal and abnormal are different for adults and children and should be individualized.
- *"FeNO-based care provides the clinician with a simple and noninvasive point-of-care test that provides complementary information over usual care and the undesirable effects are small relative to the potential benefit."* – ATS

*ATS does not endorse any specific FeNO measuring device in this paper

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