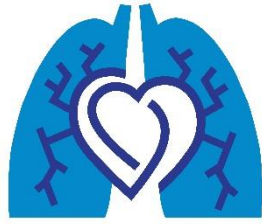


CDI Clinical Designs - Cover Sheet*

Document Type	Clinical Management
Document Title	Guidance document on the use of FeNO in the evaluation of airways disease in adults.
Document Owner (e.g. NCP)	NCP Respiratory
NCAGL	Dr Sarah O' Brien
Approved by	NCAGL
Unique Identifier Number (UID)	
Version Number	Version 1
Publication Date	2026
Recommended Revision Date **	2028
Electronic Location	



NATIONAL CLINICAL
PROGRAMME RESPIRATORY

NCP Respiratory

GUIDANCE DOCUMENT ON THE USE OF FRACTIONAL EXHALED NITRIC OXIDE (FeNO) IN THE EVALUATION OF AIRWAYS DISEASE IN ADULTS.

March 2026



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1. What is Fractional exhaled nitric oxide (FeNO)?

Fractional exhaled nitric oxide (FeNO) is a simple, non-invasive test that is widely used in both primary and secondary care internationally to measure the levels of exhaled Nitric Oxide (NO) in the breath. FeNO is an established biomarker of type 2 inflammation in the respiratory tract (upper and lower airway). Nitric Oxide (NO) is produced by the airway epithelium in response to the type 2 inflammatory cytokines IL4 and IL13.

FeNO provides a point-of-care measure of airway inflammation and is increasingly used in routine clinical practice for the evaluation of patients with symptoms of obstructive airways disease, and in whom a diagnosis of asthma is suspected. FeNO can assist in confirming an asthma diagnosis (BTS/NICE/SIGN 2025), in guiding inhaled corticosteroid dosage and treatment, and in those with severe asthma, aid selection of appropriate biologic therapy (Rupani et al 2022). There is also evidence to support a role for FeNO in predicting asthma exacerbations (Couillard et al 2021), and as an adjunct to the assessment of adherence to inhaled corticosteroid therapy (Heaney et al 2019).

The FeNO device is a small and portable machine, which can be easily used in the outpatient clinic setting.

This guidance document outlines the role of FeNO in adults only, and provides recommendations on its appropriate use, and the interpretation of FeNO results. This document is intended for use by respiratory specialist teams assessing adult patients with suspected airways disease in either the community or the acute hospital setting.

Key points

1	FeNO is a supportive test in those in whom eosinophilic airways disease is suspected and therefore it should not be used as the sole basis for any diagnosis.
2	Commencing any treatment or onward referral should never be delayed due to lack of access to FeNO testing.

2. The benefits of FeNO

- Improved accuracy of diagnosis for patients with suspected asthma
- Improved effectiveness of patient care through better understanding of an individual's condition
- Improved patient outcomes, reducing the risk of exacerbations and admissions to hospital
- Reduction in inappropriate prescribing
- Reduction in the number of inappropriate referrals to secondary care clinics.

3. FeNO in Chronic Airways Disease

3.1 The Role of FeNO in Asthma

Asthma is one of the most common chronic respiratory conditions worldwide, and Ireland is no exception. Recent data from the GP-delivered Irish National [Chronic Disease Management](#) programme shows that 14% of the adult population in Ireland carry a diagnosis of asthma. However, despite being so common, asthma is surprisingly difficult to diagnose with high rates of under and over diagnosis. There is no gold standard diagnostic test.

The episodic and fluctuating nature of asthma symptoms means that variable airflow obstruction, characteristic of asthma, can be difficult to capture on spirometry. A significant proportion of people with asthma will have neither airflow obstruction nor a positive bronchodilator response when tested, particularly if they are well at the time.

Additionally people with severe asthma are often misdiagnosed as COPD due to the development of fixed, post-bronchodilator airflow obstruction secondary to chronic airway inflammation leading to airway remodelling.

As the knowledge of the underlying immune pathogenesis of asthma has evolved over the last decade, it is now well recognised that the vast majority of asthma patients (50-60%) have an eosinophilic phenotype (Eileen et al 2019; Wenzel 2012; Cushen et al 2020). Both FeNO (a marker of IL4/IL13 cytokine activity) and peripheral blood eosinophil count (a marker of IL5 activity) are established biomarkers for the detection of eosinophilic (Type 2/T2 high) inflammation. As with the symptoms of asthma, these biomarkers also demonstrate variability over time, and repeated measurement may be required.

The current BTS/SIGN/NICE and ERS guidelines on the diagnosis of asthma now include FeNO in the diagnostic evaluation of patients with suspected asthma in the primary care setting. As is highlighted in these diagnostic guidelines, while a raised FeNO level supports a diagnosis of asthma in those with a suggestive clinical presentation it is not itself diagnostic in isolation.

The measurement of FeNO should therefore **not** be performed as a “screening test” for asthma but reserved for those presenting with symptoms suggestive of obstructive airways disease in whom the clinical suspicion of asthma is high.

3.2 The role of FeNO in COPD

The role and relevance of FeNO in COPD is not yet established. FeNO may be useful in patients with a historic diagnosis of asthma or those COPD patients who have symptoms characteristic of asthma. Measurement of FeNO in the routine evaluation of COPD patients cannot be recommended at this time. This is an active area of research, and future recommendations may change.

3.3 FeNO in the assessment of inhaler adherence

Elevated FeNO is marker of inhaled corticosteroid (ICS) responsiveness. The majority of patients with high FeNO in the setting of eosinophilic airway disease will demonstrate FeNO reduction following the initiation of ICS. FeNO suppression testing (FST), where daily serial measurement of FeNO is undertaken along with directly observed use of an ICS containing inhaler can therefore be a useful aid assessment of adherence to ICS (McNicholl et al 2012; Butler et al 2021).

However, there is a cohort of patients with steroid-resistant type 2 inflammation in whom FeNO remains elevated despite adherence to ICS therapy. Isolated FeNO measurement should not therefore be used as a determinant of inhaler adherence, and appropriate due diligence should be undertaken to confirm adherence or non-adherence in this group.

3.4 Contraindications for FeNO

FeNO measurement requires patients to exhale into a filtered mouthpiece at a controlled rate.

The following contraindications are listed in manufactures instruction for the use of FeNO and include:

- Haemoptysis,
- Unstable cardiac condition,
- Recent abdominal/ cardiac surgery,
- Recent eye surgery.

When using FeNO equipment the manufacturers instructions should be followed at all times.

3.5 Who can perform FeNO?

FeNO can be undertaken by any healthcare professional who has been trained in its use.

No specific accreditation, certification, or qualification is required to undertake FeNO. (see 10.2 for further information on resources for FeNO education).

Local policies, procedures, protocols and guidelines (PPPG) should be in place to ensure staff undertaking FeNO are appropriately trained in its measurement.

4. Interpretation of FeNO

Interpretation of FeNO results should be undertaken by healthcare professionals who are trained and competent in diagnosing asthma and who have appropriate understanding of the value of FeNO in making a diagnosis. Whilst differing cut-offs have been suggested, it is widely accepted that a normal FeNO is <25 parts per billion (ppb), whilst a FeNO >50ppb supports a diagnosis of asthma in the appropriate clinical context (GINA, ATS/ERS, NICE/BTS/SIGN).

The significance of FeNO between 25ppb and 50ppb is less certain, and should be interpreted taking into account the patient’s clinical presentation and the results of other supportive investigations including BEC, spirometry, serial PEFR etc. FeNO levels are usually highly sensitive to ICS usage, so may be suppressed in people with genuine asthma who are using ICS containing inhalers.

5. Additional considerations when interpreting a FeNO result

While FeNO is an established marker of T2 inflammation in asthma, it can be raised in other conditions, most notably chronic rhino sinusitis. It can also be increased by other extrinsic factors, such as a nitrate rich diet.

Conversely, several factors can cause FeNO levels to be low. Current smoking reduces the accuracy of FeNO and can cause falsely low FeNO levels.

FeNO can show variability over time, and repeated measurement can therefore be helpful (Dotan et al 2025; Yuda et al 2025). It also has significant circadian variability, with higher levels in the morning.

Common Causes of False High FeNO
<ul style="list-style-type: none">• Allergic Rhinitis• Chronic rhino sinusitis with polyps• Nitrate-rich diet• Atopy without asthma
Common Causes of False Low FeNO
<ul style="list-style-type: none">• Current smoking• Recent ICS use• Poor exhalation technique

Key message: A normal FeNO does not exclude a diagnosis of asthma and further investigations should be undertaken to confidently establish or out rule the diagnosis in line with best clinical practice.

Key message: A positive test increases the probability of asthma, but a negative test does not in of itself exclude asthma.

6. Evidence for the use of FeNO

The comprehensive review of the evidence performed by NICE UK to support the use of FeNO in the evaluation of patients with asthma can be found at [NG245 Asthma: Evidence review F for diagnostic accuracy of fractional exhaled nitric oxide \(FeNO\) measures](#).

In non-smoking adults with suspected asthma, FeNO >50ppb had a sensitivity of 0.56-0.69, and specificity of 0.77-0.91, vs diagnosis with PEFr variability or bronchodilator reversibility, or clinician diagnosis with bronchodilator reversibility, or methacholine bronchial challenge tests. Irish data from the 200 patient Traits study found FeNO>50ppb had PPV of 89 (72-96) percentage, and NPV of 58 (48-67) % (data shared with NCP by authors unpublished). This data demonstrates the utility of FeNO in supporting a diagnosis of asthma but its limitations in out ruling asthma.

7. Clinical Recommendations when using FeNO

1	When used to support diagnosis of asthma, a) FeNO should only be measured in patients presenting with characteristic symptoms of asthma, and in whom the clinical suspicion of asthma is high. b) Low/Normal FeNO in the absence of objective evidence of variable airflow obstruction and raised BEC, and in the absence of regular ICS use, should prompt consideration of alternate diagnoses.
2	There is currently no evidence to support the use of FeNO as a screening test for asthma.
3	Smoking status, recent ICS use, and evaluation for the presence of significant sinus disease should be recorded, and all considered when interpreting FeNO results.
4	It is recommended that the following are avoided pre-FeNO testing as they will affect the results – caffeine, smoking, strenuous exercise, all foods especially those containing nitrates.

8. Operational Recommendations when using FeNO

1	All departments using FeNO should have a local Standard Operating Procedure (SOP) to include the procedures for machine maintenance.
2	All operators should be experienced in FeNO measurement and result interpretation. Training should be provided at a local level. Local competency can also be developed.
3	FeNO is not an aerosol generating procedure, and can be performed by experienced healthcare professionals in an outpatient clinic setting.
4	HSE organisations should ensure a consistent application of all current Infection Protection Control (IPC) measures, following both local and national guidance.

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10. Appendices

10.1 Purchasing a FeNO Machine

Consider the following:

- Adherence to HSE procurement processes
- Initial cost of equipment
- Annual cost of contract and/or servicing
- On-going cost of consumables including mouthpieces, filters, test cassettes etc., also consider basic cost, bulk-buy, shelf-life
- Functionality including: Adult, screen visibility, visual & audible prompts
- Data storage capacity
- Power source: Charging times and battery life
- Extras: protective carry case, ease of cleaning.

10.2 Resources

- [Catalogue](#) – NHS FeNO in asthma module
 - Module 1: an introduction to FeNO testing
 - Module 2: focuses on the interpretation of FeNO
- [NHS Accelerated Access Collaborative » Fractional Exhaled Nitric Oxide \(FeNO\)](#)

Further information

Authors: Prof Breda Cushen Clinical Lead NCP Respiratory in collaboration with Dr Brian Kent St James Hospital.

Feedback provided by the Clinical Advisory Group (CAG) and signed off by CAG on 17/02/26

NCAGL CD Dr Sarah O'Brien sign off 31/03/26

Thank you to all who assisted in this document including the NCP Respiratory Physiotherapy Reference group, Sandra McCarthy ICPCD DON and the ICPCD Nurse Reference Group and members of the NCEC asthma management guideline development group.