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Reducing Short-Acting Beta-2 Agonist (SABA) Overuse in Asthma: A Quality Improvement Project in Primary Care

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Abstract

Introduction

Asthma is a common chronic respiratory condition. Current national guidelines advocate for a transition from traditional short-acting beta-2 agonist (SABA)-based approaches to anti-inflammatory reliever (AIR) and maintenance and reliever therapy (MART) to patients aged 12 years and older. We identified patients whose asthma was not well controlled at our general medical centre, analysed compliance with these guidelines and introduced appropriate measures to improve service provision.

Methods

This was a two-cycle audit. The first cycle conducted in October 2024 was a retrospective analysis of current practice. After identifying gaps in compliance with national guidelines, service improvements were implemented. A second cycle was retrospectively undertaken in September 2025 to evaluate impact. Patients having been issued a SABA inhaler at least twice in the last 12 months were deemed as having potential SABA overuse and met the inclusion criteria. Outcome measures included demographics, inhaler prescription, adherence, technique check and symptom control. The gold standard for management was derived from the National Institute for Health and Care Excellence (NICE) guidelines.

Results

Ninety-four patients from the estimated 7,670 practice population met the inclusion criteria for the first audit cycle. Of these, we were able to contact 72/94 (76.6%) patients. Thirty-seven (51.2%) patients reported at least one symptom of poor asthma control against recommendations and required changes to usual medication. After presenting these findings and the patients undergoing educational and practical interventions, the second cycle was conducted. Thirty-five patients met the inclusion criteria for the second audit cycle. Of these, we were able to contact 23 (65.7%) patients. Eighteen (78.2%) patients reported at least one symptom of poor asthma control. The number of patients issued two SABA inhalers in the last 12 months at the practice decreased by 62.8% from 94 to 35 patients between cycles. The number of patients reported at least one symptom of poor asthma control decreased by 51.4% from 37 to 18 between cycles. After identifying the 18 patients who reported at least one symptom of poor asthma control in the second cycle, six consented and commenced new inhaler therapy upon being contacted and offered.

Conclusions

This quality improvement project highlights the importance of identifying and addressing SABA overuse in patients with asthma, as optimally aligning therapy with national guidelines reduces the risks associated with overuse and poor asthma control. This audit further aims to raise awareness among primary care teams to promote adherence to updated pharmacological management to improve patient outcomes and reduce primary and secondary care pressures due to poor symptom control.

Categories: Family/General Practice, Quality Improvement, Pulmonology
Keywords: asthma, asthma education, clinical audit, inhaler therapy, quality improvement (qi), uncontrolled asthma

Introduction

Asthma is a chronic respiratory condition estimated to affect approximately 5.4 million people in the United

Kingdom (UK), placing a significant burden on patients and healthcare services [1]. Short-acting β2-agonists (SABA), delivered via inhalers or nebulisers, have historically been the cornerstone of reliever therapy due to their rapid bronchodilator effect in relieving acute symptoms [2]. However, SABA do not address the underlying airway inflammation central to asthma pathophysiology, potentially necessitating concurrent inhaled corticosteroid (ICS) therapy for adequate disease control.

Recent evidence has demonstrated that SABA overuse is associated with worse clinical outcomes, including increased exacerbations, hospital admissions and asthma-related mortality [3]. The National Review of Asthma Deaths (NRAD) identified high SABA use as a contributing factor in over 40% of asthma deaths in the UK [1]. In addition to clinical harms, inappropriate SABA prescribing contributes to wider challenges such as increased healthcare costs and environmental impact. Poorly controlled asthma has been linked to a three-fold increase in carbon footprint compared with well-controlled disease and pressurised metered-dose inhalers contribute 20-30 times more greenhouse emissions than dry-powder or soft-mist inhalers due to hydrofluorocarbon propellants [4,5]. Financially, the national Investment and Impact Fund (IIF) has incentivised primary care to reduce SABA prescribing to fewer than six inhalers per patient per year, reflecting the economic burden of inappropriate prescribing [6].

In recognition of these concerns, updated national guidelines from the British Thoracic Society (BTS), Scottish Intercollegiate Guidelines Network (SIGN), and National Institute for Health and Care Excellence (NICE) now recommend anti-inflammatory reliever (AIR) therapy in place of SABA monotherapy and maintenance and reliever therapy (MART) in place of SABA used in adjunct with ICS, long-acting beta-2 agonist (LABA), leukotriene receptor antagonist (LTRA) or long-acting muscarinic receptor antagonist (LAMA) therapy for patients aged 12 years and older [7]. If asthma remains uncontrolled despite this, checking fractional exhaled nitric oxide (FeNO) level and blood eosinophil count is recommended to help guide further management choices. Despite this, SABA overprescribing remains prevalent across the UK, as 38% of UK patients with asthma were prescribed at least three SABA inhalers per year, while a large-scale quality improvement project in East London, United Kingdom identified SABA overuse in one-quarter of patients with asthma [8,9]. Both the Global Initiative for Asthma (GINA) and NICE emphasise that patients prescribed more than three, six, or 12 SABA inhalers annually should be reviewed with increasing levels of urgency [7,10].

Given the current literature and updated guidance, it is pertinent to assess adherence to the guidelines in primary care. The authors of the study conducted a closed loop clinical audit at a general medical centre. We aimed to evaluate baseline SABA prescribing, implement strategies to optimise care and reduce unnecessary reliance on SABA and re-evaluate in a further audit cycle.

Materials And Methods

This was a closed-loop audit quality improvement project conducted at the Willows Medical Practice, a National Health Service (NHS) general practice in Essex, UK with approximately 7,670 registered patients. Each cycle involved screening the entire registered patient population. The audit was conducted by a multidisciplinary team comprising general physician (GP) partners, resident doctors, clinical pharmacist, practice management team and medical students.

The first cycle was conducted retrospectively in October 2024 using electronic patient record (EPR) data. The inclusion criteria included: patients registered at the practice before commencing an audit cycle; adult patients aged 18 or older; patients authorised and dispensed a SABA inhaler at least twice in the last 12 months; patients with a previous diagnosis of asthma. The exclusion criteria included: patients not registered at the practice before commencing an audit cycle; non-adult patients aged 17 or younger; patients authorised and dispensed a SABA inhaler less than twice in the last 12 months; patients without a previous diagnosis of asthma. All eligible patients were included and deemed to require screening for potential SABA overuse and/or poor asthma symptom control; therefore, no formal sample size calculation was performed.

The definition of poor symptom control was guided by BTS/NICE/SIGN guidelines. Uncontrolled asthma was defined by the presence of one or more of the following: courses of oral corticosteroids for asthma exacerbations, night-time waking (more than one time per week), frequent use of reliever inhaler (⩾3 days per week), absence from work or school due to asthma, hospital admission due to asthma, or attendance at an emergency department due to asthma.

Asthma reviews were offered for all eligible patients face-to-face through direct patient assessment and, failing this, patients were contacted by telephone. Up to three attempts were made to contact each eligible patient. Patients unable to be contacted were not included in further intervention nor any additional data was collected from them.

The asthma review comprised assessment of poor symptom control, inhaler technique, and review of smoking status. Patients' asthma management was then updated according to their clinical needs, including consideration of stepping treatment up or down and switching from SABA-based therapy to appropriate AIR or MART. Follow-up was arranged where clinically indicated. Inhaler technique assessments were

performed by doctors, with education provided to patients where technique errors were identified. Consultations also included an explanation of any proposed change in inhaler therapy, education regarding the recognition of worsening asthma, and safety-netting advice regarding when to seek further medical assistance.

Education and awareness regarding appropriate asthma management and SABA prescribing were provided to GPs and pharmacists within the practice delivered through a formal meeting, alongside the introduction of prescribing system alerts/prompts for repeat dispensations of SABAs.

A second audit cycle replicating the first cycle was conducted retrospectively in September 2025 to evaluate the impact of these interventions using the same inclusion criteria, asthma review and education process.

Following this second cycle and a formal meeting within the practice, it was concluded that an additional system-level prescribing intervention would be beneficial to the relevant patient population. This intervention would be that automatic repeat dispensation of SABA was removed for patients identified as meeting the inclusion criteria and remained uncontactable. Preventing repeat dispensation refers to stopping patients from collecting a particular prescription in advance without contacting a doctor each time in a 12-month window. When repeat dispensation is stopped, a patient would require a new authorisation for a particular prescription. The aim was to encourage patients potentially requiring further reliever medication to initiate clinical follow-up, prompt reassessment of asthma control and treatment and regulate safe repeat prescription.

Patient data was extracted from Egton Medical Information Symptoms (EMIS) software. A search protocol was created within EMIS using predefined diagnostic codes for asthma and prescription records to identify eligible patients registered at the practice.

This project was registered as a clinical audit at the 'Willows Medical Practice' and in accordance with local policy, formal research ethics committee approval was deemed as not required. Any changes to a patient's medication or management were made with their informed consent.

Outcome measures included patient demographics, frequency of inhaler use and symptom control. The gold standard for management was derived from the BTS, NICE and SIGN guidelines, NG245 [7].

Data was collected, stored and analysed using Microsoft Excel (Microsoft, Redmond, WA, USA). Chi-squared tests were conducted using Microsoft Excel to statistically compare the results between audit cycles. A significance threshold of $p<0.05$ was applied.

Results

Ninety-four patients from a practice size of approximately 7,670 patients met the inclusion criteria for the first audit cycle in December 2024. The mean age of the group was 61.4 years. The group had 41 (43.6%) men and 53 (56.4%) women. Of these, we were able to contact 72/94 (76.6%) patients for at least one clinical encounter. Of the patients we were able contact, the mean age of the group was 61.7 years, and the sex distribution was 30 (41.7%) men and 42 (58.3%) women. The 37 (51.2%) patients we were able to contact reported at least one symptom of our definition of poor asthma control. All contacted patients were informed of current national guidelines for asthma management and offered asthma reviews with an appropriate clinician at the practice. These findings were presented at a quality improvement meeting at the practice and interventions were introduced. These included: using electronic patient record system and communication software to set up asthma review reminder for patients; presentation of results to practice clinicians; and encouraging further face-to-face asthma reviews for patients to practice clinicians.

Following presenting these findings and undergoing interventions, the second cycle was conducted. Thirty-seven patients met the inclusion criteria for the second audit cycle. The mean age of the group was 56.3 years. There was no statistically significant difference in age between the two cycles ($p=0.19$). The group had a sex distribution of 8 (22.9%) men and 27 (77.1 %) women. There was a statistically significant higher proportion of female patients in this cycle compared to the first ($p<0.05$). Of these, we were able to contact 23 (65.7%) patients for at least one clinical encounter. Of the remaining patients we were able to contact, the mean age of the group was 54.2 years, and the sex distribution was six (26.1%) men and 17 (73.9%) women. Eighteen (78.3%) of the 23 patients we were able to contact reported at least one symptom of poor asthma control, overusing their SABA inhaler at least three days per week. Baseline characteristics and symptom control of patients included in the first and second audit cycles are presented in Table *1*.

	First Audit Cycle (n=94)	Second Audit Cycle (n=35)
Total eligible patients, n	94	35
Mean age (years)	61.4	56.3
Sex (eligible patients)		
Male, n (%)	41 (43.6%)	8 (22.9%)
Female, n (%)	53 (56.4%)	27 (77.1%)
Patients contacted for ≥1 clinical encounter, n (%)	72 (76.6%)	23 (65.7%)
Mean age of contacted patients (years)	61.7	54.2
Sex (contacted patients)		
Male, n (%)	30 (41.7%)	6 (26.1%)
Female, n (%)	42 (58.3%)	17 (73.9%)
Patients contacted reporting ≥1 symptom of poor asthma control, n (% of contacted)	37 (51.2%)	18 (78.3%)

TABLE 1: Baseline characteristics and symptom control of patients included in the first and second audit cycles.

The number of patients issued two SABA inhalers in the last 12 months at the practice, with an estimated population size of 7,670 patients, significantly decreased from 94 to 35 patients between cycles ($p<0.05$), with a relative reduction in number of patients of 62.8%. The proportion among contacted patients reporting one or more symptom of poor asthma control statistically significantly increased from 37/72 (51.4%) to 18/23 (78.3%) ($p<0.05$). The number of patients reporting one or more symptom of poor asthma control among the estimated total patient population significantly decreased from 37 to 18 between cycles ($p<0.05$), with a relative reduction of number of patients of 51.4%. The compliance with the audit standard between the two cycles is presented in Table *2*.

Compliance against audit standard(s)	First audit cycle	Second audit cycle	P-value*†
Patients issued ≥2 SABA inhalers in the last 12 months (n)	94	35	<0.05
Patients with ≥1 symptom of poor asthma control (n)	37	18	<0.05

TABLE 2: Compliance against audit standards

*Chi-squared test used for assessing statistical significance.

†p-value of <0.05 set as measure of statistical significance.

In the second cycle, following the identification of the 18 patients overusing their SABA inhaler, patients were informed of current national guidelines for asthma management and offered asthma reviews with an appropriate clinician at the practice. Six patients consented to an asthma review and commenced new inhaler therapy. Four patients consented to an asthma review but deferred and subsequent attempts to arrange follow-up were unsuccessful. Seven patients rejected an asthma review for various reasons: two did not want to use inhaler medication; one had used MART therapy previously but had side effects and thus preferred the SABA and ICS combination therapy; one had a recent review and preferred to stay on SABA and ICS combination therapy until she would stop breastfeeding; three gave no reason. One patient remained undecided regarding an asthma review.

Discussion

This quality improvement project successfully evaluated baseline SABA-prescribing practices and adherence

to current national guidelines. The quality improvement project, the number of adults issued ⩾2 SABA inhalers and reporting poor asthma control in 12 months among individual patients across the practice population. Notably, the proportion among those contacted reporting poor asthma control remained high. Despite there being statistical significance, this does not necessarily establish that asthma control worsened across the whole patient population, particularly if only patients who could be contacted were included.

Our audit shows that education-based and practical interventions focussing on increasing engagement with patients can increase compliance with new pharmacological national guidelines in routine primary care practice. These findings are even more relevant considering that SABA inhalers were previously the preferred reliever for over 30 years [11]. Furthermore, the proactive identification and follow-up of patients in the second audit helped the authors of the study to gain insight into the various reasons why primary practices and patients may struggle to reach 100% compliance with new guidelines.

A cross-sectional study conducted in East London, United Kingdom, using data from primary records from over 30,000 patients with asthma found that repeat dispensing was strongly linked to SABA overprescribing, supporting the efficacy of this study's practical interventions [9]. Our results were comparable to the conclusions of the East London cross-sectional study; eliminating repeat dispensations, particularly those with shorter interval times, may help both patients and clinicians quantitatively identify poor symptom control and that an asthma review is warranted.

A recent qualitative study conducted across multiple countries explored why patients may fail to identify poor symptom control and be reluctant to present to a clinician [12]. The study showed many patients may have a strong psychological reliance on SABA inhalers largely due to the rapid symptom relief. Furthermore, frequent use is often not recognised by patients as a marker of inadequate control, reflecting the gap in patient education similar to this study. In such cases, easy access to repeat SABA prescriptions can inadvertently reinforce poor control and mask the need for more proactive symptom management [13].

There were numerous limitations to this study. Despite the medical practice serving a patient population of approximately 7,670 patients, for both cycles the sample size may be deemed relatively small, restricting generalisability. Loss to follow-up reduced the number of patients who could be fully assessed, introducing the possibility of selection bias. Self-report from patients may also engender reporting bias. The interventions after both cycles at least partially relied on patient engagement and non-attendance or lack of communication may have limited the extent of observed benefit. The outcome measures implemented across audit cycles were limited due to time constraints at the practice. Future similar quality improvement projects may benefit from evaluating factors potentially affecting compliance with guidelines such as concurrent spacer use, inhaler technique confidence and polypharmacy. The exclusion of patients aged 12-17 years limits the generalisability of the findings to adolescents, whose asthma management may involve different prescribing arrangements and levels of parental or carer involvement. Given that cohorts differed significantly in sex distribution, patients may have been followed across both audit cycles and the two 12-month cycles overlapping by one month, any imbalances may have introduced confounding when interpreting findings. Future studies should aim to avoid these limitations as well as involve balancing measures such as evaluating AIR and MART therapy uptake.

This study aims to promote compliance with the new asthma management guidelines in primary care settings. Implementation may benefit resource management for practices directly given the potential reductions in inhaler prescriptions and appointments due to poor symptom control. Furthermore, improved management in primary care may result in fewer hospital admissions.

Conclusions

This closed-loop audit showed that focussing on education, awareness and altering prescribing practices may improve compliance with new guidelines for asthma management. Future studies and cycles should measure guideline compliance more directly to include balancing outcomes and time-series methods to demonstrate intervention that can show causal improvement in AIR/MART therapy uptake. This study shares similarities with other studies demonstrating potential success in changing prescribing behaviours nationally and internationally. Continuing to identify patients at risk of poor asthma control and prevent complications is pivotal for providing optimal care and reducing healthcare system burden. Embedding sustainable intervention strategies into routine primary care practice may further enhance asthma outcomes over time.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Willows Medical Practice Ethics Committee issued approval N/A. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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