

Putting NICE guidance into practice

Resource impact report: Asthma: diagnosis, monitoring and chronic asthma management (NG80)

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Summary

This report focuses on the recommendations from NICE's guideline on [Asthma: diagnosis, monitoring and chronic asthma management](#) that we think will have the greatest saving nationally (for England), and will potentially need the most additional resources to implement or generate the biggest savings.

They are:

- The introduction of a new diagnostic pathway for asthma.
- The use of leukotriene receptor antagonists (LTRAs) as an alternative to long-acting beta agonists (LABAs) for people with asthma that is not adequately controlled with an inhaled corticosteroid (ICS).

The estimated annual resource saving of implementing this guideline per 100,000 population based on the resource impact assumptions is shown in table 1.

Table 1 Estimated saving per 100,000 population of implementing the recommendations in NICE guideline Asthma: diagnosis, monitoring and chronic asthma management

	2017/18 (£)	2018/19 (£)	2019/20 (£)	2020/21 (£)	2021/22 (£)
Diagnosis and monitoring	Resource saving will depend on the diagnostic model adopted locally				
Chronic asthma management	1,306	3,917	10,445	10,445	10,445

This report is supported by 2 resource impact templates for asthma diagnosis and monitoring and for chronic asthma management, which may be used to calculate the resource impact of implementing the guidance by amending the variables.

Asthma services are commissioned by clinical commissioning groups and NHS England. Providers are NHS hospital trusts, community providers and primary care.

1 Introduction

- 1.1 The guideline offers best practice advice on diagnosing, monitoring and managing chronic asthma.
- 1.2 This report discusses the resource impact of implementing our guideline on Asthma: diagnosis, monitoring and chronic asthma management in England. It aims to help organisations plan for the financial implications of implementing this NICE guideline.
- 1.3 Resource impact templates accompany this report to help with assessing the resource impact at a local level in England, Wales or Northern Ireland.
- 1.4 We have considered direct costs and savings to the NHS and not those for the individual, the private sector or the not-for-profit sector. Any cost savings arising from a change in practice have been offset against the cost of implementing the change.
- 1.5 Asthma services are commissioned by clinical commissioning groups (CCGs) and NHS England. Providers are NHS hospital trusts, community providers and primary care.

2 Background

- 2.1 Asthma is the most commonly diagnosed long-term medical condition in the UK, affecting over 5 million people, of whom over 1 million are children ([asthma UK](#)). It involves inflammation and obstruction of the airways. A key feature of asthma is that the airway obstruction is reversible with medical treatment that relaxes the airway smooth muscle.
- 2.2 The sections in the guideline on diagnosis and monitoring are based on the estimate that around 30% of people with an asthma

diagnosis have no clear signs of asthma or may have a different condition that presents with asthma-like symptoms.

- 2.3 There is no cure for asthma, so the management section of the guideline focuses on reducing exposure to known triggers if possible, relief of symptoms if there is airway narrowing, and reduction in airway inflammation by regular preventive treatment. Adherence to regular treatment reduces the risk of significant asthma attacks in most people with asthma. The focus of asthma management in recent years has been on supporting people with asthma and their healthcare professional to devise a personalised treatment plan that is effective and relatively easy to implement.

3 Significant resource impact recommendations

3.1 *Asthma: diagnosis and monitoring*

The recommendations below form a new diagnostic pathway for asthma and the resource impact of implementing this is the cumulative effect of all of these recommendations.

Recommendation 1.3.5. Offer spirometry to adults, young people and children aged 5 and over if a diagnosis of asthma is being considered. Regard a forced expiratory volume in 1 second/forced vital capacity (FEV1/FVC) ratio of less than 70% (or below the lower limit of normal if this value is available) as a positive test for obstructive airway disease (obstructive spirometry).

Recommendation 1.3.6 Offer a bronchodilator reversibility (BDR) test to adults (aged 17 and over) with obstructive spirometry (FEV1/FVC ratio less than 70%). Regard an improvement in FEV1 of 12% or more, together with an increase in volume of 200 ml or more, as a positive test.

Recommendation 1.3.2 Offer a FeNO test to adults (aged 17 and over) if a diagnosis of asthma is being considered. Regard a FeNO level of 40 parts per billion (ppb) or more as a positive test.

Recommendation 1.3.11. Offer a direct bronchial challenge test with histamine or methacholine to adults (aged 17 and over) if there is diagnostic uncertainty after a normal spirometry and either a:

- FeNO level of 40 ppb or more and no variability in peak flow readings or
- FeNO level of 39 ppb or less with variability in peak flow readings. Regard a PC20 value of 8 mg/ml or less as a positive test.

Background

- 3.1.1 It is estimated that [30% of people with an asthma diagnosis currently being treated for asthma may have no clear evidence of asthma](#). By implementing a new diagnostic pathway for asthma the guidance aims to reduce this number and increase the accuracy of asthma diagnosis.
- 3.1.2 NICE undertook a [feasibility project](#) into the use of the diagnostic algorithm recommended in the guidance. The project found that the recommended objective tests can be performed in primary care.
- 3.1.3 The committee considered that the cost and practicality of introducing the diagnostic algorithms into individual practices will be

challenging. Therefore, they recommended considering diagnostic hubs as a service delivery model (recommendation 1.3.1).

- 3.1.4 While it is cost effective to deliver the recommendations on a GP practice basis model, the budget impact varies significantly when compared to a diagnostic hub model.

Assumptions made

- 3.1.5 It is assumed that no objective testing takes place in current practice for the diagnosis of asthma in primary care. This is based on the expert opinion of the guideline committee who felt that very little objective testing was currently performed in primary care.
- 3.1.6 When people have contradictory test results and are reassessed following the new algorithm, it is assumed that 70% will go on to have an asthma diagnosis confirmed.
- 3.1.7 When the algorithm states that tests should be repeated, the cost of this is assumed to be for peak flow and FeNO.
- 3.1.8 20 minutes of nursing time is assumed to perform each objective test.
- 3.1.9 The template bases FeNO equipment and consumable costs on NIOX VERO because this was the more expensive option, and the consumables are based on packs of 500 being purchased.
- 3.1.10 Using the most expensive option, NIOX VERO in the template demonstrates that savings can be achieved even using the most expensive machines.
- 3.1.11 It is assumed that all equipment purchases take place in the first year.
- 3.1.12 The costs related to these recommendations are an average of the complete cost of treatment including clinician time and exacerbations. The costs considered relevant for the management Resource impact report: Asthma: diagnosis, monitoring and chronic asthma management (November 2017) 6 of 18

recommendations are the costs of drugs used in treatment with exacerbations for the specific drugs which are identified separately.

3.1.13 Diagnostic tests per 100,000 population are shown in table 2

Table 2 Diagnostic tests estimated per 100,000 population

	%	Number
People present at their GP with suspected asthma	0.25	245
Adults, young people and children over 5 who present at their GP with suspected asthma	100	237
People who have spirometry	100	237
People who have a FeNO test	96	228
People who have peak flow variability monitored	60	142
People who have bronchodilator reversibility tested	50	119
People who have a direct bronchial challenge test performed	6	14
People who have an unclear diagnosis and have the peak flow and FeNO test repeated	22	52
People diagnosed with asthma using the diagnostic pathway	65	153

Costs/Savings

- 3.1.14 The annual treatment cost for asthma is assumed to be £290 per person based on the health economic work used in the guideline.
- 3.1.15 Nursing time for performing objective tests is assumed to cost £36 per hour based on PSSRU 2016.
- 3.1.16 The costs of FeNO devices and consumables including VAT are shown in table 3.

Table 3 FeNO device and consumable costs (including VAT)

Device	Device cost	Other cost	Filter cost
NIOX VERO	£3,168		£9.96 (pack of 100) £6.04 (pack of 300) £5.81 (pack of 500) £5.50 (pack of 1,000)
NObreath	£1,794	5 yearly service £540	£3.60

- 3.1.17 The resource impact of the new diagnostic pathway is shown in table 4

Table 4 The resource impact per 100,000 population of the new diagnostic pathway

	Number	Costs (£)	Resource impact (£)
Current practice			
People who are diagnosed with asthma	237	290	68,862
Future practice			
Spirometry tests	237	2.19	519
FeNO tests	228	5.81	1,324
Peak flow variability tests	142	6.48	923
Bronchodilator reversibility tests	119	11.50	1,365
Direct bronchial challenge tests	14	208	2,963
Adults, young people and children over 5 having repeat tests	52	112.29	642
Cost of nursing time to perform tests	264	36	9,517
People who are diagnosed with asthma	153	290	44,347
Total cost of new diagnostic pathway			61,601
Resource impact (saving)			7,261

3.1.18 In order to implement the new diagnostic pathway there is a requirement to buy new FeNO machines.

3.1.19 We have modelled 3 scenarios as follows

- 1 FeNO machine per GP practice, 14 per 100,000 (7,454 in England)
- 5 FeNO machines per 100,000 population (2,740 in England)
- 2 FeNO machines per 100,000 population (1,096 in England)

3.1.20 The recommendations support a diagnostic hub model. As would be expected the bigger the diagnostic hub, the shorter the payback

period. The payback period per 100,000 population is set out in table 5.

Table 5 The payback period per 100,000 population for each scenario of investment in FeNO machines

	Scenario 1	Scenario 2	Scenario 3
Number of FeNO machines	14	5	2
Cost per machine	3,168	3,168	3,168
Total cost	44,352	15,840	6,336
Annual savings from new diagnostic pathway	7,261	7,261	7,261
Payback period	6.1 years	2.2 years	0.9 years

Other considerations

3.1.21 While people may not have asthma they may have another disease with treatments costs which may reduce the potential savings in the new pathway.

3.2 *Chronic asthma: management*

Recommendation 1.6.4 If asthma is uncontrolled in adults (aged 17 and over) on a low dose of inhaled corticosteroids (ICS) as maintenance therapy, offer a leukotriene receptor antagonist (LTRA) in addition to the ICS and review the response to treatment in 4 to 8 weeks.

Background

3.2.1 Currently people who are having their treatment stepped up because their asthma is not controlled with ICS alone as maintenance therapy (with short-acting beta agonists (SABAs) for symptom relief), would be offered additional treatment with a long-

acting beta agonist (LABA). LTRA treatment is added only if the asthma is not well controlled with a LABA.

- 3.2.2 The guideline recommends adding LTRA as a maintenance therapy before LABA is offered.
- 3.2.3 Currently asthma is treated with multiple inhaled drugs such as SABAs, ICSs and LABAs.
- 3.2.4 The population that are affected by this recommendation are those people with newly diagnosed asthma who do not have well controlled asthma on a low dose of ICS for maintenance treatment and a SABA for symptom relief.

Assumptions made

- 3.2.5 The committee considered clinician time needed for treatment with both LABAs and LTRAs to be the same.
- 3.2.6 The costs considered relevant for this recommendation are the costs of drugs used to treat adults with uncontrolled asthma. The exacerbations for the specific drugs are identified separately. The costs related to the diagnosis recommendation are an average of the complete cost of treatment including clinician time and exacerbations.
- 3.2.7 Table 6 shows the population assumptions used to estimate the resource impact of the guideline.

Table 6 Adult population with uncontrolled asthma with low dose ICS and SABA per 100,000 population per annum

Description	Assumption	Population
Population per 100,000		100,000
Annual incidence of asthma diagnosis	0.25%	245
Adult population with newly diagnosed asthma	78.6%	193
People with uncontrolled asthma with ICS and SABA	50%	96
Current practice treated with LABA	75%	72
Current practice treated with LTRA	25%	24
Future practice treated with LABA	25%	24
Future practice treated with LTRA	75%	72

Costs/Savings

3.2.8 The resource impact of the Asthma: diagnosis, monitoring and chronic asthma management guideline on the adult population with newly diagnosed asthma is assessed in this report and accompanying template. NHS organisations are advised to assess locally the effect on children and young people.

3.2.9 The annual cost of treatment with a LABA is £319 and the annual cost of treatment with an LTRA is £48. For people who do not adhere to treatment the annual cost is assumed to be half of these amounts.

3.2.10 The cost of non-hospitalised exacerbations is £1.45 and is estimated to be the cost of a 5-day course of prednisolone, prescribed by a GP.

3.2.11 The estimated cost of hospitalised exacerbations is around £820. This is calculated by the weighted average of national tariff 2017/18 prices for asthma without intubation (DZ15D, DZ15E and DZ15F), weighted by the activity from reference costs 2015/16 for asthma without interventions (DZ15N, DZ15P, DZ15Q and DZ15R).

3.2.12 The net saving per 100,000 population of offering an LTRA in addition to ICS, for people with newly diagnosed asthma, if it is not

Resource impact report: Asthma: diagnosis, monitoring and chronic asthma management (November 2017) 12 of 18

well controlled on a low dose of ICS for maintenance treatment and a SABA for symptom relief, is estimated to be £10,400 after 3 years as summarised in table 7 below. This is equivalent to £5.7 million for the population of England after 3 years. The saving increases each year as more people are diagnosed with asthma by around £10,400 per 100,000 population.

Table 7 Estimated savings of recommendation to offer LTRA for people who are not controlled on low does ICS and SABA for symptom relief and estimated number of people affected per 100,000 population

	Current practice	2017/18	2018/19	2019/20	2020/21	2021/22
Cost of treating people with LABA £	18,984	17,396	14,218	6,275	6,275	6,275
Cost of treating people with LTRA £	1,120	1,404	1,970	3,385	3,385	3,385
Total cost of treatment (£)	20,105	18,799	16,188	9,660	9,660	9,660
Total resource saving (£)		1,306	3,917	10,445	10,445	10,445
Number of people who receive LABA	72	66	42	24	24	24
Number of people who receive LTRA	24	30	54	72	72	72
Total number of people who are not controlled on ICS with a SABA	96	96	96	96	96	96

Benefits and savings

- 3.2.13 Savings are generated as a result of the difference in treatment cost between LABAs and LTRAs.
- 3.2.14 The savings are generated by the incident population each year. This means that there will be a cumulative effect increasing the savings year on year.

Other considerations

- 3.2.15 Decreasing maintenance treatment (recommendation 1.12), was considered by the committee to result in savings because people move to less expensive treatments and take less treatment. Organisations are advised to assess the impact of this recommendation locally.
- 3.2.16 It was considered by the committee that risk stratification (recommendation 1.13.1) would improve outcomes for people at risk of poor outcomes. This may reduce the number of exacerbations that these people have and decrease long-term treatment costs because treatment can be better individualised according to risk.

4 Resource impact over time

- 4.1 The estimated annual saving of implementing this guideline per 100,000 population based on the uptake in the resource impact assumptions is shown in table 8. As the guideline affects the incident population, annual savings from implementation are cumulative. After full implementation in 2019/20 this is around £10,400 per 100,000 population.
- 4.2 The saving is equivalent to around £5.7 million for the population of England in from 2019/20 onwards.
- 4.3 There is no resource impact in 2017/18 and a part year effect in 2018/19 for the diagnosis and monitoring recommendations because it is assumed that the establishment of diagnostic hubs and equipment procurement to deliver the service will not be completed until 2018/19.

Table 8 Estimated saving per 100,000 population of implementing the recommendations in NICE guideline Asthma: diagnosis, monitoring and chronic asthma management

	2017/18 (£)	2018/19 (£)	2019/20 (£)	2020/21 (£)	2021/22 (£)
Resource impact each year for diagnosis and monitoring	Resource impact will depend on the diagnostic model adopted locally				
Resource impact each year for chronic asthma management (saving)	1,306	3,917	10,445	10,445	10,445

5 Implications for commissioners

- 5.1 Asthma falls under programme budgeting category 11B 'Asthma'.
- 5.2 The savings from increased use of LTRAs would be in CCGs' primary care prescribing budgets.
- 5.3 The costs of implementing FeNO and other objective tests in a primary care or community care setting, and the savings from correct treatment for people with asthma and other diseases with similar presentations to asthma would be in CCG budgets.

6 Sensitivity analysis

- 6.1 There are some assumptions in the model for which no empirical evidence exists, so we cannot be as certain about them. Appropriate minimum and maximum values of variables were used in the sensitivity analysis to assess which variables have the biggest impact on the net cost or saving. This enables users to identify the significant cost drivers.
- 6.2 Appendix A is a table listing all variables modified. The key conclusions are discussed below.
- 6.3 The diagnosis and monitoring model is very sensitive to the amount of nurse time required to perform the objective tests. Reducing the time take in the model in the model to 10 minutes increases saving significantly.
- 6.4 The chronic asthma management model is very sensitive to the level of future uptake of LTRA compared to LABA uptake. An increase of 10% LTRA uptake is anticipated to increase savings by £2,200 per 100,000 population.

Appendix A. Results of sensitivity analysis

Asthma: diagnosis and monitoring

<u>Individual variable sensitivity</u>				Recurrent resource impact			Change (£)	Sensitivity ratio
	Baseline value	Minimum value	Maximum value	Baseline resource impact (£)	Minimum resource impact (£)	Maximum resource impact (£)		
Nursing time taken to perform diagnostic tests (minutes)	20.00	10.00	30.00	-16,834	-38,248	4,579	42,827	1.00
Number of FeNO machines purchased per 100,000 population	5.00	2.00	14.00	-16,834	-26,338	11,678	38,016	0.37

Chronic asthma: management

<u>Individual variable sensitivity</u>				Recurrent resource impact			Change (£000s)	Sensitivity ratio
	Baseline value	Minimum value	Maximum value	Baseline resource impact (£000s)	Minimum resource impact (£000s)	Maximum resource impact (£000s)		
People who have asthma that is not controlled on ICS alone as a maintenance therapy with SABA as a reliever	50%	40%	60%	-10,445	-8,546	-12,615	-4,069	0.62
Future practice: people offered an LTRA when ICS alone as a maintenance therapy with SABA as a reliever does not provide adequate control	75%	65%	85%	-10,445	-8,218	-12,615	-4,397	1.00

About this resource impact report

This resource impact report accompanies the NICE guideline on [Asthma: diagnosis, monitoring and chronic asthma management](#) and should be read in conjunction with it. See [terms and conditions](#) on the NICE website.

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