SENTINEL PLUS
Partnering to improve asthma outcomes

PROSPECTUS

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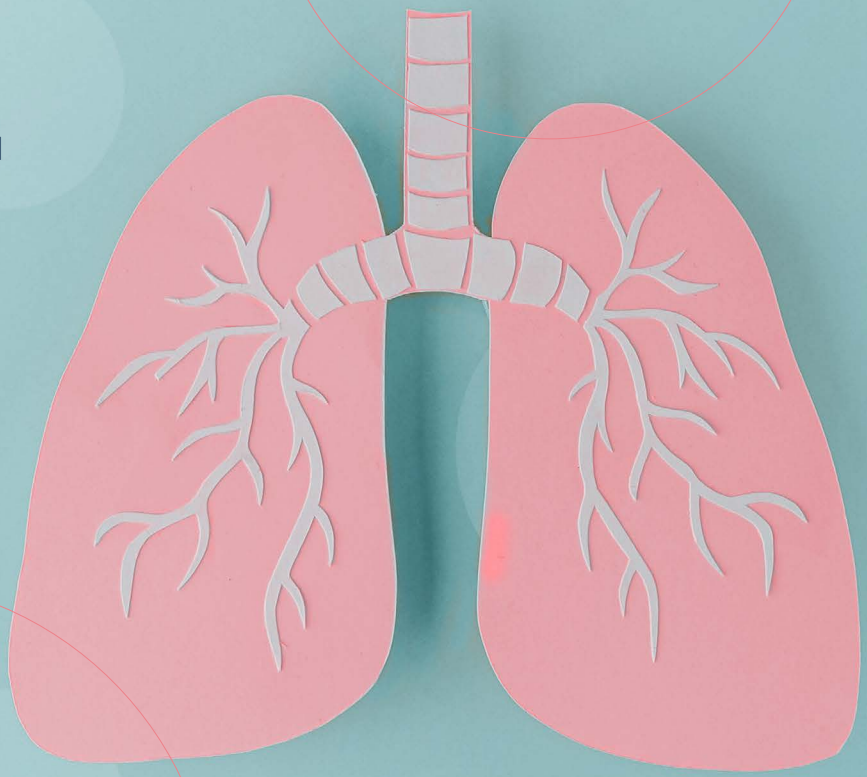

This prospectus is part of the Sentinel Plus quality improvement framework, providing non-promotional educational resources funded by AstraZeneca and co-developed with Hull University Teaching Hospitals NHS Trust, and is intended for UK Healthcare Professionals

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WELCOME

Short-acting beta-agonist (SABA) overuse has been a common feature in asthma management for many years, despite its recognised association with increased risk of asthma attacks and asthma-related deaths[1,2]. While SABA inhalers provide rapid relief of symptoms through airway smooth muscle relaxation, they do not treat underlying airway inflammation[3], contributing to poor asthma control and risk of adverse outcomes. While the risks associated with SABA over-use are well known, they remain widely used and a systematic approach is needed to make SABA over-use and its associated risks a thing of the past.

It was this challenge that inspired the launch of the SENTINEL Project, a co-designed quality improvement initiative, in 2020. SENTINEL was initially created in Hull and East Yorkshire to help identify, address and reduce over-reliance on SABA inhalers within the local population by supporting clinicians to deliver, and patients to receive, high-quality, guideline-informed asthma care. By doing so, SENTINEL aimed to improve long-term health outcomes for people living with asthma. Following local success, the SENTINEL Plus quality improvement framework was developed, as a set of educational resources to allow SENTINEL to be scaled across the UK.

SENTINEL Plus provides a practical framework to empower clinicians to deliver guideline directed care in practice, ensuring they inform the care that patients receive. **Because the real challenge in asthma care is not simply knowing what to do, it is ensuring that best practice happens consistently in everyday practice.**

Prof Michael Crooks, Honorary Consultant in Respiratory Medicine based in Hull in East Yorkshire

The publication of the collaborative BTS/NICE/SIGN NG245 guidelines in 2024 marked a pivotal moment for many people with asthma, reinforcing the change in practice that the SENTINEL Plus quality improvement framework was developed to support[5]. The guideline signalled a fundamental shift in asthma care, moving away from over-reliance on SABA relievers, towards approaches that prioritise the use of anti-inflammatory combination inhalers as relievers, with or without regular preventer therapy[5].

According to a survey by Asthma + Lung UK:

31% Only a third of people receive all elements of good basic asthma care[6]

SENTINEL Plus is based on the SENTINEL project, a quality improvement initiative undertaken in Hull and East Yorkshire, supported through a Joint Working Agreement between Hull University Teaching Hospitals NHS Trust and AstraZeneca UK.

WHAT IS SENTINEL PLUS?

The SENTINEL Plus quality improvement framework was developed from the original SENTINEL quality improvement project undertaken in Hull and East Yorkshire. The framework comprises a set of educational resources to support implementation of the 5 pillars of the SENTINEL quality improvement project.

The SENTINEL quality improvement initiative was co-designed by clinicians and patients. The 5 pillars facilitate a comprehensive change in practice - supporting high quality asthma care in a way that is practical, scalable and grounded in real world experience.

SENTINEL Plus is fully aligned to the joint BTS/NICE/SIGN 2024 asthma guideline, which moves away from SABA reliever inhaler use and towards anti-inflammatory ICS/formoterol based management use for newly diagnosed and uncontrolled asthma patients.[5]

The following 5 core elements aim to support sustained improvements in asthma care:

- Healthcare Professional Education
- Implementation of SENTINEL Plus 'GOLD STANDARD' Prescribing Practice
- Targeted Asthma Reviews
- Patient Support and Education
- Real-time Data Monitoring and Reporting of Asthma Care Metrics

SENTINEL PLUS AIMS AND OBJECTIVES

AIM 1

Improve outcomes for adult asthma patients through identification of SABA over-reliance and appropriate implementation of guideline directed anti-inflammatory based management strategy.

OBJECTIVES

- Reduce the proportion of inhaled asthma treatments prescribed that are a SABA inhaler by increasing appropriate ICS containing anti-inflammatory based inhalers and reducing over-reliance on SABA
- Reduce the number of asthma exacerbations requiring treatment with oral corticosteroids
- Reduce asthma related emergency department attendance and hospitalisation

AIM 2

Reduce the environmental impact of adult asthma management through reduction in SABA over-reliance, reducing health care resource utilisation, and increasing use of dry powder inhalers (DPI) where appropriate.

OBJECTIVES

- Reduce the number of SABA inhalers prescribed
- Reduce health care resource utilisation through improved asthma control
- Increase the proportion of anti-inflammatory inhalers that are DPI where appropriate

WHY SENTINEL PLUS MATTERS

There is a significant burden of asthma in the UK and SABA over-reliance is associated with poor asthma outcomes

In the UK, ~5.4 million people are currently receiving treatment for asthma.[6] An asthma attack is a terrifying event[7] and can be life threatening.[8] There were approximately 39,000 emergency admissions for adult asthma attacks in 2024/25,[9] and the rates of hospital admission and mortality in the UK are amongst the worst in Europe.[10] Additionally, progress on these outcomes has stalled.[11]

Asthma is a chronic, inflammatory disease of the airways, and therefore the foundation of care is anti-inflammatory treatment with inhaled corticosteroids (ICS).[12] SABAs work by relieving bronchospasm but have no inherent anti-inflammatory pharmacological properties;[3] however, they are the most widely prescribed and utilised inhaler treatment in the UK.[13]

The level of SABA use in the UK is amongst the highest in Europe with ~38% of asthma patients potentially over-reliant on SABA inhalers (prescribed 3 inhalers or more each year).[14] SABA over-reliance could be a key contributor to the poor asthma outcomes observed.[1]

SABA over-reliance is associated with an increased risk of asthma exacerbation and death

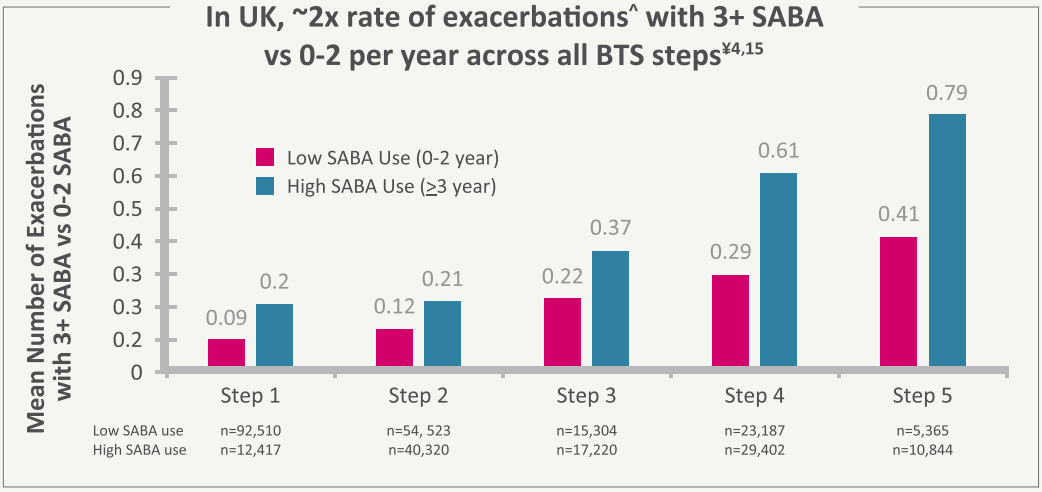
Using a SABA inhaler on 3 or more days per week is considered a sign of poor asthma control and should prompt clinical review and consideration of switch to an anti-inflammatory inhaler based treatment strategy.[5]

Over-reliance on SABA can have serious consequences for patients. Patients prescribed 3 or more SABA inhalers per year are at increased risk of severe exacerbation, emergency department attendance (figure 1), and premature death.[2,15,16]

Another potential consequence of SABA over-reliance is the increased need to use oral corticosteroids (OCS) to treat severe exacerbations. Cumulative exposure to OCS is associated with an increased risk of developing adverse side effects, and repeated short courses can have a significant impact on patients, increasing the risk of conditions such as depression, anxiety, osteoporosis and diabetes.[17]

Early identification of SABA over-reliance in asthma patients provides an opportunity to review asthma control and optimise asthma management; thereby reducing symptoms, reducing the requirement for SABA reliever inhalers and potentially preventing exacerbations.

SABA OVER-RELIANCE IS ASSOCIATED WITH ASTHMA EXACERBATIONS



Adapted from Bloom et al. 2020

38%
of patients in the UK prescribed ≥3 SABAs/ year (n=574,913)[4,15]

Why asthma still kills
The National Review of Asthma Deaths (NRAD)

In UK patients with fatal asthma, in the 12 months prior to death (n=165):[1]

56% (92/165) patients prescribed **6+ SABA**
39% (65/165) patients prescribed **12+ SABA**

¥ A retrospective longitudinal observation study (n=573,913) where data was pooled from primary care, hospital and mortality records (CPRD, HES and ONS) from 2007-2017. The study examined prescription patterns and the impact of SABA inhaler use on asthma related health outcomes in the UK. ^ Defined as either asthma worsening that necessitated a short course of OCS (≤300mg; not during an annual asthma review or on days treated for other steroid responsive diseases - GP managed exacerbation), an Accident and Emergency (A&E) department visit for asthma, a hospital admission or death secondary to asthma.

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WHY SENTINEL PLUS MATTERS

SABA over-reliance has a significant negative impact on the environment

Reducing SABA over-reliance and optimising anti-inflammatory treatments could improve outcomes for asthma patients while achieving carbon savings aligned to the NHS Net Zero ambitions.

SABA inhalers also have a significant environmental impact. In the UK, 94% of SABA inhalers used are pressurised metered dose inhaler (pMDI) devices, and SABA inhalers (both pMDIs and DPIs) contribute to ~70% of the total carbon footprint of inhaler devices.[13,18] In asthma, 83% of SABA inhalers are prescribed to patients that are already using 3 or more SABA inhalers a year, which equates to greater than 250,000 tonnes of CO2 equivalent (eCO2) per year – this is the same as >100 million average trips in an average diesel car (based on an average car trip being 8.4 miles).[13,18,19,20]

Poor asthma control and the associated increase in health care utilisation (HCRU) have a negative impact on the environment. Data in 2021 from the UK shows that poorly controlled asthma is associated with 3-fold higher greenhouse gas emissions than well-controlled asthma.[13]

How can anti-inflammatory based asthma management help to reduce SABA over-reliance?

Anti-inflammatory based asthma management places inhaled corticosteroids (ICS) as the cornerstone of asthma management for asthma patients. This is critically important because asthma is a disease characterised by airway inflammation.

While SABAs are effective at relaxing airway smooth muscle, reducing bronchospasm and thus providing rapid relief of symptoms, they do not treat the underlying airway inflammation that is driving the asthma symptoms.

Use of anti-inflammatory, ICS-formoterol combination inhalers as AIR or MART instead of SABA provides an anti-inflammatory based approach to asthma management.

The ICS/formoterol inhaler contains both an inhaled corticosteroid to treat inflammation and the long-acting beta-2 agonist formoterol to provide bronchodilation and relief of symptoms, with a similar speed of onset of action to SABA.[22]

The ICS/formoterol inhaler may be used only on an as needed basis, in the anti-inflammatory reliever as needed AIR regime, or as both a regular daily maintenance preventer inhaler, as well as a reliever, known as maintenance and reliever therapy MART regime.

One ICS/formoterol inhaler as both preventer and reliever[5]

Not all ICS/formeterol inhalers may be used for both AIR and MART regimens.

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When compared with treatment regimens where an ICS/LABA is used as a preventer and a SABA is used for relief, MART is associated with reduced risk of asthma exacerbations.[22] Figure 2 illustrates how AIR or MART regimes (Panel B) prevent exacerbations through early suppression of airway inflammation when compared with a fixed-dose ICS/LABA regime with SABA reliever (Panel A).

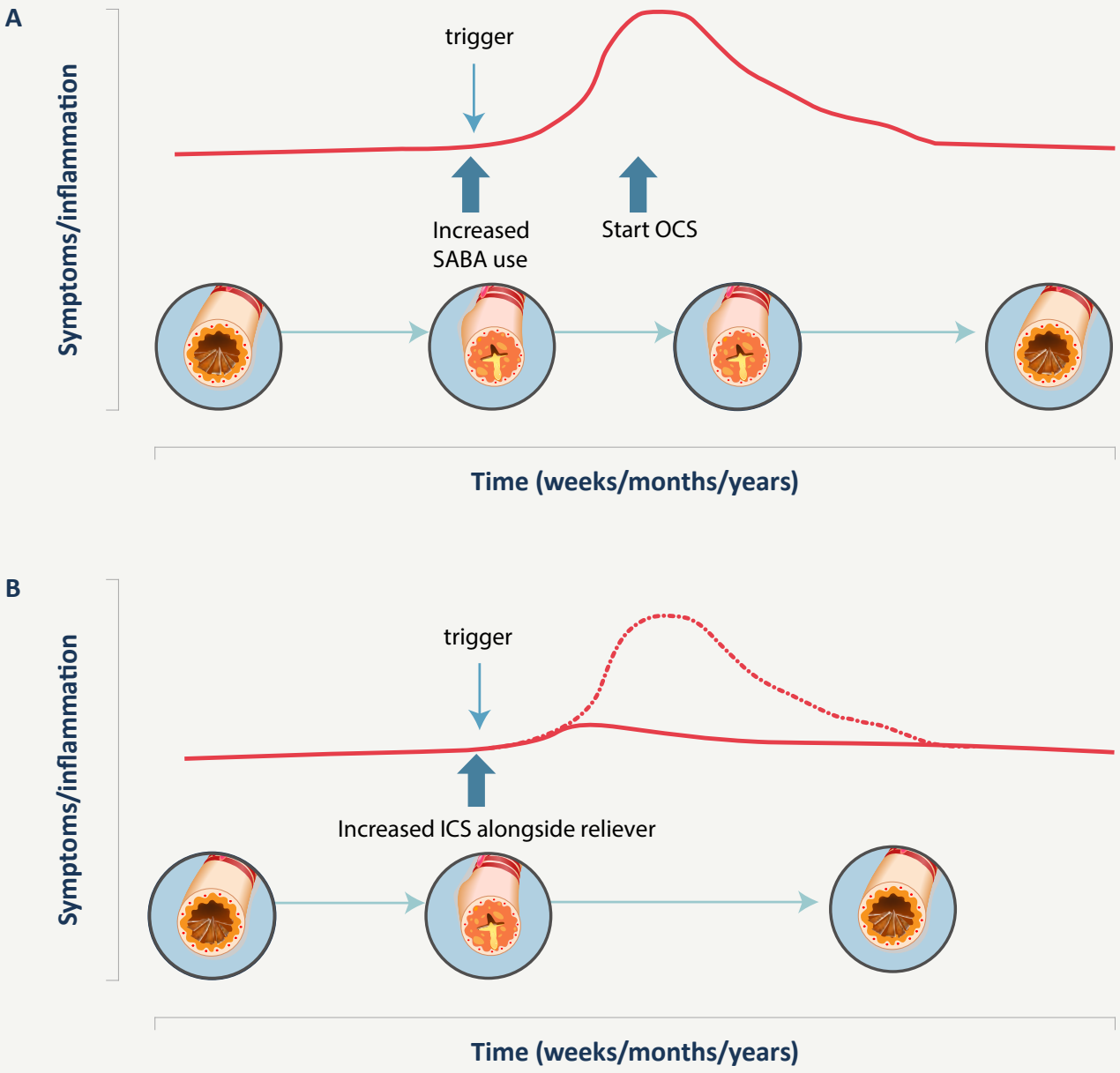

Figure 2: Graphic depicting an asthma exacerbation when using a fixed dose ICS/LABA with SABA for relief (panel A) and how MART (panel B) can potentially prevent exacerbation through early suppression of inflammation. The red line illustrates asthma symptoms and the dashed red line illustrates the potential exacerbation avoided by the use of MART.[12, 23,24]

The graphic is not to scale and is for descriptive/ illustrative purposes only. Illustration adapted from Tattersfield AE et al. 199925 and van der Valk RE et al. 2012 [23,24]

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MAKE AN IMPACT WITH SENTINEL PLUS

The original SENTINEL quality improvement programme was delivered across 6 primary care networks (PCNs) in Hull and East Yorkshire between 2020-22.

Across the SENTINEL Project's 6 Primary Care Networks, SABA overuse dropped considerably after implementation, with a 51% relative reduction and 40% absolute reduction, from 79% to 39% in reviewed asthma patients.[25*]

The first PCN in this cohort was the SENTINEL **pilot** site (Nov 2020-Jan 2021), with subsequent PCNs implemented sequentially as part of the same programme. This initiative provided the blueprint for the SENTINEL Plus quality improvement framework.

OUTCOMES FROM THE PILOT PCN:

5 FOLD INCREASE IN MART PRESCRIPTIONS

The proportion of overall asthma patients receiving one or more MART prescriptions in the Pilot PCN increased by over 5 fold, from 4.7% pre implementation to 25.2% post implementation.[4]

72% PATIENTS REMAINED ON MART

Over 71.5% of patients initiated on maintenance and reliever therapy (MART) in the Pilot PCN were still using it at the end of the year.[4]

30% REDUCTION IN PATIENTS WITH EXACERBATIONS

Following implementation of SENTINEL in the pilot PCN, the proportion of asthma patients experiencing one or more exacerbations decreased by 30% in the reviewed asthma population.[4] There was an absolute reduction of 0.16 exacerbations per patient.[4]

38% REDUCTION IN CARBON FOOTPRINT

The carbon footprint (COe) of asthma prescribing fell by 38% – from 402,000kg to 247,000kg – in the 12 months post-SENTINEL implementation.[26]

Discover the measurable impact of SENTINEL Plus through real world results and case studies on the SENTINEL Plus website.

*STUDY DESIGN: A stepped-wedge programme evaluation across 6 Primary Care Networks in Hull and East Yorkshire that investigated the impact of a co-designed, five-pillar intervention on SABA prescribing and asthma exacerbations in adult asthma patients. Outcomes were assessed using electronic medical records (EMIS/SystmOne) comparing 12 months pre- and 12 months post-SENTINEL implementation. Inclusion criteria were an asthma diagnosis in a primary care record and at least one prescription for an inhaled asthma medication in the baseline period. Patients with a diagnosis of COPD at any time in the primary care record were excluded. 14,202 patients were included in the overall population, of whom 3,208 were prioritised for clinical review due to SABA overuse.[25]

SENTINEL PLUS QUALITY IMPROVEMENT FRAMEWORK: THE 5 PILLARS OF IMPLEMENTATION

The SENTINEL quality improvement framework was developed through co-design.

Working directly with asthma clinicians and patients, we identified what was driving SABA over-use and what was preventing adoption of an anti-inflammatory based approach to asthma management, so we could develop a package of support to help to overcome this.

01

HEALTHCARE PROFESSIONAL EDUCATION

In order to achieve sustained change in practice, it is important that education is delivered to all members of the healthcare team involved in the management of asthma patients, including those involved in the prescribing or issuing of asthma treatments.

02

IMPLEMENTATION OF GOLD STANDARD PRESCRIBING PRACTICE

A series of 'Gold Standards' for asthma prescribing have been developed through co-design in consultation with asthma prescribers and patients. Participating practices are asked to implement the SENTINEL Plus prescribing Gold Standards and are advised to include review of these standards within a rolling audit programme to promote continued good practice.

03

TARGETED ASTHMA REVIEWS

Practices are encouraged to prioritise targeted reviews for those asthma patients at highest risk - such as patients issued six or more short-acting beta 2 agonist (SABA) inhalers in the past year - while working towards reviewing all patients prescribed three or more SABA inhalers annually. Depending on local resource, this process can be repeated to ensure patients that become over-reliant are identified and have their asthma treatment optimised in line with guideline recommendations.

04

PATIENT SUPPORT AND EDUCATION

Asthma education is essential in addressing SABA overuse and optimising asthma outcomes. It's important that patients do not feel they are being denied treatment, but rather they are being actively managed to improve their asthma control both in terms of current symptoms and long-term risk.

05

REAL-TIME DATA MONITORING AND REPORTING OF METRICS

Data can be a powerful tool to identify the need for change and to demonstrate the impact that an intervention has on practice and patient outcomes. SENTINEL Plus recommends using publicly available prescribing data to establish baseline prescribing practice and track change in practice following SENTINEL Plus implementation.

START YOUR JOURNEY

If you want to start your SENTINEL Plus journey, head to the website to access the SENTINEL Plus toolkit:

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