Kent Surrey Sussex Academic Health Science Network

Unity Insights

Fractional exhaled Nitric Oxide (FeNO) testing

Impact Reporting

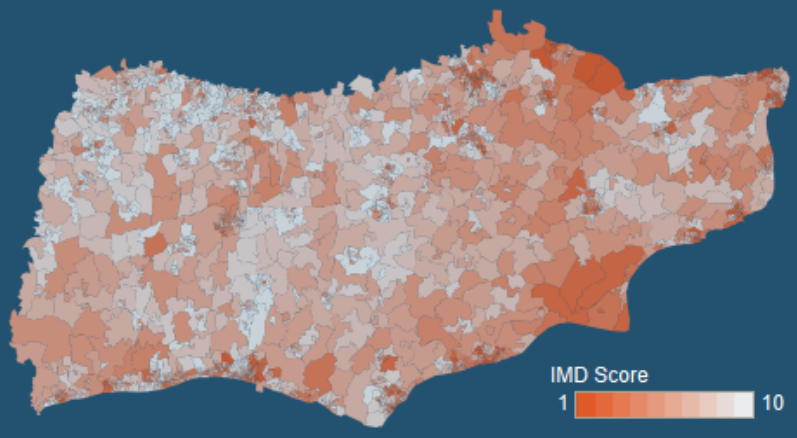
June 2023

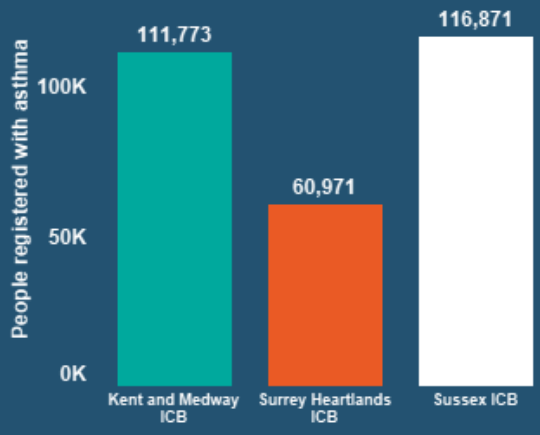
Contents

1. Regional Summary

Regional Context

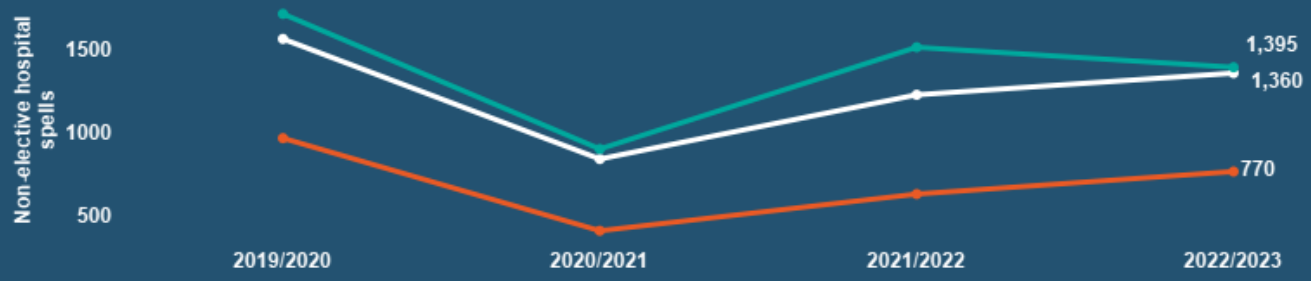
Kent, Surrey & Sussex Academic Health Science Network (KSS AHSN) is one of the 15 AHSNs set up by NHS England in 2013. The AHSN has a mandate to operate as the key innovation arm of the NHS, and works to spread evidenced-based innovations. Since April 2021, KSS AHSN have been working to spread FeNO diagnostic testing to support asthma diagnosis.





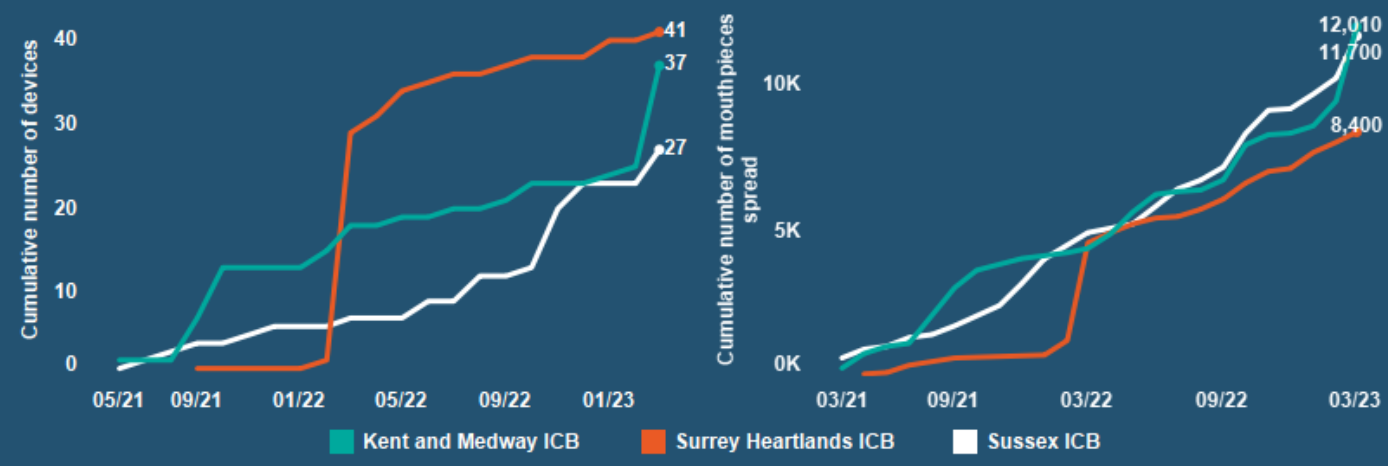
The KSS region has a total of 4.9 million people registed across 411 GP practices and 106 PCNs. 8.2% of the South East's population lives within 20% most-deprived LSOAs, the majority of which are based along the coastline. Health indicators for the South East coastal communities are significantly worse than England's average, and demand 33% more bed days per 100k people than less deprived communities.

In the latest Quality and Outcomes Framework (QOF), it is reported that a total of 289,615 people are registered with a diagnosis of asthma, with non-elective asthma admissions peaking in 2019/20 at 4,250, and 3,525 being recorded in 2022/23.



FeNO Spread

Since April 2021, a total of 105 devices have been spread across the KSS region, in addition to 32,110 mouthpieces. Should all mouthpieces be used, it is estimated that 8,991 patients should benefit from FeNO testing, avoiding an estimated expenditure of £928k on inhaled corticosteroids for patients with a false positive diagnosis.



2. Clinical introduction

What is fractional exhaled nitric oxide (FeNO) testing?

It is well recognised that a significant proportion of UK asthma patients are over-reliant on reliever inhalers. The 2022 Asthma and Lung UK annual survey reports that over a fifth of asthmatics surveyed (21%) used six or more relievers in the preceding year[1]. This implies poor control of asthma and a need to improve on management. It is also reported that the diagnosis of asthma is incorrect in up to a third of patients[2] and this may be another reason for poor symptom control. There is therefore a strong case to be made for using objective tests prior to commencing, or escalating, asthma treatment.

Fractional exhaled nitric oxide (FeNO), is a simple, quick, easy to perform non-invasive test. The test is conducted using a small portable device. The patient blows through a filtered mouthpiece at a controlled rate for 10 seconds. It is not a forced breath. The result is available within a minute. It is a simple test that most people over the age of 5 years can perform quickly with instruction. The equipment is portable and results are available immediately.

Raised FeNO levels indicate eosinophil airway inflammation and support a diagnosis of asthma. There is also a case to be made for the use of FeNO in titrating asthma medication, FeNO levels fall with effective inhaled or oral steroid treatment. NICE published diagnostics guidance on FeNO in 2014[3] and introduced FeNO measurement into its diagnostic algorithm for asthma in both adults and children over 5 years in its 2017 asthma guidance[4]. In 2021, prior to the beginning of the programme, relatively little FeNO testing was occurring out of hospital settings in England and Wales, hence the importance of this programme to support the spread and adoption of fractional exhaled nitric oxide (FeNO) testing in primary care.

A diagram showing the positive outcomes associated with the objectivity and efficiency of a FeNO test.

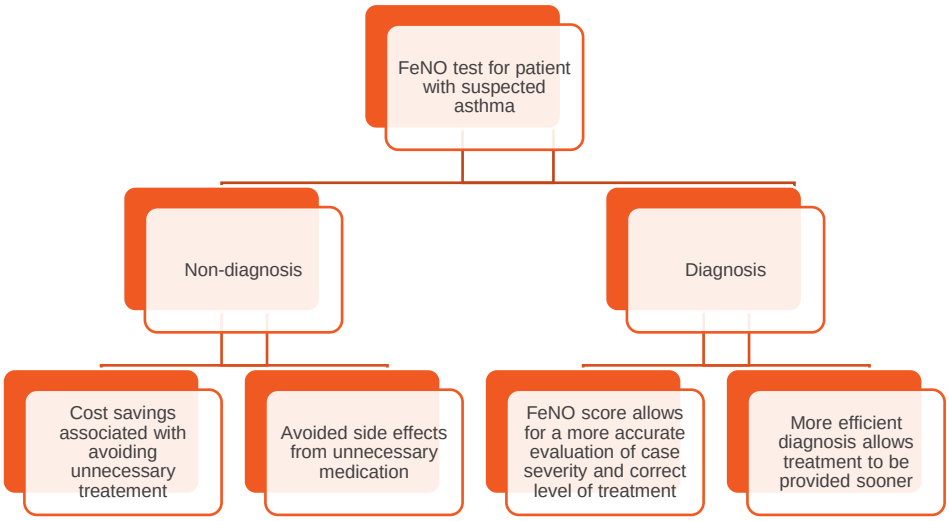


Figure 1: Diagram showing the positive outcomes of FeNO testing

1. Fighting back (asthmaandlung.org.uk)

2. Reevaluation of Diagnosis in Adults with Physician-Diagnosed Asthma
Aaron SD, Vendemheen KL, Fitzgerald JM et al
JAMA. 2017;317(3): 269-279

https://jamanetwork.com/journals/jama/fullarticle/2598265

3. NICE Diagnostics Guidance DG12 April 2014:Measuring fractional exhaled nitric oxide concentration in asthma: NIOX MINO, NIOX VERO and NObreath
https://www.nice.org.uk/guidance/dg12

4. NICE guidance NG80 Asthma: diagnosis, monitoring and chronic asthma management March 2017, updated March 2021
https://www.nice.org.uk/guidance/ng80/chapter/Recommendations#objective-tests-for-diagnosing-asthma-in-adults-young-people-and-children-aged-5-and-over

3. Background

Introduction to the NHS Accelerated Access Collaborative

The NHS Accelerated Access Collaborative (AAC) is the umbrella organisation for UK health innovation. It supports the NHS to quickly adopt clinically and cost-effective innovations, and to ensure patients get access to the best new treatments and technologies. It identifies, supports, and spreads NICE approved innovations that supports the NHS Long-Term Plan.

Kent, Surrey & Sussex Academic Health Science Network (KSS AHSN), a member of the AHSN Network and AAC, has been supporting the spread and adoption of fractional exhaled nitric oxide (FeNO) testing to aid the diagnosis of asthma since April 2021.

The aim of the FeNO programme is to:

- Improve patient care and outcomes by more effectively diagnosing patients with suspected asthma
- Increase widespread patient and clinician access to FeNO testing across primary care

KSS AHSN have been driving local implementation, adoption, pathway transformation, and have engaged with respiratory teams across Kent, Surrey and Sussex to support the region to access FeNO testing across primary care. The ambition is to improve patient care and outcomes by supporting clinicians and patients to access FeNO testing.

Resources:

FeNO testing used in breathlessness pathway | Kent Surrey Sussex Academic Health Science Network (kssahsn.net)

FeNO v5 (kssahsn.net)

4. Spread and return on investment.

Spread of FeNO to date

Kent, Surrey & Sussex Academic Health Science Network have been supporting the spread of FeNO testing across primary care since April 2021. The driving of local implementation includes the procurement of FeNO devices and mouthpieces by organisations adopting FeNO testing. Figure 2 provides an overview of the areas adopting FeNO testing.

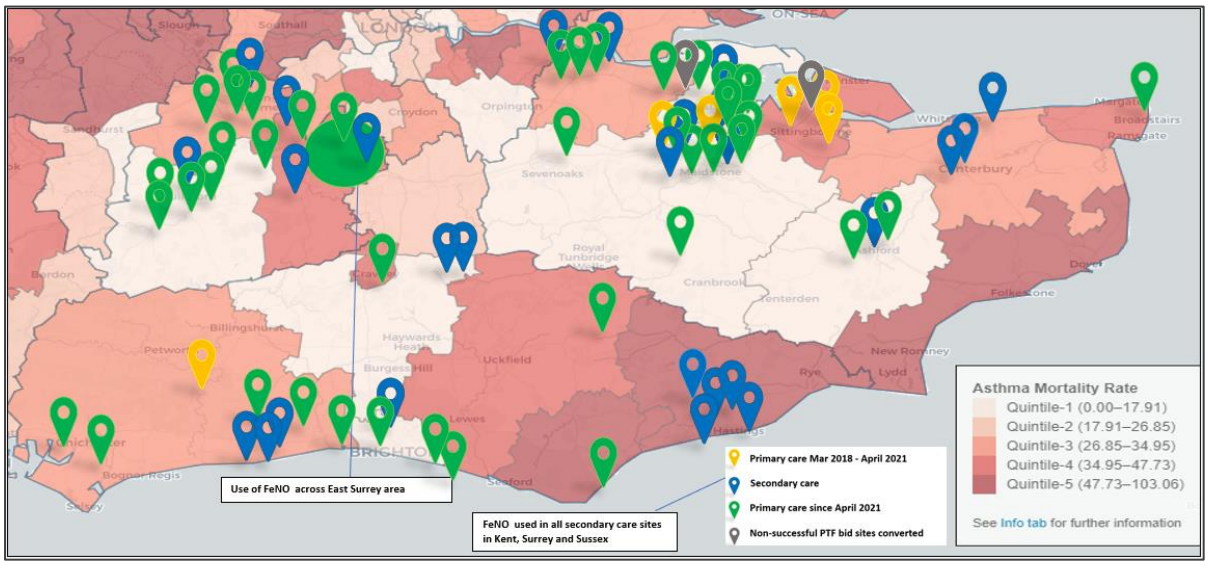


Figure 2: Map of locations adopting FeNO testing across KSS

As of the end of March 2023, a reported 105 devices have been spread across Kent, Surrey and Sussex since April 2021, benefitting an estimated 8,991 patients. A full breakdown of the ICB level uptake data can be found in Table 1, below. Additionally, two PCNs, one in Surrey Heartlands ICS and one in Kent & Medway ICS, have received FeNO devices via AAC pathway transformation funds in 2021.

Table 1: Summary of FeNO devices and mouthpieces spread

ICB	Devices	Mouthpieces	Estimated Patients
Kent & Medway ICB	37	12,010	3,363
Surrey Heartlands ICB	41	8,400	2,352
Sussex ICB	27	11,700	3,276

As part of the evidence base used to initiate the further spread and adoption of FeNO, the AAC analytics unit conducted a health economic analysis to demonstrate the impacts of FeNO testing.

The analysis utilises the National Institute for Health and Care Excellence (NICE) resource impact assessment NG80. Tools and resources | Asthma: diagnosis, monitoring and chronic asthma management | Guidance | NICE

The main benefit demonstrated in the AAC's analysis of FeNO testing is the reduction in unnecessary inhaled corticosteroid usage – costed at £230 a year per unnecessary asthma diagnosis avoided. As per the NICE impact assessment, an estimated 29% of people are provided with a negative asthma diagnosis following objective tests. In 22% of cases, the diagnosis is unclear following the first round of tests, and FeNO is repeated.

Table 2: Example of FeNO pathway using 100 patients

Stage	%	People
People diagnosed using diagnostic algorithms	100%	100
Positive asthma diagnosis following objective tests	49%	49
Negative asthma diagnosis following objective tests	29%	29
Proportion of people with unclear diagnosis who have FeNO	22%	22
Positive asthma diagnosis following repeated FeNO test	70%	15
Negative asthma diagnosis following repeated FeNO test	30%	5

By utilising the methodology detailed in Table 2, above, and applying the estimated 8,991 patients benefitting from FeNO diagnostics across KSS, the following impacts can be estimated:

Table 3: Estimated benefits of asthma diagnosis pathway

ICB	Positive Diagnosis	False Positives Prevented	Estimated Inhaled Corticosteroid Cost Avoided
Kent & Medway ICB	2,166	1,197	£347k
Surrey Heartlands ICB	1,515	837	£243k
Sussex ICB	2,110	1,166	£338k

5. Next steps – national report, resources and loan offer

As part of the end of programme activities, Wessex AHSN, the AHSN responsible for leading the national programme, have compiled a report detailing the impact of the programme on a national scale. You can read the report here: FeNO Impact Report - April 2023 (wessexahsn.org.uk)

During the programme, there has been a FeNO toolkit developed with various resources from evidence to implementation in practice.

Resources at a glance (wessexahsn.org.uk)

For rapid access to all resources available within these pages you can download and print out our Summary QR Code document which allows you to use a smart device to review individual sections.

FeNO machine loans for primary care

The national AHSN Network is working with NIOX® Group and Intermedical, suppliers of respiratory diagnostic and monitoring devices, to continue providing access to FeNO machines across primary care as the project draws to a close. There will be a cost involved to hire the machines over a three-year period and participation is entirely optional. Note that NIOX® will give priority to PCNs that do not currently have access to any machines.

Circassia : To access the offer contact Steven Adair via email steven.adair@niox.com and registering to the portal via link The NIOX® UK Online Store

Bedfont : Collaboration with Intermedical announced to improve asthma diagnosis - The AHSN Network. To access the offer contact Marc McDonnell, via email marc.mcdonnell@intermedical.co.uk