

# Can we reduce asthma attacks in children using spirometry measurements and symptoms?

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<b>Registration date</b> 01/07/2022	<b>Overall study status</b> Ongoing	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 30/09/2025	<b>Condition category</b> Respiratory	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

Asthma affects 1.1 million children in the UK. Asthma attacks are frightening for the child and their family and can be fatal. A child has an asthma attack every 2.5 minutes, and one-in-10 of these children is admitted to hospital. Current guidelines say that recent asthma control (symptoms) should guide treatment choices to prevent attacks. What is needed is a reliable and evidence-based test, which can be used alongside asthma control (symptoms) to guide treatment and reduce the number of asthma attacks.

Spirometry is a simple breathing test that does not change over time when asthma is controlled. Spirometry could be a very useful test to monitor asthma because it measures lung function, i.e. how the lungs are working. To do spirometry, children take a big breath in and breathe out through a tube as hard as they can. The amount of air they can breathe out in the first second is called the FEV1 (forced expiratory volume in 1 second). Currently, doctors disagree about how to best use spirometry to monitor asthma because of a lack of research evidence and conflicting guidance from experts. We know that only ~25% of hospital doctors in the UK use spirometry regularly in their asthma clinics. Our recent research shows that a 10% fall in FEV1 over a 3-month period is followed by a 28% increased risk of an asthma attack in the next 3 months. We still do not know why using spirometry to guide treatment may lead to reduced attacks.

This research proposal will build on our previous research findings to answer the question “In children with asthma does spirometry and symptom-guided treatment, compared to symptom-guided treatment alone, reduce the number of asthma attacks?” In this study, we also will further explore the links between treatment guided by spirometry and the risk of attacks.

### Who can participate?

Children aged between 6 and 15 years old who have asthma and have had an asthma attack in the last year

### What does the study involve?

Everyone that takes part will be put into one of two groups and has an equal chance of getting treatment in group 1 (treatment guided by spirometry plus asthma control (symptoms)) or group 2 (treatment guided by asthma control (symptoms) alone). All children will have

spirometry measured at every visit. Asthma control (symptoms) and other asthma details will be gathered from questionnaires. A computer programme will guide treatment decisions based on symptom score, current treatment and also, in group 1, spirometry measurements. At 3-month intervals over a year, children will meet the research team, complete the symptom questionnaire, and spirometry, and have their treatment changed according to spirometry and asthma control (symptoms), or asthma control (symptoms) alone. We will measure asthma attacks and other outcomes over 12 months.

What are the possible benefits and risks of participating?

Families will be informed of the possible benefits and disadvantages of taking part by means of information leaflets, discussion with local research nurses and the asthma team. All participants may benefit because they have a more regular follow-up for their asthma. Participants who are randomised to the treatment guided by spirometry plus asthma control may benefit because the intervention may reduce the risk of exacerbations. The policies of recommending treatment based on asthma control (symptoms) only and based on spirometry plus asthma control (symptoms) are both used routinely within the NHS. We do not anticipate that participants will run additional risks by participating in SPIROMAC. Parent/carer(s) of children will sign a consent form approved by the Ethics Committee. Children or families who are not willing to be randomised will not be recruited.

Where is the study run from?

Royal Aberdeen Children's Hospital (UK)

When is the study starting and how long is it expected to run for?

August 2021 to December 2026

Who is funding the study?

National Institute for Health Research (NIHR) Efficacy and Mechanisms Evaluation (EME) Programme (UK)

Who is the main contact?

Nicole Sergenson (UK)

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## Contact information

### Type(s)

Scientific

### Contact name

Ms Nicole Sergenson

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### **Type(s)**

Principal investigator

### **Contact name**

Prof Steve Turner

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## **Additional identifiers**

### **Integrated Research Application System (IRAS)**

306946

### **Central Portfolio Management System (CPMS)**

53202

## **Study information**

### **Scientific Title**

SPIROMetry to manage asthma in children (SPIROMAC)

### **Acronym**

SPIROMAC

### **Study objectives**

We hypothesise that asthma treatment guided by spirometry will improve flow and volumes and that this will lead to reduced asthma attacks. SPIROMAC will therefore determine whether the spirometry-guided treatment reduces attacks by achieving one or more of the following:

1. Increased spirometry measurement as evidenced by improved airway flow (FEV1)
2. Increased spirometry measurement as evidenced by improved lung volume (FVC)
3. Reduced eosinophilic airway inflammation, as evidenced by a fractional exhaled nitric oxide (FeNO) test. The mechanistic aim has eosinophilic airway inflammation as an intermediary on the mechanistic pathway we will explore between treatment guided by spirometry plus symptoms (the effector) and reduced asthma attacks (the outcome). Eosinophilic inflammation may be relevant to attacks independently of lung function (as evidenced by FEV1 and FVC). FeNO is not

part of the SPIROMAC treatment algorithm and is being measured to give this mechanistic insight.

### **Ethics approval required**

Old ethics approval format

### **Ethics approval(s)**

Approved 24/05/2022, West Midlands – Black Country Research Ethics Committee (The Old Chapel, Royal Standard Place, Nottingham, NG1 6FS, United Kingdom; +44 (0)207 104 8010; blackcountry.rec@hra.nhs.uk), ref: 22/WM/0097

### **Study design**

Randomized interventional

### **Primary study design**

Interventional

### **Study type(s)**

Treatment

### **Health condition(s) or problem(s) studied**

Asthma

### **Interventions**

We will invite eligible children to take part in our study. We hope to be able to recruit children at up to 40 hospital-based asthma clinics and primary care practices across the UK.

We aim to recruit 550 children aged 6-15 years with asthma who have had an asthma attack in the last year.

There will be five study visits, the first one will be the recruitment visit. There will then be four follow-up study visits, approximately every three months.

At the first appointment with the research team, permission to take part in the study will be obtained from the parent/carer and from the child.

Children will be put into one of two groups (randomised) and have an equal chance of getting treatment in group 1 (treatment guided by spirometry plus asthma control (symptoms)) or group 2 (treatment guided by asthma control alone).

At the first visit all children will:

1. Answer some questions about themselves and their asthma
2. Have spirometry measured
3. Have their height and weight measured
4. Complete a questionnaire about asthma control (symptoms)
5. Complete a questionnaire about their quality of life
6. Have another breathing test that measures fractional exhaled nitric oxide (FeNO)

A computer programme will guide treatment decisions based:

1. Group 1, on their asthma control (symptoms), their current treatment and spirometry measurements.
2. Group 2, on their asthma control (symptoms) and their current treatment

At the end of the first visit, we will give children a small device (called a smart inhaler) that will fit on their asthma preventer inhaler to measure how frequently they take their inhaler. We will see children every three months for the next year.

At each of the follow-up visits, children will:

1. Be asked to tell us if they have had any asthma attacks since their last visit
2. Have spirometry measured
3. Have their height measured
4. Complete a questionnaire about asthma control (symptoms)
5. Have another breathing test that measures fractional exhaled nitric oxide (FeNO)
6. Have adherence data downloaded from their smart inhaler

As at the first visit, a computer programme will guide treatment decisions based:

1. Group 1, on their asthma control (symptoms), their current treatment, adherence to their preventer inhaler and spirometry measurements
2. Group 2, on their asthma control (symptoms), their current treatment and adherence to their preventer inhaler

At their last follow-up visit (at 12 months) we will ask them to complete a quality of life questionnaire.

We will then compare the number of asthma attacks between the two groups over the 12-month follow-up period.

## **Intervention Type**

Other

## **Primary outcome(s)**

Asthma attacks in children with spirometry plus asthma control (symptoms) compared with asthma control (symptoms) alone measured using participant-reported asthma attacks that require treatment with 1-7 days of oral corticosteroids and/or intravenous corticosteroids up to 12 months post-randomisation

## **Key secondary outcome(s)**

1. Efficacy in children receiving spirometry plus asthma control (symptoms) compared with asthma control (symptoms):
  - 1.1. Any asthma attack measured using participant-reported asthma attacks up to 12 months – data collected at each follow-up, 3, 6, 9, 12 months
  - 1.2. Time to a first asthma attack measured using participant reported first asthma attack up to 12 months – data collected at each follow-up, 3, 6, 9, 12 months
  - 1.3. Health-related quality of life measured using Paediatric Asthma QoL Questionnaire at 12 months only
  - 1.4. Asthma control (symptoms) measured using Asthma Control Test/Children's Asthma Control Test up to 12 months – data collected at each follow-up, 3, 6, 9, 12 months
  - 1.5. Adverse events measured using participant-reported events up to 12 months
  - 1.6 Dose of inhaled corticosteroids measured using participant reported dose of inhaled corticosteroid up to 12 months
2. Mechanism of action in children receiving spirometry plus asthma control (symptoms) compared with asthma control (symptoms) alone:
  - 2.1. Airflow (FEV1) measured using spirometry up to 12 months – data collected at baseline and each follow-up, 3, 6, 9, 12 months

2.2. Lung volume (FVC) measured using spirometry up to 12 months – data collected at baseline and each follow-up, 3, 6, 9, 12 months

2.3. Eosinophilic airway inflammation (fractional exhaled nitric oxide, FeNO) measured using the FeNO test up to 12 months – data collected at baseline and each follow-up, 3, 6, 9, 12 months

### **Completion date**

31/12/2026

## **Eligibility**

### **Key inclusion criteria**

1. Aged 6 to 15 years old
2. Asthma diagnosis confirmed by a doctor or a respiratory/asthma specialist nurse (or Read code for asthma if recruited in primary care)
3. Patient/parent reported-asthma attack treated with at least one course of oral corticosteroids in the 12 months prior to recruitment
4. Be able to perform spirometry
5. Be able to understand written/spoken English

### **Participant type(s)**

Patient

### **Healthy volunteers allowed**

No

### **Age group**

Child

### **Lower age limit**

6 years

### **Upper age limit**

15 years

### **Sex**

All

### **Key exclusion criteria**

1. Not being able to perform spirometry satisfactorily
2. Presence of another chronic respiratory condition (e.g. cystic fibrosis)
3. Current treatment with maintenance oral steroids and biologicals (we cannot provide standardised step-up/down treatment options)

### **Date of first enrolment**

01/10/2022

### **Date of final enrolment**

12/06/2025

## **Locations**

## **Countries of recruitment**

United Kingdom

England

Scotland

## **Study participating centre**

### **NHS Grampian**

Summerfield House

2 Eday Road

Aberdeen

United Kingdom

AB15 6RE

## **Study participating centre**

### **Alder Hey Hospital**

Eaton Road

West Derby

Liverpool

United Kingdom

L12 2AP

## **Study participating centre**

### **Leicester Royal Infirmary**

Infirmary Square

Leicester

United Kingdom

LE1 5WW

## **Sponsor information**

### **Organisation**

University of Aberdeen

### **ROR**

<https://ror.org/016476m91>

## **Funder(s)**

**Funder type**

Government

**Funder Name**

National Institute for Health Research Evaluation, Trials and Studies Co-ordinating Centre (NETSCC); Grant Codes: NIHR129819

**Alternative Name(s)**

National Institute for Health Research, NIHR Research, NIHRresearch, NIHR - National Institute for Health Research, NIHR (The National Institute for Health and Care Research), NIHR

**Funding Body Type**

Government organisation

**Funding Body Subtype**

National government

**Location**

United Kingdom

## Results and Publications

**Individual participant data (IPD) sharing plan**

The data sharing plans for the current study are unknown and will be made available at a later date

**IPD sharing plan summary**

Data sharing statement to be made available at a later date

**Study outputs**

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Protocol article</a>		29/09/2025	30/09/2025	Yes	No
<a href="#">HRA research summary</a>			28/06/2023	No	No
<a href="#">Study website</a>	Study website	11/11/2025	11/11/2025	No	Yes